RECORD, Volume 28, No. 2*

San Francisco Spring Meeting
June 24–26, 2002

Session 133PD
Health Valuation Issues: Nontraditional Health Products

Track: Health

Moderator: JOHN I. MANGE
Panelists: JOHN S. CATHCART
                    DAVID WILSON

Summary: This session provides an overview of industry approaches to valuing the liabilities of nontraditional health products. Liabilities for losses that have been incurred but not reported and for losses that have been reported but not paid are examined. These liabilities are considered from both insurer and reinsurer perspectives.

MR. JOHN I. MANGE: Our panel members include David Wilson, who is with North Shore International Insurance Services and APEX (NiiS/APEX). David is the president of their ventures group. NiiS/APEX is a consulting and insurance services organization that specializes in actuarial, underwriting, claims management, and auditing services. NiiS/APEX was recently acquired by Arthur J. Gallagher & Company. David is going to discuss the valuation issues relating to provider excess. The other panelist is John Cathcart, who is vice president and actuary with General/Cologne Re. General/Cologne Re is one of the world's leading reinsurers of critical illness products, and John will discuss valuation issues in relation to critical illness. My name is Jim Mange and I am the CEO of Health Reinsurance Management Partnership (HRMP), which is a reinsurance management and third party administration firm that provides Accident & Health reinsurance and outsourcing solutions throughout the United States and internationally. I will discuss medical stop loss valuation issues.

Medical stop loss is a product that indemnifies employers against excess losses incurred by their self-funded employee benefit plans. Excess losses may be incurred either individually, meaning that single covered lives incur a large amount of claims,

_____

Note: The chart(s) referred to in the text can be found at the end of the manuscript.

or in the aggregate, meaning that the group incurs claims that are much greater than expected. We'll look at valuation issues in relation to specific and aggregate stop loss separately, as well as from the insurer's and reinsurer's perspectives.

I will begin and spend most of my time on specific stop loss. Let's spend a minute talking about how development factors work with specific stop loss. Specific stop loss triangles do not examine the dates on which losses were paid and incurred. Instead, specific stop loss triangles examine policy effective dates versus the date on which losses were paid, because of the difficulty defining the incurred date in relation to a specific stop loss claim. Is it the date the claim began? Is it the date the specific deductible was pierced? It could be a wide variety of dates, so to get a consistent definition, it's typical in the industry to compare the policy effective date to the paid date.

Paid losses to date are divided by the development factors to estimate ultimate losses. Ultimate losses are divided by annualized premiums to estimate the ultimate loss ratio. The estimated ultimate loss ratio is multiplied by earned premiums to date to estimate claims incurred to date. Finally, we subtract claims paid to date from claims incurred to date to calculate our reserve estimates. Our estimate of reserves, then, is an estimate of losses that are incurred but not paid (IBNP).

In Table 1, there's a column labeled " Society of Actuaries Study." Paul Fallisi conducted this study. Paul is an FSA with Cairnstone, a Miami-based MGU. He presented this study at a Society of Actuaries seminar in October 1999 called "Current Issues in Employer Stop Loss." He surveyed five different stop loss carriers and stated that four of them identified development factors that he characterized as close to the results reported here. He believes that the factors represent a mix of contract types, meaning, for example, a paid contract or a 12/12 or 12/15 contract.

Table 1

Employer Stop Loss
Specific Loss Development

POLICY MONTH	SOA STUDY	MGU 1	MGU 2	MGU 3	MGU 4
5	9.0%	10.9%	9.9%	10.0%	8.8%
10	42.0%	40.6%	42.3%	47.0%	46.0%
15	90.0%	94.6%	91.5%	89.5%	90.7%
20	97.0%	98.6%	99.8%	98.2%	99.2%
25	100.0%	99.8%	100.0%	99.8%	100.0%
30	100.0%	100.0%	100.0%	100.1%	100.0%

4

Let's take a look at what these factors actually mean. If you look at the 42 percent factor, it means that at the 10th policy month, the carriers in Paul's survey estimate that they have paid 42 percent of their ultimate claims for a policy that was issued 10 months prior. If you take a look at the next step in the table, approximately 50 percent of claims are paid between the 11th and the 15th policy month, so a substantial portion of claims are paid after the policy period has actually ended.

The factors that are reported in the columns labeled MGU 1, 2, 3, and 4 are factors that come from studies that I performed in 1998–99 of separate MGU clients of HRMP. I conducted Monte Carlo simulations of the development process. I started with thousands of individual claim records. I built them into claimant records, then built the claimant records into policy records and was able to map out the development of a block of policies. I assumed a block of 150 policies, which would generate about $15m² of gross premium.

I think it's helpful to look at these factors in relation to the SOA study. The factors for MGUs 1, 2, 3, and 4 are what I would characterize as best-estimate factors because they have no margin for adverse deviations. If you compare the SOA study to the factors that I developed, you see that the SOA study stacks up pretty sensibly next to the best-estimate factors. If you look at the 10th month, the 42 percent factor lies somewhere toward the low end of the range for the different MGUs.

I'd like to help you build a better appreciation of and intuition for the volatility of the

development process. I think everyone knows and understands that at the fifth policy month, for example, the results are going to be quite volatile. You've got a factor of about 10 percent. If you have a swing, anywhere from plus or minus two percentage points, your development factor runs from eight percent to 12 percent. Obviously, that would give you a wide range of reserve estimates. I think it's less obvious that, even at the 10th policy month, there is substantial volatility.

Let's take a look at the example in Table 2. We have $10 million of annualized net premium for MGU 1 and MGU 3. (By net, I mean the gross premium less any ceding allowance. The ceding allowance would include a producer commission, underwriting fees, carrier fees, and premium tax.) For example, let's say the paid losses to date are $4 million. The development factor at this point for MGUs 1 and 3 are 40.6 percent and 47 percent, respectively. Estimated ultimate losses are $9.8 million for MGU 1 and $8.5 million for MGU 3. That is the difference between a profitable and an unprofitable program for the reinsurer. Even at the 10th policy month, between different MGUs you get a wide range. Moreover, these are the expected development factors. Let's examine the variances of these factors.

Table 2

Specific Stop Loss
Expected Development

DURATION 10	MGU 1	MGU 3
Annualized Net	$10,000	$10,000
Paid Losses to Date	$4,000	$4,000
Development Factor	40.6%	47.0%
Est. Ultimate Losses	$9,852	$8,511
Est. Ultimate L/R	98.5%	85.1%

- And these are expected development factors!

5

What you're seeing in Chart 1 are the actual simulated paths of the development process. (Note to the reader: Chart 1 was animated.) I have 1,000 different scenarios, and I've randomly selected 10 different paths that the development process follows in my Monte Carlo simulation. All of the paths are going to converge at $10 million. You see some of them start below $10 million and then go

up. Others go up a lot and then come back down. You can see the enormous range, and I think it's important to see that there's quite a wide range even at the 10th, 11^{th,} and 12th policy months. It takes a long time for this business to develop.

In your reserving process, how you would recognize what happened and how this developed? How would you recognize whether your losses are coming in higher or lower than what you'd expect at the 5th, 6^{th,} or 8th policy month? It presents a real challenge to the valuation actuary.

Chart 2 is the distribution of the development factor by policy month. At month five, we've got a right tail distribution. As we move on toward month 10, we've got something that's more symmetrical, and then when we go to month 15, it's somewhat left tailed. Those results aren't terribly surprising, because there are natural limits to this distribution. It normally should range between zero and 100 percent. Sometimes you'll see factors that will be a shade above 100 percent, but eventually it will settle down to 100 percent. By month five, we're about 10 percent developed. Over the next five months, we develop another 30 percent to 40 percent, and at month 15 we develop another 50 percent to a 90 percent development factor.

Chart 2, to some extent, disguises the volatility that you actually observe in the first several months, so I want to discuss normalized development factors (Chart 3). To normalize the development factors, I divide the development factors at each month by the means at each month. At the very first month, we actually have a bimodal distribution. A lot of the development at the first month occurs in the general range of 20 percent of the mean, but the other mode shows up at 200 percent of the mean. In fact, one of the simulated paths was as far as eight times the mean factor. In month two, you have almost a uniform distribution. In month three, we're starting to see it emerge more bell-shaped. By month five, the factors are still running somewhere between 25 percent and 240 percent of the mean development factor. At month 10, they're running between 47 percent and 144 percent of the mean development factor. At month 11, the distribution finally starts to tighten up, and by month 15 it ranges between 92 percent and 104 percent of the mean development factor.

Table 3 shows the percentiles of the distribution at the 5th, 10th, and 15th policy month from the development factor study of MGU 1. At the 5th month, a factor of eight percent will overstate the liability 75 percent of the time. At the 10th month, there is a 50 percent chance that the factor falls between 36 percent and 45 percent. At the 15th month, the left tail distribution can be observed. From the first to the 50th percentile, there is a five percentage point difference in the development factor, but from the 50th percentile to the 99th percentile there is only about a three percentage point difference.

Table 3

Specific Stop Loss Development Volatility

MGU 1

POLICY MONTH	PERCENTILES OF DISTRIBUTION								
	1%	5%	10%	25%	50%	75%	90%	95%	99%
5	3.5	5.0	6.0	8.0	10.9	14.1	16.7	18.6	23.2
10	25.9	30.2	32.1	35.9	40.6	45.2	49.1	51.3	56.5
15	89.1	91.0	92.0	93.3	94.6	95.8	96.7	97.2	97.9

9

Table 4 shows what this means in terms of loss estimates and reserve estimates. Looking at policy month 10 — again we'll start with $10 million of annualized net premium and $4 million of paid losses to date — the development factor at the 10th percentile is 32 percent. At the 25th percentile, it's 36 percent. At the 50th percentile, it's 40.6 percent. At the 75th percentile, it's 45.2 percent, and at the 90th percentile, it's a factor of 49.1 percent.

Table 4

Specific Stop Loss
Projected Loss Volatility

MGU 1

POLICY MONTH 10	PERCENTILES				
	10%	25%	50%	75%	90%
Net Annualized	$10,000	$10,000	$10,000	$10,000	$10,000
Paid Losses to Date	$4,000	$4,000	$4,000	$4,000	$4,000
Development Factor	32.1	35.9	40.6	45.2	49.1
Est. Ultimate Losses	$12,461	$11,142	$9,852	$8,850	$8,147
Est. Ultimate Loss Ratio	124.6%	111.4%	98.5%	88.5%	81.5%
Reserve	$6,384	$5,285	$4,210	$3,125	$2,789

10

Our best estimate loss ratio using this set of factors is 98.5 percent. There is an 80 percent chance that our ultimate loss ratio is between 80 percent and 125 percent. That is a wide range. We don't know an awful lot about ultimate losses, even at the 10th policy month. There's a 90 percent chance that the loss ratio is better than 125 percent.

I hope I've convinced you that for specific stop loss policies effective within the last 12 months, the development process is subject to a considerable amount of volatility. Given this uncertainty, what can we do to try to value specific stop loss liabilities for policies issued within the last 12 months?

From the insurer's perspective, I have a number of suggestions. First, it is reasonable to expect that development will be different by contract type as well as by first and renewal business. In fact, I have studied first and renewal business separately, and there was a striking difference in the development process between them.

Recall that the development factors reported here are for losses that are incurred but not paid (IBNP). You could make an effort to break that down between incurred but not reported (IBNR) and reported but not paid (RBNP). In doing so, you remove the uncertainty in your estimate of IBNR that relates to the time paid once you know about a claim.

Third, you can try to project your ultimate losses based upon early payment information and diagnosis information. This is a pretty common approach, and it can be a good test, especially in early months, regarding whether or not the development factors are leading to an unreasonable result.

Finally, you can credibility-adjust the development factor. I do this with a loss-ratio method, but there are other ways you could do it. Credibility, of course, is simply averaging two different estimators in order to minimize the variance of the result. You could use your pricing assumptions as your global estimator and your development factors as your local estimator in the credibility process.

Reinsurers face a number of additional issues when compared to the carrier. We have less data than a carrier. For example, reinsurers may not have information about policy effective dates that are in a useable electronic form, so the reinsurer may have to value their liabilities by treaty effective dates and not by policy effective dates. This produces a very long tail, and it makes the development process very volatile. Reinsurers often receive the data later than the carriers. Typically, treaties require treaty holders to send their data to the carriers within 45 days of the end of the reporting period. The insurer can make use of its data, but the reinsurer has to wait 45 days for it. If the treaty has poor reporting, the reinsurer has to wait even longer to get some meaningful information. Lastly, there is inconsistent reporting among the different programs that reinsurers write, especially with respect to reporting of open losses. Some MGUs or carriers will project their future losses, but then they don't update their projections as losses are paid. When this occurs, their loss projection has no meaning.

What can the reinsurer do? As the market has hardened — and the hardening of the market has been a true blessing from this perspective — many reinsurers have been able to obtain data in electronic format as soon as it's available. In fact, some reinsurers are able to obtain their data before the carrier because these programs know that they have to make the reinsurer happy. They want to demonstrate that they've made the improvements that the reinsurer has insisted that they make. Reinsurers now receive detail that they could not obtain four to five years ago. Another option is to credibility-adjust the loss development process.

Finally, you might ask, "Why don't reinsurers require information about reported losses?" The reason is, the inconsistency in reported information. Inconsistent data is so much more problematic that it may not be worth trying to manage it.

Let's take a look at some valuation approaches that insurance companies might take regarding the aggregate stop loss. You have two basic forms of the product: the accommodation product, where you're paying benefits monthly; and the annual product, where you just pay benefits once a year after the policy period has ended. If you were to make a substantial change in your mix of accommodation versus annual business, you'd have difficulty trying to map your historical development process to the current development process. Consequently, most carriers don't

apply a development approach to reserving aggregate stop loss. As the market has hardened, we've actually seen people shift from the accommodation form to the annual form of the product.

When I was working for a carrier I tried to compare losses to date to my pro rata attachment point to date to see where I stood, then I generally could come up with a respectable reserve estimate. Another thing you can do in applying this process is to adjust for any known large losses on the programs. Also, from a theoretical perspective, you have an attachment factor that is a flat factor for the entire year. But in theory, it starts a little lower and it trends up toward the end of the year, so you could adjust your monthly attachment factor, recognizing the effect of that trend and, perhaps, improve your reserve estimates.

Reinsurers face the same issues with the specific. Reinsurers have less data, receive it in a less timely fashion, and the reporting is inconsistent. Moreover, the premium is typically only 10 percent of the specific. I've even seen programs where it's been five, six, or seven percent of the specific. It tends to receive less attention, although as at least some of us have experienced, the aggregate has added a considerable amount to the loss ratio of the overall program. It's a pretty highly leveraged product.

What can the reinsurer do? The same things they do on the specific. In the harder market, we can try to obtain the same data that the insurer is obtaining, but we can also monitor the reinsurance underwriting audits that we all ought to be doing. We can use those audits as an opportunity to identify how an attachment factor is being developed and identify some problematic cases where we may want to set up an aggregate stop loss reserve.

MR. JEFF LOOKLONG: I am with ESG Re. Should we also consider separate specific stop loss development factors by deductible?

MR. MANGE: I have looked at that. There is some value in it, but it's not as useful as you might think because, for a lot of large losses, you incur a large portion of the expense in a fairly limited time frame.

MR. LOOKLONG: We find that large-employer clients tend not to need the reimbursement back as quickly as small employers do. Sometimes claims backlog, or sandbagging is going on with these large employers, so the specific stop loss development is delayed considerably.

MR. MANGE: In my study, there was a difference by deductible, but it wasn't significant enough to try to make that difference in my reserving. It sounds like in your situation it might make sense.

MR. LOOKLONG: We are getting a lot of data in from our clients as you are, and when we did some forensic analysis, we find that they're not aware of the claims

backlog. Sometimes there's a claims backlog issue that we need to pay more attention to.

MR. MANGE: It becomes important for your MGUs to have good, positive relationships with their third party administrators (TPAs) so that they're getting good monthly reporting from them.

MR. LOOKLONG: We are, but the definition of claims backlog is sometimes deceiving. The TPA may say, yes, we're processing claims very quickly, but what they're actually doing is putting the claims into a pending pile. They treat claims that have been pended as not being part of the backlog.

FROM THE FLOOR: There's not much in the literature of the Society of Actuaries about determining confidence levels of the development process. Do you agree with calculating confidence levels and variance of loss development indications?

MR. MANGE: It's not something I have seen a lot of, especially in the context of health. There is an actuary in Australia, Ben Zehnwirth, who has done quite a bit of work in trying to add more statistical sophistication to the analysis of the development process.

FROM THE FLOOR: Right. Are you aware of any papers that have to do with developing confidence intervals around estimates?

Mr. Mange: Yes, there is a paper that may be of some use to you. One of the papers that is on the Course 7 pretest actually looks at these kinds of issues. The paper is "Probabilistic Development Factor Models with Applications to Loss Reserve Variability, Prediction Intervals and Risk Based Capital," by Ben Zehnwirth. It is Course 7 Pre-Test Study Note 7P-27-00. It was originally published in the CAS Forum, Spring 1994, Vol. 2.

FROM THE FLOOR: My second question is what do you use as a benchmark for your credibility weighing?

MR. MANGE: I apply a square-root rule to the development factor and assume a breakeven loss ratio applied to annualized premium. I did not derive this approach statistically, but it reduces the volatility of the development process in the early months, so it doesn't cause me to dramatically overstate or understate losses.

FROM THE FLOOR: Now that you've changed your report and you're getting data directly, do you expect that it will change your loss development indications? Do you hope your patterns will shift? Do you think it might change the fact now that you're getting the data directly?

MR. MANGE: Prior to getting the data directly and in electronic format, I had to look at development by treaty effective dates because I didn't have data by policy

effective dates. I had 10 to 12 years of loss history developed by treaty effective dates. Now, because I have data in a great deal more detail than I used to have, I look at the results by treaty effective date as a check on the detail.

FROM THE FLOOR: My name is Walt Marsh. I want to reiterate a couple of things. I've had a lot of trouble with volatility with the specific stop loss. In doing further analysis, I came across one of the things that was mentioned previously: the really large clients seemed to lag much longer. You're also right about the contract types, the 12/15, and if you have any 12/18, they're really terrible. I've had some success with a couple of my clients because they do get a lot of data and have been able to develop losses using their 50 percent notices, their high cost claim trigger notices, and their reserve for pending losses. I've had a little more success with that, but the late reporting that comes from the larger clients and the clients with the 12/15s and 12/18s have caused me more grief than anything.

MR. DAVID WILSON: My topic is provider excess loss. I'm actually going to build on what Jim was saying, because I think a lot of the techniques are similar.

Let me start off with a little background on provider excess loss. Taking a real scientific approach to provider excess of loss valuation is tricky, because it's a very different product than employer stop loss. If you assume it's very much the same going into it, which a lot of people did back in the early 1990s, you could get your head handed to you. For those of you who might not be familiar with it, it's a product that reinsures catastrophic losses for provider entities accepting underwriting risks. It's generally written as specific, although we will occasionally see aggregating specifics. There are hybrid aggregated specifics, hybrid aggregates, and some very large aggregate provider excess loss contracts have been written. It's often tailored to the client in terms of how losses are defined.

When you're talking about employer stop loss, maybe they have a network and all the plan designs are about the same. When you're talking about specific stop loss for employers, the underlying plan design doesn't really impact them in a huge way. In provider excess loss, however, there is a lot of individual variation from contract to contract or year to year, which means it's a little more complex. It could be written on physician contracts, hospital contracts, or global contracts and then, layered on top of that, there could be Medicare, Medicaid, or commercial risks. Or you might be writing a combination of all three on the same entity, and then it all wraps around a particular managed care contract and becomes trickier.

In terms of looking at it historically, it's been a disappointment, profitability-wise. Part of the reason was that we didn't know how to reserve for it properly. I can remember one of our clients got into it very early, and when they did their first financial projections, it looked like a huge winner to them. This was back in the early 1990s, and they didn't have strong limitations on when claims needed to be reported. All of a sudden, the large hospital systems found buckets of claims almost a year after the fact. It went from being very profitable to being a disaster, but at

that point in time, it almost extends through two renewals. By the time year one was known, they were actually renewing year three.

There are few underwriters actually pursuing this line of business today. The business has really shrunk over the last few years, as providers have either rejected taking on risk or some large insurers or HMO organizations have said that they want to keep it all in house. The market expanded pretty quickly and then it shrunk back down. Now, with the current level of inflation, it's hard to say where it's going to go.

When we first got into it, one of the more sensitive issues for underwriters was underestimating what I call "moral hazards." It's not like employer stop loss, where Bob goes into the hospital to have a quadruple bypass and there is a real expense going to him and his employer that you're covering. This is a situation where somebody has made a deal, and the deal isn't working out as well as they expected. This is a moral hazard, and it creates some additional issues in fitting the coverage to what is actually needed or to what the real risk is. It differs when you're talking about an institution or a physician practice. When you're talking about a hospital, they might have a per diem of $1,000 or $2,000 at the contract, and their actual costs on a marginal basis for providing that room might be a few hundred dollars. Trying to set up a provider excess loss arrangement that really helps them out when they're truly hurting tends to be more of an art than a science.

On the physician side, there are not a lot of hard dollar costs. It tends to be more lifestyle issues, so the issue becomes how to design the right kind of coverage. We don't typically see co-insurance on the employer side where 100 percent of the losses are not reimbursed. Instead, it might be 80 or 90 percent of the losses. This helps providers to keep some skin in the game. However, if their marginal costs are $200, and their marginal revenue is $1,000, and you've agreed to reimburse them at, say, $500, then they never really have any skin in the game. The definition of a loss is also something that's negotiated, and often times, it doesn't follow the underlying managed care contract that it is wrapping around.

With that background in mind, I want to talk about valuation issues in the context of underwriting support. Underwriting support includes the type of coverage, the contract terms, how the liability is developing, and volatility and margins. Underwriting support is a two-way street. I'm going to discuss two different kinds of estimators. One of them is based on the rates, or the loss ratio that you expect on the business, and the other one is based on the actual development. This isn't a very large marketplace, and every deal tends to be customized with many variations. Manual rates are either not very sensitive to the variations or, to the extent they have a lot of refinement in them, there isn't a whole lot of business standing behind those rates. So there will be some inherent volatility in the manual rates. In addition, they've often been adapted from HMO or employer stop loss, further contributing to the volatility.

We've seen that you have some experience to build these rates on, which is the same kind of experience that you would analyze in a different context to look at development factors. It's pretty heterogeneous, in that it's from different parts of the country, commercial, Medicare or Medicaid, or hospital/physicians. There are a lot of different cuts to the data to get it down to something that would be relatively homogenous.

We find that while the underwriter calculates manual rates, they also rely heavily on the past experience in looking at the costs, how that's trending, and how particular reimbursements are going to change. They look at whether a new piece of business or a renewal is requested. Experience itself is very slow to develop, and the current year takes longer to measure than what we saw with employer stop loss. So this creates a natural relationship between the actuaries and the underwriters. They're both trying to figure out what's going on. It's very tough to renew a case if you don't know how it's running, but at the same time, it's very difficult to know how it's running if you're not getting any data.

In terms of looking at the business situation, the kind of business you're writing, and how the contracts are set up, any moral hazards are going to generally increase your loss ratios. We've found, with a lot of our clients, that the size of the entity is also a factor. If you're reinsuring bigger deals, we find that the buyer tends to be much more sophisticated, and there's a lot more anti-selection involved with them. In fact, a number of the arrangements that historically have caused the most trouble in the industry have been very large.

This often depends on reimbursements from the provider stop loss and, for a lot of these organizations, there is not a high sense of urgency to obtaining their reimbursement. The more sophisticated ones realize that they may obtain a lower rate at renewal when they put their business out to bid and slow down the data and try and keep it.

In terms of how the business is coming to you, I generally think our experience is that good reinsurance brokers in this market are helpful with supporting and getting the data to flow. Because there isn't a tremendous amount of business, you have to take your mix into account. If you're going to start looking at development patterns and you've got a $10 million block of business, a $20 million block of business, or a $60 million block of business, what's happened to your business? Do you really have the same kind of risk? Maybe you lost all of your Medicaid business? What's happened with your risk mix?

In terms of risks that are covered, we're now starting to see specialty programs that reimburse providers for their excess loss experience relating to particular diseases. I'm not sure how these programs will develop, but I would expect that they would have an opportunity to develop a little more rationally than your traditional provider excess loss.

Now I'll discuss aggregate wraps. It's a term that we made up, but it's a hybrid policy that is in some ways like specific. The theory is that there's no point charging for specific coverage or reimbursing for specific coverage if the entity that you're reinsuring is still making money on that risk pool. This becomes a different approach, where you examine at what point the entity would start to lose money and then structure your coverage to get around that.

In terms of developing the liability, we have the traditional development methods in which, based on all of the different options including hospital, physician, Medicaid, Medicare, and commercial, there are many of challenges in trying to get a single set of factors that would work in every situation. The development method is going to be suspect in terms of how much credibility you want to give the particular factors that are coming out of that.

At this point in time, depending on who the underwriter is, I have a little more confidence in the loss ratio method. I think most of the good underwriters are doing well with this product now. They have a pretty good sense of how the business is running, so we would use that approach.

Case reserves, something that Jim alluded to on the stop loss side, are something that we look at as well. I've had clients that use case reserves but who fail to clean up the liability as specific situations are resolved. Sometimes it takes two years before the case reserves are released.

Another issue revolves around the accuracy of the case managers in setting these case reserves for your diagnosis or your notices. One of the things we're doing for some clients is starting a feedback loop where we show them how the case manager pegged this particular case and how it actually came out. Then we provide them with that same kind of feedback.

Similar to employer stop loss, we're going to use effective dates of the contract as the "incurred dates" for all claims in our triangles. If it is possible, we want to split it into two triangles by size of risk. We don't want to do this by the deductible, although that might come along with it. We want to do it by whether or not you're writing big cases or small cases, depending on how you define that. That might be by premium. We obviously want to take a look at how stable completion factors are from month to month. I've got a lot of interest in looking at confidence intervals, and we're just starting to scratch the surface with some of our work in that area. I think you have to look at the data as a time series and how the environment could be changing. There might be other factors that you had to bring in from the outside to help explain some of that variation, and that might allow you to produce a tighter confidence interval to the extent that you can reflect those outside influences. We obviously want to look at how stable these completion factors are from month to month. So if you're reserving for 12 months, your first one is going to be down at a level where you're still unhappy with the volatility, but

by the time you're looking at month 12 you might as well use the loss ratio.

Other considerations include the following: What makes a month early? How do you reflect case reserves? Do you just add them in? What do people do with case reserves? Do you disregard them or do you add them in? It's dependent on how good your picks are on the case reserves, and that's where we've got to find a way of getting our people making those picks a little better.

In terms of the loss ratio approach, there is uncertainly in the data. The loss data may be very old or the premium unreliable. It may be appropriate to add additional margin to your loss ratio pick to allow for this uncertainty. I think to the extent that your underwriters know what they're doing and know what the target is, that's the best you can do. It's not going to be based on the employer stop loss where you can write at a percentage of manual. I don't think a percentage of manual really means much in provider excess loss depending on how your risk mix is changing, because all of the individual cases are so unique.

When you look at credibility adjusted methods, we think the result, or the reserves, need to be from the development approach blended with a loss ratio approach based on how much we believe in each one. I think this is an area that's ripe for research, because I haven't seen a solid way of doing it. Everything we do tends to be a little bit arbitrary. I think the square root approach might be an area where some application of statistics might come into play, as well as looking at the variability of the two results and then at various points in time. Then you can look at what kind of blend would produce the least amount of variability.

If you can, I think you'd want to look at large cases and small cases separately. To the extent you have large blocks of business with one or two brokers, you may want to make that the distinction. They might have different performance in terms of working with their clients and providing you with regular data. Then you will want to look at it by hospital, physician, Medicaid, Medicare, or commercial.

Now I'll discuss volatility and margins. The considerations for these include the size of the block. The smaller the block, the more the development factors are going to bounce around, and it may be a lot longer before they stabilize. Consistency of contracts and risks in the block are also considerations. Are they all the same kind of contracts in terms of incurred and paid in periods and reporting limitations? Is there consistency of risk in the block? Obviously, the more homogenous your block is, the more stable the information or the development factor basis should be. I've seen some of our clients pick a fairly conservative loss ratio and a fairly conservative blend of development factors, because they don't want any surprises. But if things start looking like they're running well, you've got other considerations and you have pressure to start reflecting underwriting gains.

Aggregate wraps are a different kind of a product, one that is a substitute for capital and surplus. Typically, they have very high aggregate limits. They are often

written around Medicaid contracts where the risk taker has to provide a fair amount of security to the state. They actually will not become insolvent during the period of the contract, and they can do that by negotiating with the state agency. They can do that by acquiring an aggregate contract that attaches at a pretty low level. There's virtually no corridor in it. It attaches at the point where the risk assuming entity would become insolvent, so it bails them out at that point and attaches right at the end of their risks. I've seen it used in some carve-out situations, in particular mental and nervous contracts.

The real trick here is for the underwriters to peg what the true expected plans are going to be compared to the revenue that's coming in to the entity that is assuming this risk that you're providing the wrap around for. If you're going to do one of these, you want to make sure that your actuary is heavily involved with your underwriter on it. It becomes like reserving aggregate stop loss on the employer side. We've assumed that we're going to run in the 100 percent net-loss ratio, basically reserve all of the net premium and then we're going to track claims development compared to expected on a monthly basis. The contract will probably specify some reimbursement during the year, because you can't let the entity run out of the cash. We keep track of how much is going out in terms of expense versus the capitation revenue. Once that actual-to-expected starts getting near 90 percent or the margin they actually have in the capitation, you might want to start thinking about how certain you are that your loss ratio is appropriate. At that point, you may want to start pumping up over 100 percent.

In terms of reinsurer considerations, taking a step back from the actual Provider Excess Loss (PEL) insurer or MGU, the case-specific data might not be available. It would be available through your underwriting audits, but you may or may not gather that information on a regular basis from the organization that you're working with, so you're doing all this analysis and reserving it at a higher level. The tail may be stretched out even further — maybe as much as 12 months — and reporting lines are obviously greater. So there are all the same problems that Jim discussed.

In summary, it's not reserving as usual for provider excess loss contracts. There's a real potential synergy between the actuary and the underwriter, because the results are very useful for the actuaries in doing the reporting and tracking as well as for the underwriters in doing their renewals. The usual caveat is that the reinsurers need to be very careful of the timing of information from their clients and, in general, this product has had a history of unpleasant surprises. We've encouraged people to be a little more conservative than they would be in the employer stop loss business, and to wait either for profits to emerge or until you can't hold them back any longer, although that's not always possible.

MR. JOHN S. CATHCART: I decided to focus on developing assumptions. I started thinking about products that don't have standard valuation tables and products that have unusual features. They're not your major medical health products; they're

supplementary products for the most part. These are products that include critical illness, cancer, and may even include other types of individual health coverages. I will be talking about different types of reserves, but primarily about active life and claim reserves.

I also have a lot of questions about what types of valuation are we talking about. Are we talking about Statutory (STAT), GAAP, or tax? Are we going to talk about the contract reserves, or are we going to talk about the claim reserves or premium reserves? I'm going to touch on all three types of reserves — contract, claims, and premium. A lot of the issues that I'm going to comment on are really related to STAT, but I think the questions that you ask in developing your assumptions and methods for STAT are also applicable to GAAP. The products that I'm talking about are, for the most part, individual guaranteed renewable or non-cancelable, but it also includes group products.

I want to talk about contract reserves first. Contract reserves are generally required on any contract for which at any time the present value of future benefits exceeds the present value of future net premiums. It usually involves any contract that has a level premium. That is, your claim costs are going to be increasing, but your premiums aren't, so you're going to need to hold a reserve for those claims in the future. Contract reserves may also be necessary in some attained-age contracts due to increases in claims costs that are not related to age and are not expected to be covered by rate increases. This could be because of the wearing off of underwriting selection, or it could be because of a cumulative anti-selection in your lapse rates.

Other types of increases may be due to inflation or utilization shifts. I think that it's generally assumed that those are going to be covered by rate increases. However, if you're anticipating that you're not going to use rate increases, you ought to consider setting up some form of contract reserve. The difficulty there is trying to forecast what inflation is going to be and what kind of utilization shifts you might experience.

The contract reserves for STAT are generally two-year full-preliminary term. There are exceptions. One-year preliminary term is required if there's a return of premium provision, or other deferred GAAP benefits, which are provided before the policy anniversary. If there are reserve adjustments that are required, you could end up holding reserves for those, even before the preliminary term period is up. That preliminary term does not reapply to those reserve adjustments; it only applies to the original date of issue of the contract. Rate guarantees may generate a need for a contract reserve even during the preliminary term period. If you have a three- or four-year rate guarantee where the claims are also going to be increasing during that three- or four-year period, you should be holding some reserve during that period. GAAP, of course, is a net level premium. Contract reserves generally require three different types of assumptions — morbidity, mortality, and lapse (i.e., termination assumptions) — and interest.

I'm trying to focus on products that don't have standard tables. If you have standard tables, developing your morbidity assumptions is prescribed for you. This is on a statutory basis, for the most part. For something like critical illness, there are no standard tables that have been promulgated, certainly not in the United States anyway. So you're likely to start with your pricing assumptions. First, you're going to look at your provision for adverse deviations. If you are concerned with your pricing assumptions, you're going to have to go back and understand the specifics of the contract. You're probably going to have to spend a lot of time talking with a pricing actuary. Try to get some understanding of what level of services he or she has built into the pricing assumptions and make some decisions with regard to additional provisions for adverse deviation that you may need to put into the valuation claim cost.

Generally, your provisions are going to be more conservative for STAT than for GAAP. You will frequently have a provision that's going to increase by duration. That is, the pad or the extra loading is going to be larger in the later durations than in the current duration. Part of the reason is that you have to be concerned about deterioration — not improvements — in future morbidity. For example, earlier detection of critical illness or earlier detection of diseases may lead to higher claims. You may have a shift in utilization toward more expensive treatment procedures on a product like cancer insurance, and those shifts could become pronounced over time. I think that that would indicate a need for greater provisions for adverse deviations in later durations.

Another important thing to take into consideration in developing your morbidity assumptions is the date of accrual. There are generally two different ways you can set dates of accrual of claims for something like a cancer product. The first is the date of the initial diagnosis. All future payments are tied back to that initial diagnosis date. The second is date of service, in which each hospital admission, each treatment, whether or not it is related to the same cancer, is a separate date of accrual. Obviously, what dating rule you use will effect how your claim payments or your accrued claims costs are reflected. If you're doing date of diagnosis, you're going to have earlier claim costs. If you're doing date of service, you're going to have later claim costs. It's important to make sure that the definition you use is consistent with the definition you'd use in calculating claim reserves.

Moving on to mortality and lapse rates, the NAIC specifies what mortality table to use and basically says that you can't use voluntary lapse rates at all in calculating your contract reserves. There are exceptions to that. If your rates are not guaranteed and your valuation morbidity includes some selection, then you can use some voluntary lapse rates. However, you're limited to total termination rates, which are the lower of 80 percent of your pricing termination rates or eight percent. I think this is something you still need to be very cautious with because, for most of these products, the conservative assumption is to have very low ultimate lapse rates. What's important is not just the voluntary piece, but generally, the total

termination rates. Obviously, the mortality assumption is going to become important if the product has a return of premium on death benefit, in which case you're going to want to have a conservative mortality assumption, which is high mortality.

Interest rates for contract reserves are prescribed by the NAIC as the maximum rate allowed for whole life policies on the issue date of the health contract. On policies that require contract reserves, it's the maximum rate allowed for whole-life policies on the date of accrual. For other types of policies, it's related to the maximum allowed for single premium immediate annuities (SPIAs) on the date of accrual. Frequently, interest might be ignored in claim reserves, particularly if it's a short-tail claim and it's more of a matter of conservatism than anything else. But if you expect the bulk of your claims to be paid out within six months, you can generally ignore interest. Critical illness is a single lump-sum benefit up front and not a payment pattern over a period of time, so you're not going to hold claim reserves or discount that for interest anyway. In the calculation of tax reserves, some discounting may be required on claim reserves, primarily because the IRS wants you to report more income.

As is the case with traditional products, there are a variety of claim reserve methods. One of the things you need to keep in mind when you're developing your claim reserve is that you are reflecting the total liabilities. That is, you want to make sure you have provisions for incurred but not reported claims, incurred but not paid claims, reported but not paid claims, as well as accrued and unaccrued benefits. The standard methods are the development method or completion factor method and the claim triangles, which calculate total reserves. They generally don't make a distinction between incurred but not reported (IBNR), known claims, accrued, and unaccrued benefits. There's a tabular method that is going to be applied to known claims and is generally used to calculate reserves for unaccrued benefits. You have an exposure method, loss ratio method, and case reserve method. You can use combinations of these, and that's not unusual.

As I indicated in my discussion about contract reserves, it's important to make sure that your date of accrual is the date you use to calculate contract reserves. If you're using the date of service on your claim reserves and the date of diagnosis on your contract reserves, your overall reserve level is going to be too low. The important thing isn't necessarily what your claim reserves or contract reserves are, it's what the aggregate is. You have to make sure that it's adequate and appropriate.

Another consideration in setting claim reserves is seasonality. Seasonality is when you're using a development method and you find that claims are reported more during one period of time during the year than another period. You should have claims backlogs that are distorting your completion factors. If you're using the loss ratio method, it's important to consider that you might be setting a reserve higher for an accrual quarter. That is where you expect higher claims as opposed to using

the annualized loss ratio. You should at least recognize that you've smoothed things out if you're not doing that.

Loss adjustment expense reserves are reserves for the administrative expenses usually related to the ratio of your claims administrative expenses to your paid claims. It is usually added to the claim reserve for cancer and other types of nontraditional products, just as it would be for a traditional health product. Once again, interest rates may or may not be something that need to be considered. I think it's appropriate to consider interest rates if you have long-tail claim reserves. If you're using the date of diagnosis for your definition of accrual dates, cancer products can be paid out over 10 or more years and, obviously, it would be appropriate to be discounting those claim payments that are going to be that far into the future. There's nothing unusual on premium reserves related to nontraditional products, but you have to hold them in addition to your contract in claim reserves.

For cancer products, which have a lot of different benefits that are paid for cancer, you might have a schedule of surgical benefits, a hospital income benefit, an ambulance benefit, or a transportation benefit, but for the most part, a lot of scheduled benefits. Some products have a radiation or chemotherapy benefit, which is not a scheduled benefit. It pays whatever the charges are, and it's unlimited. There are some prescribed tables for cancer products. The 1985 NAIC cancer claim cost payables is an appropriate starting place, because that's what the standard valuation law says you ought to use. It's important to apply actuarial judgment in looking at your current and future expected experience. It is a 1985 table that's based on experience from over 20 years ago, and I think we would find that utilization patterns have changed. I think a fair amount of judgment needs to be used in taking a look at that.

As I mentioned earlier, it's important to look at your date of accrual, whether you're using service or diagnosis. I believe that the cancer tables give you adjustment factors to translate the claim costs that they give you from one to the other. For your claim reserve, once again, you can use the variety of methods that we've talked about. The development factor is one of the more frequent methods used. Generally, that's done in the aggregate, but that you need to be sensitive to the fact that those completion factors could be changing over time as the utilization of different types of benefits change over time. Also, I think that they're going to be significantly affected if you have an unlimited radiation chemotherapy benefit that is subject to inflation. If you're using the date of diagnosis for finding your date of accrual, that inflation factor can have a big impact on what those completion factors are over time.

Critical illness is a product that's fairly new in the United States. It's very popular elsewhere in the world, but there is no morbidity standard based on U.S. insured data. Your pricing basis is a starting point, and the valuation actuary has to use judgment to make sure that his or her morbidity assumptions are reasonable and

that they have appropriate levels of conservatism in them. Several sources of data might be available. Population data is available for the different types of benefits that might be covered under a critical illness policy, but it's population data, not insured. It's usually based on prevalence rather than first occurrence, so there has to be a lot of judgment used in making adjustments to that data. It might also be reasonable to look at the experience in other countries, but the morbidity experience is not the same as it is here. So once again, you may be able to look at the experience in other countries in developing those assumptions, and look at the relationship, but you have to be very careful not to use them per se, because their experience is different from ours.

This is also a product where I think it may be important to at least consider whether or not some morbidity deterioration is appropriate. One of the things that we found is that you're getting earlier detection of what we are defining as critical illnesses. That's obviously going to shift the claim to an earlier point in time than you would otherwise assume. If you're detecting something five years earlier because of improved technology, you should be properly reserved for that. Critical illness, being a lump sum benefit, generally does not have claim reserves other than an IBNR, since the claims have simply not yet been reported. Critical illness products frequently have a survival period of 30 days. You may have a claim that's been reported that hasn't reached the end of the survival period yet, so you may be holding all of it, or a portion of what you might expect to pay if they do survive the 30-day period.

Other issues to be considered include rate increases. Generally, if you need a rate increase, there is some premium that you're going to start getting that could be used for reserves for future benefits. Another issue is reinsurance. We can talk about this from either the ceding company or the assuming company's perspective. If it's straight first dollar, then the reserves should be proportional, but you may get different reserve considerations on other types of reinsurance contracts. It's important to not only look at the language of the policy that's being reinsured, but also to look at the reinsurance agreement itself to see what the appropriate reserves are.

When it comes to reserves, what's just as important as doing the calculations is going back and doing some tests of their adequacy. For example, do both premium valuations on either the contract reserves or the contract reserves plus the claim reserves. In addition, go back and do Annual Statement Schedule 8 tests for the claim reserves.

This has been a quick overview. I would encourage you to obtain the NAIC Health Insurance Reserves Model Regulation and the NAIC Health Reserves Guidance Manual.

MR. FRANCIS NKETIA: Are you aware of any standards in the industry where people only discount the IBNR just for this task, but not for GAAP and STAT where

the interest discount is on the long tail?

MR. CATHCART: No. I've seen situations in which the company will not discount, particularly for the short-tail reserves for STAT or GAAP, but the IRS has told them that they still need to discount even a short-tail IBNR for tax purposes. I'm not aware of any standards other than that.

Chart 1

Specific Stop Loss
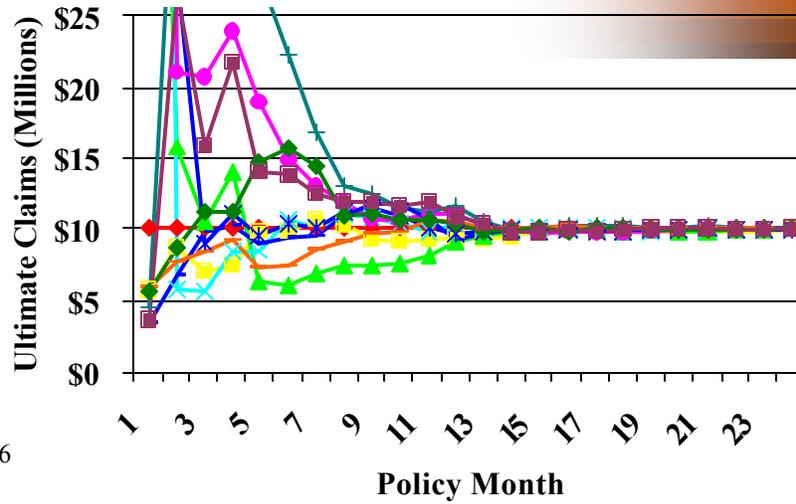## *Simulated Paths of Development*

Ultimate Claims (Millions)

$25
$20
$15
$10
$5
$0

1 3 5 7 9 11 13 15 17 19 21 23

6

Policy Month

Chart 2

Specific Stop Loss
Simulated Distributions by Month

Number of Simulations

600
500
400
300
200
100
0

Month 15

Month 5

Month 10

0% 8% 16% 24% 32% 40% 48% 56% 64% 72% 80% 88% 96% 104%
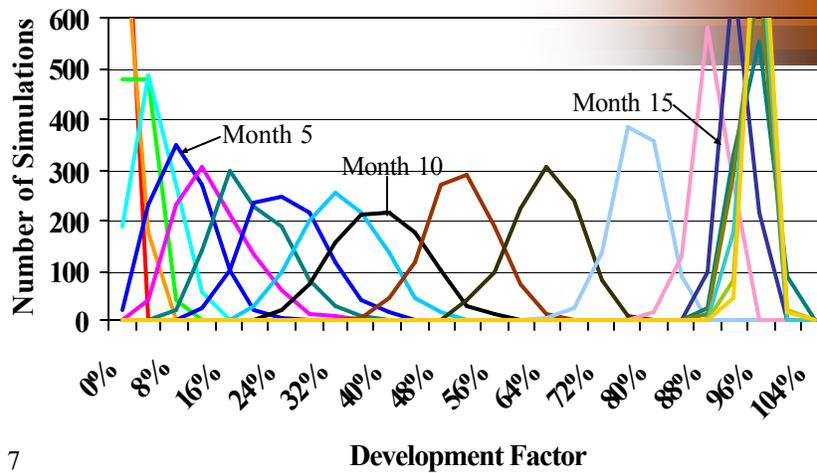
7

Development Factor

Chart 3

Specific Stop Loss
Normalized Distributions by Month

8