1991 VALUATION ACTUARY SYMPOSIUM PROCEEDINGS

SESSION 9

Claim Reserves

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LONG-TERM-DISABILITY (LTD) RESERVES
AND OTHER GROUP HEALTH CASH FLOWS

LTD Reserves

MR. BARRY T. ALLEN: The 1987 Group LTD (GLTD) table is published in the *Transactions of the Society of Actuaries*. The article includes one set of formulas and an APL computer program as one possible way to use this table. Some people have duplicated the calculations on LOTUS. In addition you have available both a diskette from the Society of Actuaries, which incorporates a different formula, and the complex formulas used for the 1964 CDT table. Therefore we have a situation where no specific formula is mandated for using the 1987 GLTD table.

I must caution you about using your own company's experience. It was recommended, is in the model law, and appears to be allowed by the individual states that you may use your own company's experience for the first two years. However, it was recommended but inadvertently left out of the model law that you be allowed to grade your own experience to that of the standard table by the end of the fifth year of disability. Since it was left out of the model, some states are also excluding any reference to grading after two years. If Connecticut fails to allow grading, our reserves could increase significantly. We have had rapid growth and have many claims in the early durations. For companies with little growth the affect will be less.

Projections of LTD Cash Flow

My goal for cash-flow projections for LTD was to produce a monthly payment stream that, when discounted at the reserve valuation interest rate, would result in essentially the same reserve as produced by the formulas published with the 1987 GLTD table. This is a useful approach even though our statutory reserves are on a different basis. For instance, while our management reserves are on the 1987 GLTD table as modified for our own experience, our statutory reserves are still based on a modification of the 1964 CDT table at 3%.

Using the regular reserve program, I simply retained the string of lx per $100 of monthly benefit. I then linearly interpolated on those lx that were on an annual basis to get

everything on a monthly basis. The beginning and ending of each month was then averaged. I then filled the string of numbers with zeros in order to achieve a resulting string of constant length. The results of using each string can therefore be added to the results of all prior calculations. However, instead of arranging for one single string of numbers as the sum of all calculations, I produced separate sums for claims incurred in each of the last few years. This enabled me to capture the most recent incurrals separately to store them as a model for the runout of incurred but not reported (IBNR) reserves.

The resulting cash flow was essentially from our management reserve basis, but when it was discounted at a suitably lower rate of interest, the statutory reserve total could be reproduced. This leads to the observation that in today's computer age a suitable way to calculate LTD reserves might be to simply discount the payment stream indicated by the appropriate continuance table.

Chart 1 shows the changes I made to the published APL program. The result of these changes is that the program will return the currently calculated reserve followed by the cash-flow stream.

The simplest model for IBNR is to sum the runoffs for incurrals in the last few years. Discount the result back at the interest rate that, when applied to the sum of all such runoffs, would reproduce the statutory reserves. Divide the result into the IBNR to get a ratio that can be multiplied by the runoffs of incurrals in the last few years to produce the desired model.

Note that loads to reserves for claim payment expenses should be spread proportionately over all the payments. Note also that production of all payments on a monthly basis accomplished two things. First, it worked well with the 1987 GLTD data, which start monthly and change to annually. Second, it allows me to combine and use the results in any desired manner (i.e., monthly for the next 24 months and annually thereafter, monthly until the end of next year and quarterly thereafter, etc).

CHART 1

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[1]   A THIS IS NOT A FUNCTION BUT THE ADDITIONAL LINES TO BE ADDED TO
[2]   A THE APL FUNCTION PUBLISHED WITH THE 1987 GLTD TABLE IN ORDER
[3]   A TO OBTAIN A MONTHLY RUNOUT OF CLAIM PAYMENTS PER $100 OF BENEFIT.
[4]   A IN ADDITION THE FUNCTION MONTHLY IS USED.
[5]
[6]   A THE NEXT 8 LINES SHOULD BE INSERTED BETWEEN LINES 18 AND 19
[7]     EALT←+/A[3]≥(2+ι1100)÷12
[8]     NALT←¯1++/A[2]≥(2+ι1100)÷12
[9]     LALT←L[X;ιE+2]
[10]    →(21>ρLALT)/L3
[11]    LALT←LALT[ι21],MONTHLY 21↓LALT
[12] L3:LALT←NALT↓EALT↑LALT
[13]    LALT←0.5×(1↓LALT)+¯1↓LALT
[14]    RUNOFF←0.01×L0.5+10000×LALT÷1↑LALT
[15]
[16]  A THE NEXT 8 LINES SHOULD BE INSERTED BETWEEN LINES 31 AND 32
[17]    EALT←+/A[3]≥(5+ι1100)÷12
[18]    NALT←¯1++/A[2]≥(5+ι1100)÷12
[19]    LALT←L[X;ιE+2]
[20]    →(18>ρLALT)/L4
[21]    LALT←LALT[ι18],MONTHLY 18↓LALT
[22] L4:LALT←NALT↓EALT↑LALT
[23]    LALT←0.5×(1↓LALT)+¯1↓LALT
[24]    RUNOFF←0.01×L0.5+10000×LALT÷1↑LALT
[25]
[26]  A THE NEXT 8 LINES SHOULD BE INSERTED BETWEEN LINES 44 AND 45
[27]    EALT←+/A[3]≥(11+ι1100)÷12
[28]    NALT←¯1++/A[2]≥(11+ι1100)÷12
[29]    LALT←L[X;ιE+2]
[30]    →(12>ρLALT)/L6
[31]    LALT←LALT[ι12],MONTHLY 12↓LALT
[32] L6:LALT←NALT↓EALT↑LALT
[33]    LALT←0.5×(1↓LALT)+¯1↓LALT
[34]    RUNOFF←0.01×L0.5+10000×LALT÷1↑LALT
[35]
[36]  A THE LAST LINE SHOULD BE INSERTED AS THE VERY LAST.
[37]  A THE RESULT WILL BE THE NORMALLY CALCULATED RESERVE FOLLOWED BY
[38]  A THE CLAIM PAYMENT RUNOUT.
[39]    R←R,1000ρRUNOFF,1000ρ0
     ∇
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     ∇MONTHLY[□]∇
   ∇ R←MONTHLY V;N;VX
[1]   AEXPANDS A VECTOR OF ANNUAL LIVES TO ONE OF MONTHLY LIVES
[2]    N←ρV
[3]    VX←((1↓V)-¯1↓V)÷12
[4]    R←(,+\(((N-1),1)ρV),Q(11,N-1)ρVX),¯1↑V
     ∇
```

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For those who like absolute precision, the discounted value of anticipated payments is very close to the reserve number. If you want it even closer you can play with (1) the assumption of averaging the lives at the beginning and ending of each month to better match the reserve formulas and/or (2) adjust the interest discount assumption from whole months to something else.

Projections of Cash Flow from Premium Waiver Reserves

Similar to LTD I went to the continuance tables behind the reserve assumptions. I tried to reproduce the reserves by discounting a string of average monthly deaths. I got excellent results simply by adjusting the interest discount assumption a few months to allow for delayed payment caused by the time lag between actual death, notification and proof of death. Again I used the string of payments from disabilities in the last few years to model the IBNR.

Projections of Cash Flow from Medical, Dental and Short-Term Disability

I wanted to project these lines (1) to get a more precise handle on the short-term nature of the payouts and (2) just in case anyone wanted to combine these lines with other lines to test the overall asset/liability match.

I used monthly claim runoff triangles for each line or major subdivision of a line to calculate monthly runoff curves. It was then a simple matter to apply each runoff curve to its corresponding runoff triangle to calculate the remaining runoff of each month's incurrals. For any line where some minor component was left out of the analysis, I simply multiplied the combined results by the ratio of total reserves to the sum of the combined results.

HEALTH CLAIM LIABILITIES
BEYOND THE LAG TABLES

MR. DAVID J. BAHN: There exist well-documented standard techniques for the development of the claim liabilities (or "reserve" or incurred but not reported "IBNR") for medical insurance included on the balance sheet of an insurance company (or HMO or Blue Cross/Blue Shield Plan or benefit trust). Almost universally, these techniques begin with a claim triangle (or "lag table") of historical claims sorted into paid and incurred cells. Using these tables, ratios are calculated. These ratios, commonly called completion factors, are applied to the claims already paid to develop "completed" claims for a period. The completed claims are the estimate of the incurred claims for the period. The reserve is then the difference between the completed claims and claims already paid.

Considerable variation exists between completion factors for different benefit types. Additionally, the numerical factors are subject to the influence of many events, both internal and external to the insuring organization. Finally, newly introduced products do not have a history of valid factors to be used in the development of the reserve.

This paper examines completion factors (and the resulting completed claims and reserves) over time and for several benefit types. The purpose is to illustrate the caution that is required when using the standard numerical techniques to develop the claim reserve, or its counterpart, ultimate incurred claims. Alternate techniques are suggested to assist the practicing actuary in developing the best estimate of incurred claims. This best estimate is then used as the basis for the establishment of the actual claims liability. An additional amount, called a margin, is often added to the best estimate, the exact size of which may depend on the purpose of the estimate, and which may be a function of the variations found in the factors.

Introduction
Blue Cross/Blue Shield of Florida (BCBSF) has underwritten a large volume of Medicare supplement (medigap) insurance for many years. The volume of data is large enough, with a long enough history, to be very credible. Medigap insurance is both extremely simple and

extremely complex. Simply stated, medigap pays what Medicare doesn't (i.e., the hospital deductible, the 20% coinsurance on doctor bills, and coinsurance amounts for long hospital stays and skilled nursing facility days). There is a clear distinction between hospital and physician claims. Further, the majority of claims are relatively small: the hospital deductibles ($628 in 1991) amount to 85% of the Part A claims, and the average Part B claim (the 20% amount) is $40. Because of its simplicity and the high frequency and small amounts of individual claims, the paid claims, completion factors, and resulting calculations should be straightforward with readily explainable differences between factors.

The complexity in medigap coverage arises from both regular and ad hoc changes in the Medicare program. Ad hoc changes have become more frequent of late. The changes are both explicit (the annual Part A deductible change, the Catastrophic Coverage Act) and implicit (benefit reclassifications, liberalization, or tightening of rules). These changes lead to materially significant differences in the numerical values of completion factors and the resulting calculations.

An additional determinant of variations in completion factors is changes in the administration of Medicare by the fiscal intermediary (which is BCBSF for the State of Florida). These changes may be due to permitted staffing levels, the installation of a new processing system or changes in the way data are stored. Since medigap can only pay after Medicare pays, any speed-ups or slowdowns in Medicare payments will directly affect the timing of medigap payments.

Further illustrations of completion factor variations are provided by variations within the medigap product portfolio. As an example, some products provide for an electronic crossover (or "piggyback") of claims from Medicare to medigap. Other products require the beneficiary/ policyholder to submit the claim, using the Explanation of Medicare Benefits as the required proof of loss. A new series of products may be introduced from time to time.

The effect of the above on the development of incurred claims and the reserve will be illustrated by sets of ratios. These ratios are of the following types:

1. "Claims Paid over Ratios" -- such as the ratios of claims paid in the second three months after the incurral quarter to claims paid in the first three months after incurral. The ratio of six-month paid claims, over three-month paid claims is the ratio of claims paid in the fourth through sixth months to the ratio of claims in the first through third months.

2. "Claims Paid to Ultimate Ratios" -- the ratios of claims paid through X months to the ultimate incurred claims paid. (For practical purposes, this paper considers claims to be complete 24 months after incurral).

Illustrations will demonstrate how the use of calculated ratios, without adjustment, may lead to the misstatement of incurred claims and claim liability estimates.

Factors Over Time

Tables 1 through 7 use ratios of claims paid in the fourth through sixth months after incurral to claims paid in the first three months after incurral to illustrate the variations in factors. Table 1 illustrates ratios for calendar quarters from 1985 through 1990, separately for Part A and Part B medigap benefits. As noted, there is very wide variation in the factors. The largest and smallest factors are:

	Range of Factors	
	Part A	Part B
Largest	43.9%	82.7%
Smallest	20.7%	20.9%

The largest factor occurred at a time when the intermediary experienced staffing difficulties. The smallest Part A factor occurred in 1989 when the Catastrophic Coverage Act was effective. That law reduced medigap Part A benefits to a single Part A deductible each year, for all practical purposes. Benefits for long stays were paid by Medicare not medigap, as had been the case.

TABLE 1

Illustration of Medigap Insurance
Ratios of Second Three Months Payments to First Three Months Payments

Incurred		Medigap Benefit Type	
Quarter	Year	Part A	Part B
1	1985	38.6%	41.6%
2	1985	43.9	44.5
3	1985	40.9	37.9
4	1985	36.1	35.4
1	1986	31.8	82.7
2	1986	32.9	64.9
3	1986	33.4	39.6
4	1986	34.7	32.1
1	1987	32.1	31.2
2	1987	32.2	27.6
3	1987	37.1	26.6
4	1987	30.9	30.9
1	1988	23.9	31.8
2	1988	33.5	24.9
3	1988	33.0	21.2
4	1988	27.1	23.0
1	1989	20.7	29.4
2	1989	20.7	29.4
3	1989	25.4	22.5
4	1989	30.7	23.0
1	1990	34.1	29.2
2	1990	39.5	30.7
3	1990	39.6	20.9
4	1990	42.6	20.9

Largest Factor		43.9%	82.7%
Smallest Factor		20.7%	20.9%
Average Factor		33.1%	34.8%
Standard Deviation		6.2%	14.0%

Significant Events which may be probable causes:
1. Limitations on intermediary staffing in 1986
2. New Part B System introduced by intermediary in fourth quarter of 1988
3. Catastrophic Coverage effective for Part A benefits during 1989

TABLE 2

Misstatement of Claims Using Prior Year Factor for Projection

PART A CLAIMS ($000s)

Incurred				Actual-Projected	
Quarter	Year	Projected	Actual	Amount	Percent
1	1986	$2,718	$2,238	($480)	-21.5%
2	1986	2,965	2,223	(742)	-33.4
3	1986	2,631	2,151	(480)	-22.3
4	1986	2,247	2,158	(89)	-4.1
1	1987	2,267	2,289	22	0.9
2	1987	2,216	2,171	(45)	-2.1
3	1987	2,108	2,338	230	9.9
4	1987	2,228	1,984	(244)	-12.3
1	1988	2,305	1,717	(588)	-34.3
2	1988	1,915	1,992	77	3.9
3	1988	2,107	1,872	(325)	-12.6
4	1988	1,816	1,592	(224)	-14.1
1	1989	1,359	1,179	(180)	-15.3
2	1989	1,564	965	(599)	-62.0
3	1989	1,215	936	(279)	-29.8
4	1989	879	995	116	11.6
1	1990	1,163	1,916	753	39.3
2	1990	999	1,907	908	47.6
3	1990	1,187	1,850	663	35.9
4	1990	1,397	1,938	541	27.9

Average Absolute Value of Misstatements $375

Percentage of Actual Claims   20.6%

TABLE 3

Misstatement of Claims Using Prior Quarter Factor for Projection

PART A CLAIMS ($000s)

Incurred				Actual-Projected	
Quarter	Year	Projected	Actual	Amount	Percent
1	1986	$2,542	$2,238	($304)	-13.6%
2	1986	2,147	2,223	76	3.4
3	1986	2,116	2,151	35	1.6
4	1986	2,079	2,158	79	3.7
1	1987	2,474	2,289	(185)	-8.1
2	1987	1,421	2,171	9	0.4
3	1987	2,032	2,338	306	13.1
4	1987	2,382	1,984	(398)	-20.1
1	1988	2,219	1,717	(502)	-29.2
2	1988	1,421	1,992	571	28.6
3	1988	1,903	1,872	(31)	-1.6
4	1988	1,939	1,592	(347)	-21.8
1	1989	1,541	1,179	(362)	-30.7
2	1989	966	965	(1)	-0.1
3	1989	762	936	174	18.5
4	1989	824	995	171	17.2
1	1990	1,725	1,916	191	10.0
2	1990	1,646	1,907	261	13.7
3	1990	1,845	1,850	5	0.2
4	1990	1,802	1,938	136	7.0

Average Absolute Value of Misstatements $207

Percentage of Actual Claims   11.4%

TABLE 4

Misstatement of Claims Using Average Factors for Projection

PART A CLAIMS ($000s)

Incurred				Actual-Projected	
Quarter	Year	Projected	Actual	Amount	Percent
1	1986	$2,808	$2,238	($570)	-25.5%
2	1986	2,578	2,223	(355)	-16.0
3	1986	2,279	2,151	(128)	-5.9
4	1986	2,088	2,158	70	3.2
1	1987	2,367	2,289	(78)	-3.4
2	1987	2,241	2,171	(70)	-3.2
3	1987	2,089	2,338	249	10.7
4	1987	2,184	1,984	(200)	-10.1
1	1988	2,375	1,717	(658)	-38.3
2	1988	1,845	1,992	147	7.4
3	1988	1,781	1,872	91	4.9
4	1988	1,782	1,592	(190)	-11.9
1	1989	1,671	1,179	(492)	-41.7
2	1989	1,334	965	(369)	-38.2
3	1989	935	936	1	0.2
4	1989	762	995	233	23.5
1	1990	1,370	1,916	546	28.5
2	1990	1,338	1,907	569	29.8
3	1990	1,515	1,850	335	18.1
4	1990	1,637	1,938	301	15.5

Average of Absolute Value of Misstatements: $283

Percentage of Actual Claims: 15.5%

The factor used for projection is the arithmetic average of the factors for the prior four quarters.

TABLE 5

Misstatement of Claims Using Prior Year Factor for Projection

PART B CLAIMS ($000s)

Incurred				Actual-Projected	
Quarter	Year	Projected	Actual	Amount	Percent
1	1986	$2,568	$5,103	$2,535	49.7%
2	1986	3,657	5,334	1,677	31.4
3	1986	3,878	4,048	170	4.2
4	1986	4,210	3,812	(398)	-10.4
1	1987	9,730	3,676	(6,054)	-164.7
2	1987	9,078	3,867	(5,211)	-134.7
3	1987	5,371	3,614	(1,757)	-48.6
4	1987	4,491	4,320	(171)	-4.0
1	1988	3,951	4,032	81	2.0
2	1988	4,148	3,735	596	15.3
3	1988	3,810	3,041	(769)	5.7
4	1988	3,683	4,815	1,132	23.5
1	1989	3,443	3,512	(1,863)	-53.0
2	1989	3,683	3,844	161	4.2
3	1989	2,859	3,032	173	5.7
4	1989	3,372	3,061	(2,394)	-76.0
1	1990	5,375	3,512	(1,863)	-53.0
2	1990	3,683	3,844	161	4.2
3	1990	2,959	2,746	(212)	-7.8
4	1990	3,372	3,061	(311)	-10.2

Average Absolute Value of Misstatements $1,374

Percentage of Actual Claims 35.5%

TABLE 6

Misstatement of Claims Using Prior Quarter Factor for Projection

PART B CLAIMS ($000s)

Incurred				Actual-Projected	
Quarter	Year	Projected	Actual	Amount	Percent
1	1986	$2,185	$5,103	$2,918	57.2%
2	1986	6,795	5,334	(1,461)	-27.4
3	1986	6,641	4,048	(2,593)	-64.0
4	1986	4,710	3,812	(2,593)	-32.5
1	1987	3,777	3,676	(101)	-2.7
2	1987	4,364	3,867	(497)	-12.9
3	1987	3,743	3,614	(129)	-3.6
4	1987	3,721	4,320	599	13.9
1	1988	3,913	4,032	119	3.0
2	1988	4,779	3,735	(1,044)	-28.0
3	1988	3,567	3,041	(526)	-17.3
4	1988	2,527	4,815	2,288	47.5
1	1989	4,374	4,844	470	9.7
2	1989	5,935	3,902	(2,033)	-52.1
3	1989	3,965	3,032	(933)	-30.8
4	1989	3,088	3,151	63	2.0
1	1990	2,766	3,512	746	21.3
2	1990	3,658	3,844	186	4.8
3	1990	4,037	2,746	(1,291)	-47.0
4	1990	3,065	3,061	(4)	-0.1

Average Absolute Values of Misstatements $ 945

Percentage of Actual   24.4%

TABLE 7

Misstatement of Claims Using Average Factors for Projection

PART B CLAIMS ($000s)

Incurred				Actual-Projected	
Quarter	Year	Projected	Actual	Amount	Percent
1	1986	$2,460	$5,103	$2,643	51.8%
2	1986	4,119	5,334	1,215	22.8
3	1986	5,651	4,048	(1,603)	-39.6
4	1986	6,618	3,812	(2,806	-73.6
1	1987	6,451	3,676	(2,775)	-75.5
2	1987	5,868	3,867	(2,001)	-51.7
3	1987	4,425	3,614	(811)	-22.4
4	1987	4,110	4,320	210	4.9
1	1988	3,681	4,032	351	8.7
2	1988	4,392	3,735	(657)	-17.6
3	1988	4,090	3,041	(1,049)	-34.5
4	1988	3,242	4,815	1,573	32.7
1	1989	3,202	4,844	1,642	33.9
2	1989	4,355	3,902	(453)	-11.6
3	1989	4,575	3,032	(1,543)	-50.9
4	1989	4,701	3,151	(1,550)	-49.2
1	1990	3,595	4,844	(83)	-2.4
2	1990	3,260	3,844	584	15.2
3	1990	3,456	2,746	(719)	-26.2
4	1990	3,805	3,061	(744)	-24.3

Average Absolute Values of Misstatements $1,251

Percentage of Actual   32.3%

The factor used is the arithmetic average of the factors for the prior four quarters.

Table 1 illustrates that the Part A and Part B factors are different. Because of these differences valuation data should be assembled separately for Part A and Part B. Because the Part B component has been growing more rapidly than the Part A component, a composite historical factor would likely misstate the current situation. Additionally, factors are larger and smaller at different times for the separate benefit components as they are subject to different influences.

In order to demonstrate the effect of the varying factors, claims were projected using the factors; the projected claims were compared with actual claim payments.

Tables 2-4 compare illustrative projections of Part A claims in the fourth through sixth months based on the historical factors with the actual claims paid in the fourth through sixth months. Table 2 uses the factor for the same quarter in the prior year for the projection. Use of this factor resulted in significant misstatements of claims (both over and under statements), by up to 62%. Table 3 uses the factor for the most recent prior quarter for the projection. The range of misstatements is reduced, but still exceeded 25% in many instances. A common technique used to smooth data with wide variations is averaging. Table 4 uses the arithmetic average of the factors for the prior four quarters in developing the projections. A wide range of misstatements was produced using this approach. Misstatements above 25% were also quite common with this technique.

The average absolute values of the misstatements were calculated as a measure of the misstatement, and compared with the average actual claims. This produced the following:

<u>Part A Misstatements</u>

Factor for Projection	Average Absolute Amount ($000)	Percentage of Actual
Prior Year	$375	20.6%
Prior Quarter	207	11.4
Average	283	15.5

Tables 5-7 illustrate projected claims and actual claims for Part B (physician) benefits. The same three methods were used in projecting claims. The results were quite similar: a wide range of misstatements, both positive and negative. Using the absolute value as a percentage of actual as a measure of variation, the variation was even larger than for Part A:

	Part B Misstatements	
Factor for Projection	Average Absolute Amount ($000)	Percentage of Actual
Prior Year	$1,374	35.5%
Prior Quarter	945	24.4
Average	1,251	32.3

Use of the prior-quarter factor seems to result in closer estimates, although there is still considerable variation. The prior-quarter factor may be a better predictor because of the rapidity with which events affecting a medigap block of business occur. The prior-year factor would correct for seasonality but ignores events, such as system changes or major benefit changes, which occur close to a valuation date.

Although the projected claims in the fourth through sixth months represent only a part of the total liability, those claims typically represent a large portion of the total liability. Techniques other than completion factors could be more appropriate for development of the portion of the reserve for periods close to the valuation date.

Typically, after several quarters the claims are "complete" for practical purposes. There may, however, still be a large percentage of variations in payment ratios after several quarters have elapsed. Because of the smaller dollars at the end of the payment period, the dollar misstatements are normally smaller. The table below illustrates percentage and dollar misstatements for claims projected for the tenth through twelfth months based on claims paid in the seventh through ninth months. The calculations were done in the same manner as for the "six over three" payments. For Part A, the percentage variations are

larger than for the six over three projections. The Part B variations are smaller but are still on the order of 10%:

Misstatements of Projected Claims
10th-12th Months based on 7th-9th Months

Factor for Projection	Part A		Part B	
	Average Absolute Amount ($000)	Percent of Actual	Average Absolute Amount ($000)	Percent of Actual
Prior Year	$70	34.5%	$47	10.5%
Prior Quarter	88	43.1	66	14.9
Average	65	31.8	42	9.5

The Part A variation reflects the effect of the Catastrophic Coverage Act effective during 1989. Because no long-stay benefits were paid under medigap (especially for days when Medicare normally would not have paid), the claim tail was shortened drastically. The result was that prior factors were not valid and resulted in sizeable variations. When the Catastrophic Coverage Act was repealed, the 1989 factors were not valid for projections during 1990. This demonstrates that, when a major change is made, factors generated prior to the time of change are not valid to use during the change period. Factors developed during the change period are not valid for use after the change.

Factors for Ultimate Claims

In developing the reserve, the claims incurred in the time period closest to the valuation date are the largest component. This is also the period for which the least information is available. Considerable variation can result in projections based on the most recent data.

Table 8 illustrates the ratios of claims paid in the first three months after incurral to the ultimate claims. (Ultimate claims are claims paid through 24 months). The ranges for these factors are smaller than the six over three ranges. The standard deviation of the

factors is on the same order of magnitude. Normally, projections of ultimate claims are made based on several factors multiplied together ("six over three," times "nine over six," etc.). For illustrative purposes, a projection of ultimate claims was made using only a single factor, the prior-year, three-month-to-ultimate factor. These are in Tables 8 and 9. The misstatements were calculated as in Tables 2 through 7 (Table 10). The results were as follows:

<u>Misstatements of Ultimate Claims</u>

	Average of Absolute Value	Percentage of Actual
Part A	$ 524	5.7%
Part B	$2,453	13.5%

The percentage differences are smaller than for the six over three ratios. The dollar amounts are larger because a larger amount of dollar claims is being projected.

Factors for New Products

During 1987 the company introduced two new series of products, called Series W (With) and Series W-O (Without). With new products, there is, of course, no history of completion factors. Benefits for the W series were very similar to the existing products with only minor differences. In establishing claim reserves for the first several years after the product introduction, factors for the mature products were used to develop incurred claims for the new series. Tables 11 and 12 indicate that this was a reasonable choice for series W.

Although the factors for the newer products had a slightly wider range, the average factors as well as the standard deviations of the factors were reasonably close to the mature product factors for both Part A and Part B benefits.

Benefits in the other series (W-O) were the same as in the W series, with one major exception. The W series provided for automatic (electronic) crossover of claims from the

TABLE 8

Ratios of Three Months Payments to 24 Months Payments

Incurred		Medigap Benefit Type	
Quarter	Year	Part A	Part B
1	1985	62.7%	62.2%
2	1985	61.3	62.0
3	1985	60.7	65.0
4	1985	62.3	65.5
1	1986	66.5	44.7
2	1986	66.8	51.9
3	1986	65.5	62.7
4	1986	64.3	67.7
1	1987	67.4	67.4
2	1987	68.8	70.9
3	1987	64.2	70.6
4	1987	66.2	69.1
1	1988	71.6	68.5
2	1988	67.2	74.0
3	1988	67.4	75.0
4	1988	72.1	60.9
1	1989	79.0	60.4
2	1989	79.3	70.4
Largest Factor		79.3%	75.0%
Smallest Factor		60.7%	44.7%
Average Factor		67.4%	64.9%
Standard Deviation		5.1%	7.3%

TABLE 9

Misstatement of 24 Months Claims Using
Prior-Year Factor for Projection

PART A CLAIMS

Incurred				Actual-Projected	
Quarter	Year	Projected	Actual	Amount	Percent
1	1986	$11,225	$10,592	($633)	-6.0%
2	1986	11,009	10,112	(897)	-8.9
3	1986	10,598	9,825	(773)	-7.9
4	1986	9,997	9,825	(323)	-3.3
1	1987	10,724	10,586	(138)	-1.3
2	1987	10,087	9,787	(300)	-3.1
3	1987	9,637	9,829	192	2.0
4	1987	9,997	9,705	(272)	-2.8
1	1988	10,662	10,028	(634)	6.3
2	1988	8,641	8,849	208	2.4
3	1988	8,848	8,425	(423)	-5.0
4	1988	8,883	8,147	(736)	-9.0
1	1989	7,942	7,195	(747)	-10.4
2	1989	6,946	5,888	(1,058)	-18.0

Average of Absolute Values of Misstatements $524

Percentage of Average Actual Claims   5.7%

TABLE 10

Misstatement of 24 Months Claims Using
Prior-Year Factor for Projection

PART B CLAIMS

Incurred				Actual-Projected	
Quarter	Year	Projected	Actual	Amount	Percent
1	1986	$ 9,929	$13,807	$3,878	28.1%
2	1986	13,260	15,845	2,585	16.3
3	1986	15,749	16,327	578	3.5
4	1986	18,155	17,579	(576)	-3.3
1	1987	26,321	17,458	(8,863)	-50.8
2	1987	26,971	19,714	(7,257)	-36.8
3	1987	21,641	19,218	(2,423)	-12.6
4	1987	20,679	20,238	(441)	-2.2
1	1988	18,787	18,488	(299)	-1.6
2	1988	21,183	20,319	(864)	-4.3
3	1988	20,299	19,098	(1,201)	-6.3
4	1988	17,241	19,582	2,341	12.0
1	1989	15,809	17,924	2,115	11.9
2	1989	17,952	18,865	913	4.8

Average of Absolute Values of Misstatements $2,453

Percentage of Average Actual Claims   13.5%

TABLE 11

**Ratios of Six Months Payments to Three Months Payments
New Product (Series W) Compared with a Mature Product**

| Incurred | | Medigap Part A Benefits | |
Quarter	Year	Mature Product	New Product
3	1987	37.1%	34.5%
4	1987	30.9	28.7
1	1988	23.9	26.6
2	1988	33.5	38.2
3	1988	33.0	33.0
4	1988	27.1	26.8
1	1989	20.7	19.3
2	1989	20.7	26.7
3	1989	25.4	29.6
4	1989	30.7	34.3
1	1990	34.1	33.0
2	1990	39.5	34.6
3	1990	39.6	45.4
4	1990	42.6	45.9
Largest Factor		42.6%	45.9%
Smallest Factor		20.7%	19.3%
Average Factor		31.3%	32.6%
Standard Deviation		6.8%	7.0%

TABLE 12

Ratios of Six Months Payments to Three Months Payments
New Product (Series W) Compared with a Mature Product

Incurred		Medigap Part B Benefits	
Quarter	Year	Mature Product	New Product
1	1987	26.6%	36.0%
2	1987	30.9	32.9
1	1988	31.8	31.6
2	1988	24.9	24.4
3	1988	21.2	18.6
4	1988	40.4	40.7
1	1989	44.7	41.9
2	1989	29.4	27.7
3	1989	22.5	21.3
4	1989	23.0	20.0
1	1990	29.2	27.5
2	1990	30.7	30.1
3	1990	20.9	19.4
4	1990	20.9	20.2
Largest Factor		44.7%	41.9%
Smallest Factor		20.9%	18.6%
Average Factor		28.4%	28.0%
Standard Deviation		7.0%	7.6%

Medicare intermediary to the medigap claim operation. Processing in the Medigap claim department was also done electronically, resulting in a very rapid payment of the medigap benefits. (The mature product also contained this crossover feature). The W-O series did not contain this crossover feature. Providers or policyholders submitted the Explanation of Medicare Benefits in order to receive the medigap benefits. Tables 13 and 14 present the six over three claim ratios for the two new series of products.

For both Part A and Part B benefits, the ratios for the W series were much smaller than the ratios for the W-O series, indicating more rapid payments for the W series. Average factors (ignoring the first four quarters after introduction, when enrollment was small) are:

Average Claim Payment Ratios
Third Quarter 1988 Through 1990

Benefit	Without Crossover	With Crossover
Part A	45.4%	32.9%
Part B	63.0%	26.7%

The magnitude of the difference between the two Part B (mainly physician service) average factors is understandable and reasonable. Policyholders may hold Explanation of Medicare Benefits (EOMBs) and submit several claims together. The medigap payments under each claim may be small; it may be easier for the policyholder to submit several at once. The larger Part A hospital claims will be submitted more quickly; or the hospital itself may assist in the process.

Medicare is now requiring that many claims (e.g., for services provided by participating physicians) be automatically crossed over to the medigap carrier. The ratios should approach each other in the future, but factors for the W-O series will probably be slightly larger in the future as some claims will still be submitted by policyholders.

TABLE 13

Ratios of Six Months Payments to Three Months Payments
Products With and Without Crossover Feature

| Incurred | | Medigap Part A Benefits | |
Quarter	Year	Without Crossover	With Crossover
1	1987	306.8%	34.5%
2	1987	204.1	28.7
1	1988	183.8	26.6
2	1988	196.7	38.2
3	1988	143.9	33.0
4	1988	46.2	26.8
1	1989	19.9	19.3
2	1989	26.7	26.7
3	1989	32.4	29.6
4	1989	33.7	34.3
1	1990	36.2	45.9
2	1990	41.7	34.6
3	1990	35.9	45.4
4	1990	37.6	45.9
Largest Factor		306.8%	45.9%
Smallest Factor		19.9%	19.3%
Average Factor		96.1%	32.6%
Standard Deviation		89.0%	7.0%

TABLE 14

Ratios of Six Months Payments to Three Months Payments
Products With and Without Crossover Feature

Incurred		Medigap Part B Benefits	
Quarter	Year	Without Crossover	With Crossover
1	1987	102.4%	36.0%
2	1987	127.7	32.9
1	1988	129.9	31.6
2	1988	106.4	24.4
3	1988	85.5	18.6
4	1988	77.4	40.7
1	1989	82.8	41.9
2	1989	73.3	27.7
3	1989	51.5	21.3
4	1989	47.0	20.0
1	1990	69.6	27.5
2	1990	55.0	30.1
3	1990	40.5	19.4
4	1990	47.9	20.2
Largest Factor		129.9%	41.9%
Smallest Factor		40.5%	18.6%
Average Factor		78.4%	28.0%
Standard Deviation		28.3%	7.6%

Selection of appropriate factors for new products will be an important topic in 1992. The NAIC recently proposed legislation (medigap standardization) that requires the development of new products to replace existing products. Benefit packages in the new standardized products are similar to, although not identical to, benefits in existing products. Certain of the new features may result in claim payment patterns unlike those of existing products. As an example, the Part A benefits in the core product (a required offering) are limited to the long-stay coinsurance payments and coverage for 365 hospital days after Medicare benefits have ceased. This structure is almost the reverse of the Part A benefit structure during 1989 when the Catastrophic Coverage Act was effective. It is most likely that medigap benefits under the core product will be paid much longer, on average, after the incurral date than benefits under products which pay the Part A deductible. Actuaries responsible for establishment of claim liabilities for the new products should exercise caution for several years until the claim patterns for the new products stabilize.

Alternative Techniques

There are several alternative techniques that attempt to circumvent the problems encountered with payment ratios. Some techniques are:

1. projections based on larger blocks of claims, such as projecting twelve months of claims rather than three months of claims;

2. projections based on pure premiums; and

3. projections based on loss ratios.

These techniques are often useful, either to establish the reserve itself, or to validate the reasonability of reserves produced by other techniques. The alternative methods also have drawbacks that should be balanced against the drawbacks of other methods. The techniques attempt to adjust for the fact that the largest component of the claim reserve is for claims incurred in the periods just prior to the valuation date, the periods for which the least information is available.

Projection based on larger blocks of claims -- This technique will smooth some of the quarterly aberrations that are due to "noise," one-time fluctuations. On the other hand rapidly occurring and/or repetitive changes (e.g., due to benefit changes) will be masked by this technique. An example is the changes in Part A benefits in 1989 (cf., Table 1).

Projections based on pure premiums -- In this technique, historical pure premiums are calculated. Pure premiums for recent periods are estimated based on observed trend (inflation) or known benefit changes. The current enrollment and projected pure premium is used to develop total estimated incurred claims. Paid claims are subtracted, yielding the reserve. A major difficulty with this technique is that significant changes, such as in the trend, may be occurring during the projection period. The projected pure premium may not be accurate. This situation occurred in the early quarters of 1986, at the same time that the Part B payment ratios were at their highest level. The actual pure premiums are not known until the claims are complete, of course.

<u>Part B Pure Premiums</u>

Incurred Quarter/Year	Actual Pure Premium	Quarterly Change
1/85	$18.93	N/A
2/85	21.63	14.3%
3/85	21.36	-1.3
4/85	22.57	5.7
1/86	19.31	-14.4
2/86	22.48	16.8
3/86	23.68	5.3
4/86	23.55	-0.5

Projections based on loss ratios -- This technique is useful in establishing claim reserves for new products. For the first several months or quarters after product introduction, the target or pricing loss ratios can be applied to the earned premium in order to estimate incurred claims. Paid claims are subtracted, yielding the reserve. For mature products, this technique has the same drawback as the pure premium technique. A rapid change in

trend will result in an inaccurate estimated loss ratio which, in turn, will result in inaccurate reserve estimates.

Statutory claim reserves are required to meet a "good and sufficient" test. Given the magnitude of variations and fluctuations which are possible, and even probable, a sizeable margin should be added to the best estimate claim reserves developed by one or more techniques.

Summary

The establishment of appropriate claim reserves is a critical part of the job of a health insurance actuary. Many mathematically sound techniques have been developed. Events and other changes, both internal and external can make the results produced by a particular technique invalid at a point in time. Caution must be exercised, and reasoned judgment applied to the results.

This paper used a block of medigap insurance to illustrate variations, fluctuations and aberrations that occur within a block of business and between blocks. Similar situations are very likely to occur in other types of medical insurance. As an example, if a single set of incurred claim factors are used for group comprehensive major medical insurance, these factors will be subject to influences, such as, a change in the mix of hospital and physician services; a rapid change in the trend; changing deductible levels; and changes in the claim payment operation.

In developing claim reserves, the several techniques should be employed to develop the best estimate. For statutory reporting a margin large enough to satisfy the "good and sufficient" requirement should be added. The size of the margin (if any) for other types of reporting should be determined by the purpose for which the reserve is being established.

The actuary must be very knowledgeable about current events and influences affecting the block of business. These events and influences can have a material effect on the liabilities being established.

SMALL GROUP AND THIRD PARTY ADMINISTRATOR (TPA) RESERVES

MR. JAMES E. DRENNAN: Small group is defined in this speech as groups of less than 25 employees, since this is similar to the definition under small group reform bills in most states. The usual products in the small group area are medical and dental, often with vision and prescription drug benefits attached. Group life insurance is also included; however, our subject will be primarily medical and dental.

Small Group
In the small group area, deductible shifts are usually minor, since they typically do not all take place at one time. These deductible changes or other benefit changes can be staggered if the anniversaries are spread throughout the year. Sometimes they are all moved to a common anniversary, such as January or July. This latter approach is more common on trusts or association-type business.

The effect of changes in deductibles and other shifts in the benefit package will usually be to create an apparent lower trend rate than is the true underlying trend. This is the result of claims per unit under the benefit package after the change being lower than if no change were made. This ratio then is used to estimate the trend, and the result will be lower than the true trend rate with benefit adjustments. In the small group area, it is very difficult to make such a benefit adjustment since each group can individually change its benefits independent of all others. However, exceptions are found sometimes where an association changes the entire benefit package or there are some mandated benefits that are applicable to all groups.

In the small group area, most products are individually underwritten or at least utilize a short-form medical underwriting questionnaire. In addition, preexisting conditions are usually not covered or only covered up to a dollar amount, such as $1,000. The effect of this first-year underwriting is to create a low claim cost in the early months after issue and a much higher claim cost in later years as the group underwriting wears off. This wearing off of underwriting is usually called deterioration. The effect of this deterioration is in addition to the typical underlying claim trend. The deterioration can be as much as 30%

over a period of three or four years after issue compared to the aggregate claims, and a large portion of the change occurs in the first year.

In order to prepare claim liability estimates for small group business, the effect of deterioration should be adjusted in the trend projections and lag factors for reserving procedures. One approach is to separate the small groups according to duration. For instance all groups issued in the same quarter or calendar year can be reserved together if there is a large enough block. If sales have been level over a period of time, such as three or four years, the effect of deterioration will average out with new sales, and therefore, the separate adjustment by duration may not be necessary. However, if sales decline, the proportion of old business becomes greater, and it may be necessary to again adjust by duration.

The most common vehicle for small group products has been the multiple employer trust (MET). The advantage of the MET has been to obtain the situs of the contracts all in one state and thereby avoid the problem of complying with multiple-state mandates and laws. Quite often the trusts are moved from one state to another to obtain the most favorable site for the trust contract. Some states have interpreted their laws to apply to any business written in their state whether or not the trust is located in their state.

The effect of small group reform on claim reserves is not yet clear. As most of you know, small group reform is being enacted in several states with varying provisions. The general provisions have to do with reinsurance of uninsurable risks, the inability to decline an individual in a particular small group, and the narrowing of rate bands. The effect of these could be to lessen the effect of underwriting and thereby have a smaller deterioration from issue into the second and third year. If the reinsurance were done on a basis similar to stop-loss reinsurance, then large-claim fluctuations may be alleviated. The narrowing of rate bands will not directly effect the claim reserve, however, it could affect the difference between the first-year premium and the first-year claims, which some companies set up as an active life reserve. In total, the effect on claim reserves will probably not be material

at the onset, and will be phased in over time. The exception to this would be if the reform were to be enacted on the entire block of business, and not just on new issues. However, it is an item that must be evaluated by the actuary on a state-by-state basis.

Third-Party Administrators (TPAs)

TPAs are becoming more frequently used by insurance companies, both to obtain access to new markets and to process claims for self-insured cases. There are several unique problems that occur with a TPA.

Quite frequent changes occur in the TPA used to pay claims, and this will create problems in establishing lag factors on a historical basis for developing claim reserves. Each administrator may pay claims differently and may have different systems which are not necessarily compatible. In addition, the definition of runout claims may vary not only by the contract, but also by the actual procedures for coding claims within each TPA.

Since there are numerous TPA firms, it is difficult to be familiar with the accuracy of each. Therefore, it is important to perform tests of the coding of claims, the total payments compared to the lag runs, and the backlog calculations.

Associations are frequently self-insured through TPAs, or may have a reinsurer to take the ultimate risk. The associations may have unique problems in that they typically do not underwrite new groups, and therefore have an adverse selection, as opposed to small group underwriters, which are very selective in underwriting. This adverse selection is usually intensified in that no age rating and often no area factors are used. Quite frequently groups can choose from several associations depending on which one has the best benefits and lowest rates. For example, they may choose between a chamber-of-commerce association versus an industry-specific association.

Due to this adverse selection, it is often difficult to obtain a reinsurer, and therefore many associations remain self-insured. They often do not have insurance professionals within the

association and must rely upon the TPA or professional consultants for their pricing and reserving. The usual concern of an association is often cash flow in the short term rather than the longer term, which is more typical of an insurance company. In addition, reserves are typically not understood, and associations often question whether reserves are redundant in association financial statements.

Reserves for associations are probably more important since they may be underfunded and not have other lines of business to support them. However, it is often more difficult to convince the client or association staff to set up reserves. This is an area that is frequently not regulated by insurance departments and therefore may not have a valuation actuary. However, there is a great need for valuation expertise in this area.

Margins

I would now like to discuss the margins to be added on the claim liabilities, both for association business, TPA business and all small group business. The self-insured market may have a different opinion as to the needs for margins, since they may not be regulated and therefore feel that the only need is to have the reserve as close as possible to the actual. There is some question whether margins, if included, should be as high as for an insured plan. In theory the smaller the self-insured case is, the larger the margins due to claim fluctuations should be. However in practice, the margins do not seem to be as high as for insured plans.

For insured plans, the question of margins may vary depending on the reason for the valuation. For example, a statutory versus tax versus GAAP valuation may result in different levels of margins. For a large block of small group business, the typical margins have been in the 3-5% range. However, other margins may be implicit in the calculations. For example, the estimates for the last three months incurred claims may be conservative and therefore have some underlying margins which are not explicitly stated. Typically different methods are used to give a range of answers for reserves. This serves a purpose of advising management or a client that the reserve is not an exact number; however, it

does enable the valuation actuary to give his best estimate as the center of the range, yet still show the variability by using different methods or different margins.

Often the goal of the valuation may necessitate different margins. For example, if the use of the valuation of liabilities is in projecting funding levels, another level of estimate is added. Typically the funding projections are for more than 12 months into the future, and therefore not only the current liability must be estimated but also future incurred claims must be estimated. In this case, it might be more logical to have a valuation with little margin for the current period and add some margins in the projection period so that there is no compounding effect.

If the goal of the valuation of liabilities is for financials, then it may also vary, depending on whether the financial statement is an interim management report, a report to the full board of directors, or is an end-of-the-year statutory valuation. For example, often for interim management reports the management prefers that reserves not be seasonally adjusted and be slightly smoothed so that there are no great fluctuations between months.

Expense Reserves

Expense reserves are specifically addressed by the actuarial standards for claim liability. However, the actual methodology of calculating them is not specified and is up to the judgment of the actuary. The expense reserve is intended to cover the payment of claim processing expenses during the runout period, if such were necessary. In this sense, the expenses generally are not held at the total claim expense for an ongoing case, but at a lower amount that would be expected to be paid during the runout period, such as 2-4% of claims.

The expense reserve is typically added to the claim liability and included in the same sections of the annual statement. However some companies have included the reserve for expenses in the Exhibit 5 section as an expense accrual. This prevents their test reserves in Schedule H from appearing to always be overreserved, however, it is not as common as

including the expense reserve in with the claim liability reserves. The latter approach also appears more consistent with the actuarial standards.

The expense reserve may or may not be allowed under federal income tax, and if it is allowed, it may have to be discounted for interest. Tax reserves are not covered in any depth in this session.

Data Concerns

Data concerns are always a problem in small group and TPA business. The exposures may be based upon employee lives or the number of members, which would include dependents. Premiums also give a measure of the change in risk; however, rate increases often make projections difficult unless they are all done at one time.

Claim data are the most important item to test and typically should be tested to the financials that have been audited. This is most important for a TPA where you do not have a track record of its ability to produce accurate data.

The backlog of claims must be reviewed at various points in time to establish the change in the number of claims in house and not processed. One test is to compare the change in backlog to the change in paid claims for the same time period. This should show some consistent relationship over time. For example, the backlog should go down as the paid claims go up. In addition, the number of claims and dollars of claims in the backlog should both be reviewed if they are available.

One procedure used by some claim payers is to input each claim submission at the time of receipt and adjudicate the claims at a later date. This helps in finding lost claims and cuts down the number of phone calls. It is also quite common in HMO claim systems, since the adjudication of the claims is generally more easily done by the computer system. Utilizing this input data can give a much more accurate idea of the backlog, and factors can be developed over time to apply to this input data. Some companies simply split the claims

in the backlog between prescription drugs and medical claims, which would give them a little bit better idea of the backlog since the lag is different between the two types of plans.

Another procedure is to estimate hospital days in the backlog based upon the precertification records. This may have more use as outpatient precertification becomes more common, and therefore the precertification records will cover a larger percentage of the claims.

Completion of Recent Months

The main problem in all claim reserving is completing the most recent months' incurred claims. Several methods have been used and generally more than one method is used in any one valuation. In cases where very little historical data are available, pricing assumptions, such as loss ratio are often used to estimate the most recent months' incurred claims. Other procedures that have been used are to trend the incurred claims per unit or do a regression upon some recent period of incurred claims per unit. The question on each of those is what period of time to use and to determine if that historical period is indicative of the most recent period.

Another procedure not as frequently used is the harmonic method, which uses the inverse of the completion factors and is subject to more accuracy when the completion factors are small. In any method, utilizing a running 12 months incurred claims per unit often gives a more consistent answer; however, it may mask most recent months' changes. Using an average of several past months may also mask any trends or changes in assumptions.

In all cases, it is generally more accurate to adjust both premiums and claims to a per unit basis whether that unit is an exposure on lives or total family members. The typical evaluation will use several methods for the most recent months and a different method for the older more complete months. The key concern is to check the answers for consistency and use several methods to test the sensitivity. Quite often using a graphic

package will point out flaws in the consistency over time, and is recommended for use in almost any valuation.

In conclusion, the goal of the valuation actuary is to set an adequate reserve, and no one technique and no one method will always work. The valuation actuary must always be alert for changes in trends in the products he or she is reserving, and in the industry in general.