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Session 95PD
Current Risk-Based Capital Developments For Disability Income, Long-Term Care, And Stop Loss

Track: Health

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Summary: This session explores the issues raised and logistical problems encountered in setting risk-based capital (RBC) factors for various health products. Panelists also review in detail the applications of these basic principles in the development of surplus requirements for disability income (DI) products by a joint talk force of the Life Risk Based Capital (LRBC) and Health Organizations Risk Based Capital (HORBC) committees of the American Academy of Actuaries.

MR. BURTON D. JAY: I'm with Mutual of Omaha and United of Omaha. For most of my career, I have been the chief actuary for the Life Company of the Mutual of Omaha Companies. For the last 10 years I've been involved in all product lines at the corporate level.

This session is on RBC work that we have completed on DI, long-term care, and stop loss coverage. Our first speaker, Dennis Lauzon, is supervising actuary with the New York Insurance Department. He has 21 years of industry experience with a focus on corporate, financial, and investment management issues. He served on the Industry Advisory Committee to the Life RBC Working group that developed the original National Association of Insurance Commissioners (NAIC) life RBC formula in

1991. He also served on the Academy's Life RBC and the Health RBC Committees, and most recently chaired the work of the DI Working Group.

Mike Abroe is an equity principal with the Chicago office of Milliman U.S.A. and has been with the firm since 1985. His area of expertise is health insurance. He has assisted a variety of clients with administration, management, strategic planning, acquisitions, marketing, and pricing. Mike has advised organizations such as state insurance departments, hospitals, insurance organizations, the Blues, HMOs, and PPOs. Prior to joining Milliman in December of 1985, Mike was vice president and health actuary of Bankers Life and Casualty. At Bankers, Mike was responsible for all actuarial aspects of the Bankers individual and small group health lines of business. He joined Bankers in 1966. He's a Fellow of the Society and a member of the Academy and either a chairman or a member of a lot of different task forces and committees of the Academy and the Society.

Darrell Knapp is a partner of Ernst and Young. He has been involved with a wide variety of engagements, many of which focus on financial reporting and surplus requirements. Darrell was also a member of the original Health RBC Task Force of the Academy that developed the original formulas. That committee continues to focus on the stop-loss component of this analysis, which he will discuss later. Darrell is currently chairperson of the Academy's Health Practice Financial Reporting Committee and has worked on the "Health Reserve Guidance" manual.

The Academy's Health RBC Task Force was asked by the NAIC Health RBC Working Group and Life RBC Working Group to take a look at these three products, plus the limited benefit line of products, two or three years ago. We determined very quickly that there was no need to change the factors on the limited benefit products. They were reaffirmed within six months or a year from the original request, but work has been ongoing on disability, long-term care, and stop loss since then.

Dennis will spend time going through the work that his committee did to develop the new disability factors. It looks like they will be implemented by the NAIC this year for the life RBC formula, and probably next year for the health RBC formula. If we can complete our recommendations on stop loss and long-term care (LTC), they also may have an opportunity for the life formula this year and, hopefully, for the health RBC formula next year.

MR. DENNIS LAUZON: I'm going to talk about the work done by the DI Working Group. A detailed report on this work is available on the Academy's Web site. The DI model is also available from the Academy.

I will cover the basic approach the working group took to analyzing DI, review the recommendations, compare the recommendations to the current requirements, and provide some sensitivity analysis of the recommendations to the assumptions underlying the analysis.

I want to talk about the 1991 work that was the basis for the original DI factors in the current formula. The current working group had hoped, at least initially, they could just look at some of the prior work, update it, and finish in a short time. Instead, a fresh analysis was needed which took three years. The report on the 1991 recommendations was 100 pages, but there were only two pages devoted to DI. Those pages noted that the DI recommendations were based on judgment, composite formulas, and a review of other risk models. The working group could not conclude from the report that the DI factors were still appropriate.

In 1994, there was a review of RBC requirements for health companies, which included a review of DI. The 1994 review used one model with specific assumptions. There was good documentation of both the model and the process that was followed in 1994. While the 1994 model produced reasonable results for the other health lines, it didn't produce reasonable results for DI. For example, with reasonable profit assumptions, the 1994 model indicated little or no capital was required for DI products. Another problem with the 1994 model was that it produced higher RBC requirements for guaranteed renewable products than it did for noncancellable products. The DI working group did not use the 1994 model. However, they did take a lot from the approach used in 1994. They applied this approach using a simpler model where the dynamics were more transparent.

The basic approach of most RBC analysis is to use Monte Carlo techniques to translate volatility into an RBC requirement. One of the first things to determine using this approach is what kind of population model should be used. Should it be a stationary population, a closed block, or an open block?

The working group decided on a stationary population for three reasons. First, a stationary population would be consistent with the work done in 1994, which is the basis for the current health factors. Second, a stationary population would be a lot closer to the populations from which historic data would be taken to help set model assumptions. Finally, and probably most importantly, it is a lot easier to model a stationary population than a closed block.

Another consideration in a Monte Carlo analysis is determining how to segment risk. Hopefully, the variations among risk segments do not require an alternate model, but only a change in assumptions for the same model. The working group decided on six product segments. There were noncancellable and guaranteed renewable products on the individual side which included group short-term disability (STD), group long-term disability (LTD), monthly outstanding balance (MOB) credit, and single premium credit. The working group also tested small size blocks and large size blocks.

The working group tested for an aggregate requirement and separately tested a requirement for disabled lives only. The aggregate requirement, for both active and disabled lives, was the main focus of their effort. The aggregate analysis was based

on percentages of premium assumptions. The RBC requirement that came out of the aggregate analysis was a percentage of premium number. The testing of disabled lives resulted in a claim reserve factor. The premium equivalent of the claim reserve factor was subtracted from the aggregate premium requirement to get a premium factor to be used along with the claim reserve factor.

The working group looked at volatility as a change in an actual loss ratio from an expected loss ratio. Volatility was not the difference between two actual loss ratios, it was a variation from an expected loss ratio. I'll explain how the expected loss ratio was calculated shortly.

The standard deviation of the historic random deviations of actual loss ratios from expected loss ratios showed a definite decrease for larger size blocks. This is what you would expect to see. But another important characteristic of the historic differences between actual loss ratios and expected loss ratios was negative serial correlation. For example, if one deviation was positive, the next one tended to be negative, and vice versa. Negative serial correlation did not appear to depend on block size.

Table 1

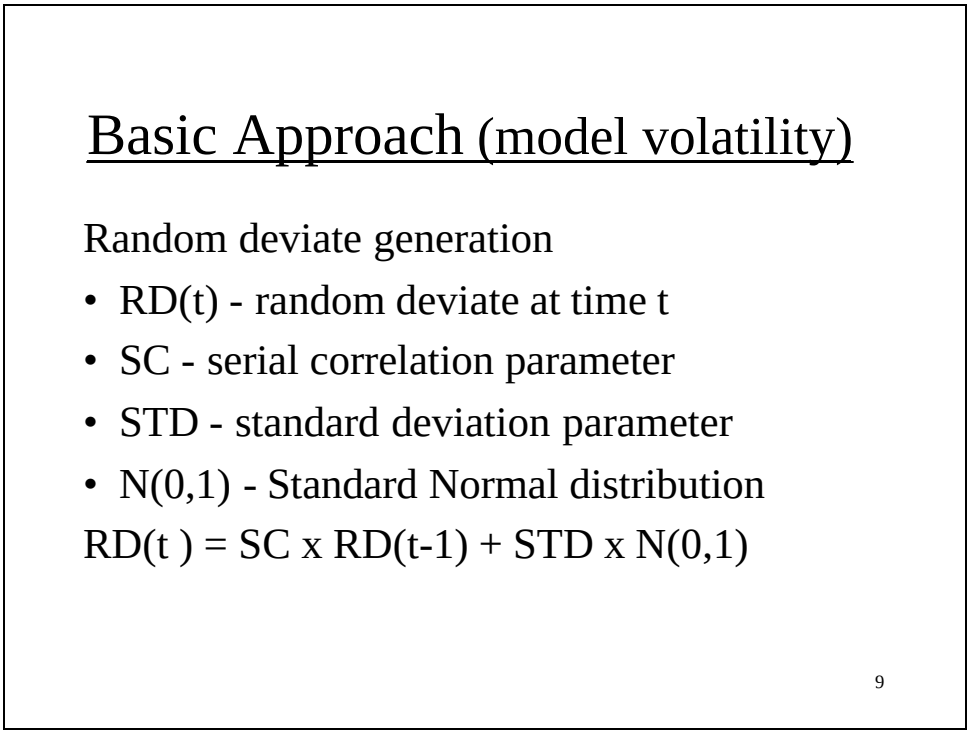
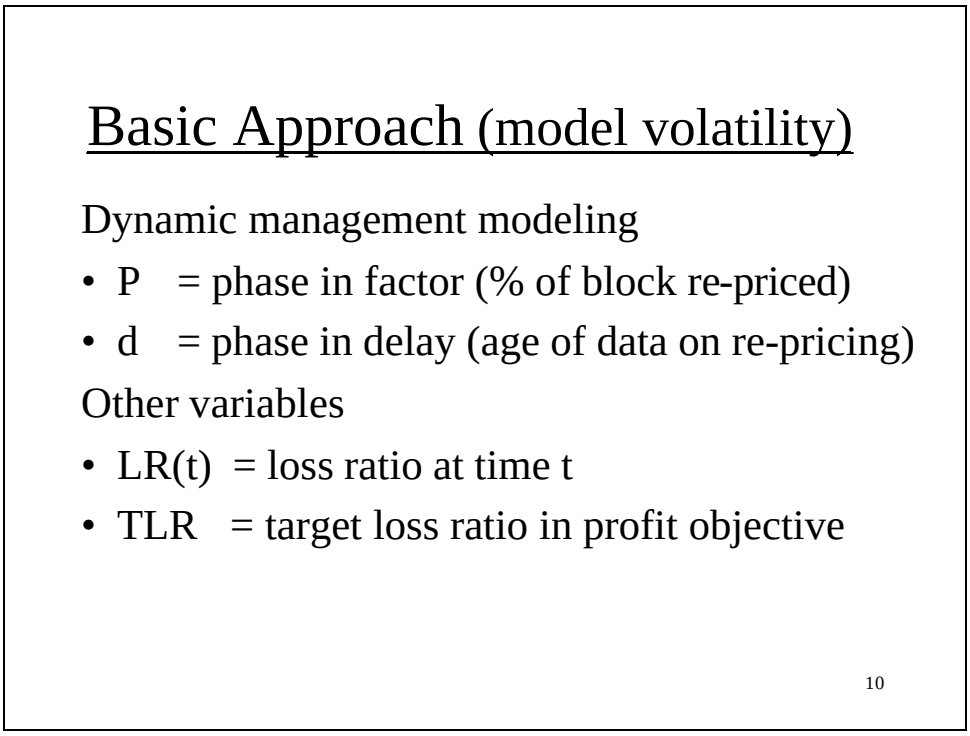


Table 1 shows the way the working group modeled random deviation at time (RD(*t*)) was as a serial correlation factor multiplied by the prior deviation, plus a noise term based on the standard deviation observed in the historic data.

Table 2



Expected loss ratios depended on assumptions about the pricing process and how it is managed. These assumptions were called management dynamics (Table 2). One key management dynamic is the phase-in factor. This is the percentage of a block of business in a stationary population that can be repriced each year. For a business such as individual noncancellable in a stationary population, the only business repriced is the business that has lapsed or matured. For noncancellable, a phase-in factor of eight percent was assumed. For a product segment such as group LTD where some of the in force can be repriced each year, a much larger phase-in factor is appropriate.

A second key management dynamic was the phase-in delay. The phase-in delay is the amount of time between the start of a change in loss ratio experience and when new business is being priced, based on an understanding of the change.

Table 3

Basic Approach (model volatility)

Loss ratio modeling

- Experience base: LR(t-d)
- Premium adjustment: LR(t-d)/TLR
- New premium as a percent of prior year

  NP = (1-P) + P x LR(t-d)/TLR
- LR(t) = LR(t-1)/NP + RD(t)

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When looking at repricing, (Table 3) the experience base on a delay (*d*) is going to be based on the loss ratio of time (*t*) minus *d* periods. That is the experience base for repricing. Now, the assumed adjustment in premium needed is the experienced-base loss ratio multiplied by (*t-d*), divided by the target loss ratio in pricing to achieve the profit objective (TLR). For example, if the experience base loss ratio is twice the target loss ratio, the premium adjustment is two. That is, premiums have to be multiplied by two to produce the target loss ratio given the experience losses. At any point in time the new premium in this stationary block of business depends on the phase-in delay and the loss ratio experience *d* periods ago.

The percent of premium that can be repriced in a period, which is based on the phase-in factor, gets multiplied by this premium adjustment factor to bring the expected loss ratio in line with the target loss ratio. However, the premium that can't be repriced is unchanged. The expected loss ratio in the next period is the loss ratio in the prior period (LRT (*t-1*)) divided by the new premium amount based on repricing a certain percentage of the stationary block of business. To get an actual loss ratio for the period, a random deviation is added to this expected loss ratio. This was the working group's model for loss ratios. It's fairly simple and straightforward. In practice, the process is more complicated in terms of the experience being reviewed and the adjustment process, but this gives a first approximation to the actual process.

Table 4

DI model sample

TLR=60% d=2 years, P=25%

Year	New Premium %	Expected LR	Random Deviate	Actual LR
1		60%	5%	65%
2	100%	65%	7%	72%
3	102%[1]	70.5[2]	-16.5%	54%
4	105%	51.4	.6%	52%
5	97.5%	53.3	13.7%	67%

1) 102=.25x65/60+.75 2) 70.5=72/102

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Consider a simple example (Table 4) with a target loss ratio of 60 percent, a two-year delay, and a phase-in factor of 25 percent. In the first year, a random deviation of five percent occurs. The actual loss ratio is then 65 percent. In the second year, with a two-year delay, we haven't repriced for the 65 percent loss ratio in year one. So, our expected loss ratio is unchanged from actual experience. In year two we have a random deviation of seven percent. The actual loss ratio is now up to 72 percent. In year three, we are two years out from the first bad experience and we reprice for the 65 percent experience in the first year. The repricing is built into the 25 percent of premium that gets phased in. (The new premium is calculated as 102 percent of the prior premiums. Twenty-five percent of the premium gets adjusted to correct the 65 percent loss ratio back to 60 percent and the other 75 percent of the premium is unchanged.) Now our expected loss ratio in year three is the loss ratio that was occurring, 72 percent, divided by the new premium, 102 percent.

Now it's interesting to consider what's going to happen in the sixth year. Repricing will be looking at experience in year four, 52 percent, which is below target and premiums will be cut. But, as it turns out, because of the poor experience in year five, premiums will be cut in year six when experience is actually worse than expected.

Volatility has to be put in a financial context to develop RBC. The 1994 report noted that RBC should recognize the need of a product to have a profit level adequate to attract the capital needed for the product. It also noted RBC should consider the viability of a product. The working group addressed adequate profitability by fixing the return on equity (ROE) assumption in the model. As different levels of RBC were tested, the profit as a percentage of premium was adjusted to maintain the target ROE. With ROE fixed, something else has to give to keep revenue balanced with outgo as the various capital levels were tested. The basic balancing item was the expense margin. There also was a small adjustment in investment income. While the RBC recommendations had a fixed ROE, the viability of the product will depend on whether or not the resulting expense margin can be achieved. In ROE, capital was defined as RBC plus statutory strain. So assumptions were needed on the level of statutory strain as a percent of premium.

Other model assumptions included a tax rate and a net investment income rate. The aggregate model also had what I would call general assumptions, which are not specific to the DI analysis. These include items like the percent of ruin that is targeted. I'll address these general assumptions in more detail shortly.

Table 5

DI model sample

All items as a percent of premium

Year	Profit Margin	Actual LR	Target LR	Tax	Dividend	EOY Surplus
0	5%					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

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The sample (Table 5) has a product that has a profit margin of five percent and a target loss ratio of 60 percent. The beginning surplus is 20 percent of premium. In

the first year there is a five percent deviation that is just covered by the profit margin, so there are no earnings, taxes, or dividends. The 20 percent starting surplus is unchanged. In year two, a 12 percent deviation from the expected loss ratio eats through the five percent margin and causes a seven percent loss. The model assumes losses are fully tax effective, so there is a $2 savings from taxes on the $7 loss. The net of $5 comes out of surplus, which is decreased from $20 to $15.

In year three, a favorable deviation results in an actual loss ratio six percent below the target. The total pre-tax earnings is 11 percent—the five percent built into the margins, plus the six percent deviation. Of the $11 pre-tax profit, $4 is paid in taxes leaving $7 net. The model uses $5 to bring the surplus back up to the testing level and the other $2 is a dividend.

The model can run one of two ways. It can cap surplus at the level being tested, as in this example, or it can accumulate the surplus. The working group's recommendations are based on capping the surplus, but most prior RBC work that I'm aware of accumulates the surplus. The working group felt capping was appropriate when the capital level is meant to be adequate for ongoing operations. The working group's analysis of claim reserves was not in depth, but just enough to confirm that the five percent recommended in 1991 and in 1994 was not unreasonable. For individual noncancellable business, after the premium requirement of the aggregate analysis is reduced by the premium equivalent of the claim reserve requirement, the premium factors were within one percent of the current factors. Therefore, the working group left these factors the same.

When guaranteed renewable business for premium amounts of $50 million or less were analyzed, the results were similar to the current factors so no change was recommended. For premium amounts above $50 million, the recommendation is seven percent versus the current 15 percent. In general, the working group's analysis found a much steeper decline in requirements by block size than in the current factors. The relationship of the proposed recommendations seems more intuitive.

The current factors reflect a difference by block size for both noncancellable and guaranteed renewable—the factor drops for amounts over $50 million for both. Comparing the two current factors for the first $50 million, there is a difference that reflects the additional flexibility on premiums in guaranteed renewable business. But the current formula does not reflect any benefit for the flexibility in premium for amounts over $50 million. In the current formula, $50 million of noncancellable premium and $150 million of guaranteed renewable premium has the same RBC as $200 million of noncancellable. There is no recognition of the premium flexibility above $50 million in guaranteed renewable business. This makes the relationship among the proposed factors more intuitive.

The two individual lines were grouped together in applying the higher factor to the first $50 million of premium.

The other four segments—monthly outstanding balance credit, group LTD, single premium credit, and group STD are grouped together for the purpose of applying a higher factor to the first $50 million of premium. There was some question as to whether the credit lines should be aggregated with the group lines. The working group decided not to change the current grouping. Of these four segments, the monthly outstanding balance credit had the highest factor at 20 percent for the first $50 million of premium. Again, there is a steep drop in factors for premium over $50 million.

Group LTD has a 15 percent recommendation of the first $50 million, which is significantly lower than the current 25 percent. The three percent on amounts over $50 million is much lower than the current 15 percent. No specific model or assumptions underlie the current proposal, so it's difficult to say why the recommended factors are so much lower than the current. One thing to note is that claim reserves may vary by block size, as is indicated in the current Canadian formula. A lower claim reserve factor for larger size claim blocks would not change the result of the aggregate model.

Because of the way the claim reserve requirement was subtracted from the aggregate requirement, if the five percent claim reserve requirement were overstated for a large block, then the premium factor would be understated. The claim reserve requirement did not change the overall requirement—it just changed how the aggregate requirement was allocated between claim reserves and premiums. For group LTD, claim reserves were assumed to be three times the premiums. Thus, if the claim reserve factor were one or two percent less, the premium factor would be three or six percent higher.

There is a potential change in accounting for single premium credit from an unearned premium reserve to an active life reserve. The working group made a recommendation that would apply if that accounting change were made. Group STD had the lowest factors. STD was defined as two years or less.

Next, I will go over some of the general assumptions and talk about how sensitive the RBC analysis was to those assumptions. We've already talked about the choice of population and why a stationary population was chosen. To develop a sensitivity analysis for this assumption would require building a new model, so sensitivity was not tested. However, with the claim reserve analysis, a much simpler model was used and it was designed for both a closed block and a stationary population. That model showed the requirement for a stationary claim reserve block tested over a five-year time horizon was very close to that for a closed block tested over 50 years. So for one case, stationary population over five years was equivalent to a closed block over 50 years.

Another general assumption is the years of seasoning. If the analysis is started without any seasoning and the target loss ratio was 60 percent, then the in-force block of business would always start off at 60 percent. By having a certain amount of seasoning, the starting in-force will be distributed around that 60 percent target loss ratio. Three years of seasoning was used. In the 1994 analysis two years was used.

Another general assumption is the length of the testing period. Five years were used to be consistent with the 1994 analysis underlying other health factors.

A third general assumption is the target probability of ruin: five percent was used, which is the general assumption across most RBC testing. The thinking is that a five percent ruin target at this level of risk segmentation will result in a one or two percent ruin probability at the enterprise level.

As already mentioned, surplus was capped so it never exceeded the testing level. Another general question is on the need for reserve strengthening. The recommendations do not make any provision for reserve strengthening. The working group did not think it would be consistent with what underlies most, if not all, prior RBC work. However, the working group did do some sensitivity analysis on what the impact would have been if reserve strengthening were done at the end of a testing period.

Let's consider how sensitive results were to these assumptions. If the three-year seasoning period is changed to a four-year seasoning period, the starting in-force is slightly more dispersed around the target loss ratio. The individual noncancellable segment had the largest increase, an eight percent increase in modeled requirements. In general, individual noncancellable tended to be more sensitive to some of the assumptions than the other segments because of the low phase-in factor. It only repriced eight percent of the in-force premium per year.

The other product segment that was more sensitive to assumption changes was the single premium credit segment. This product segment had the highest ratio of profit margin as a percent of premium to RBC. For single premium credit, relatively more of the defense against ruin is provided by the profit margin than by capital. If you think of the profit as a deductible, capital attaches at a higher stop loss level in this particular product so it tends to be more sensitive to some of the sensitivity analysis.

Changing the testing horizon from five years to six years results in a 10 to 15 percent increase in required capital levels. Five years was chosen as being consistent with the 1994 result. I don't see five years as being a better choice than four years or six years .

If it was a four percent ruin instead of five percent, it would increase RBC about 10 percent.

The result of capping surplus is a little surprising. I didn't think it would have much of an impact. The recommendations are based on capping surplus. Without a cap, the required surplus levels would have been significantly lower. For single premium credit, it would have been 80 percent lower, probably because the profit margin is large relative to the capital requirements.

Reserve strengthening was looked at in two ways. It is based on strengthening reserves at the beginning and end of the five-year testing period. Reserve strengthening was based on the excess of the current loss ratio over the sum of the target loss ratio and the pricing margin. If the current loss ratio exceeded both of them, additional reserves were set up. The amount of additional reserves depended on the phase-in factor, which determines how long that excess losses would last and the discount rate. For some of these lines, the reserve strengthening at the end of the testing period would have increased the required capital significantly. Strengthening reserves every year during the testing period, instead of just at the beginning and end, was also examined. That results in somewhat higher requirements.

Next we considered assumptions specific to the DI testing. First, we have standard deviations for the large blocks. Standard deviations for the small block were higher. Another DI specific assumption was the serial correlation factors. Serial correlation assumptions did not vary by block size. The serial correlation in the historic deviations by block size didn't seem to be correlated. Very little data was available for the guaranteed renewable segment. Because the data that was available was not inconsistent with the noncancellable data, the same factors for standard deviation and serial correlation were used for both segments.

I am not a credit expert, but a one-year delay is fast. The credit experts on the working group thought one year was a good amount of time for the delay on reflecting loss ratio changes into new premium. Credit segments either react fast to the environment or get more information that allows a quicker recognition of trends. Finally, the phase-in factors had a large range. The highest phase-in factor was for group STD.

We now turn to the sensitivity of the recommendations to changes in these assumptions. At 110 percent of the assumed standard deviation, RBC increases on average about 15 percent; more for some lines than others. Taking 90 percent of the negative serial correlation, a reduction in negative serial correlation increases factors about five percent. The largest impact is on group STD, which had the largest serial correlation.

The next step was interesting and a little surprising to me. It reveals the results of adding a half-year to the phase-in delay assumptions. It increases capital requirements about 20 percent, so time is money. If you ever need to do a cost-benefit analysis for some information improvements, at least there's something that indicates a half-year improvement in information that can reduce your capital about 20 percent.

The next sensitivity analysis was also surprising in that it didn't have a very big impact. When 90 percent of the assumed phase-in factors were tested, no significant changes resulted.

Data on the impact of the recommendations was prepared for the NAIC. Thirty-five companies respond to a survey. The companies represent $7 billion of disability premium and $22 billion of reserves. The companies calculated their action level RBC on the current formula and on the proposed formula. There was only a small change—$16.8 billion to $15.4 billion. In the aggregate, the action level RBC recommendations were 97.6 percent of the current amount. At the company level, the largest change for a company was a little more than a 25 percent reduction in the company action level RBC.

This information can be misleading because, for large companies with very little DI business, you wouldn't expect the company's action level RBC to change very much. So the impact of weighting company changes by the amount of DI premium was also examined. In this case, the mean recommended company action level RBC to the current company action RBC of the 35 companies is 88.1 percent. The standard deviation is 10.6 percent, though the maximum change would have been a little more than a 25 percent reduction in the company action level RBC.

Obviously, there is a significant amount of judgment that went into these assumptions, so the working group thought it was important to show the sensitivity of the recommendations to the various assumptions. As already mentioned, not a lot of work was not done on claim reserves, just enough to verify that the five percent was not unreasonable. That's certainly an area that could be looked at in the future.

One of the items recommended for future study is the consideration of continuous formulas by size instead of looking at a two tier formula for the first $50 million of premium and for amounts over $50 million. The working group's recommendations, by request of the NAIC, were forced to fit into the current structure, except for the changes made to add group STD and the credit lines. But you could have a continuous formula.

The working group measured the standard deviation and the serial correlation by assuming the noise term was a normal distribution. It might be useful to take a

harder look at that assumption which ignores the fact that there is good volatility and bad volatility.

The working group pointed out that loss ratio volatility seemed highly correlated with premium volatility. Maybe some of the loss ratio volatility has to do with the underlying statutory accounting.

The working group was of the opinion that none of the recommended factors were unreasonable given the basic assumptions used for the testing.

MR. MICHAEL ABROE: I'm going to talk about current RBC developments for LTC. The very short answer is we've done nowhere near the amount of work that's been done on the DI business. I'm going to give a little bit of a background that will give a flavor for why we are where we are on LTC. Then, I'll concentrate more on what are we currently doing and where we are going. Many of the comments that I make will be in relation to what was presented on DI, because basically, we're piggybacking off of the modeling that is being used on DI. We plan on populating it with assumptions, phase-in factors, etc., consistent with what we think should be used for LTC.

Let me get into the background of what the LTC market is like. We'd have to say that it really is an immature market and that has many implications—primarily the lack of credible data. It was mentioned before that there was a 1991 and a 1994 study on DI. In 1991 and 1994, LTC was looked at, but it was concluded that credible models couldn't actually be developed. The result of that was to piggyback on top of the DI factors and use those for LTC. That's basically where we are right now.

The market has also been characterized with a lot of product changes, rapid growth, considerable state and federal regulatory actions, and laws. The laws, such as the Health Insurance Portability and Accountability Act (HIPAA) in 1996, are having an impact on the types of benefits or product designs that are being primarily sold today. There also has been quite a bit of variability of success in this particular business segment by the companies and different approaches that companies have used. Some companies have increased rates rather significantly over the years. Other insurers have never implemented rate increases. There's been movement of insurers in and out of the marketplace.

In addition to that, the top eight to ten insurers dominate the marketplace. You're talking about as much as 90 percent of the total business under management right now, being with the top 10 insurers in the marketplace. Certainly, if you would group the insurers into company groupings or common ownership, it would be even larger than that.

The one thing to note is that today's product is dominated by what's called the "pool of money" approach—tax qualified-type products that provide comprehensive nursing home and home health care coverage. Products that were issued 10 years ago would have primarily been nursing home only or more limited benefit-type products. There's been a significant shift in the types of products that have been sold over the years, which obviously has an impact on how to use historical data in coming up with RBC requirements.

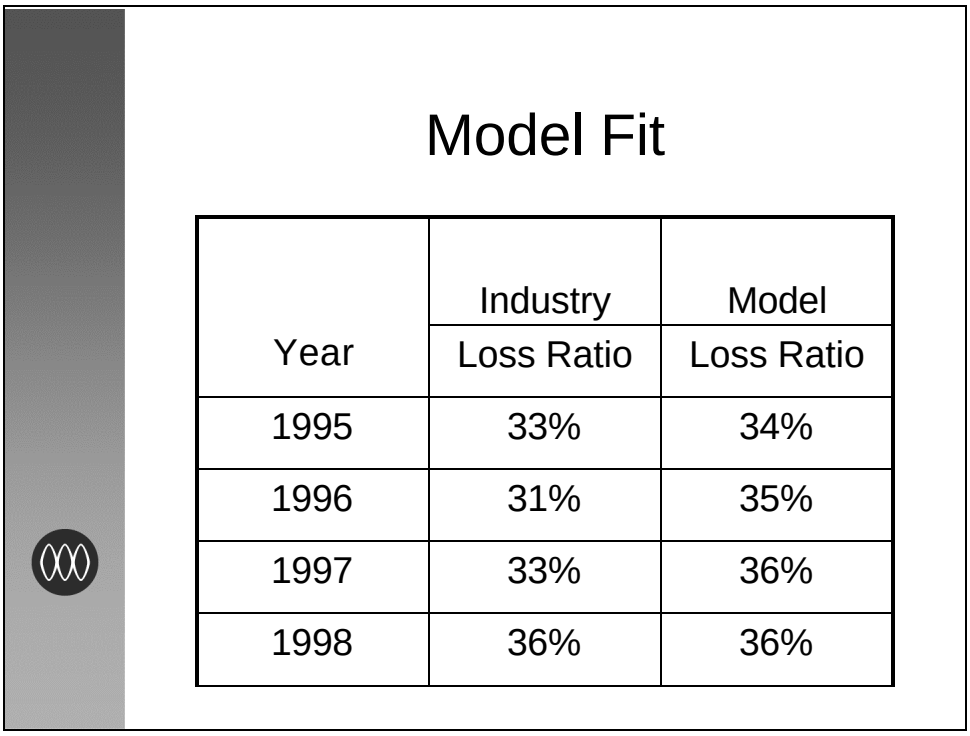
As I mentioned before, the results of prior RBC efforts were not credible and basically, we relied on the DI factors. We've been working on this for about two and a half years. I think we are probably following the 80/20 rule, where we have 80 percent of the work done and we are 20 percent toward our goal.

We went through a similar process that was explained by Dennis and that is to determine the appropriate type of model to use. We know that DI is based on a stationary population. That is where we were going initially. Then, we gradually came to the conclusion that we needed to work on an open block approach type of a model and one that actually reflects the growth in the industry. The fact is the loss ratios that are being experienced today are still in larger, earlier duration business and it's not a mature block by any means. As I mentioned, the shift in the product mix has had some significant impacts on the types of loss ratios that one would expect.

The result is that we constructed an initial model that would allow us to try to project what we think the future experience is going to be in LTC. Then we set our assumptions based upon what we think the future is likely to be rather than where the last six years of experience has been.

To do that, we set growth assumptions at 10 percent annual growth for 2006 and five percent thereafter. We didn't think that was unduly aggressive. We thought that was reasonable. It might even be a little bit less than what the company may experience. It's certainly less if there is some enabling LTC legislation in terms of tax deductibility and so on. We also modeled this so that we would have older designed products sold through 1997 and the newer designed products sold since 1996 with a phase-in period. Once we built that model, we wanted to do a variance that basically stated there would be no growth for 2002 and beyond. We figured that would probably be a worst case scenario with business still being issued each year, but it would be at the current sales level or it wouldn't increase thereafter.

Table 6



Model Fit

Year	Industry Loss Ratio	Model Loss Ratio
1995	33%	34%
1996	31%	35%
1997	33%	36%
1998	36%	36%

The emerging industry experience is developed from the annual LTC reports which the NAIC publishes each year. That report just came out recently. This is a very immature block of business (Table 6). We're still talking loss ratios in the low range of 31-35 percent, and 36 percent in 1998. We still have a long way to go when you consider that many of these products are priced for 60-65 percent or even higher percentage loss ratios over the lifetime of the business. In addition, with the way this data is presented, there's a lot of paid claims data in there without the full discounting back to the accrual date as you would have with some types of a lifetime loss ratio calculation. It's even further away from 60-65 percent lifetime loss ratio than the data showed.

Table 7

Model Loss Ratios

Year	Loss Ratio Base Scenario	Loss Ratio Zero Growth Variance
1999-2003	35% - 38%	35% - 39%
2004-2008	40% - 49%	41% - 53%
2009-2013	51% - 59%	56% - 67%

In terms of what this model is producing as to expected loss ratios going forward, there is very little change in the period from 1999 to 2003 (Table 7). There is a slight one percent increase. When you get out to the next five-year period you're talking about somewhere between one to four percent change in what we expect a loss ratio to be. And in the five-year period following that, we're talking a five to eight percent difference. But, we're still talking about loss ratios that are significantly lower than what we would expect in a stable population scenario. Again, when we were originally using the stable population scenario and looking at what statutory reported-type claims would be under that type of scenario, you are talking 75-85 percent reported loss ratios. These would be paid claims, plus a change in an interest discounted claim liability. It's not the same thing as a lifetime loss ratio for pricing purposes.

We sent out a survey in April 2001 to assist us in developing our assumptions and run them through the model. Primarily, the types of assumptions that Dennis was talking about that were asked in the survey include the amount of time that one would take to understand they're starting to get deteriorating experience, how much of a timeframe there would be, the speed of rewriting the various blocks that companies may or may not take, target profit objectives, and average investment return. Common sense tells us that, because of the nature of this type of business, we're probably talking about longer periods of time to recognize deteriorating experience to implement rate increases than would be in guaranteed renewable DI.

It wouldn't necessarily be longer than what a noncancellable DI would be, but again, those are all part of the assumptions that we're testing out and modeling and doing variance analyses on now.

In terms of the current status of this survey, the initial results are in. The Academy staff is in the process of compiling these results. We've got a first cut of their summary of the results, which we are looking at and we'll probably ask them to call several companies get clarification of some of the answers in order for us to properly interpret what they're saying. The results are not that far away from what we had expected the numbers to be, because again, most of the people on the RBC task force work in the business. We wanted to make sure that we got the full recognition of how the industry is going.

Now we will discuss source data. We really have one primary source that we're using—the annual NAIC LTC form filings. The variances that we're using are based upon analysis of 1995-98 loss ratios and that's actually a little bit of a misnomer. It's actually the relationship of the actual to the expected loss ratios that we're calculating the variances off of. The 1999 results just came out. I'm not sure if our committee is going to update for 1999 results or not. I think that's still an open question in terms of what we're going to do because that would set us back a month or so in terms of getting the work product out.

Similar to what was done on DI, we've looked at the variances categorized by size of company. But because of the nature of this business, we've really lumped everything together in terms of group and individual business. Renewability periods are really guaranteed renewable or collectively renewable. We're just lumping everything together and considering it to be guaranteed renewable. We're not making any difference in historical product mix, although that's a possibility if we run into some issues that might come up in our testing. The point that we need to make is that these loss ratios do reflect growth in business. Since they are 1995-98 loss ratios they represent that past history of the 30 percent loss ratios.

We have to complete our modeling. We have to come up with our final recommendations in terms of what we expect to do. We've got several issues that we haven't addressed yet, such as limited pay policies or new benefits such as survivorship benefits that aren't really reflected in historical data. We have certain issues like that we have to handle. In terms of timing, I think this is optimistic. But what we're hoping to do is get a work product to the Academy by the end of the third quarter of 2001 for internal review purposes. The idea then is that final report coming out from the Academy would be sent out in time for the 2001 winter annual meeting.

MR. DARRELL KNAPP: My goal is to update you on the status of the stop-loss effort and provide a little bit of a historical context in terms of where we've come

from with RBC stop loss. Before we can really talk about RBC on stop loss, we need to consider some of the unique features of stop-loss insurance.

First of all, there are two distinctly different stop-loss products—aggregate and specific. Aggregate stop loss is typically going to be low premium, high-risk business with a fairly low target loss-ratio. Most of the carriers I talk to that really do a lot of aggregate stop loss basically say that the plan is that you don't ever have an aggregate claim. Any claim at all is generally a problem either in underwriting or in really adverse experience.

Alternatively, when you have significant changes in overall trends, like what's happened in 1998 and 1999, the aggregate stop-loss really goes bad in a hurry and there are significant losses.

Specific stop loss, on the other hand, is higher premium and a higher target loss ratio. It's also important to consider the interrelationship—the risk associated between the aggregate and the specific. If you have a specific stop loss plus an aggregate, it significantly dampens the impact of the aggregate compared to not having the specific. There are a lot of interworkings, as well as two very different coverages, with respect to stop loss.

There are also varying levels of attachment points. For example, the varying levels of attachment points impact the premiums more than the risk. To the extent that you attach at $25,000 versus $100,000, our modeling did not demonstrate significant changes in the underlying risk. But there is a large impact on the premiums. However, you really need to consider the relative impact of the risk related to the premium.

When we look at an aggregate alternative, a great example is a 100 percent aggregate stop-loss product (which we see from time-to-time) that has nearly all the risk of a fully insured medical product with a fraction of the premium. When we try to turn it into a capital formula that states the required capital as a percent of premium, it's important that we have the stop-loss flow in with the other products that are around that stop loss.

It's also important to recognize that to the extent this formula is adopted, it's also going to be the formula that's used for a company primarily assuming reinsurance in a life and health insurance company. Any formula changes have a potentially big impact on that industry as well.

When we started with a request from the NAIC to come up with a health organization RBC formula, they requested the best formula that accurately reflects all of the risks. That's a dangerous thing to say to a group of actuaries. Given all the complications between the variance of the two different products and the interrelationships between the products, we ended up developing an array of

factors that varied by the specific level and the attachment level—kind of like a matrix. We had different matrices depending on where the attachment level was set as a percent of expected claims and we wanted to try to get beyond medical into other products. For example, for DI we had a separate factor based on the benefit period as opposed to an absolute level. All of it was pretty complicated.

The factors that were developed were largely based on an analysis of claims distributions in relationship to fully insured. We really didn't try get data specific to stop loss (to the extent we tried to get such data, we didn't find much available). We tried to model off of a fully insured plan at an assumed level of risk and factored stop loss onto it by considering how the risk changes in comparison to the premium change. This developed a stop-loss factor. Needless to say, when we submitted the matrices to the NAIC, they indicated it was way too complex and thought nobody could possibly understand them (which was probably true because, of the small group of us that were really actively working on it, I think only about half of us understood it).

We then moved into the stage of revising the original proposal, and the NAIC reduced the scope from health organization RBC to managed care organizations. Their first reduction was to take it all the way down to only HMOs and then they brought back in the Blue plans and the organizations filing the white blanks. When they made this scope reduction, we noted that we weren't very comfortable with the stop-loss results and that HMOs don't have much stop-loss risk so the stop-loss risk was combined with other medical and health organizations RBC moved on.

As such, the life and health formula did not change treatment of stop loss and the health formula had stop loss fall into other medical coverages due to materiality. When the NAIC rolled the white blanks back into the managed care organizations' RBC formula, it brought in some of the BlueCross BlueShield plans that really did legitimately had a fair size block of stop-loss insurance. However, this solution seemed so elegant that the NAIC did not consider it at the time. The NAIC ended up adopting a formula that was consistent with the existing life and health formula for the life side and that had the stop loss roll into the other coverages on the health side.

A couple of years ago the whole issue came up again. The NAIC requested that we go back and take a more in-depth look at the stop-loss formula. We reviewed the prior analysis and, not surprisingly, found that the analysis that was done was not really specific to stop loss. We solicited company experience on a wide cross section of underwriters and tried to get stop-loss experience that spanned the entire underwriting cycle. If we would have looked only at the experience in the late 1990s, we would have found only losses in stop loss. From 1996-1999, we would have found pretty heavy losses in stop-loss insurance. For about the eight years before that, we would have found only pretty good financial results. Therefore, we

needed to span the entire cycle. We focused almost exclusively on medical stop loss to try to make the task more achievable.

We performed a number of initial analytical runs. Our choice of modeling was to go back to the model that was used in the initial health organization RBC effort and update the population for the variance in the product and update some of the assumptions, but not to create a new model. As a result of that model, we found some apparent inconsistencies from the prior analysis. Given the prior methodology, finding inconsistencies probably shouldn't have been unanticipated.

We are generally finding a higher level of RBC than what's currently in the life and health formula and what is currently in what was recommended in the original health organizations' RBC formula. As such, we're trying to reconcile those inconsistencies. We are going to modify the DI model that Dennis described and see if we find any different results using a different model.

We will then go forward and develop a recommendation, trying to have the report back to the Academy sometime late this fall with an anticipation of delivering something to the NAIC in December 2001. I think we're less optimistic about the timing of NAIC implementation given that if I had to stand here and say what our recommendation is going to be, it probably would be a fairly significant increase in the liabilities. We would expect that the NAIC will want to expose any change for a while with the magnitude of increase that may occur. This likely means there will be no change with respect to stop-loss factors until at least 2002.

MR. JASON T. KLAWONN: (Northwestern Mutual) My question is for you, Dennis. Specifically, with DI, but may touch on the other products to the extent you piggyback off of the DI work. You mentioned the five-year horizon and the nicety that it matched up well with the prior efforts. But was there a concern given the fact that the experience with the DI industry for more than a decade now has been less than desirable. I'd like hear your reaction to that.

MR. LAUZON: When you look at the five-year testing horizon for a product segment like noncancellable, which probably has a liability duration of five to seven years, and you look at a group STD product, which might have a duration of a half a year, it is hard to reconcile that the same time horizon fits both products. But it is the same horizon that's underlying all the work in 1994. We did do a sensitivity analysis on a different time horizon.

The other point I would make on claim reserves is that the five-year time horizon on a stationary block was equivalent to a 50-year runoff of a closed block. I guess the kind of population should also come into play as you start to reflect about an appropriate time horizon. You made need to question whether or not the stationary block is appropriate, and somehow, if the time horizon and population type are connected.

MR. JAY: Another thought that I had on that, too, is what we're really testing is that the RBC is a function of the variability. If the experience was uniformly bad, we would assume that that's a pricing problem and not a capital problem. What we're really trying to allow for is unexpected changes from the expected value.

MR. CHARLES H. MEINTEL: (John Hewitt & Associates Inc.) Dennis, as a state regulator, would the statutory capital requirements, for example, in group LTD be lowered as well, recognizing that at least a significant portion of the RBC piece was lowered? For example, typically, the statutory capital is 1.5 to 2 times the RBC. If you lower the RBC level, would you have the same kind of drop in statutory capital?

MR. LAUZON: I think the reason that it's 1.5 to 2 times the NAIC RBC level is a management decision based in part on rating agency credit ratings. So it may depend on the rating agency's reactions. Would they look at this analysis? If they do, do they find it credible? Now it's certainly possible that they could take this analysis and instead of plugging in our volatility and serial correlation, they could take an individual company's factors. What volatility did that company show over the last 10-15 years? You will find that while we have recommended requirements that represent the ruin probability of five percent, that is for an average company. For a lot of companies to have ruin at five percent, they would need 10 times the recommended capital requirements. Other companies would need $1/10^{th}$ of the recommended capital to have ruin at five percent. I would think that how much capital a company actually holds might depend on how the rating agencies view their specific risk and whether they make any adjustments in the way they look at things.

MR. JAY: Did your question relate to what we call the target surplus or the amount of required surplus that management deems is the appropriate amount for that company?

MR. MEINTEL: Will this process give capital relief on the pricing front? For the same amount of margin, if you have less equity, the equivalent ROE would be that much higher. You either fix the numerator or you fix the denominator.

MR. JAY: If I understand your question, that's a management decision. They can actually require for themselves whatever level of capital they want. The opinion of the rating agencies is a factor, but I think in general, companies tend to hold about 230-240 of the company action RBC. I would expect if we make some changes in the NAIC, most managements will choose to still keep the same factor.

PANELIST: Remember that the rating agencies also have their own internal formulas that they use and you still have to meet those to meet your various ratings, so they won't necessarily change even though the RBC requirements may

change. Companies have a dual standard that they have to meet and, generally, it tends to be the higher of the two.

MR. CHRISTOPHER D. ZUIKER: (Trustmark Insurance Company) You took taxes into account when determining the RBC levels and it seems appropriate. My only question is that it seems to lead to a funny result—the higher the tax rate, the lower RBC requirement. Would that be true?

MR. JAY: First of all, if you raise your tax rate and the ROE stays the same, your pretax margin is going to have to shoot up. That's going to give you extra protection. I assume that if tax rates go up and companies keep their ROE the same, the required capital would go down.

To the extent that when most companies ruin during our modeling, they would have had more losses than gains over the testing period and higher tax rates would have offset those losses to some extent. It probably would tend to result in dampening the number of ruins that occur during a particular test.