

RECORD, Volume 22, No. 3*

Orlando Annual Meeting
October 27–30, 1996

Session 146IF

Dynamic Financial Condition Analysis Handbook Task Force

Track: Financial Reporting

Key words: Financial Analysis, Financial Management, Management Information, Modeling, Risk Measurements

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Panelists: WILLIAM J. BUGG, JR.
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Recorder: JAMES F. REISKYTL

Summary: The session will focus on:

- *the latest additions to the Handbook*
- *recent developments/requirements in Canada*
- *current research to support the Dynamic Financial Condition Analysis Handbook (DFCA)*

Mr. James F. Reiskytl: Let's talk about how to make your company a better company. Mike Eckman is the editor of the chapter in the second version of the Handbook that addresses modeling and assumptions, and he will describe some of the recent changes. He was a writer the first time. Our second panelist is Judy Strachan, SOA Education Actuary and liaison for the finance and investment area, who will describe current research efforts that you may find useful. Our third panelist is Bill Bugg, the health chapter editor of the second edition.

We intend to spend most of our time in interactive discussion. Is the Handbook meeting your needs?

Let's begin with a very brief history. The AAA and the SOA were responding to a NAIC concern about company solvency. Some might think that problem is behind us now so why not use valuable resources elsewhere?

Hopefully that's in part because of the number of actions that have been taken. But the fundamental issues and needs remain—you need to quantify financial risks and their potential impact on your surplus, your ratings, your earnings, etc. The DFCA was created to help you do a better job in responding to these needs and issues.

We updated and completed the Handbook in 1996. We have led concurrent sections, workshops, and a day-and-a-half seminar. Are there more things you'd like us to do? If so, please let us know.

Mr. Michael V. Eckman: Based on the comments on the first edition, we revised the liability modeling Chapter 3 in several ways. One of the things we and the readers noted was the overlap between Chapters 2 and 3 on assumptions. We recognize that repetition can serve a purpose so we decided to keep the overlap, but make it consistent. In particular, where Chapter 3 dealt with assumptions, we wanted to focus on how to use them and put them in the model. We added an example showing how to construct an excess lapse formula.

We also provided some reference sources for the assumptions that are updated from time to time. These references provide the latest information and the possible interrelationship between assumptions.

We added information from the SOA March 1995 survey on economic and actuarial assumptions. We focused on the top ones cited: inflation, competition, and regulation. The most important actuarial assumptions were new business, premium and policy persistency, expense, and interest-related items.

We expanded liability modeling to include group and accident and health (A&H) business. We cited types of business for which cell-based modeling might be appropriate, and with Bill Bugg's help identified simulations as an alternative model. We highlighted the importance of coordinating the inflation assumption for A&H premiums and claims. So we have added additional line information to make it more useful.

I re-recruited two authors, Susan Watson and Mark Milton, to rewrite this modeling area and had all the other original authors review their own work to see whether it should be updated. I reviewed all of the work, served as an author, a critic, and finally as an editor. Our work product was also reviewed by another editor. I also reviewed Chapter 4, *The Modeling of Assets*, and made some suggestions.

Before working as an editor, I read the entire Handbook, and after reading it, suggested we needed an index to make it a more user-friendly, working reference

tool. Now you can look up a particular issue, go to that part, and read about it. Hopefully this will increase the use of the Handbook.

There is some repetition about assumptions in Chapters 2 and 3, but I think that repetition is good. If somebody looks at Chapter 2, they will get some information. If someone else is looking in Chapter 3 for modeling, they'll get some information on the assumptions.

When I put Chapter 3 together I viewed it as an essential chapter. If you construct a model with everything described in Chapter 3, you'd have quite a model. My idea was to list every possible thing and then let the reader choose which features are most important.

I hope that it will be used for more than just DFCA and it will become a general reference for modeling. As Jim said, we're looking for feedback. When I was in the speaker's lounge, I noticed this little card that says Walt Disney World Company is meeting your business needs. At the bottom, it says that this equipment was set up by Richard, Steve, and Meg. We, as authors and editors, put our name on our product, so you can call us and let us know what you think about it.

Mr. Reiskytl: Bill, what changes did you make in Chapter 6 on individual group health?

Mr. William J. Bugg, Jr.: We reviewed the entire chapter and made significant changes in the group portion. These included updating the managed care portion and expanding it to include HMOs and dental HMOs and managed care, expanding long-term-care sections and improving the material addressing special risk.

In the individual portion, new material was added on HMOs, managed care, and supplemental health products: dread disease, hospital indemnity, hospital intensive care, and accident. Finally, some minor changes were made to the disability income sections.

Mr. Reiskytl: Did you affect any other chapters?

Mr. Bugg: Yes, as Mike said, we assisted in introducing some health material in the modeling chapter. And we rewrote the portion of the sample report in Appendix A that addresses the group health product line.

Mr. Reiskytl: You also conducted an SOA workshop recently.

Mr. Bugg: We had a workshop discussion of this handbook in Colorado Springs this past spring, and about 25 people attended. The majority came to find out what this book was all about, and how it might be used in their businesses.

Mr. Reiskytl: Judy, what research has been done that might be useful to do this work and what do we have in our plans?

Ms. Judy L. Strachan: When the SOA Dynamic Solvency Task Force wrote its 1992 report, it identified eight areas where they thought more research was needed. These included confidence standards, time frame for analysis, scenario interpretation, credibility and reliability, economic assumption guidance, reliance guidance, behavior models, and alternatives to cash-flow testing.

There has been a great deal of research completed since the task force's report was written. One research report by Allan Brender and Donna Claire addressed five of the topics: confidence standards, time frame for analysis, scenario interpretation, credibility and reliability, and reliance guidance. It's in the Handbook's Appendix B.

There are a few things under way right now that are related to confidence standards and credibility and reliability. The first is a project by Louis Doray on the empirical likelihood of insurance. It should be available sometime in 1997. Vladimir Kalashnikov is working on bounding and asymptotic behavior of ruin probabilities and collective risk theory, also expected to be completed in July 1997. And Shaun Wang is working on an actuarial measure of the right tail risk. The expected completion date is June 1997. That topic was presented at the Investment Section breakfast where they were talking about securitization of catastrophic property/casualty risks. It sounds like they could use that.

As to time frame for analysis, there's a call for papers on the 100-year term structure of interest rates. This is to develop a guide on how to construct long-term interest rate structures that will be important for the longer businesses that many of us are in. Papers submitted are expected to provide guidance for suitable interest assumptions in cases where an actuary needs to set up scenarios over a very long time frame.

On economic assumption guidance, an economic assumptions task force was created that sent a survey to about 2,000 people. It received 160 responses and wrote an article on the results in the November 1995 issue of *The Actuary*. Copies of the report are available in the research library, on Actuaries Online, or from the SOA office. We expect that the 100-year term structure paper will also be helpful in terms of economic assumption guidance.

There's a current exchange risk group that put together a professional specialty guide (PSG) and a call for papers. There has been a good response and the papers should be available by the end of 1997.

There's a two-phase actuarial modeling project. The first phase analyzes the total impact of economic factors on the components of life insurance. It expects to present their results at the Western Risk and Insurance Association meeting in January so those data should be available soon. Data are being collected for the second phase that will look at the impact of term specific and overall economic factors on the performance of individual life insurance companies.

There's also a macro demographic model feasibility study that is primarily for the pension practice area, but I think it will also be useful for people in the life insurance company pension area. The study expects to assess what happens as the population ages or changes in various ways.

With respect to behavior models, there have been a series of joint SOA and Life Insurance Marketing and Research Association (LIMRA) studies. The first one was the single premium deferred annuity persistency report, and that was in the 1991–92 reports. The *Annuity Persistency Study* is done and available from LIMRA. It's scheduled to be published in the *Transactions* soon.

A follow-up study of the fixed and variable annuity persistency experience of 26 companies is in the analysis stage. A preliminary report is expected by the end of this year. There have been two projects on the relationship between lapse rates and mortality rates. The first one, by Faye Albert and Jacque Frank on the lapse and mortality experience of 13 companies is being reviewed, and it should be out shortly. Bruce Jones is working on a paper in which he develops mathematical models for random mortality rates and the analysis of selective lapsation.

Finally, the last area that the task force cited was alternatives to cash-flow testing. There has not been much activity in this area. Two projects may be of some value. The first is the monograph on the valuation of interest-sensitive financial instruments that has been published by Frank Fabozzi Publishing. Second, Sam Cox is working on two research papers on the financial markets approach to valuation that are expected to be available next year.

The SOA does a great deal of research—some may relate and some may not. If there's anything you're interested in, check with the SOA office, the research library staff, or Actuaries Online. You can also post messages on the Actuaries Online research section. There's a research brochure describing available research in our literature center.

From the Floor: I just wanted to thank you for putting the book online because I downloaded it and shared it with people at the Florida Department of Insurance. In fact, it was so well received, that the examiners had a class for each other on the topic of collateralized mortgage obligations, and the chapter on assets was used as the text for that working session.

Mr. Peter L. Smith, Jr.: Is anybody working on bar frameworks as an alternative to cash-flow analysis?

Mr. Warren R. Luckner: The Investment Section has allocated some funding to look at valuation at risk. There is, of course, some controversy about whether it is applicable in insurance companies or not because of the nature of the liabilities that are covered. It was presented initially as a framework for bank liabilities. I think it's certainly worth pursuing. Cindy Forbes and I are looking at finalizing a request for proposals for people to do something in that area or perhaps a call for papers.

Mr. Reiskytl: I shortly intend to get into actual company practices soon.

Mr. Thomas J. Mitchell: I attended the session on low discrepancy points, and it was very, very impressive. There's some massive improvements in Monte Carlo methods that are going to rapidly come into our practice. I would suggest that would be an area to follow.

Mr. Smith: Are you coordinating work on dynamic solvency standards with activities in other countries? Japan has a new dynamic solvency test (DST) that it is doing, as does the U.K., and Canada, of course, has had one for awhile. I have a visitor from Japan who's working on a dynamic solvency model, and he's finding the U.S. experience and guidance very useful in terms of constructing a model.

Mr. Reiskytl: Does anyone know anything about Japan's standards? Can any Canadians bring us up-to-date?

Ms. Caroline C. Rendall: We've had DST for quite a number of years and more recently we have sort of progressed to dynamic capital adequacy testing. This is partly renaming and partially an actual enhancement of those standards. We are now looking more at a nonstatic picture and moving into scenarios that aren't predefined. We used to work with ten defined scenarios that you had to use as a bare minimum for your testing. We are also moving into looking at incorporating more assumptions into one scenario and how assumptions interact. For example, if mortality changes, how does that affect lapses and other cash flows? We are moving towards incorporating everything into one picture and doing fewer but more realistic scenarios.

Mr. Reiskytl: Are you up to date as to what's occurring in your actuarial opinions?

Ms. Rendall: A little. I was recently at an appointed actuary meeting in Toronto. A consolidated standards of practice is being brought up in the CIA, and there's still a great deal of discussion about the phasing of the opinion. Are you looking at the actual future capital implications or are you looking at future testing as part of your current opinion? There's much concern that this effort could lead into disclosure issues. There's also a great deal of concern right now about how much you should say in your opinion and what people are going to infer from what you've said. So you want to be very careful about how much you are implying.

Mr. Reiskytl: It's my understanding that your 1997 or 1998 opinion as to the future financial condition of the company will possibly be replaced with the requirement that the actuary give a confidential report to the board.

Ms. Rendall: That's my understanding from the meeting I was at, but it's still not final.

Mr. Bugg: As dynamic testing is evolving in Canada, is the valuation actuary being given more flexibility as to what scenarios to test?

Ms. Rendall: Yes. They're still looking at prescribing scenarios, and suggesting that, at a minimum, you also should be considering the interaction of certain assumptions. The preference is for actuaries to use those scenarios as a minimum and then go on to consider your individual company risks. The problem with the current minimum continuing capital and surplus requirements (MCCSR) and the capital position guideline is that it doesn't allow you to consider individual company positions. It's hoped that during the dynamic testing you can put more thought into your specific company risks.

Mr. Bugg: My basic impression is this: you look at your business plan, and then test whether your new business growth will be much more or much less over a time frame of five years.

Ms. Rendall: Yes, that's a possible scenario.

Mr. Bugg: Then you can stress the key risk factors. For some, this will be investment yields; for others it might be persistency, mortality, or morbidity. The actuary's judgment determines which one to focus on.

Mr. Reiskytl: Bill, you've got an operation in Japan. Do you get involved with this type of testing there?

Mr. Bugg: Yes, we've been doing testing on our Japanese operation in the U.S. I know that Japan is working on solvency standards, but frankly I'm not up with what they are asking for in the way of cash-flow analysis.

From the Floor: I can tell you a little bit about their standards. The projection period is five to ten years. If you test every year on a book-value basis, you have to make new business assumptions. There's two sets of scenarios you can choose. The preferred set is a stochastic set. There's no number specified, but it's a stochastic set. The second approach is specific deterministic scenarios. My understanding is that just about any set people come up with will be approved by the Management Research Services this year. That's probably the way most companies will go. They're definitely leaning towards stochastic testing and a large stochastic set of scenarios.

Mr. Bugg: What product does that apply to?

From the Floor: Life and health products. I do not believe that variable is included.

Mr. Reiskytl: Canada clearly has a different reserve structure than exists in the U.S. I think part of the trade-off for these more flexible reserve standards is to have to do more capital adequacy or solvency testing, opinions, or reports. As actuaries and regulators begin to seriously look at new nonforfeiture laws or possible permitted alternatives in the U.S., it wouldn't surprise me if additional DFCA of some sort will be required. Someone will be held responsible when one has greater freedom.

We, the writers and editors, are not opposed to this. We do prefer confidential internal actuarial reporting to the board, rather than external public opinions. It seems that the Canadian requirements are now moving closer to this viewpoint from earlier preference for public opinions. There's a real concern on our part that requiring public opinions would both dilute their meaningfulness and usefulness and perhaps sink some companies that would otherwise have survived. It's a delicate practical balance. The public, shareholders, and policyholders have the right to know important information, yet if the company is taking corrective actions that are reasonably likely to be successful, and if these actions are published, the plan may not get a chance to work. Clearly restoring any company to a healthy financial position is in everybody's self-interest. So we have to try to find the best balance between the two possibly competing interests when corrective actions must be taken.

I met with the Academy of Actuaries on Monday. They are developing recommendations on a number of issues involving insurer solvency. First is the definition. The initial focus was on solvency—either you were fine or you were not. Since

then I believe they have been increasingly shifting to a dynamic analysis of financial condition. For example, you may wish to do this to increase the likelihood of maintaining your current rating from outside agencies or you may do this to determine what needs to be done to maintain and grow surplus. Probably most companies don't expect to go broke—that's a pretty remote possibility, so why does this work? Yet they are probably all interested in measuring potential risks that could adversely affect their current surplus. Each company should attempt to identify the key factors for their company—they can vary from company to company—and that's why we don't want a cookbook analysis.

There are some things that are common to all companies, but there will be others that are unique to your pricing, your investment mix, your management style, your ability or inability to adjust quickly etc. The Academy committee is moving toward a definition that is tied to viability in the marketplace rather than simply defining it. If liabilities exceed assets, you are insolvent. What you're really trying to identify is whether you are currently viable in the marketplace, and what events could adversely affect you. They are currently wrestling with the big issue of mandated versus encouraged. I believe they would like to have it done by most companies voluntarily—they are encouraging this effort without making it mandatory.

They are interested in and looking for positive incentives to encourage its use. In a way this is like having an agents' sales contest. The agent always has an incentive to sell because he gets paid for selling. Yet, if you have a contest, some agents sell more to qualify for the prize. So it is with DFCA; the rewards are always there for doing it in being a well-run, well-managed company. But maybe there could be some inducement that would make it a little more attractive and many more would do it. I'll just throw out one idea to get you thinking that. If you did this work and had an acceptable internal analysis that they could review (but was not prepared as such for them as regulators) maybe you'd have an exam every five or six years instead of triennially. Would that be attractive? Is there something else that you would prefer? I think there are many things occurring in the U.S. now—derivatives, risk-based capital, C-3 risk, the possible new nonforfeiture law—that may require DFCA, and you might receive better treatment if you use it.

I would also note that both Canadian and U.S. property/casualty actuaries are getting excited about this concept. As I understand it, the property/casualty actuaries in Canada were very resistant initially but now they have become excited. They think it's effective and believe it's useful. We put on an SOA seminar for about 35; the property/casualty seminar had 150 for the first one, and 230 for the second. We have been trying to coordinate our efforts especially where there is some overlap in what we do such as investments.

To summarize, the Academy is trying to decide what to do to support this concept. I continue to emphasize positive inducements rather than mandatory opinions. The Canadians are ahead on this.

Mr. Kerry A. Krantz: Just a comment on your idea of less frequent state examinations. Something that's a little more likely to happen sooner is coming from the Academy group on statutory variations. Asset adequacy might be approved as a way to avoid having to do an opinion based on the state of filing. I would imagine dynamic condition analysis would be another way that a company could be exempted from doing a state of filing and simply be required to do a state of domicile opinion.

Mr. Reiskytl: Any other things that might make it attractive?

Mr. Willis B. Howard, Jr.: I'd like to offer a devil's advocate comment on the less frequent examinations. I'm the project manager to get the guaranty associations to continue their obligations on a company that was reorganized in 1990 and was told by the Georgia Commissioner to stop writing business a little less than a year after it started in 1991. It might have had a great examination in 1990 or 1991 and if the Commissioner wasn't going to come back for another six years, it might still be writing business and we'd have an even bigger hole. I guess I'd say examinations are like checking your oil. Just because you checked it the last time you got gas doesn't mean you don't have a hole in your oil pan this time.

Mr. Bugg: My rebuttal to that is that what we're talking about is more than just an oil check. Dynamic testing is a much more extensive review.

Mr. Reiskytl: People often point to the Canadians as leaders. My understanding is that a company must meet certain standards to get into its guaranteed system—the counterpart of risk-based capital or MCCSR might be another way to go. If you don't do this work, the guaranty fund will only cover, say, the first \$10,000 of death benefits and related cash values, if any. If you do DFCA, the first \$100,000 will be covered. Or you could develop risk-based capital adjusted premiums for guaranty association coverage. Obviously just doing the work is not sufficient. You would probably have to meet some other conditions too.

Mr. Armand M. de Palo: One product in the marketplace that I've been very concerned about, both from an aggressive pricing point of view and from what is believed to be held as reserves, may only be dealt with by establishing strong standards or simply requiring minimum standards to be in the guaranty association. If you're holding reserves below these standards, even if they are technically within the literal reading of the state law, this product is not covered by the guaranty

association. The only way to get a stamp of approval from the guaranty association is to comply with some national minimum reserve standard prescribed by the National Organization of Life and Health Guaranty Association minimum reserve standard—not from the NAIC. There's just too much risk of other companies picking up the liability as a result of the very aggressive pricing by some in the marketplace. It's getting worse.

Mr. Erin Dandridge Cole: I think that the in or out of the guaranty association is not a sufficient hurdle. If some products are not included, they could still be sold. You're not able to tell the buyer who is in, or who is out, or that if this continues, it doesn't seem to be much of a threat.

Mr. Reiskytl: The intent obviously was not to debate features of guaranty associations. The real focus was to be on what might be a possible positive incentive for you to do this analysis—it would give you some concrete recognition for doing it, maybe you have a better idea.

I didn't attend the session on "Strategic Management of Insurance Company Risk." Maybe some of you did. It seems like it could directly tie into what we're talking about—a financial focus on the key things.

At this point, I would like to begin discussing what you are doing. Are you doing DFCA within your companies? One of the basic questions is, how do you identify the key factors that could have an adverse financial impact on your company?

What process have you used to decide what they were? You must be doing some type of analysis.

Mr. Bugg: It would be my guess that many companies are doing something of this sort and don't even realize that they are. For example, my company deals with the financial analysts on a very regular basis. Our chief executive officer (CEO) wants to be able to assert with some confidence what our position will be next quarter or next year, and have a range for the next five years. In order to do that, we have to do a decent modeling job. We have to be aware of the pricing sensitivity points—otherwise we might be out looking for a job if we had too bad a surprise. Why didn't you tell us about that? We have a good sensitivity test to use on the insurance side.

We also are doing analysis at our holding company level ever since we have had a stock buy-back program. How much can we buy back? How much can we borrow? How much in dividends is needed in order to write them? If we pull out the dividends, what's going to happen to our risk-based capital?

From my way of thinking, Jim, this is the kind of thing we're talking about.

Mr. Reiskytl: It sure is. How many of you make a presentation to your board on the major financial risks and what, if anything, is the company doing to control or minimize those risks? How many of you present risk-based capital or MCCSR to the board? Is that a routine presentation? At Northwestern Mutual we present a report to the board's audit committee and have also given it to the policyowner examining committee. The full version is about two hours. They want to understand what risks the company is facing and what assurances or what controls have been put in place. Obviously we don't give them any actual stochastic runs; we do identify the key issues.

Mr. de Palo: We go to the planning committee of the board. We meet with the committee several times during the year. The process is very well documented and restarts at the beginning of each year. We produce two documents. One is called the plan book, which is a tactical document of what you will do in the next year. It's tied into the budget. The second document that we've developed over the last two years is called the strategic document. It covers what the company is likely to face in the next five to ten years. It goes through the standard strengths, weaknesses, opportunities, and threats to the company. Within that document we develop a five-year plan for the company. It's not stochastic. It's running out the GAAP model and the statutory model under one set of assumptions for the next five years. What will the company look like years from now? We have not done any stress analysis of it as to what would happen if, say, interest rates spiked up or if the inside buildup of annuities was taxed. We identify these risks in the document, but we don't do a financial analysis of them.

Mr. Jeffrey T. Robinson: I represent mostly small companies, and their efforts are similar to those Armand described. Most of them are owned by stock parent companies that require a five-year plan. As Bill said, the only thing that may be missing, and this might be an area in which a company can do the necessary research, is sensitivity analysis. Usually it's a big deal to get the required plans done. How much research is being done by or for the smaller companies in terms of sensitivity analysis? This also ties in with the elimination of the Section 7 opinion. At the small company breakfast—Sheila Kelley was saying there are different ways you can go. In a way, DFCA is one of them. I don't know whether many small companies are doing any sensitivity analysis when they do these plans. What are their chances of not reaching their goals or getting into very bad financial shape? I think it's an opportunity for the companies to use something as an alternative to cash-flow testing.

Mr. Reiskytl: Clearly, there's not a requirement for cash-flow testing or probabilities of insolvency. Your comment gives me a chance to reemphasize the latter point. The focus of this report is less and less about probabilistic statements and more about measuring risks, stress testing, and financial risk measurements. To give you one example, when President Clinton introduced his health care plans, we measured our potential disability income risk by assuming that half of our insured doctors might become disabled if his plans became law. That was not a probabilistic statement—it was simply a measure of the extra claims in dollars we'd see if the event were to occur. Some might say that's an improvement.

My point is that sometimes you can run your model to get specific answers, but not probabilities. Your CEO and senior officers are going to form their own opinions as to the probabilities of the event occurring anyway, and we, as actuaries, don't know these anyway. We found it useful to identify possible risks on the horizon and then to try to establish some financial measure of each one, imperfect as they may be. Often we used a range. We found that some things were likely to be more important than originally thought, and some things were less.

It's my understanding that in Canada, the actuary actually shows the results in the report under each of various scenarios. The board can then get directly involved in reviewing contingency planning over time.

The second point I want to emphasize is that this is not a witch hunt. This analysis is designed to consider alternatives, given that an identified possibility could occur, e.g., is there something the company could do now about the way it invests, the way we design our products, the promises we are making, etc., that could minimize the possible adverse impact. That's what this analysis is all about, and hopefully this Handbook will help you accomplish those objectives.

Mr. Lee R. Lambert: My question is about current practices. We hear a great deal about stochastic testing. How much of this is being done? What systems are being used?

Mr. Reiskytl: How many are doing some form of DFCA testing? Most of you. How many are doing stochastic testing to support this analysis? Two. Would either of you wish to comment on what you're doing?

Mr. Peter Hepokoski: We have looked at large critical blocks of business in many of our companies. Generally that is interest-sensitive life insurance and annuity business. I think the only way to make sense of the results is to look at them from a stochastic standpoint. We look at each block in the way Jim just described: to get a sense of the kinds of risks we might be facing and where we have some potential

weak spots. Then we address possible solutions, such as some sort of a hedge or some sort of a change in management strategy for that block of business. This effort is not part of any formal roll up to a board report or on an annual schedule. At this point, it has been on an ad hoc basis for the major blocks of business.

Mr. Reiskytl: Do you share any of it with your board?

Mr. Hepokoski: It has not gotten to the board level. I think that as we get better, it may go higher. At this point it has been at the business units level.

Mr. Lambert: Do you use any particular system?

Mr. Hepokoski: The Tillinghast Actuarial Software (TAS).

Mr. Lambert: Are you generating lattices of interest rates or using a log normal?

Mr. Hepokoski: The system we are relying on most often for our interest rate scenarios is the global advanced technology rate generator. There are some applications where that tends not to give us enough of a distribution. Then we'll most often use the stochastically generated scenarios from the TAS generator itself. We will generally seek to make those consistent with the forward rates.

Mr. Lambert: Have you found anything that you weren't expecting or were surprised by?

Mr. Hepokoski: It's hard to make the profit objectives with any of our businesses these days, regardless of where future rates go. We thought there might be some scenarios where it might be easy, but we're not so sure anymore.

Mr. Reiskytl: You said you were doing some, too?

From the Floor: We have not put together a stochastic model for an entire company or an entire branch yet. It has basically been blocks. The interest has often been in pricing risk issues. For instance, if there's a block of business with a great deal of up-front single premium money, you may want to evaluate the options provided, (such as loans), for those blocks of business. You might look at a lapse distribution for that block and the possible effects on your profit objectives of fully utilizing those options. What we are seeing is an extension of techniques used on the valuation side to the pricing side of the shop. We have used the same interest rate generator that Peter described: Global Advanced Technology (GAT). We also use TAS and generate a number of internal stochastic ones, such as Schwartz and

Brennan, for about five different currencies and foreign exchange rates. We also do Monte Carlo simulations for our multicurrency investment models.

Mr. Hepokoski: At ReliaStar, we require the business units, when they put together a product proposal, to test the most significant risk in the product. That test was actually suggested by the product development actuaries themselves. We want management to know how good and how bad this can get so that it won't be surprised when future interest rates move this way and profits go that way.

Mr. Reiskytl: How do they determine what's the most significant risk? Do you use stochastic testing or go in with predetermined ideas?

Mr. Hepokoski: They try to go in with a predetermined idea and then if that doesn't seem to be significant, they have to keep searching until they do find it.

Mr. Steven W. Caress: For those doing stochastic testing, when you've got your results, what do you have? Do you try to assign probabilities to any of these scenarios, or do you keep this as a road map so that if interest rates start to go in the direction of one of your scenarios, then you know what to expect? What is the use of all those scenarios?

From the Floor: I guess we, as Jim has referred to earlier, try to stress test—that's a very interesting perspective on the issues. I think it's especially interesting if you believe stochastic modeling is not appropriate. If the assumptions that are used to drive a stochastic model are not appropriate to the questions that you are trying to answer, you really should not be using a stochastic model. You could apply a stochastic model to measure downside risk, where you are only interested in the probability of some adverse event and not in your average probability. I think first you need to determine which events can be modeled stochastically, and then for those events determine what measure will be most useful or meaningful.

Mr. Hepokoski: The GAT rate generator that I mentioned earlier, if you're not familiar with it, uses what they call a structured sampling of interest rate paths. They have a lattice that has seven gates. In their original generator, which was a one-factor model from each gate, rates can then go three possible paths: either consistent with forward rates, up, or down. I think they generate something like 2,000 possible paths. Because of structured sampling, we will sometimes work with just the first 51, or the first 200 and some scenarios, each of which is associated with a probability. So we do get into some probability weighting there. We've found that with the first 51 that the result isn't that different whether it's weighted by probability or not. The other thing that can generally be done to cut down on some of the testing that we do when we're getting into a lot of the analysis of the

sensitivity of separate individual assumptions is to identify which of the 250 we are working with are the most risky. Then we just test say 20 that are potentially of greatest concern using all those scenarios. That process really cuts down on computer run time.

This is getting to be less of a problem as we're getting more Pentiums and 200 megahertz PCS in our offices. We may start running many more scenarios.

Mr. Reiskytl: Either one may be effective. It depends on your management or personal needs. The Handbook was designed to be useful in either case. How are you doing it?

It would seem that most CEOs or most boards would like to know what could reduce their ratings or lower current surplus. What are your areas of vulnerability? They likely depend on your own circumstances.

Suppose the chief financial officer (CFO) asks you what are our financial risks and what are we doing to minimize them? What controls are in place? Are they adequate?

When we ran the workshops and concurrent sessions on DFCA, many people said, "We are struggling to keep up. If it's not required, we simply are not going to do it." If you are in this group and would like to do it, how do you encourage your management to see the value of doing it? A related question might be, with risk-based capital or MCCSR, what does this add or accomplish? From our perspective this work is related to that of the valuation actuary and yet it's substantially different. If valuation testing work is being done, you may be able to use it as a base for this analysis. Clearly DFCA is more encompassing—it includes surplus, new business, and future plans for the corporation. Arguably, if this had come first, there might not have been any need for valuation actuaries. In many ways, it's more difficult to do. Unlike the valuation actuary who can call on surplus if a shortfall develops, here your choice is to go to the capital market, surplus relief reinsurance, or some other action that may be very difficult at the time you are going broke.

How have you convinced your management to do it? Are you thinking about doing it?

From the Floor: We do it at the direction of the board, but the board doesn't actually direct the activities. It is very interested in the risks that the company is taking on and how they are being managed. Because the board might have a variety of different product lines (life insurance, a fair amount of annuities, both individual and group, individual disability income, and so on), it is very interested

in what the risks are that we have and our management of them. I attended the session you referred to earlier. They discussed many of the same things including trying to identify your risks, their significance, and finding the time to do it. The bottom line is what can we do to manage risks so as to optimize the results for the company?

For example, we have a company committee to manage our asset/liability risks that involves senior management to keep the focus and the allocated resources at the right level. The committee's focus is to figure out how much to mismatch. If you just match, you immunize. You are not taking any risk, and we're in the business of taking some risk.

So we are going at it from the point of view of trying to identify our risks and then figure out how to manage them to do the best for our policyholders and customers. We try to focus on ones that deserve the most attention. Many of our efforts do not involve cash-flow testing. Some of the analytics used by the rating agencies are quite applicable and useful. So we focus our energies on how best to manage risks.

Mr. Reiskytl: How do you go about picking the key factors to study? Is that done by you personally?

From the Floor: No. I'm involved, but it's essentially done through our senior management group initially because we also have meetings with our board. As Armand mentioned, we do an annual business plan, which is more of a tactical operational plan, and we update a longer term strategic plan every couple of years. Part of the latter plan deals with the risks that we have as a company. In those forums and other special meetings we communicate with our board what we're doing on specific items. In the identification of the risks, we get input from throughout the company. It then becomes a matter of prioritization. Given our size, we don't have enough resources to deal with all of them.

Mr. Reiskytl: Do you put financial measures on them?

From the Floor: We do. Some nonfinancial measures can become financial, such as how might this event affect our ratings? Our risk-based capital ratios? Our ability to grow? How will it affect our position in the marketplace?

Mr. Reiskytl: Do you use the Handbook?

From the Floor: Yes. I would like to go back to the suggestion of fewer triennial exams. As an examiner, I doubt that would be viable. What could happen though is they may be less intrusive in the 21st century. I would love to be able to

examine a company without having to calculate deposit term policy reserves. I would much rather be able to look at the big picture and test the company's solvency. We have to use the tools that are available in the 20th century until we reach the 21st century. I would encourage regulators, companies, and consultants to try to cooperatively develop appropriate solvency testing. The common goal is to have solvent companies. The goal is not to spend a couple of weeks making the actuary entertain the Department of Insurance actuary and show him how to calculate a reserve.

Mr. Hepokoski: You had asked, Jim, about how to get management's attention; how to get them to pay attention to these things. Management isn't necessarily going to want to talk about it or listen to what factors might lead to insolvency after a certain number of years. However, if you get into it and make some probability distributions of earnings over the next few quarters one of the by-products of your work, then you're likely to get its attention. This will probably get your foot in the door and enable you to make an impact and then make your case for doing more a little bit further down the line. Explain what some of these things can lead to.

From the Floor: I'll just add to what Peter was saying. Even without probability distributions, showing what can happen to your earnings over the next few quarters, or a year, showing what volatility can occur can catch management's attention.

Mr. Reiskytl: We used to develop best-estimate economic scenarios. It took quite a bit of effort and no one totally believed them. Now we project current rates continue for five years, rapidly increasing or rapidly decreasing over that period. We stress test. If we get unexpected results, we do more analysis. A committee used to pick the most likely scenario over the next five years with a 40% probability and two other scenarios with lower probabilities—to show results under various conditions. Management really wanted to know whether we are OK. So we have shifted to focusing on vulnerability or stress testing. How about you, Mike? Do you do this type of work for your board?

Mr. Eckman: Not that I know of. One area where we've used this work has been arguing with the rating agencies as to appropriate levels of risk-based capital and setting our own internal target surplus formula.

Mr. Reiskytl: That might be another potential payoff. I presume that if you had done some of this work that the rating agency could review perhaps it might have a better understanding of your company's possible results. If, for example, surplus ratios are currently declining, you could show the results of your plans and that it is manageable. You know more about your company than the raters do. They can and will apply their own assessment to the financial risk measures.

Mr. de Palo: I'll give you a real life example from the Guardian. Guardian is a very profitable company and has a very profitable group health line of business. You can't run models to tell what's going to happen over the next five to ten years with any certainty for the group health line. All we know for sure is it's going to change. We can position ourselves to react to change. In our opinion, it's more important to determine whether five years from now, if we have federal legislation and government-regulated medical care, you could exit that line very profitably or very unprofitably. Do we have the ability or inability to change as events unfold? What's more important in thinking about the future—and sometimes you have to do this with nonnumbers—is to consider what-if scenarios and what would you do to react to each of them. You can survive if your management is willing to react. If it's not willing to react—and no set of numbers is going to give this to you—whatever you project will not mean anything unless they match your company's responsiveness to the situation as the page unfolds. What really should come out of this work is to sensitize management that it has to react to potential risks. If it does not get involved, it does not matter what numbers you produce. The point is, you must sensitize management. If it is going to change the environment it must adapt and react to change. That's not an actuarial issue; it's a management issue. You must have both. If you only have the numbers, you have nothing.

Mr. Reiskytl: I agree. The intent is to get the key players involved; not create a new role for the actuary as a policeman. When Pete and I began, this was one of our first concerns. In our opinion, the actuary should do this work as a key member of the management team that is trying to do a better job of analyzing and managing risks.

Are there any questions that you haven't had a chance to ask yet? What are you doing at CIGNA?

From the Floor: I would categorize it as stress testing. We are building quite extensive models that are too large. They take so long to run that you cannot do many scenarios. We test what would happen in various scenarios and try to prepare for potential adversities in advance, if we can. We have found that there are a lot of events where you really cannot do anything, for example, if you are stuck with a mismatch.

Mr. Reiskytl: Do you report to your board?

From the Floor: Not as formally as you have described.

Mr. Reiskytl: Is there any forum where the actuary or the CFO can talk about risks?

From the Floor: I'm not involved at that level. I know I'll often meet with one of our corporate actuaries and go over what's happening generally.

Mr. Luckner: It occurred to me there are several issues that relate to this discussion. They are (1) low discrepancy points and how they affect the Monte Carlo techniques that you might use in modeling; (2) sensitivity analysis, particularly at small companies where resource allocation is another issue; (3) the best size for a model. There was a recent article about modeling in the *Actuarial Digest* that I thought was very helpful. It covered the practical limitations of modeling and important considerations designed to help you make your model useful and used.

The SOA Modeling 1 research project relates to the issue of trying to identify the most important factors. The results may be helpful for smaller companies in terms of sensitivity analysis because it could minimize the number of factors you have to analyze.

The Board of Governors established a new award, the Edward A. Lew Award, for the best paper on modeling research. Edward A. Lew was a former President of the SOA and an actuary involved for over 60 years in research. He made contributions to the actuarial profession. He was one of the pioneers, whose efforts led to this conference. Hopefully this award will help motivate the writing of more papers on modeling.

Mr. Bugg: Jim, I would like to personally acknowledge those people who worked on the health chapter: Neil Lund on special risk; Andrew Wang on HMOs and managed care; Ron Wolf on disability income; and Bob Yee on long-term care. In addition, Ron Worth helped with the modeling input and Ed Butler worked on the report.

Mr. Reiskytl: I am very pleased with your participation and your interest. If you think the Handbook is useful, please tell your friends. It's somewhat like an encyclopedia or a reference book. It's also online.

Where do we go from here? Hopefully, we're going to find additional ways to encourage more actuaries to do some form of DFCA. In the U.S. the AAA committee will do something. In Canada the opinion/report issue will be resolved. I hope to discuss this with the chief actuaries at their forum in June 1997 to see what they are doing and to encourage them to consider it. We plan to be on the program again next year to bring you up to date on what is happening and to give others a chance to share what they are doing.

Has this been effective? We'd like to hear from you. If you think there are things that are missing or that could be improved, you can get answers by using the index

and reading the key section(s). You don't have to start at the beginning of the handbook and read all the way through to understand later sections. You might begin by looking at the sample report (at the end) to get ideas of what some others are doing.