1991 VALUATION ACTUARY
SYMPOSIUM PROCEEDINGS

SESSION 7

Health Topics

E. Paul Barnhart

Kriss Cloninger III

Karen Lynn Gervasoni

David E. Olsho

GROSS PREMIUM VALUATIONS OF INDIVIDUAL HEALTH BUSINESS

MR. E. PAUL BARNHART: The health insurance product spectrum is an exceedingly wide, multidimensional one. As a result, it presents an exceedingly wide array of issues, questions, and problems confronting the valuation actuary.

The Benefit Dimension

First is the wide array of benefits and benefit variations. This can range all the way from a simple scheduled AD&D benefit to disability income benefits of a fixed monthly amount -- or more complicated benefits involving cost of living increases, options to increase coverage without health underwriting, variable partial disability provisions, etc. -- to scheduled and unscheduled major medical plans of infinite variety, under which the risk becomes subject to medical cost inflation, changing medical practices and exploding medical technology.

The Renewal Guarantee Dimension

There are essentially four variations of renewal guarantee:

1. So-called noncancellable: Guaranteed renewal at guaranteed premium rates;
2. So-called G.R.: Guaranteed renewal at nonguaranteed premium rates;
3. Conditionally renewable: Limited guarantee of renewal, subject to specifically stated conditions, and normally with premiums not guaranteed;
4. Renewable at the insurer's option: A renewal clause becoming less and less used or permitted under individual health insurance.

The Premium Structure Dimension

Premium structure applies to either guaranteed or nonguaranteed premium rates:

1. Level premiums, based on age at issue.
2. Step-rate premiums, involving one or more specified attained-age rate increases.
3. Annual renewable-term premiums.

All of these dimensions can be or have been mixed, up to a degree (e.g., I am not aware of any major medical plans ever having been issued at guaranteed premium rates).

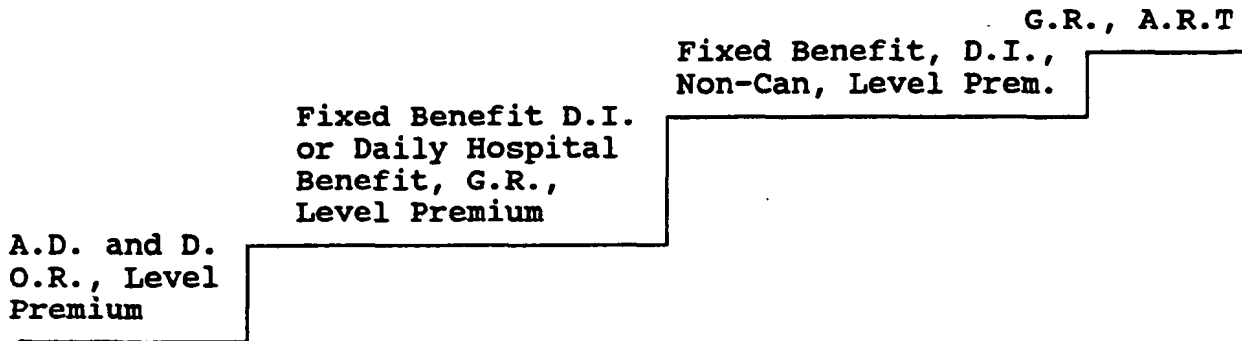### Gross Premium Valuation -- What Is It?

As used here, gross premium valuation is an actuarial valuation of a specific block of in-force health insurance, measured as of a specific point in time; the object being to assign to the block a gross present value, positive or negative, based on its expected future financial performance and any reserve then held (either statutory or GAAP).

If the gross present value is positive, no adjustment is called for with respect to the reserves held as of the date of valuation. If the value is negative, this result must be recognized immediately by establishing a deficiency reserve, in addition to the statutory or GAAP reserve held.

My purpose in this Session is to discuss and compare various "valuation risks" that must be identified and measured in the valuation process. By "valuation risk" I refer to the combined impact that three factors may have on the valuation result:

1. The probabilities involved that may yield a negative result;
2. The possibilities involved that could yield a very large negative result; and
3. The degree of uncertainty in quantifying the assumptions measuring (1) and (2) with any confidence.

The possible mixes of product dimensions lead to many kinds and many levels of increasing total valuation risk. Four examples are:

```
                                                        G.R., A.R.T
                                       Fixed Benefit, D.I.,  ┌────────────
                                       Non-Can, Level Prem.  │
                      Fixed Benefit D.I.  ┌──────────────────┘
                      or Daily Hospital   │
                      Benefit, G.R.,      │
                      Level Premium       │
         A.D. and D.  ┌───────────────────┘
         O.R., Level  │
         Premium      │
         ─────────────┘
```

The relative valuation risk can increase enormously, moving from left to right in this diagram.

Now let us examine several very specific product examples, in order to consider what key factors make up the valuation risk and which need to be quantified in the valuation assumptions.

Example I is disability income; noncancelable as to renewal; guaranteed level premiums.

The basic risk characteristics are:
1.   The coverage is fixed benefit monthly total disability income.
2.   Premiums may not be increased.
3.   The premium structure is level age at issue.

Here the valuation risk relates to the adequacy of the original pricing assumptions as compared to actual experience, in terms of the experience to date and perceived current trends as to morbidity, persistency, investment income performance and total insurer expenses, including, of course, taxes and commissions.

There are, however, additional risk considerations, difficult to quantify or even identify, with respect to the future, which is, after all, what the valuation is addressing. These

considerations have to do with the projected effects of present and future changes in the total economic environment affecting the policyholders:

1. Changes in occupation. Many disability income policies provide for a reduction in premium if the policyholder moves to a less hazardous occupation, but do not provide for any increase in premium if he moves to a more hazardous occupation, because of the premium guarantee.

2. Changes in earned income. If earned income declines, the policyholder may become more receptive to claiming a disability status. Evidence of this can be seen in the upward cycles in disability experience during past adverse economic periods.

3. Motivation to recover from disability. Once disability has commenced, various individuals under various circumstances have widely varying motivation to recover and return to the job full time. Some professions and job specialties have exhibited distinct cycles of disability experience which would appear traceable to motivation that is affected by the broad job environment. Such a factor can obviously become extremely difficult to quantify.

4. The extent of "overinsurance" or "underinsurance." This factor is really a generalization of the factors already mentioned. Where "underinsurance" exists, the disabled individual can be much more strongly motivated to recover or to find a way to function again productively.

While the actual experience may provide implicit quantification of these environmental factors, it is hardly likely that the past has seen every version. The array of considerations can become so elusive to quantify that the best the valuation actuary can do may be to evaluate a reasonable range of sensitivity assumptions to provide some measurement of the possible effects.

Another important factor to be dealt with is the extent of future renewal antiselection. Policyholders who believe themselves healthy may eventually simply lapse the insurance, or if they can pass health underwriting, may reapply to another insurer that has more competitive rates or more attractive policy features. This factor, again, may not be

sufficiently included in the actual experience. Under level premium policies, the antiselection factor should diminish with time, because of original age rating.

Now let us move to Example II. This example involves only a single change from Example I: the premium is not guaranteed, so the insurer can raise premiums. The implications are more complicated than might appear at first sight.

It is my view that an insurer should not incorporate this provision into a product simply for the purpose of reducing the original premiums. The right to increase premiums should rather be used with a product where there is substantial uncertainty as to future costs and trends, such as major medical or a disability income product containing experimental benefits or involving other factors, such as underwriting, for which little or no claim experience exists.

Unfortunately, some insurers do use the right to increase premiums as a basis for justifying reduced original premiums. Furthermore, some regulatory jurisdictions hold the same view, since they require higher loss ratio standards for products without guaranteed premiums. This is a mistake that may backfire down the road, because increases in renewal premiums involve major pitfalls.

In any event, a gross premium valuation of a block of business involving adjustable premiums should first be tentatively carried out as though the premiums were guaranteed. Only if the resulting gross value is unacceptable should assumptions as to premium increases be tested. An initial tentative valuation assuming no change in premium may also reveal the approximate target magnitude of the rate adjustment that must be considered.

In considering increases in premiums, there are important risk considerations and alternative strategies to be examined:
1.   The amount and timing of a single rate increase, as compared to several planned increases of lesser magnitude. What is the most promising strategy?

2.   Evaluation of the potential impact of regulatory delay and/or approval of reduced increases in some jurisdictions.

3.   Of critical importance, the expected impact of antiselect lapsation initiated by the rate increase.

Careful attention should be given to this choice of basic strategy: a single rate increase, projected to be sufficient, versus two or more planned increases at times and in amounts designed to minimize the impact of antiselect lapsation.

Here is the result of one actual case history (Table 1). The figures are rounded and disguised, but the outcome was quite close to what you see here. A 100% rate increase was put into effect, with the result that premium income, claims incurred and loss ratio remained virtually unchanged. What happened is that about 50% of the business lapsed, and that 50% was not submitting the claims. The company would have been better off to have done nothing, thereby saving the expense associated with enacting the rate increase. The insurer's actual objective at the time was to induce all of the policies to lapse. That 50% success amounted to 100% failure. Clearly, careful management of the rate increase process is critical!

TABLE 1
An Actual Case (Disguised and Rounded):

Year before Increase		Year after 100% Rate Increase	
Premium Earned:	$2,000,000	Premium Earned:	$2,000,000
Claims Incurred:	$2,100,000	Claims Incurred:	$2,100,000
Loss Ratio:	105%	Loss Ratio:	105%

The impact of antiselect lapsation, and the resulting continuing effect on the morbidity level of the renewing block, increases with the magnitude of the rate increase imposed. Also, the impact of a second rate increase of equal amount, is likely to exceed the impact induced by the first increase.

I hesitate to show the illustrative values in Table 2 because, while they roughly fit much of my own experience with rate increases, they must be recognized as essentially illustrative. The actual impact, in any given situation, is a function of many variables: the type of product; the in-force age of the block of business, especially when level premiums are involved; the extent to which other competing or similar coverage is available to those in the block who are insurable; and even the nature of the agency force involved (e.g., career agents versus independent brokers).

TABLE 2

Management Strategy
Rate Increases vs. Antiselection
Illustrations of Possible Interaction

Single Rate Increase % of Prior Rates	One Time Shock Lapse %	Continuing Morbidity Impact %
10	+1.0 point	+0.5 points
20	+2.5 points	+1.3 points
30	+6.0 points	+3.0 points
40	+15.0 points	+9.0 points
50	+30.0 points	+18.0 points

Note here also that the magnitude of the antiselect lapse impact increases at a steeper rate than the magnitude of the corresponding rate increase that provokes the lapsation. In my own experience, a rate increase reaching a level of about 35 to 40% begins to act as a kind of threshold for sharply increased shock lapsation. And we've seen what a 100% rate increase can accomplish!

Let me return for a moment to the regulatory impact.

Because of the uncertainties involved here, the planned objectives of a rate increase can be severely upset. A delay of only a few months in approval from an important jurisdiction can have very significant impact. Approval of a reduced increase in an important jurisdiction can have long-term effects, not only reducing expected premium income but also unbalancing premiums and claims in the experience base. If the volume of business in the

particular jurisdiction has sufficient credibility on its own, and the likelihood of a variant rate approval can be anticipated, then the block may be manageable on a segregated basis with respect to two or more groupings based on jurisdiction.

Let's take a brief look now at a different benefit product: a scheduled benefit hospital/ surgical block of business.

Here the claim costs, even with extensive scheduling of benefits, are still vulnerable to changes in hospital and medical practice, in the relative incidence of surgical and medical procedures, and in hospital confinement itself. Changes in medical technology can have a major impact. So the uncertainties affecting valuation risk are of a different kind, and in general tend to be of greater relative magnitude than those affecting disability income.

Also, regulators and legislators tend to show more critical concern with respect to hospital/ medical insurance than with disability income because the public is more quick to complain about health costs along with the escalating cost and shortcomings of hospital/surgical/ medical insurance.

We should look at risk considerations involved with major medical. Here, about the only controls on claim costs are the deductible and the coinsurance percentage. As we all know only too well, the upward trends in these costs have been extremely steep, so much so that this whole area of health care and health insurance is again reaching the crisis stage in America.

Another characteristic of major medical coverage is that premiums are almost always based on attained age rather than issue age. This fact tends to magnify rate increases still more since actual premium increases must be superimposed on age increases. Still another factor is that cost inflation shrinks the deductible, so that yet another factor compounds the rate of increase in costs and premiums.

Consequently, valuation of major medical blocks are difficult to undertake with confidence beyond very short-term periods, such as next year, or the next six months, and management of renewal premium rates is a process of constant attention, where two or three years down the road is a long way into the future.

Guaranteed renewability, consequently, is of decidedly questionable wisdom with respect to major medical insurance.

POLICY RESERVES ON ADJUSTABLE PREMIUM POLICIES

MR. KRISS CLONINGER III: My charge for this portion of the program is to discuss valuation techniques that can be applied in situations where policy premiums and/or policy benefits are subject to change. The types of policies I am addressing are primarily guaranteed renewable health products that are priced on the level premium principle, but I think that some of these valuation techniques can be applied to other types of products as well. I will primarily be addressing statutory and GAAP reserving, but I will also make some comments about the effect of applying these principles in a value-added accounting model.

The accounting practices that I see utilized in various companies are influenced by the reasons premiums and/or benefits change and the type of financial statement that is being prepared. It is fairly common to see companies using different approaches for statutory and GAAP financials due to the different purposes of those financial statements. If value-added financials are being prepared, one might see a third approach used. The point is that the selection of an accounting method to reflect policy changes requires judgment and depends on the purpose of the financial statement.

While there is no cookbook to tell us what valuation approach to use in every situation, there are some generally accepted basic valuation principles that one should consider during the decision-making process. Let me review three of them that Stephen Beach has summarized in his recent paper entitled "Statutory Reserves For Nonlevel-Premium Policies." His focus is on life insurance policies, but the principles may be applied to health insurance as well.

He cites Principle 1 from the Standard Valuation Law (SVL) that net premiums should be a uniform percentage of the gross premium. This principle is also incorporated in Statement of Financial Accounting Standard (SFAS) 60 that applies to A&H products. The main question that has to be dealt with in this context is over what period of time the net premiums have to be a uniform percentage of the gross. Possibilities include the full life

of the contract, the remaining life of the contract at the time premiums or benefits change, or some other period such as the pricing horizon if that differs from the life of the contract. The model law for valuing health contracts provides that consistency between the gross premium structure and the valuation net premium is required only at issue. Presumably, the valuation actuary can make a judgment as to the most appropriate method to handle the consistency requirement after the date of issue.

Principle 2 is that reserves should not be negative. This principle can be applied to A&H contracts because certain benefits have claim costs that are higher in the early years than the later years, which can result in negative reserves. The situation can also arise in reserving family policies where the full family premium is paid as long as the policy remains in force, but the total family claim cost declines due to elimination of children or survivorship considerations.

For statutory, there is a long-standing rule that negative reserves for one benefit may offset positive reserves for other benefits in the same contract, but the total reserve for the contract cannot be less than zero. For GAAP, some companies do recognize negative reserves on certain types of benefits, such as accident and intensive care, where there tends to be antiselection in the early years. Obviously, the adequacy of total reserves needs to be carefully monitored when a company chooses to recognize negative reserves on certain benefits.

In addition, for statutory, reserves should not be less than the cash-surrender value of the contract. Today, we are seeing more and more A&H contracts that contain a return of premium or other type of pure endowment benefit. Some of these contracts provide cash values and the prevailing thought seems to be that this principle, which was initially applied to life insurance contracts, should apply to A&H contracts as well.

Principle 3 is that a given reserve is not sufficient if projected future profits are negative. Another way of saying this is that a prospective gross premium valuation is the ultimate

test of reserve adequacy. If a tabular reserve valuation produces a result that is determined to be less than a gross premium reserve, the gross premium reserve should be recognized in the financial statement. This principle applies both to statutory and GAAP financials.

One issue you need to consider, when you are dealing with a gross premium valuation, is whether you will permit profits in certain years to offset losses in other years. For statutory, it is my experience that the most common practice is not to offset sufficiencies and deficiencies within a policy. For GAAP, SFAS 60 provides that, where circumstances are such that profits would be recognized in certain periods and losses in others, the liability should be increased by an amount that is necessary to offset the losses. This means that profits on certain contracts can offset losses on other contracts, but only within the same year. I expect that full offsetting occurs in most value-added accounting models.

Now let's discuss why premiums and/or benefits change and what alternatives we have in accounting for those changes. External factors that cause changes in the cost of benefits provided under the contract are a major source of change. Examples of external factors include changes to Medicare benefits that impact Medicare supplement (Medsup)policies and general increases in health care costs that impact policies that do not have meaningful inside limits. These factors tend to cause policy premiums and benefits to change frequently.

Internal factors also precipitate changes. Internal factors include policy exchanges and increases in indemnity benefit amounts. These types of changes do not occur as frequently as those precipitated externally, but they do occur as policyholders attempt to keep their coverages adequate.

From a reserving perspective, Medsup business is probably the most volatile business I have had to deal with. It may become simpler in the future with the new premium refund requirements in place, but that is yet to be seen. Clearly the refund requirements will have to be considered in determining both statutory and GAAP reserves. In general, if the loss

experience that is recognized in the current financial statement is such that a premium refund will be triggered, that expected refund should be accrued currently.

In his recent paper, "GAAP for Medicare Supplement Policies," Alfred Raws discusses five reserve methods that can be used for Medsup business. I will comment on some of the advantages and disadvantages of those methods and offer some observations on statutory reserve practices.

The easiest method to apply is the static method. At every valuation date, reserves are calculated using original assumptions without anticipating premium or benefit changes and without making any adjustments to recognize actual changes. Interpretation 1-I of the Academy's Financial Reporting Recommendations says that this approach is acceptable if the actuary is satisfied that continuing utilization of original assumptions produces a reasonable matching of revenues and costs and does not materially distort the pattern of earnings that would be realized if current assumptions were used. This is an application of the first valuation principle that says the net premium should be a uniform percentage of the gross.

One of the keys to successfully utilizing the static method is to consider total costs when evaluating the pattern of expected earnings. The percent of premium required for benefits will tend to increase as benefit levels increase and the block ages, but the percent of premium required to amortize deferred costs will decrease as gross premiums increase. It is also helpful if renewal commissions are paid on the original premium rather than the current premium, because that causes the renewal commission rate to decline over time.

Under the global approach, reserves are calculated at issue on the basis of assumed future changes to premiums and benefits. Acquisition costs are amortized against the premium stream that reflects the assumed changes. Reserves are not adjusted for differences between actual and assumed premiums and benefits. Consequently, as in the static approach, the actuary has to determine that not changing the valuation assumptions has not

distorted the pattern of earnings. In my opinion, the global approach is preferable to the static approach because there is more prefunding of probable future benefit increases.

Each of the other three methods are dynamic in the sense that reserves are recalculated to reflect actual changes in premiums and benefits. Raws calls these methods the prospective, the retrospective, and the intermediate method.

Under the prospective method, assumptions are changed to reflect current conditions at every premium or benefit change date. Reserves are recalculated using the current reserve combined with revised assumptions as to the present value of future benefits based on current benefit levels. The amortization of deferred costs is not affected because future premiums are assumed to remain level at their current amount. The balance sheet is not changed at the date assumption changes are made under the prospective method.

The intermediate method is a combination of the prospective method and the global method. Future benefit and premium changes are assumed to occur for a limited period of time, say three to five years. No changes to reserve assumptions are made during the period that changes are assumed to occur. At the end of that period, reserves are recalculated prospectively using revised assumptions for future periods only. Deferred costs are amortized against a premium stream that reflects the premium changes assumed in the reserve calculation, and are recalculated using the prospective method at the same time as the benefit reserves. No balance sheet changes occur when future assumptions are changed.

The retrospective method is based on the premise that actual changes to premiums and benefits should be substituted for assumptions and reserves should be recalculated from the date of issue. Any difference between the current and recomputed reserve would flow through earnings at the time of recomputation. Amortization would be recomputed similarly. Though this approach is similar to the SFAS 97 method of amortizing deferred costs on universal-life-type contracts, I have only seen one company attempt to apply it, and that company abandoned its experiment fairly quickly due to the volatility of the results.

My personal preference for Medsup-type business is for a prospective-type method that incorporates assumed future changes to premiums and benefits. Reserves and deferred costs would be recalculated prospectively when differences between actual and assumed changes become material. I have seen this approach successfully applied in practice. I might call it the realistic method.

Prospective type methods implicitly accept the financial reporting that has been done in the past as accurate or reasonable. There is no attempt to level profits over the entire term of the contract. There is an attempt to level profits over the remaining future of the contract based on assumptions we adopt today.

One thing that worries me about value-added accounting models as applied to health products is how changes in assumptions are handled. If the effect of all assumption changes are recognized in current period results, I think you really have to ask yourself, "Did we really do that well (or that badly)?" There is a lot of uncertainty in dealing with valuation assumptions for volatile health products. When I'm working in this area I always reflect on a comment a coworker once made to me. His advice was: "Don't go from one lousy number to another lousy number." I have taken this to mean that when you are working with estimates, make your best one and don't change the assumptions until you have substantial evidence that you need to.

I will close with a few comments about accounting for policy changes generated by internal forces such as policy exchanges. Prospective methods can be applied easily to the situation where the policyholder exchanges an existing contract for one that provides higher benefits at a higher premium. The GAAP or statutory net liability that exists at the date of exchange can be used in conjunction with the revised future benefits and premiums to level the revised expected profits over the remaining life of the contract.

The alternative is to treat the exchange as a lapse and a new issue or, depending on the premium situation, as a continuation of the original contract at an increased benefit level.

If a policy is treated as a continuation at a higher benefit level, some will argue that the full reserve for the original issue age and policy year should be booked immediately. Several years ago, I had a insurance department actuary looking at the reserves of one of my clients. He said to me, "Well, I think you're either overreserved by $50 million or underreserved by $50 million but I can't decide which." He finally accepted the middle ground of the prospective valuation method that the company was using.

This incident illustrates that deciding how to reserve policies with changing premiums or benefits is not a cookbook process. One has to consider the facts and circumstances and develop a valuation approach that makes sense within the framework of basic valuation principles and prevailing actuarial standards of practice.

HEALTH REINSURANCE: THE ACTUARY'S DILEMMA

MS. KAREN LYNN GERVASONI: "The work of science is to substitute facts for appearance and demonstrations for impressions." Implementing the motto of the Society of Actuaries can be an elusive goal for the reinsurance actuary.

A Spectrum of Data Availability

Depending on the product, treaty terms, and sophistication of the ceding company, the data accessible to the reinsurance actuary may fall anywhere within a broad range. At one end, a private label arrangement ensures the best case scenario. UNUM's long-term disability (LTD) reinsurance is one example of such a product. As in the classic case where Whirlpool designs, manufactures, and supplies appliances, which Sears then markets with its own brand name, UNUM provides a complete product package to its client companies. UNUM develops the product and assists with policy filing. Premium structures for reinsurance are a part of the contract, though client companies may choose to modify rates on the street. UNUM often performs the underwriting function, or may supply an underwriting manual and provide advice and assistance to the reinsured. After the sale, UNUM evaluates claims as they are submitted, coordinates rehabilitation services, and authorizes payment. UNUM and the reinsured share risk and profit. Such an arrangement enables the ceding company to add an important product to its portfolio without investing the time, money and effort required to develop specialized expertise. In this situation, the reinsurance actuary has access to detailed data; estimating reserves is very similar to direct reserving practices.

At the other end of the data spectrum is the reinsurance pool. The actuary for the reinsurer -- who is often a retrocessionaire by this point -- is distanced from direct detailed data. Multiple reporting lags (from claimant to direct writer, from cedent to pool, from pool to reinsurer) further complicate analysis.

In a pool arrangement, an underwriting manager functions as an intermediary, brokering one or several lines of business on behalf of a group of reinsurers, the "participants." The

manager markets reinsurance, collects premium, pays claims, and provides financial reporting services to the participants. The product is usually financial reinsurance, and the manager is dependent on ceding insurers to provide detailed data. Reserves for pool business are set according to guidelines established by a committee representing the participants, and calculated by the underwriting manager.

Case Study of Pool Reserve Evaluation

UNUM participates in a number of these reinsurance pool arrangements. Serving as the valuation actuary for this business segment can be a challenging experience. Consider a pool which markets mainly accidental death coverages. The major reserve for this product is IBNR (claims incurred but not reported). Traditional actuarial techniques would construct loss triangles of claims incurred by date of payment, and evaluate sufficiency in light of historical experience. Such procedures cannot be applied in some cases since pools do not always track claims by incurral date. The IBNR formula is based on reasonable patterns and approved by a committee of seasoned experts. Are such assurances, however, enough for an actuary to state an opinion as to whether the reserves reported make good and sufficient provision for the obligations guaranteed? Certainly, some broad testing would serve to increase one's confidence level.

When developing a new evaluation approach, the first step is to assemble all data available. In the case of reinsurance pools, all data are reported by calendar quarter, but separately for each "underwriting year." An "underwriting year" comprises all exposures on reinsurance treaties that are written or renewed within a given 12-month period.

The simplest example is a calendar underwriting year. A contract written on January 1, 1990, contributes 12 months of exposure to underwriting year 1990: from January 1 to December 31, 1990. A contract written on December 15 also contributes 12 months of exposure to underwriting year 1990: from December 15, 1990 to December 14, 1991. Claims paid in second quarter 1991 on underwriting year 1990 can arise from incurrals in any of six quarters: from January 1990 through June 1991. When incurral data are not

available, alternative approaches must use whatever information is at hand. In the example included in the appendix, paid data were collected by underwriting year. Traditional methods were then adapted to develop the following procedure: project total earned premium and develop ultimate paid losses by underwriting year, estimate ultimate incurrals, and allocate to past versus future based on premium earned to date. The process is outlined step by step in the appendix.

Document!

After trudging through an excruciating process like year-end valuations, it's tempting to collect scratched notes, file them away, and move on to more exciting territory. But documentation is not merely a nicety for the valuation actuary, it's an integral part of the process.

Documentation serves as auditable support for the Actuarial Opinion an actuary signs. It is often difficult to recreate a thinking process from a page of numbers and a few scribbled words. No matter how thorough the analysis was, if it can't be demonstrated to auditors, regulators, management, or others who are asking the questions, the effort will have been wasted.

Documentation clarifies advice to management. It spotlights sensitivities and enhances understanding of the business.

Putting it down on paper also serves as a reminder of any simplifying assumptions that were incorporated into the review. These assumptions can be tested as experience emerges, and conclusions modified as the business evolves.

Sources of Guidance for the Reinsurance Actuary

A thorough understanding of the business – the product, administrative practices, etc. – is integral to the actuary's ability to fulfill his or her responsibility in valuing reserves. Armed with that basic knowledge, professional guidance is provided through a number of sources.

The American Academy of Actuaries' *Financial Reporting Recommendations and Interpretations* form basic guidelines. If the actuary hasn't read these recently, reviewing pertinent sections may be helpful. Other actuarial standards of practice may also apply, notably those relating to cash-flow testing. While health coverages without nonforfeiture options are not subject to disintermediation, reinvestment risk is a significant consideration for long-tailed liabilities such as disability and long-term care.

Reserves must, of course, follow the *Instructions to the NAIC Life and Accident and Health Blank*, and must conform with state insurance regulations. Advice from actuaries practicing in the field will be invaluable in interpreting and applying these guidelines. Study materials, *Transactions*, and *Record* articles are additional sources of practical information, as well as publications by other actuarial organizations.

The question of reliance on others is more significant for the reinsurance actuary who may not have as close a working relationship with the accountants and auditors as an actuary signing an Actuarial Opinion for his or her own company. Reinsurance treaties contain audit provisions which, if exercised, may afford the actuary an additional degree of comfort in relying on data provided. An audit will also enable the reinsurance actuary to evaluate the reassured's capabilities.

At the very least, the actuary must use broad measures to evaluate reinsured reserves. This may be as simple as reviewing the valuation bases and considering their appropriateness based on a general knowledge of the business. Or the cedent's actuary may provide an opinion on the reinsured business, which would be important when reserves are not based on standard industry tables. Reasonableness tests, even if based only on broad industry measures, carry more weight than simple reliance on others. After all, there's only one actuary's signature on the document whose concluding paragraph begins with the words, "In my opinion . . .."

APPENDIX
HEALTH REINSURANCE: THE ACTUARY'S DILEMMA

The following case study (Tables 3-6) outlines an approach developed to value reserves for a line of business that did not track claims by incurral date. Consideration was given to specific knowledge of the business in selecting factors, in conjunction with the fundamental mathematical analysis:

1. Numbers presented here are intended for illustrative purposes only, and do not represent actual experience for any pool in which UNUM participates.

2. Some reinsurance treaties were written for more than one year. All exposure is attributed to the underwriting year when written, which explains why earned premium remains outstanding on earlier underwriting years.

3. Ratios of year-to-year cumulative paid losses were developed and averages calculated. Ratios were selected separately for 1986 and 1987, since the practice of writing multiple-year treaties was more prevalent during that period. Subsequent underwriting years were expected to mature more quickly.

4. Selected cumulative factors were applied to claims paid to date to project ultimate incurred losses.

5. Projected ultimate incurred losses were ratioed to projected ultimate earned premium.

6. Projected ultimate incurred loss ratios were reviewed with the product manager, who provided information about specific risks and/or general experience for individual underwriting years. Selected ratios were modified with judgment.

7. Selected loss ratios were applied to premiums earned to date to estimate incurred claims. Paid claims were subtracted to produce required reserves.

8. Reserves held were compared to required. Note that the margin in the most recent underwriting year's reserves offsets inadequacies in earlier underwriting years. This suggests that reserves may need to be strengthened if the company ceases to participate in future underwriting years. Documentation provides important information to management.

TABLE 3

Example: Data Collection

	Underwriting Year				
	1986	1987	1988	1989	1990
Earned premium through 12/90	3,000	4,300	2,800	2,400	500
Projected Ultimate Earned Premium	3,000	4,500	3,000	2,700	2,700

	Underwriting Year				
Cumulative Paid Claims	1986	1987	1988	1989	1990
Year 1	250	350	50	100	50
Year 2	1,000	1,600	700	900	
Year 3	1,100	2,100	1,000		
Year 4	1,200	2,400			
Year 5	1,300				
Projected Ultimate	1,600				

TABLE 4

Example: Factor Development

	Underwriting Year				
	1986	1987	1988	1989	1990
Ratios:					
Year 2/Year 1	4.000	4.571	14.000	9.000	n/a
Year 3/Year 2	1.100	1.313	1.429		
Year 4/Year 3	1.091	1.143			
Year 5/Year 4	1.083				
Ultimate/Year 5	1.231				
Average Factors:					
Year 2/Year 1		7.893			
Year 3/Year 2		1.280			
Year 4/Year 3		1.117			
Year 5/Year 4		1.083			
Ultimate/Year 5		1.231			

		Factor to Ultimate
Selected for 1988-90:		
Year 2/Year 1	10.000	17.33
Year 3/Year 2	1.500	1.73
Year 4/Year 3	1.100	1.16
Year 5/Year 4	1.050	1.05
Ultimate/Year 5	1.000	1.00
Selected for 1986, 1987:		
Year 5/Year 4	1.100	1.32
Ultimate/Year 5	1.200	1.20

TABLE 5

Example: Reserve Test

| | Underwriting Year | | | | |
	1986	1987	1988	1989	1990
Paid Claims to date	1,300	2,400	1,000	900	50
Factor	1.20	1.32	1.16	1.73	17.33
Projected Ultimate Losses	1,560	3,168	1,155	1,559	866
Projected Ultimate Earned Premium	3,000	4,500	3,000	2,700	2,700
Projected Ultimate Loss Ratio	0.52	0.70	0.39	0.58	0.32
Selected Loss Ratio	0.52	0.70	0.45	0.62	0.60
Premium Earned to date	3,000	4,300	2,800	2,400	500
Estimated Incurred Claims	1,560	3,010	1,260	1,488	300
Required Reserve	260	610	260	588	250
Reserve Held:	270	600	200	560	550
Redundancy/(Inadequacy):	10	(10)	(60)	(28)	300
Margin:	4%	-2%	-23%	-5%	120%
Overall Margin:	10.8%				

SPECIFIC AND AGGREGATE STOP-LOSS RESERVES

MR. DAVID E. OLSHO: This paper will deal with issues which should be considered when developing specific and aggregate stop-loss reserves. Except as noted, reserves will refer to incurred but not paid (IBNP) reserves, not incurred but not reported (IBNR) reserves. Similar techniques can be used for IBNR when a separate pending claim reserve is held.

IBNP reserves need to be calculated for:
1. Stop-loss insurers covering self-insured groups.
2. Stop-loss reinsurers covering either first-dollar insurers or stop-loss insurers.
3. First-dollar insurers calculating reserves for internal pooling point purposes.

For the purposes of this paper, I will assume that the reserves are calculated for stop-loss insurers, covering self-insured groups, where claims are paid by a third party administrator (TPA). With minor modifications, the same concepts hold for other instances.

This paper will not deal with more general techniques such as completing a claim lag triangle, nor will it deal with reserves such as unearned premium reserve, (which are calculated in the standard manner) where the issues are not unique to stop-loss. Because stop-loss coverage tends to be one-year term, policy reserves are not required.

Definitions
1. *Specific Stop-loss* -- Coverage of insured or self-insured claims in excess of a specified amount (the specific deductible) on any individual in a given time period (generally one year).
2. *Aggregate Stop-loss* -- Coverage of insured or self-insured claims in excess of a specified amount (the aggregate attachment point or AAP) on a group of insureds in any given time period (generally one year).

3.   *Specific Advancement* -- An amount paid by the specific stop-loss insurer to the insured (or TPA), in anticipation of a specific claim payment. In effect, this fronts the claim, rather than reimburses the claim.

4.   *Aggregate Advancement* -- An amount paid by the aggregate stop-loss insurer to the insured (or TPA), because the total claims paid exceed the AAP on a year-to-date basis. Because most aggregate insurance is on an annual basis, this also fronts the claim, rather than reimburses the claim. Aggregate advancement is also known as aggregate accommodation.

Incurred Date
While it would be possible to include the incurred date in the definition section, the incurred date is central to the calculation of an I(ncurred)BNP reserve, and therefore rates a section of its own.

For specific, the initial claim incurred date in a policy year is the date the TPA's check to the provider (or insured) exceeds the specific deductible. The incurred date for a subsequent claim on the same individual in the same policy year is the earliest date on the batch of TPA checks submitted for reimbursement. (It would be possible, but not productive, to determine subsequent claims on a check-by-check basis.)

I am often asked why the incurred date for a specific claim is not the date of illness or injury as in coverages like LTD. The reason is because in specific coverage, there is no liability for the stop-loss insurer until claims incurred and paid (or claims paid) exceed the specific deductible in the policy year, while in LTD, liability begins at the date of injury or illness (assuming other policy provisions are met). It is not uncommon for the first specific claim on an individual to be incurred in the policy year after the policy year in which the illness or injury occurred.

For aggregate, a similar definition would be the date the sum of checks for the group exceed the AAP. The AAP is not known until the end of the policy year, so the incurred

date could not be known until then. At that time, with a listing of claims paid in date order, the incurred date could be easily determined.

A simplifying assumption would be a uniform distribution of claims through the year. Then the incurred date would be calculated using a proportion of AAP to total claims. For example, for a case with a calendar year contract, a $1,000,000 AAP and $1,200,000 in total claims, the incurred date would be November 1.

I do not recommend that these methods be used for determining the incurred date of an aggregate claim. Instead, I use the midpoint of the contract period, for three reasons:
1. It is simple.
2. It is (almost always) conservative.
3. It matches risk (incurred claims) with earned premium, since it is equivalent to incurring 1/365 of total claims each day.

The incurred dates I use imply that specific claims are incurred over a short time period while aggregate claims are incurred over the entire year. Using a medical analogy, specific claims would be acute and aggregate claims chronic.

Specific Stop-Loss Reserve Calculation
For specific, I first calculate the lag using a typical claim lag triangle completion method. From this, one of several methods can be used.

The steps for the first method are as follows:
1. Calculate lag days as a proportion of a year, and multiply this proportion by the most recent 12 months' claims to determine the reserve. The problem stopping at this point is that it underestimates the reserves for a growing block of business. Even with a stable block of insured groups, it misses trend, which can be up to double the first-dollar trend due to deductible leveraging.

2.   Therefore, the most recent three months of claims can be annualized and substituted for the 12 months of claims in step 1. I use three months because typically, the bulk of Specific claims are reported within three months (or less). The problem with stopping here is that, except on a very large block, claims probably will not be stable and/or will be effected by seasonality.

3.   Therefore, I try to use a more stable base, such as the most recent three months of earned premium, multiplied by a loss ratio. This accounts for the problems discussed above. First, premiums are related to block size. Second, with new business and renewal dates spread through the year, trend is accounted for (to the extent the premium rates are related to trend). Third, since three months of premium is used, the base is consistent with the period for which the majority of the claims being reserved for were incurred. Note that this step requires the calculation of a reserve loss ratio, which is discussed below.

The second method takes the completion factors developed from the claim lag triangle. For the same reasons as discussed above, on an incurred month basis, I prefer to multiply the complement of the proportion of completed claims by the premium multiplied by the loss ratio. The alternative, dividing the incurred and paid claims by the proportion of completed claims (on a month-by-month basis) would tend to produce unstable results. My preference on this method also requires the calculation of a reserve loss ratio.

Reserve Loss Ratio Calculation

If there is not a large amount of data, the target loss ratio can be used on these data. With sufficient data, the iterative method can be used such that the change in the IBNP reserve calculated using the reserve loss ratio, plus the paid claims produces an experience loss ratio equal to the reserve loss ratio. The loss ratio can be calculated using whatever time frame the actuary believes is appropriate.

A reserve loss ratio calculated as above can be modified for trend (Is company experience improving or deteriorating?), conservatism, and credibility (weight with the target loss ratio).

The issues of conservatism and credibility are discussed below.

Aggregate Stop-Loss Reserve Calculation

For aggregate, I tend to use the first method discussed above, except that I use annual premium as a base, because of the longer claim lags associated with aggregate compared to specific. Also, I calculate dollar-weighted lag days using exact days from incurred date to paid date on a seriatim basis, because aggregate claims are relatively infrequent. As more and smaller groups are going to self-funding, we are seeing more frequent aggregate claims.

Conservatism

The degree of conservatism required is related to the purpose for the reserve calculation. You should be less conservative for GAAP purposes than for statutory purposes and even less conservative (possibly using best estimate) if developing an experience adjustment to use in producing new business premium rates for a subsequent period.

In general, more conservatism is needed if:

1. The data are scarce.
2. Loss ratios have been increasing or tend to vary widely from period to period.
3. Claim lag days have not been stable. (As an aside, I have found that recently, claim lags have been decreasing as insurers and managing general underwriters have been emphasizing quick reporting. When this is the case, using a longer period -- two to three years, instead of one year -- to develop the claim lag is conservative).
4. The block of business is rapidly growing or shrinking. A rapidly growing block may be due to rates that are relatively lower than in the past. A shrinking block may be the result of relatively high rates with the better groups changing insurers, with a subsequent deterioration of business (antiselect lapsation). Either scenario tends to lead to an increasing loss ratio.

Credibility

Depending on the specific deductible, the claim frequency is closer to disability and death frequencies, rather than first-dollar, medical-claim frequencies. For 1992, at a $25,000 specific deductible, I estimate a frequency of nine claims per 1,000 adults and three claims per 1,000 children (with a composite frequency of 14 claims per 1,000 employees). At a $100,000 specific deductible, claims are about 1/10 of a $25,000 level.

Therefore, assigned credibility should be more similar to disability and life coverage credibility than to first-dollar, medical-coverage credibility. Very roughly, I like to see $5,000,000 to $10,000,000 in premium before assigning significant credibility. In practice, the degree of credibility assigned is somewhat dependent on the desires of the client.

Miscellaneous Issues

Below I will discuss a number of additional issues which may need to be considered when calculating IBNP reserves.

At times, IBNP reserves are calculated, and it is necessary to split the reserves into IBNR and pending (or in course of settlement). One method would be to take an inventory of current pending claims, and multiply the total amount requested by a historical proportion of paid claim amounts to requested claim amounts.

I am sometimes asked about how to deal with particularly large claims, such as for an organ transplant or premature infant, particularly if the claim is reported late, so that the claim lag is adversely effected. Because there are always large claims, any one claim should not cause problems if reported on a timely basis. This is particularly true if the stop-loss insurer has proper reinsurance protection. Even if reported late, I tend not to do anything special, at least to the extent that there are credible data. If the experience database is large enough, there should not be a reserve distortion. There are occasions when some adjustment is needed. As an alternative, you can eliminate those claims from the claim lag

triangle (but not claim experience) and increase the margin. I like to use an additional 10% margin.

For stop-loss insurers just entering the business, IBNP reserves are at times calculated as the target loss ratio multiplied by the earned premium, less any claims paid. Realistically, this is about all that can be done for the first six to nine months. Some adjustments to this method would include using the target loss ratio plus expected margin in place of the target loss ratio. Besides being conservative, it would delay the release of profits. An additional adjustment would be the use of a minimum IBNP reserve factor (perhaps month by month as a percent of earned premium), regardless of what reserve the above formula produces. This would increase the reserve if there are higher than expected early claims, which is appropriate. In any instance, the actuary should be satisfied that the reserve is sufficient for its purpose.

Sometimes total stop-loss IBNP reserves need to be split by reinsurance treaty year. It is important to accurately allocate reserves to the proper treaty year, especially when there is a pool of reinsurers that may vary by treaty year to treaty year. While not going into details, this is easily accomplished using the above techniques with the proper segmentation of data.

The final issue is the handling of specific and aggregate advancements. If the stop-loss insurer accounts for the advancements as claims, as of the date they are paid, the above techniques should be used, with the paid date being the date of the advancement. If, however the advancements are booked as loans, the paid date would be the date the actual claim payment is made (even if it is just accounting entries "paying" the claim and clearing the loan).