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Panelists: DONALD P. GROOVER†
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Recorder: DAVID L. ROCKWELL

Summary: The results of recent surveys on asset/liability management (ALM) practices will provide a basis for a discussion of ALM practices in the insurance industry. Participants will be encouraged to discuss the tools and techniques used by their companies.

Mr. Joseph M. Rafson: Don Groover is the vice president and director of marketing for insurance asset management of Lincoln Investment Management. Lincoln manages assets for approximately 20 insurance companies ranging in size from $3 million in assets, to many billion dollars in assets. Lincoln totals about $37 billion in insurance assets under management, giving Don a broad overview of ALM practices and the capabilities for a variety of insurers. Don has been part of quantitative research in the industry, on various software models, and for ALM modeling purposes.

Dave Hall is the senior vice president and director of investment strategy for the ITT Hartford Life Companies, and he has been involved on their asset management side since about 1984, which gives him a fair background in the development of practices in the industry. Hartford recently has been looking at its structure for

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ALM, and is currently realigning itself to improve its ALM capabilities. Dave will be able to speak to the needs and actions of large insurers in the ALM field. Dave is a frequent speaker at SOA meetings, he's a former chair of the Investment Section Council, and has been the editor of *Risk and Rewards*, the newsletter of the SOA Investment Section.

Doug Healy is also a guest speaker. Doug is a director of the portfolio strategies department at First Boston. He specializes in insurance company portfolio strategies, and has for almost a decade. Doug is well versed in a broad array of investment vehicles available to companies, as well as how companies use these vehicles to meet their needs. Whereas Don and Dave speak from the buy side of the house, Doug can provide a view from the street.

ALM is really more art than science as practiced in the industry, and it's a developing area of practice. The tools we have at our disposal are improving, as is the usage of these tools. The actuarial profession is growing and expanding its knowledge base to do more work in ALM. We now have an investment specialty track and have for years. Investment actuaries are no longer considered extraordinary, but are considered a vital part of our profession. The asset and liability sides of insurance houses are closer together than they've ever been. Asset adequacy analysis, even if not used for ALM purposes, has required actuaries and investment professionals to talk to each other more frequently.

Many obstacles to good ALM exist. ALM is not always a top priority of management. The current models often have weaknesses or are not used for ALM purposes. Certain key experience assumptions, particularly interest sensitive lapsation are not well documented, quantified, or understood. The historical gulf between the asset/liability sides of the house, while narrowing, still exists in many places, and at certain companies it's still very severe. Finally, I would say that the ALM education for our profession still has room for improvement. A recent survey by our Finance Practice Education Committee showed a definite desire by our profession for more material, for more information, and for more learning.

Very broadly, there are a number of ways to do ALM. The fact that many companies simply do not do it at all has a historical basis, but I think it's also a very risky approach to doing business. You can approach ALM strictly from the liability side of your balance sheet. Managing your crediting strategy strictly on a portfolio basis where the investment return is simply taken from the asset side and then used to determine what can be credited to policyholders is an example. ALM can also be handled simply on the asset side and perhaps this is easier because asset portfolios may be easier to adjust. The asset manager simply meets the duration, quality, or yield targets of the liability side. They can be managed much more closely together

as well. Investment personnel may have to get involved in crediting decisions. Actuaries may be involved in portfolio or asset allocation decisions.

There are encouraging signs of improving industry practice in the ALM field. A great example is the development of equity-indexed annuities. Whatever you think of this product, I've found it has been somewhat unique in that investment personnel have been vitally involved in the pricing and design of an insurance product. Perhaps this shows how far we, as an industry, have come.

Mr. Donald P. Groover: At Lincoln, I spent a year in quantitative research, working on modeling after leaving Chalke Incorporated. I've since moved over to marketing, so I'm responsible for recruiting third party money to manage from insurance companies. In the course of doing that job, I come into contact with a great deal of small and intermediate-sized insurers. Some of them are interested in specialty asset management, but many are interested in replacing an existing asset manager or thinking about outsourcing the whole role. Part of that has to do with ALM. Often times that's what we find in smaller companies. They want to know how they can get a better handle on ALM. I've seen a great deal of customers with varying degrees of sophistication in terms of doing ALM.

I have a bias that the best models in the world and the best comprehension of the problem don't go very far in terms of delivering good ALM. You have to have an informational system that may be based on models that inform you about how to manage your liabilities and assets, and how to coordinate the two. However, it also needs to do more than that because it is management. If, in fact, crucial assumptions like lapses in a spread business don't work as assumed, your strategy is not going to perform in the manner that you anticipated. Perhaps that's something that we don't look at. In financial intermediaries, insurance companies being one of them, it is the disaster scenarios, when things don't go as we anticipate, where good management and good coordination of the process is really needed. When we go into a shop to look at it, the first thing that we do is a liability appraisal. We spend roughly two or three days with actuaries going over the book of business. This includes reviewing how it was sold, reviewing lapse assumptions, looking at the minimum guarantees that are embedded in products, asking whether they have bonus unfunded liability and so forth. We try to develop a clear understanding of what kind of product is out there, what age it is, and what its experience is. From that point, we begin to look at a company's asset/liability models.

Luke Gerrard has come up with some really interesting things in our shop that he can do with a company's asset/liability model. We'll ask them to run seven or eight scenarios. Then we go in and essentially create an artificial hedge on that with caps

and floors and a variety of floating rate notes. That can give us a sometimes segmented or sometimes unsegmented idea of what the maintained hypothesis is about that company's view of their own liabilities. From that standpoint, I try to find out how much sophistication companies have on the liability side. If they're fairly sophisticated, it means that they can maneuver the liabilities that we talked about (the crediting rates) and can coordinate that with the asset side. Oftentimes you'll see someone who is essentially crediting the same rate to all annuities, that still exists out there. If you see that, then you can encourage them to work on that, because there is a huge bang for the buck if they get better control of their liabilities. Oftentimes we'll come over on the asset side and see if we can make compensations in the short run.

Another part of my job, practical asset/liability modeling, really involves going to the board level so that board members are informed about the use of derivatives. Then they can answer questions and do their due diligence. That becomes crucial. It's one thing to say, "OK. This option works great for a portfolio crediting strategy to hedge or to buy stop-loss insurance, and here is its tax implications," but it's another matter to put that in a company that may be terribly afraid of using derivative securities.

The other things which I do at Lincoln are in consort with the reinsurance. Last year, we built a fairly interesting model that would allow a group of insurance companies to get together to provide higher capacity in bank channels on single premium deferred annuities (SPDAs). This was an interesting problem because there are multiple insurers who are going to share a common credited rate and a common investment strategy. In order to work with them, we needed to show them the statutory accounting, the cash flow, and the spread probabilities, year by year, to show that this strategy works.

Finally, what I've really done for the last five or six months is to build what we consider to be a state-of-the-art equity-indexed annuity model at the Lincoln. This was done on the investment side of the business. It is a four-factor stochastic model that involves dividend yields, the stock index price, and two factors for interest rates. It was built by Mark Tenney. This has been an example of a place where practical ALM starts with a model because these are such new products, and their risk characteristics are so different, that you need a model in order to anticipate some of the kinds of issues that are likely to evolve. This has allowed us to anticipate the regulatory environment and the way we think it will move.

Mr. David A. Hall: I'm going to briefly describe part of the approach to restructuring our ALM that we're taking at Hartford Life. I'll discuss liability driven segmentation and our attempts to move beyond that. What do I mean by liability-driven

segmentation? It's a structure where each product line owns a segregated, diversified portfolio of assets. Schematically, you might depict it as a life insurance operation split into major product lines. In this case, I've chosen universal life, guaranteed investment contracts (GICs), and disability income as three potential splits. Each of those product lines have their own portfolio of assets, which are diversified by asset sector. For illustration, I will use mortgage-backed securities (MBS), asset-backed securities (ABS), corporate bonds, and commercial mortgage loans for the asset categories, but it could be a wide variety of different asset sectors. That's an approach that was started by some companies back in the late 1970s. I think we were one of the first companies to begin to segment our portfolio. Equitable was perhaps the most outspoken about it at that time. During the 1980s, many companies, ours included, got very good at splitting assets into more and more discrete product segments.

Where does liability-driven segmentation fall short? The bottom line is, it simplifies, but I don't believe it optimizes. What do I mean by that? It tends to inhibit the opportunity for the whole to be greater than the sum of the parts. Clearly, anything you can do by managing a bunch of smaller segments, you could continue to do in managing a larger aggregation. However, there are probably opportunities of which you're not going to be taking advantage when you're managing a bunch of small pieces. It's structured for the convenience of the insurance operations, not the investment operations. It makes investment performance benchmarking very difficult, and performance bench marking is really becoming one of the hot topics recently. You need to find ways to be able to track whether your investment managers are doing a competitive job versus their peers and versus market indices. Finally, it tweaks what are potentially contradictory accountabilities. I mean by that that there are certain items that drive performance, be it control of cash flow, modeling of liabilities, or investment decisions all of which by virtue of being collected and aggregated in one pot are often not individually tracked for their relevant contribution to the bottom line. This means that if something goes right, everybody takes credit, but if something goes wrong, it has been very difficult to find out who's not pulling their weight or perhaps more nobly, what needs to be done to fix the situation.

Is unsegmentation a better answer? I'd submit no, of course not, that there are a lot of benefits to segmentation that are important and need to be preserved. So what approaches could we use that would optimize investment performance? My perspective on this whole process is really coming from the asset side, where I saw a number of inefficiencies that were brought about through a strict liability driven segmentation. As an asset manager, I'd prefer to segment my assets by investment specialty. That may be, and in our case is going to be the investment sector. By that I mean corporate securities, MBS, ABS, and mortgage loans.

Every asset sector tends to have unique characteristics. If you're going to compete in each market, you need to have the best in the business making the decisions in those sectors. Having a diversified portfolio run by a generalist is not likely to give you that leading edge or competitive advantage.

Second, you need to manage those portfolios against relevant benchmarks. In our case, we'll be using customized market benchmarks that are fitted to the critical attributes for each portfolio, including those attributes that may be yield targets, spreads, convexity, duration, quality, and liquidity. Those targets should be driven by the product line. That benchmark should be realistically indexable. In our case, we'll actually be assembling a portfolio of real life securities for which we can track their real market prices, and essentially create a hypothetical portfolio, which, if the asset manager wanted to, he or she could presumably go out and index the portfolio or come very close to indexing that portfolio.

Finally, aggregate to the extent possible. Clearly you can gain some economies of scale. That's not my big pitch. This process is to be able to exploit the efficiencies of having natural risk offsets within portfolios, or perhaps to avoid spending time trying to cure risks which might look material to small product lines, but which get lost in the big picture and just aren't worth the management effort to try to solve.

How might we depict this asset-driven segmentation framework? Portfolios are segmented by market sector. I'll use the backwards image of the investment operation wanting to segment itself by market segment. Ideally, the mortgage securities manager would be managing a portfolio made up of cash flow from universal life, disability, SPDAs, or whatever other lines of business there are. Is there a way to get the conflicting models reconciled? Here is how we're going to try to have it both ways. Each product line, in this case I'll use universal life as an example, will create a benchmark portfolio, and that benchmark portfolio will presumably be made up of representative contributions from different sectors, in this case, corporate bonds, mortgages, and ABS. Each sector will have its own duration, convexity, yield, and quality characteristics, as will the aggregation of it all. It will be made up of market indexes with underlying actual securities constituting those indexes. We'll then consolidate each of those sectors and allocate them to a separate sector portfolio. So ABS will go into the asset-backed security bucket, mortgages will go into the MBS portfolio, and corporate bonds will go up to the corporate portfolio. We follow that approach for each product line. Each will come up with its own separate set of benchmarks, and then will allocate the pieces to the separate boxes. What you end up with is assets that are collected by sector, which can now be assigned to different sector specialists against the aggregation of all the smaller benchmarks that together make up that broad portfolio index.

What are the issues that we need to address while managing in this type of framework? First, each aggregated sector could be managed in house, and, in fact, most of them will, but management now can more easily be outsourced because you have all the representative product lines collecting their common sectors in one place. Second, the risk and return should be, and can be measured for each sector relative to its sector-specific benchmarks. We could score whether our corporate manager is doing well versus the universe of corporate securities, and capture not only the risk, which we've always been able to feel, but also the return. We have created a standard against which avoiding risk is no longer the benchmark. Rather, optimizing the risk/return trade off is very clearly the objective, because we can measure our performance against a broad market portfolio of relevant securities for each sector. The returns can then be allocated back to each product segment based upon the income from their relative benchmark portfolios. Frankly, we're stopping one step short at this point of the complete aggregation; we are still going to maintain some hard lines between broad division portfolios for our individual life and annuity division. We'll still have separated assets from employee benefits versus our asset management services line. We'll try to do as much aggregation within those broad divisions as we can, but our ultimate objective is to work towards getting as much high-level aggregation as possible.

We believe that these benchmark portfolios can be used as a means to equitably allocate the returns back to the lines, even though you'll be consolidating benchmarks within a sector that will have dissimilar characteristics in terms of duration, convexity, and the like. Then, the excess or deficient returns generated within each sector could be spread across all segments that are in that sector. For example, if our corporate sector manager produces an extra 20 basis points of return versus his index, everybody who is in that corporate sector gets 20 basis points of return over the benchmark return.

Why go to all this fuss? We believe that this allows product lines to continue to retain control of general investment parameters. In fact, as part of our structure now, the portfolio manager who will be allocating money to various sectors and creating these benchmarks will actually report to the life operations, and not the investment operations. So the product lines can drive a lot of the front-end, high-level, strategic allocation and risk profile decisions.

Investment managers can now meet their objectives and demonstrate that they're meeting their objectives by indexing, if that's what they choose to do. Or, they can try to add value by individual asset selection and tactical asset allocation within sectors. They might overweight or underweight certain industries in a corporate sector, or certain types of asset backs within the asset backs sector. These are decisions for which they probably have the best expertise on which to base those

decisions. Investment returns can be optimized through efficient consolidation or aggregation of common sectors which will then be managed by a sector specialist, hopefully one of the best in the business. This facilitates the optimal alignment of expertise, incentives, and accountabilities, with relevant performance standards in place to keep score. It allows people to make decisions, give them the power to make decisions at the level of their expertise, and it provides a scorekeeping mechanism to ensure that they balance the appropriate risk versus reward.

As I said, we're just getting to the starting gate, so I know how this is all going to work. It's up to us to actually develop it. John Wooden once said that it's what you learn after you know it all that counts, so I'll come back in another two or three years and tell you what we missed.

Mr. Doug Healy: Let me start by admitting that for a long time I didn't know what ALM was, that I did not have any insurance background, and I thought ALM was a common name for insurance professionals. It took me a while to figure out what ALM really was.

Here are two examples. When I was visiting a small insurance company many years ago, I met with the two gentlemen who were in charge of managing the investment portfolio. Since I didn't know the company very well, I wanted to get an idea of the framework for their investments. I asked them what type of products their company wrote. I got a blank stare and silence, and they looked at each other and said "Products?" I said Yes, What kind of liabilities does your company write and what do you invest against, and they looked at each other and one man said, "Well, we're an insurance company, I guess we write life insurance." They were very content in buying 10-year or 30-year bonds, and a collateralized mortgage obligation (CMO) here and there. It was only later in the day that I found out what the real assets and liabilities of the company were. I would say short game and putting were the assets, and a little hook off the tee were the liabilities.

I will invoke one of my favorite quotes, which is from Martha Washington, who said, "The greater part of our misery or happiness depends on our dispositions and not our circumstances." That's not to say a "Don't worry, be happy" attitude makes a good asset/liability model. There's no doubt that ALM presents an interesting conundrum. The fact is we've seen modeling and the management process go a long way in the last ten years. From the good old days of buying 10- or 30-year corporate bonds as typical assets to match life insurance liabilities, we've gone through duration targets, cash-flow matching, and now people are starting to use dynamic stochastic earnings and surplus optimization. The problem, as you move along that line, is that the model starts deviating with reality, and without sounding too pessimistic, I'm afraid that the reality of asset/liability modeling to an extent is

that the answer that you get from a good model is either one that people don't want to hear or it's one that you cannot implement.

I would like to present to you ALM from another view, which is the sales side. The sales people who sell bonds and derivatives to insurance companies get extremely excited at the prospect of a life insurance company customer. Here's what you need to provide to life insurance companies. They need high long-term returns; they need some exposure to short-term rate movements, they often need floors built into their asset portfolios in the 4% range; and they could use a great deal of protection as rates rise or even extending assets in a bare market environment. That's your ideal lotto jackpot to a bond salesman who gets to provide all those things. We forgot to mention that you can't buy equities. Everything has to be single-A rated or better, they don't buy floating rate notes, and they don't do any derivative transactions. They really prefer corporate bonds. That tends to temper their enthusiasm to some extent. A perfect quote last week arose from one of the derivative salesmen whom I work with who literally threw down his notebook and said "I give up, I give up on life insurance companies." The asset/liability process seems to present so much opportunity to sell derivatives, but they never do anything.

Let's go back to practical ALM as a conundrum. It seems as though in the environment we're currently in, there's an extremely uneven playing field in the ALM world. There are plenty of companies who have to pass full cash-flow testing for an actuarial opinion. Recently, I was visiting a company who asked, "Now, when you run those New York seven, you do not pass all those tests, do you?" As long as those two exist, it's a difficult environment. We have an environment that is extremely competitive for marketing your liabilities, and the rate competition is heightened. In addition, there now exists an extremely difficult environment to invest in spread assets with spreads very tight. So, as Don mentioned, it seems as though the company who built the perfect model for assets/liabilities, modeled all of the risk, and then managed an investment strategy to match that exactly, would not compete. It would probably go out of business.

For fear of sounding too depressing, I think ALM, if not *the* crucial aspect, is a crucial aspect of the management or the proper management of a life insurance company. The successful companies I see implementing ALM use it much the way we, as investment banks, view risk management. We have an entire risk management group that looks at our businesses line by line, mortgage trading, corporate trading, merchant banking, and investment banking, and tries to identify and quantify the risks in each of those businesses with a full understanding that it's those risks that make us our money. It's also a full understanding that quantifying and knowing those risks is what keeps us from going out of business. Most companies

who do ALM successfully look at it the same way. It's not a panacea, and it's not a solution to the risks embedded in life insurance. It is a way to know the risks embedded in each business and to hedge them when possible. But you must use that knowledge to manage more efficiently and to manage a more profitable business.

From the Floor: I have two questions. People have said that a shareholder in a stock company owns the pretax value of the assets, pretax market value of the assets backing the surplus, and the aftertax value of the assets backing the reserves. That is, you can say that one difference between the asset management for surplus assets and the asset management for reserve assets is that you expect to release that surplus. You expect not to have to pay taxes on having to sell it. What are your thoughts about investing differently for the asset supporting target surplus and required surplus, as opposed to investing for asset supporting insurance liabilities? Second, in the benchmarking process, in trying to set market indexes or market benchmarks for the investment manager's performance, how do you account for the tax costs of actively managing those portfolios?

Mr. Hall: I have a couple of comments. One concerns how you take into account the tax effects of certain strategies, and that can come through in a number of aspects. It could be investing in assets on a pretax basis that potentially offer what looks to be inferior returns, but because of unique or special tax treatment, aftertax clearly provides better returns. I don't think it matters whether it's backing surplus or reserves to the extent that we have structured notes or trust structures that have unique tax treatment. We consider those to be at this point nonbenchmarkable assets, and we'd be putting those in a portion of the portfolio that isn't subject to a benchmark because of their specialized nature. That will be the purview of the portfolio manager, again the people working for the product lines, to identify those opportunities and to put those in place. Asset sector managers will be measured on a total return basis.

However, there will be constraints in place. Obviously, we'll have to try to balance realized gains and losses to make sure we don't get overloaded one way or the other for tax purposes. Also, we will need to make sure we don't get any adverse surplus implications. There probably will be income type constraints. It will be up to my group to try to manage that process. In a sense, we will be allocating cash to the various sector managers, giving them targets, and constraints, but then trying to work with them to balance across sectors. It is not yet clear how all those constraints can best be managed, and we try not to avoid opportunities, but clearly some of the constraints are going to be an impediment to performance, and we're just going to have to manage that. Those that I've spoken to on that subject have done performance measurement on a total return basis have said that some of these

constraints are not as much of a hardship as you might think. If you know the rules going in, you don't set yourself up to have to pull triggers that you might be precluded from pulling. I think that's the bottom line. You need to have realistic expectations upfront. There are going to be some limitations. Don't buy an asset because you think that you want to flip it three months from now; it may be at a gain or a big loss and cause other problems.

Mr. Groover: Let's discuss how tax management goes into the whole mix when you're selecting assets. Hedging assets in particular can have radically different tax implications. So you know you want to accomplish a particular objective, with a derivative security, and the caps and swaptions come to mind. They have entirely different tax consequences, and they go back to how you're going to manage your credited rate if rates rise. That's an ALM example of where you can manage tax consequence when you're planning. Then there are corporate tax consequences, and that's really where the management part of ALM comes in. It is an overlay, and you need to make sure that a company has a great deal of tax loss carry forwards when interests rates are down. You need to be very careful that you don't sell long assets that would be backing a single premium immediate annuity (SPIA) portfolio. Therefore, ALM is done in order to maximize your tax position. Things like that can happen in large companies. They can also happen in small companies, just because there's a disconnect in trying to implement intelligent strategy, which is taking advantage of a tax situation, and recognizing that part of the ongoing business is ALM.

As far as the surplus question, we're wrestling with it at Lincoln right now; specifically do we have different investment policies for surplus versus income. It comes up over and over again. I have my own opinions about what is optimal that are probably somewhat different from Lincoln. In general, if I'm doing ALM for a new product like an equity-indexed annuity, I assume I have control of the target surplus. I want control of that because it's part of my whole design process in coming up with investment strategy. What I find in practice is that what is being done with surplus at companies that invest surplus differently, usually can be accommodated in my strategy. It is more of an academic debate than it turns out to be a practical one.

From the Floor: With respect to excess lapses, which are certainly a significant part of the cash flow, almost all the software packages give tremendous flexibility in coming up with the relationship between excess lapses and interest spreads. However, knowing what this relationship is for your company becomes a little bit more difficult. My understanding is that a major company which tried to do a study historically, saw an inverse relationship from what they would have expected, and decided to throw out the real data and put in what would make sense. Are we as

actuaries fooling ourselves, saying we have the sophisticated software and real esoteric relationships? We'll put some numbers in the model and project a good cash-flow stream. Are we better off using a stochastic process and trying to take some kind of range of what might happen or should we be looking at something other than interest rates? In my company, I took a look at employment rates and unemployment. I saw a much better relationship between excess lapses in unemployment than I saw between excess lapses and interest spread.

Mr. Rafson: I was just talking to an actuary recently who was telling me that they found policy loan activity increased right before Christmas every year, and repayments in the spring. So I think that's an excellent point, and yet I think on the whole, the industry does experience excess lapses, but we just haven't had a major upturn in rates and double digit returns in the past number of years. The last time we did, we weren't tracking interest-sensitive lapses. I think that the industry may get better data after the next interest shock, unfortunately.

Mr. Groover: The interesting thing about insurance products and the way they're managed from the liability side is that you don't tell customers what they're going to typically get. Three-year and five-year products tend to carry a guaranteed interest rate for three to five years, but most SPDAs are out there with a floating index. It's a "trust me" product. It's very difficult, therefore, to use economics to say what the customer's option is, because the customer is trying to make a complex decision even if he or she is rational. Actually rational customers wouldn't buy these products, which makes it really difficult to model their behavior. So to weigh in here, we really don't know what's going to happen, and companies don't know what they're going to do. For example, think of a company with a portfolio credited strategy. What do you do, when all of a sudden, the portfolio is lagging market rates because it's too long? Are companies going to subsidize their rates? Will it be effective in stemming lapse? These are open questions. Interestingly enough, with equity-indexed annuities, because the industry is basically making a guarantee to a customer, and it is not a "trust me" product, you can calculate what home economics would do if he or she owned that policy. It's possible to create what an economist would call a rational lapse model. You go into a company and find its customers are brain dead. They're not going to behave that way. It's an art.

From the Floor: So if we don't know, is it just wishful thinking? Are we putting in formulas that give us the results that we are hoping for? Are any companies saying forget about the esoteric formulas? Are any companies just saying let's take a New York seven of possible extra lapses, or just do something stochastically by putting in a worst case and best case?

Mr. Groover: We do that in the form of sensitivity testing and modeling. We will use a model that is based on spread, but we will definitely double lapses and halve

them. When we are designing an investment strategy, depending on the client's risk preference, we will try to take that risk preference into consideration, in terms of the sensitivity testing. With lack of real hard evidence, that is what you have to do.

Mr. Hall: I frequently hear at actuarial meetings, particularly in the last several years, that we just haven't seen a good historical period to measure what lapse experience is likely to look like with a great spike. I submit we have, and you just need to use a little imagination here. We went through a period of interest rate shifts in the other direction, and saw mortgage prepayment activity, which effectively is the flip side of the lapse rate issue. Mortgage securities were more or less attractive based upon the degree to which you thought that the refinancing option would or would not be exercised efficiently.

In general, all models that were calibrated to fit historical data indicated, even as recently as four or five years ago, that it was going to take about a 200-basis point gap before people really caught on to refinancing in order to pay the points. That's in order to get them to notice what it was going to do. All sorts of friction costs were assumed to be overcome at about that level. Then you'd see models that would show maybe a short burst of activity, but perhaps tabling off at 30–35% refinancing per year. Lo and behold, we got into an environment where at 25 basis points off market some innovative capitalist found a way to offer "no points" refinancing, and the technology allowed that process to take place at the push of a button. All of a sudden, all you needed to do to refinance your mortgage was pick up your phone and tell your mortgage broker do it again, and people did it again and again. We saw annual lapse rates on mortgages that approached 70% for as long as a year; these were results that were off the charts historically. Economically, you could understand why that level of inefficiency that had been presumed to be endemic to the system just could not persist. There was too much money for somebody to take out of the system to get people to "pick up some of that money on the table."

If we got interest rates spiking in the other way, you will one day pick up your *USA Today*, and on the front page of the green section it will say "Have you refinanced your annuity?" and if not, "Here's the 800 numbers of the top five annuity refinancing companies." All of a sudden, what was perceived to be a two-time standard assumption based upon this nice S curve, gets blown through the roof as everybody runs to get the extra 25 or 50 basis points of return that previously would not even register. There are many customers whom we assume are brain dead, and many of them have historically behaved that way. We made exactly the same assumptions on mortgage refinancing five years ago, and anybody who doesn't look at that

experience as relevant, as something that teaches us what's going to happen on the other side, is overly optimistic.

Mr. Healy: It should be added that the people who brought on that refinancing wave were the mortgage bankers themselves, and it will probably be your fellow competitors who are calling your annuity holders to make sure they know that your rate is below market.

Mr. Martin Sher: I'd like to ask David Hall how much difference he sees between what banks currently do with a treasury function, transfer pricing between units, and the treasury function?

Mr. Hall: I think it's similar, but different. We stopped short of going to a full fledged transfer pricing system. We probably have some common misunderstandings about how that all works. The idea would be, in an insurance context, that the people packaging and selling the liability are cash-flow gatherers, and the people going out and investing the funds are cash-flow investors. You approach the decision somewhat independently. You try to establish some sort of a transfer-pricing mechanism to allow the gatherers to gather at the lowest cost possible, and the investors to invest at the best return possible, and have a structure that allows them not to have to talk to each other. Maybe that works. Maybe that could work. We stopped well short of that because we think that there are some interesting relationships between assets and liabilities that create the whole that we didn't want to detach at this point.

There are investment strategies that probably need to be driven by the product structure. With the advent of derivatives, perhaps you can manage many of those risk structures independent of what the asset manager is actually out there buying by loading up the portfolio with many derivatives to tweak your risk profiles independently which gives chief financial officers (CFOs) the willies. Second, the accounting for derivatives is almost moving at odds to the understanding of derivatives. We're getting to a point where, as Doug's worst nightmare, everybody finally understands they really do need derivatives, and these things could work from an economic standpoint. However, the accounting is just so mixed up that you can't do it. It feels to me like we're headed that way to some extent. I think without decent accounting mechanisms to bring those pieces together, it just really makes a pure transfer pricing mechanism problematic.

Ms. Donna R. Claire: Then I would like your reaction to it. Other than CMOs, how many of you here in the audience are invested in derivatives? Actually that's bigger than I expected. We asked the same question at a senior actuaries forum for the northeast and the answer was Not many. One of the problems people gave was

they don't have decent enough models for the ALM process. They don't feel comfortable putting it in. So even if they were investing in them, they were not reflecting them in their products. Are the panelists seeing that?

Mr. Groover: I would say that the models don't handle derivatives very well. They may do something like an interest-rate cap in which they may do a good job of the cash flows. They're going to fall down in pricing, and that's problematic. If you're trying to do a model, you're going to have some problems with that kind of thing. However, this is one of the beauties of the generic benchmark approach, which is really what Dave was saying. On the liability side you have a product line manager actively engaged in coming up with asset allocation, hopefully with the advise of investment professionals. He or she is not necessarily using true assets; he or she is using generic assets. Product managers may use a three-year or a seven-year bond, with appropriate spread, perhaps with average-yield enhancement that you could expect from the investment operation. Those kinds of assets are better handled in the simple kinds of models because the actuarial models such as PTS and TAS are probably weakest on that side. They can handle more generic kinds of assets.

An actuary that's doing ALM and a product line manager associated with that asset ir liability can get a great deal of mileage out of that model, and they can see how the cash flows are going to work out of a cap or out of a swaption, or out of a swap. Then it becomes a secondary matter to make that an investable benchmark with appropriate restrictions on sector diversification and things of that nature. Dave and I agree that is a good way to think about restructuring an investment operation. There is inadequacy in the models, and with the equity-indexed annuities, we had to start from scratch to build models of these equity options.

Mr. Healy: It's true that the systems aren't that great, but that shouldn't be a hindrance to participating in the derivative market. In fact, I'm surprised more people didn't raise their hand, if any of the companies you work for write an annuity that has a guaranteed rate in it, you are investing in a derivative. You happen to be short a floor, but you have an option position on your books, and if you don't have the capacity to either model it or price it, then you're writing options you don't know enough about, which is a dangerous situation. Despite the fact that the word *derivative* is bad, it is embedded in our business on both sides, whether you're buying MBS or writing your traditional life insurance, so it's not as easy a question as posed.

Mr. Hall: To avoid derivatives because it's inconvenient for your models is really a copout. In fact, it's a job opportunity for actuaries who are supposed to be good at valuing those things that you can't push a button and do. Those of you who want to wait for the button to come, are asking to be replaced by that button. I buy fire

insurance on my house. I don't know exactly what the replacement cost on my house is going to be. I also don't know what the flash point is that's going to cause it to go up in flames. I just know that if my house burns down, that's bad, and I don't want to be stuck without insurance. So I buy insurance, which is a derivative. It pays off in the event my house ceases to exist. I just know I need a lot of that, and I don't try to calibrate that decision down to the last basis point so I've got precisely the optimal amount of insurance that kicks in just at the moment my house kindles. Many of our liabilities are exactly the same. We know if rates go down to 3% and stay there forever, there will be some problems. If that happens the whole industry is in trouble and you take some comfort that there might be some regulatory solutions. By and large, when it's cheap to buy insurance against that, you probably want to be doing so. We know that when rates go up, those of us who have surrender values that can go out at book, are going to go. We don't know exactly how fast they're going to go. It will probably go faster than we're expecting right now. We know there are tools that help to ensure against that. If we're not a button push away from the solution and therefore don't do anything, we'll get what we deserve. Probably part of the answer to Donna's question would be that her real question was how many companies use derivatives and are willing to admit it. In today's environment that might elicit a different response than the one she actually asked. I think, in effect, all companies are involved in derivatives whether they call them that or not.

From the Floor: I have a question about risk measures. Chartered financial analysts (CFAs) and master's of business administrations will tell you that you want to compare the risk of an investment to its return. The return is expected income. The risk is a standard deviation of earnings or the standard deviation of the market values. However, when you look at a portfolio of options, which insurance companies are, you find that's not very appropriate. My question for you is, other than looking at the net present value of distributable earnings, looking at the tail of that distribution, what risk measures do you think are particularly useful, interesting, or relevant for ALM in an insurance context?

Mr. Groover: We use the tail of the distributable earnings at Lincoln internally. That's what we look at.

From the Floor: Nothing else?

Mr. Groover: We show management the entire distribution. The tail is what they look at, but much of our internal process is based on what happens in the tail in terms of risk.

Mr. Healy: To continue my corollary about investment bank risk management, when looking at a portfolio of assets or bond positions, which is the same way that I, as a portfolio strategist look at your bond portfolio, I see a number of different measures. One would just be duration of the assets versus the liabilities, or their pure interest rate sensitivity. We would also look at the sensitivity of the assets or the liabilities at different movements of the curve, which is a curve duration measure. We look at an option-adjusted duration measure to get an idea of what the options would be. Beyond that, we look at a convexity measure which determines how much the duration is going to change for changes in interest rates. We also look at a volatility or Beta measure to find out what the value of assets or liabilities would do with the change in interest rate volatility. Those are essentially the five risk measurement techniques that we use when looking at asset portfolios. At least from my view of an insurance company, this is more on the asset side, but matching the same types of risks on the liability side. That would be the framework we use when quantifying it.

Mr. Hall: I think risk is probably best defined as whatever your president, CFO, or chief actuary worries most about. So you probably need to talk to them to decide what matters. Looking at pure mark-to-market value on the assets clearly is not the right answer. Look at net economic present value, distributable earnings, or something that brings assets and liabilities together misses some things that I think can be critical and can lead you away from some solutions that maybe are more intuitive if you stop trying to convert it to science and begin to think about what matters. Part of the benefit to the approach that we're moving to is that by virtue of creating these benchmark portfolios for each line of business, we'll have a set of generic assets that we can put into some of the liability models, that are easy enough to model that we can begin to do a better job of some of that stochastic testing, stress testing, and "what if" testing. I expect this to be very much of an iterative process that we're going to learn by doing, and not by me talking.

Mr. Groover: Another thing that we do use in product development that I think is really interesting is a probability distribution of earned spread. If you're running a spread business, like an SPDA business, that can be really interesting. As you change your asset strategy, as you change your crediting strategy, look to see how sensitive that spread is or what the probability distribution is to the earned spread. I think that gives people a good picture of how the business actually works or could be modeled or simulated to work. So that's something that we use as well.

From the Floor: I just wanted to follow up on this subject briefly. I think this issue of risk/reward tradeoffs and defining the right risk/reward profile for a particular line of business is an area where actuaries can contribute significantly. I think there's a

panel discussion that will deal with quantitative assessments of risk and reward that companies are using in practice to actually make some of those decisions.

Mr. J.D. Have: I wanted to get back to some simpler things. I was interested in some of the things Dave Hall was talking about. I wanted to get into some of the nitty gritty details of exactly what it looks like, particularly what the investment looks like when it comes back. How do you figure out what belongs where? Do you physically allocate individual assets?

Mr. Hall: We spend a great deal of time looking at that. There's a lot of dirt in the details. How do you get these benchmark portfolios pulled together? The concept is simple, but the execution may be difficult. We're relying heavily on some software that has been provided to us by one of the Wall Street firms that allows us to extract market data on real publicly traded securities that are part of the broad market index. They are extracted based upon characteristics, so that if we want a benchmark of all single-A, noncallable corporates maturing in ten years or less, we can pull that down. We can measure its market price. The market prices that we'll get will be the same prices used for that particular security when it's part of the broader market indexes. That allows us to be very objective and to grab the broad market of securities that we think are relevant for our portfolio.

What's more important is it allows us to screen out those that we think are not relevant. It doesn't mean that the asset manager is screened. If the asset manager thinks that callable securities are cheap, and we've given them a benchmark target that's fully noncallable, he can go out and buy callables and hedge the risk. The rest of the market is available to him or her to explore. Our benchmark is going to be set up so that if we wanted to have a computer run the business, we could do it. We could just go out and essentially "snug up" to that basket of securities. By virtue of that, we're hopefully going to get the best trade-off of risk/return we can. The culture has developed such that risk avoidance tends to be almost the mantra to some people. They know that (particularly in investment grade debt securities) winnings are hard to find, and losings are very easy to notice. Given that nobody wants to explain why they approved the purchase of something that just went in to the dumper, there's a tendency to avoid those things that perhaps are more likely. However, those things that are more likely to get one into trouble typically offer you better net returns than those that don't. As a consequence of the risk-avoidance approach, I think you tend to be investing in the low/risk, but low/return portion of every market. This is going to try to force people to take that broad market perspective, one where avoiding risk, avoiding any sector of a market, isn't safe if that's the sector that produces higher returns. We want to get as broad a market sector as we can, while clearly zoning out those things that we think are not appropriate for what we're trying to do.

Mr. Groover: We do the same thing in that we typically use the Lehman Brothers on the corporate side. We could take that whole index apart, reprice it, and create custom benchmarks. This has been a two or three year process at Lincoln. At this point, we basically use two stages. We can work with generic assets, which are simple nonentity, I mean representative type corporate bonds, representative of swap arrangements. Then, from there, go to an investable benchmark that embodies those kinds of characteristics. That also has our diversification requirements for portfolios. It has any investment constraints that we want to impose. Many client companies will have a huge component of their portfolio that's buy and hold, so you have to build that into your custom benchmark, otherwise your performance measure, or what you're measuring your portfolio manager against gets totally out of wack. So yes, there are many dirty issues. As Dave says, that's one place where actuaries can really make a huge contribution in this process, because they have to come in and say look, we have a buy-and-hold component. You have to deal with that in the performance measurement.

Mr. Harvey Halpert: I'm interested in hearing about some of the techniques, ranging from crude to sophisticated, that are being used. What has been gleaned from the surveys about what is being done with ALM practices out in the industry?

Mr. Rafson: I think one of the more depressing answers is that many companies are doing very little, yet I think that's common, although not something I would recommend. Many companies simply don't have the time, resources, or interest, and I'm not sure why they don't have the interest in doing this. A fairly common technique is to look at cash-flow testing as a very broad brush risk analysis tool and say we're too long or we're too short, and use that very crude basis of deciding. I think we ought to shorten, or we ought to lengthen, or we ought to protect against this scenario. I would say from my less sophisticated clients, that's a step forward. To some degree, the gentlemen you see here and the people you see speaking at any of these meetings, are going to be on the leading edge, and you're not going to see people standing up here saying I really don't have any idea what we're doing. Unfortunately, there are many of those out there.

There are a number of surveys out there. The survey by the Finance Practice Education Committee asked whether actuaries were aware of this technique, or that technique, and duration was fairly well understood. Modified duration was almost as well understood, but perhaps even those concepts that some consider fundamental were not universal. When you began to talk about more sophisticated techniques, there was a dramatic drop off, and as middling an answer as it may be, I would say practice varies, and there was a bias in the survey towards the more sophisticated people returning, because people don't like to say what they don't

know. So there was a problem with the survey that I think was endemic in it. Mike Hughes could probably answer more specifically.

Mr. Michael A. Hughes*: The survey was trying to address quantitative techniques which companies are using to address issues. We asked about both techniques and measures that people were aware of. We asked about the techniques and methods that are actually used in practice at their companies. We recognized that the survey was not scientific in nature and that it didn't necessarily represent the industry practice very well from a scientific standpoint. It did give us some quick feedback on developments in the industry.

What we're seeing is that most everybody understands the basic concepts of MacCauley duration and modified duration, and so forth. Increasingly, there's a much greater awareness of option-adjusted duration, convexity issues, partial duration, and so forth. I would say that companies are becoming more sophisticated in understanding the liability side of the balance sheet. They're using more quantitative tools to address ALM issues. I think that companies are struggling with how to pull all those tools together to make decisions. They're struggling with some of the big messages that came through the survey loud and clear. One was that practical implementation issues are really holding many companies and individuals back. There's a brief article in an issue of *Risk and Rewards* [July 1996] that provides some highlights of the survey results.

Mr. Howell M. Palmer, III: It seems to me one of the challenges that we all face is getting senior management, who may not be technical people, or investment individuals to buy into this whole process. Could you comment on some of the challenges and maybe helpful hints you might have for those of us that are struggling with getting from the models to the board room with this issue?

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*Mr. Hughes, not a member of the Society, is a Partner of Ernst & Young LLP in Chicago, IL.

Mr. Hall: Quite frankly, the catalyst for our process was really that Hartford Insurance which had been part of ITT, went through a spin-off in late 1995. Hartford was a large piece of ITT prior to that, but we had no separate identity in the stock market; we did, however, have our own CFO. ITT headquarters is where much of that process took place, and so many of the questions weren't even being asked at the senior level. As part of our spin-off, our chairman decided we really ought to have a CFO so he brought one in. In fact, the CFO we got came from a finance company and had some banking background as well, and his first thought was that we ought to install some sort of a transfer-pricing mechanism just like banks. That got the process started. We had all sorts of initial reactions to it. To some people, transfer-pricing was the great evil empire, everything that was wrong could be embodied in moving to transfer-pricing, so it immediately started a great deal of discussion. We had some consultants in to talk about how transfer-pricing characteristics or techniques could be useful. They explained how to try to jam transfer-pricing down, but that there are better ways to do things. In the process of getting people talking about the issues, we very quickly recognized some inefficiencies in the system, particularly areas where conflicts tended to be festering, and where there was no good conflict/resolution mechanism because everybody was responsible for everything; therefore it was always easier to blame. Through the process of discussing all of those things, while pure transfer-pricing was not the elegant solution here, it was clear that doing nothing also was not appropriate, and it was really pushed down from the top.

Once we got started at the middle level where the action was, it was clear very quickly that there were some opportunities to do things, and with the impetus coming from "on high" to improve ourselves, I was amazed at how quickly things actually developed. I really think you need to have some "buy in" from on high because some people have to give up some turf as part of this process, and unless they're really on board and want to get something done, I think the politics get thick very quickly.

Mr. Rafson: I would also add that each appointed actuary has an opportunity to communicate with the board of directors. In a very diplomatic manner, each appointed actuary has the ability to raise top management's awareness of its risk profile, and, if used well, that can be a tool to begin or encourage that dialogue.