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Incurred Health Claims:

One Lag Report is Not Enough

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Overview

The development (or lag) method is the preferred method among health insurance actuaries for making estimates of the unpaid claim liability (UCL) for medical benefit plans and other “short-term” health insurance plans. The starting point for the lag method is usually a single claim lag report, one that distributes the claims *paid* during an experience period on the basis of both the incurred date and the *paid* date of the claim. The standard output of the development method is in an estimate, or several estimates of the UCL, usually without a distribution of the UCL into its component parts: the liability for claims reported but not paid (RBNP) and the liability for claims incurred but not reported (IBNR).

This article illustrates a variation of the development method that utilizes additional claim lag reports, ones which distribute *reported* claims on the basis of incurred date and *reported* date and that incorporates an estimate of the RBNP as a key step toward evaluating the total UCL. The article also discusses information that is often available for purposes of estimating the RBNP and concludes with an opinion concerning appropriate disclosure and actuarial standards of practice with regard to the estimation of the UCL.

Tradition of Using Paid Claim Data

The actuarial literature includes numerous papers describing variations of the development method. The earliest SOA publication on the development method appears to date from the mid-1960s. Several informative articles and SOA meeting transcripts focusing on the development method were published by the Society in 1985 through 1990. During the 1990s the Casualty Actuarial Society continued to publish articles on the development method that incorporated credibility calculations and statistical concepts into the estimation process.

In all of the published SOA sources that I reviewed, the development method clearly refers to a method relying on a single claim lag report which distributes claims paid in an experience period on the basis of date incurred and date paid, usually month incurred and month paid. That observation is consistent with discussions that I have had over the years with colleagues, with the current SOA study note on health reserves and with the definition of the development method that was included in the first two editions of Actuarial Standard of Practice No. 5:

...methods under which historical claim data, such as the number and amount of claims for the subject line of business, are recorded by period incurred and period paid, and this development pattern is used to estimate the future development of existing claims as of the valuation date.

The current version of ASOP No. 5, thanks to the comments of an actuary who reviewed the exposure draft of this standard, makes it clear that the development method may be based on reported claims as well as paid claims. The standard goes on to say that when applying the development method:

[t]he actuary should consider processing fluctuations due to seasonality, claims processing practices, inflation, or significant changes in medical practices.

ASOP No. 5 does not offer any suggestions as to how one should “consider” those fluctuations.

What’s Normal vs. What’s Perfect

Practicing health care actuaries know that there are many factors influencing the utility of a paid claim lag report. Many of these factors are enumerated in all three editions of ASOP No. 5 and in the actuarial literature. The health care actuary who attempts to employ the development method by starting with a claim lag report based on incurred dates and paid dates often poses questions that begin with:

“What would this lag report have looked like, if...”

and end with a description of some type of disruption that has occurred in the “normal” processing of claims. For example, the disruptions may involve employee turnover in the claims department, problems in the mail room or, perhaps the most traumatic of all disruptive forces, computer system-related problems.

In many cases, a better question for the actuary to ask is:

“What would this lag report have looked like if all the valid claims were paid the same day they were received?”

That question can be answered, at least approximately, without trying to decide what the “normal” payments might have been. The answer is that the

claim lag report would resemble the sum of two claim lag reports, each based on incurred dates and reported dates:

Claims paid in the experience period.

Claims reported that remain unpaid as of the end of the experience period (i.e. RBNP claims).

The challenge, of course, would be to estimate both the size of the RBNP (or “claims inventory” or “claims backlog”) and its distribution by incurred date. Fortunately it is a challenge that can be met for many claims processing operations.

Since this enhanced development method uses three dates, I refer to it as the “3D method.”

The 3D Method: An Example

This numerical example, comparing the 3D method with the traditional 2D method, is based on information for the commercial group business of an HMO that had experienced considerable growth over a short period of time and was having difficulty in paying claims in a timely manner. I have condensed the original claims information into 12 months, rather than the 24 months that were available.

Table 1 on page 10 is the traditional claim lag report that distributes, on the basis of month incurred and month paid, the \$97.5 million of claims paid in the 12-month experience period ending 10/31/2001, while Table 2 on page 10 distributes the same claims on the basis of month incurred and month reported. Table 3 on page 11 distributes the estimated \$11.1

million of claims RBNP as of 10/31/2001 on the basis of month incurred and month reported. Methods for estimating these claims are discussed in a separate section of this article. For example, when submitted charge information is available, estimates of claim-to-charge ratios may be used to estimate the company’s liability for those claims.

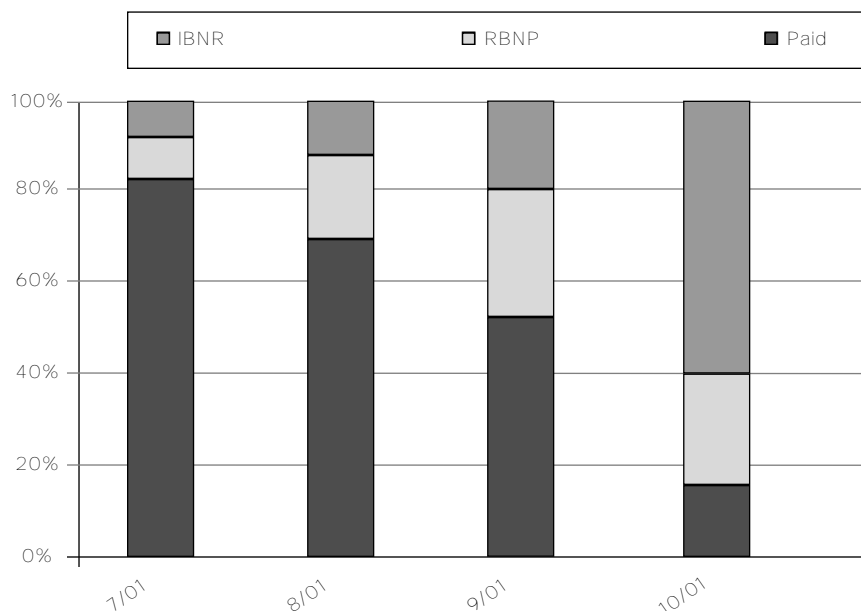
Reported But Not Paid Claims

The first fruits of the 3D method are shown in column 9 of Table 4 on page 11: an estimate of the RBNP at the beginning of the experience period and at the end of each month in the experience period. The numbers required for these estimates are derived from Tables 1, 2 and 3 by summing the appropriate rows of those tables and inserting them in columns 2, 3 and 7, respectively, of Table 4. After converting the monthly totals to a cumulative basis (columns 4, 5 and 8), the RBNP at the end of each month is simply the difference between what has been reported (columns 5 and 8) and what has been paid (column 4).

At this point, the actuary using the 3D method should compare the estimated RBNP shown in column 9 with end-of-month claims inventory information that was available during the experience period. For example, if end-of-month counts of claims or claim submission forms are available, do the implied average claim sizes or average claims per claim form make sense? If end-of-month submitted charges are available, do the implied paid-to-billed charges make sense?

Incurred Claims: 3D Method

Distribution of Incurred Claims by Month



(continued on page 10)

Table 1
CLAIMS PAID 11/2000 - 10/2001 BY MONTH INCURRED AND MONTH PAID [Total Payments: \$97,481,133]

Month Paid	Month Incurred												
	Pre-Nov 00	11/2000	12/2000	1/2001	2/2001	3/2001	4/2001	5/2001	6/2001	7/2001	8/2001	9/2001	10/2001
11/2000	5,130,889	248,344	0	0	0	0	0	0	0	0	0	0	0
12/2000	3,465,586	1,349,610	259,892	0	0	0	0	0	0	0	0	0	0
1/2001	1,546,097	2,977,460	1,750,259	238,791	0	0	0	0	0	0	0	0	0
2/2001	884,005	768,626	1,903,759	1,737,043	307,053	0	0	0	0	0	0	0	0
3/2001	548,021	480,338	1,845,867	2,904,971	2,289,810	835,362	0	0	0	0	0	0	0
4/2001	382,164	380,989	348,246	1,027,147	2,093,904	2,177,188	814,215	0	0	0	0	0	0
5/2001	372,511	90,721	116,112	421,713	479,781	2,425,220	2,275,012	672,211	0	0	0	0	0
6/2001	195,296	148,325	58,180	101,771	485,445	609,740	1,712,339	1,668,060	423,563	0	0	0	0
7/2001	-176,446	6,742	12,128	48,536	120,460	459,916	886,973	4,333,492	2,082,953	791,360	0	0	0
8/2001	-140,647	-5,430	7,575	13,046	66,353	149,282	405,293	2,673,965	5,081,060	2,000,996	953,356	0	0
9/2001	94,128	25,294	24,219	118,719	109,600	119,301	100,990	857,451	1,578,674	3,597,852	1,948,891	733,247	0
10/2001	38,356	20,666	10,575	29,392	34,698	79,448	126,432	541,552	1,379,658	3,576,636	6,651,652	3,848,747	1,112,352
Total	\$12,339,961	\$6,491,685	\$6,336,813	\$6,641,129	\$5,987,106	\$6,855,458	\$6,321,254	\$10,746,731	\$10,545,908	\$9,966,844	\$9,553,899	\$4,581,994	\$1,112,352

Table 2
CLAIMS PAID 11/2000 - 10/2001 BY MONTH INCURRED AND MONTH REPORTED [Total Payments: \$97,481,133]

Month Reported	Month Incurred												
	Pre-Nov 00	11/2000	12/2000	1/2001	2/2001	3/2001	4/2001	5/2001	6/2001	7/2001	8/2001	9/2001	10/2001
Pre-Nov 00	6,517,377	0	0	0	0	0	0	0	0	0	0	0	0
11/2000	3,805,538	2,286,775	0	0	0	0	0	0	0	0	0	0	0
12/2000	862,967	2,965,281	2,382,922	0	0	0	0	0	0	0	0	0	0
1/2001	502,642	620,400	2,887,974	2,720,349	0	0	0	0	0	0	0	0	0
2/2001	356,556	290,379	790,386	2,589,548	2,205,323	0	0	0	0	0	0	0	0
3/2001	152,270	119,215	162,915	810,096	2,756,064	3,073,811	0	0	0	0	0	0	0
4/2001	49,291	131,528	69,497	252,995	568,433	2,815,937	2,864,386	0	0	0	0	0	0
5/2001	33,996	36,494	17,631	134,556	357,021	667,301	2,782,067	4,509,465	0	0	0	0	0
6/2001	20,422	4,674	12,010	89,026	52,653	114,179	453,814	4,979,034	4,842,610	0	0	0	0
7/2001	18,690	6,027	6,873	17,701	30,195	104,638	158,112	857,596	4,639,012	4,745,903	0	0	0
8/2001	15,838	20,186	5,640	20,906	11,488	73,054	42,977	338,521	859,537	4,650,572	5,190,355	0	0
9/2001	2,182	9,111	793	4,675	5,047	4,755	16,435	43,779	186,519	460,185	4,179,136	3,137,439	0
10/2001	2,190	1,616	171	1,278	883	1,783	3,462	18,335	18,230	110,184	184,407	1,444,555	1,112,352
Total	\$12,339,961	\$6,491,685	\$6,336,813	\$6,641,129	\$5,987,106	\$6,855,458	\$6,321,254	\$10,746,731	\$10,545,908	\$9,966,844	\$9,553,899	\$4,581,994	\$1,112,352

Table 3
ESTIMATED CLAIMS REPORTED BUT NOT PAID [RBNP] AS OF 10/31/01, BY MONTH INCURRED AND MONTH REPORTED [Estimated Claims: \$11,055,531]

Month Paid	Month Incurred												
	Pre-Nov 00	11/2000	12/2000	1/2001	2/2001	3/2001	4/2001	5/2001	6/2001	7/2001	8/2001	9/2001	10/2001
11/2000	0	0	0	0	0	0	0	0	0	0	0	0	0
12/2000	0	0	0	0	0	0	0	0	0	0	0	0	0
1/2001	0	0	0	0	0	0	0	0	0	0	0	0	0
2/2001	0	0	0	0	0	0	0	0	0	0	0	0	0
3/2001	0	0	0	0	0	0	0	0	0	0	0	0	0
4/2001	0	0	0	0	0	0	0	0	0	0	0	0	0
5/2001	0	0	0	0	0	0	0	0	0	0	0	0	0
6/2001	122	191	61	0	0	0	34	13,676	56,265	0	0	0	0
7/2001	382	0	0	13,054	0	41	0	28,487	68,367	3,367	0	0	0
8/2001	11,112	1,602	25,364	12,900	1,494	4,460	2,499	513,613	71,142	304,432	187,746	0	0
9/2001	30,846	14,108	6,111	22,669	11,335	24,247	123,454	333,051	107,525	322,261	1,396,297	552,833	0
10/2001	69,942	120,054	23,105	60,143	15,525	40,603	76,354	173,502	255,113	733,580	1,003,004	2,041,573	2,177,877
Total	\$112,404	\$135,956	\$54,641	\$108,766	\$28,354	\$69,351	\$202,342	\$1,062,328	\$558,412	\$1,363,649	\$2,587,047	\$2,594,406	\$2,177,877

Table 4: HINDSIGHT ANALYSIS: RBNP CLAIMS

Month	Paid Claims Information						RBNP as of 10/31/01		
	Paid claims By Month		Cumulative Through End of Month			Estimated Reported thru Month (7)	Estimated Reported Thru Month (8)	Estimated RBNP As of End of Month (9)	
	Paid In Month (2)	Reported In Month (3)	Paid (4)	Reported (5)	RBNP End of Month (6)				
Pre-Nov00	-	6,517,377	-	6,517,377	-	0	0	\$6,517,377	
11/2000	5,379,233	6,092,313	5,379,233	12,609,690	7,230,457	0	0	\$7,230,457	
12/2000	5,075,088	6,211,170	10,454,322	18,820,861	8,366,539	0	0	\$8,366,539	
1/2001	6,512,606	6,731,365	16,966,928	25,552,226	8,585,298	0	0	\$8,585,298	
2/2001	5,600,486	6,232,192	22,567,414	31,784,419	9,217,005	0	0	\$9,217,005	
3/2001	8,904,370	7,074,370	31,471,784	38,858,788	7,387,005	0	0	\$7,387,005	
4/2001	7,223,853	6,752,067	38,695,636	45,610,855	6,915,219	0	0	\$6,915,219	
5/2001	6,853,280	8,538,531	45,548,917	54,149,386	8,600,470	0	0	\$8,600,470	
6/2001	5,402,720	10,568,423	50,951,637	64,717,810	13,766,173	70,349	70,349	\$13,836,522	
7/2001	8,566,115	10,584,747	59,517,751	75,302,557	15,784,806	184,056	184,056	\$15,968,862	
8/2001	11,204,849	11,229,072	70,722,600	86,531,629	15,809,030	1,320,420	1,320,420	\$17,129,450	
9/2001	9,308,367	8,050,057	80,030,967	94,581,686	14,550,719	4,265,156	4,265,156	\$18,815,875	
10/2001	17,450,165	2,899,446	97,481,133	97,481,133	0	6,790,374	11,055,531	\$11,055,531	

(continued on page 12)

Unpaid Claim Liability Estimates: 3D vs. 2D

Table 5 on page 13 consists of all relevant reported claims and is the sum of Tables 2 and 3. This is the claim lag report that is used to estimate claims incurred through 10/31/2001. Table 6 on page 13 is derived from Table 5 by converting the claims incurred each month to a cumulative and "reporting duration" or "lag month" basis. For purposes of calculating completion factors, let $CR(i, d)$ = claims incurred in month i that were reported through reporting duration d , with $i = 1$ through 12 (11/2000 through 10/2001) and $d = 0$ through 11.

Table 6A on page 15 includes only claims paid in the experience period and is the incurred date-paid date version of Table 6. It is derived from Table 1. Let $CP(i,d)$ = claims incurred in month i that were paid through "paid duration" d , with i and d as previously defined.

At this point, the actuary should apply his favorite method for calculating completion percentages, keeping in mind that the percentages used with the 3D method represent the percentage of claims incurred that have been reported through a given reporting duration. I chose to use the "chain-ladder" method and have included the details in Table 7 on page 15, with reported completion factors calculated in the left half of the table and paid completion factors calculated in the right half. For example, the reported completion ratio for duration 10 is $CR(1,10)/CR(1,11)$, the completion ratio for duration 9 is $[CR(1,9)+CR(2,9)]/[CR(1,10)+$

$CR(2,10)]$, etc. The completion factors for duration 11 and higher are assumed to be 1.000, while the completion factor for duration $n < 11$ is the product of the completion ratio for duration n times the completion factor for duration $n+1$ (for $n \geq 0$). The paid completion ratios and factors are calculated in a similar way from the various $CP(i,d)$'s.

Table 8 on page 16 continues the calculation by dividing the appropriate completion factors developed in Table 7 into the appropriate cumulative claims. Note that for comparison purposes, two estimates are obtained, with Estimate 1 based on the 3D method and Estimate 2 based on the 2D method. Performing the usual arithmetic results in two estimates of the UCL and two estimates of monthly claims incurred PMPM.

At this point in the estimation process most actuaries will adjust the estimated incurred claims for "reasonableness" or some other criteria, such as completion percentages that seem too low or too volatile to be useful, especially if the implied claims PMPM for "recent" months do not meet hopes or expectations. In this case, the estimated claims for October would probably be adjusted by most actuaries on the basis of low completion percentages, low claims PMPM (3D method) or high claims PMPM (2D method). The results for August and September also look suspect and appear too high or too low, depending on the method. On the other hand, with reported claim completion percentages in excess of

Incurred Claims: Traditional Method

Distribution of Incurred Claims by Month

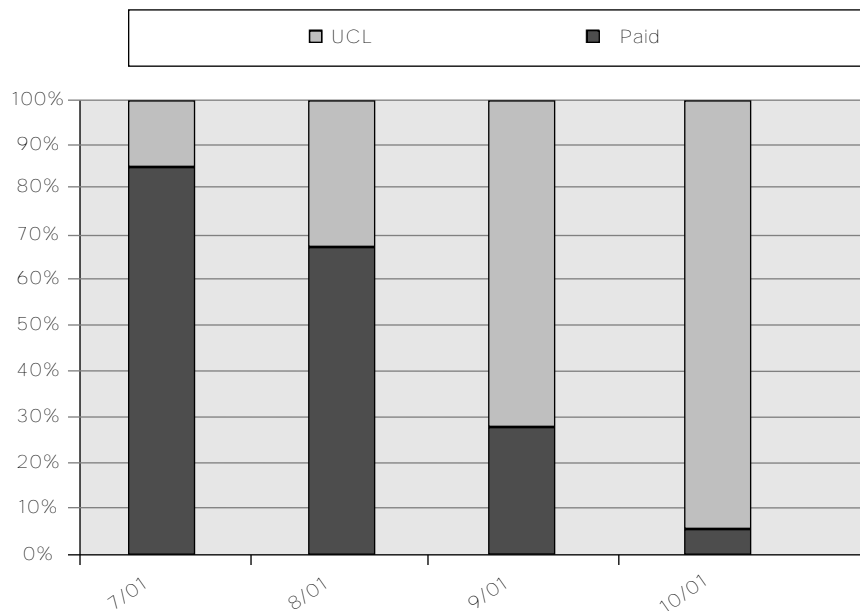


Table 5
REPORTED CLAIMS (PAID OR RBNP) AS OF 10/31/2001, BY MONTH INCURRED AND MONTH REPORTED [Total Estimated Claims: \$108,536,663]

Month Reported	Month Incurred												
	Pre-Nov/00	11/2000	12/2000	1/2001	2/2001	3/2001	4/2001	5/2001	6/2001	7/2001	8/2001	9/2001	10/2001
Pre-Nov/00	6,517,377	0	0	0	0	0	0	0	0	0	0	0	0
11/2000	3,805,538	2,286,775	0	0	0	0	0	0	0	0	0	0	0
12/2000	862,967	2,965,281	2,382,922	0	0	0	0	0	0	0	0	0	0
1/2001	502,642	620,400	2,887,974	2,720,349	0	0	0	0	0	0	0	0	0
2/2001	356,556	290,379	790,386	2,589,548	2,205,323	0	0	0	0	0	0	0	0
3/2001	152,270	119,215	162,915	810,096	2,756,064	3,073,811	0	0	0	0	0	0	0
4/2001	49,291	131,528	69,497	252,995	568,433	2,815,937	2,864,386	0	0	0	0	0	0
5/2001	33,996	36,494	17,631	134,556	357,021	667,301	2,782,067	4,509,465	0	0	0	0	0
6/2001	20,544	4,865	12,071	89,026	52,653	114,179	453,848	4,992,710	4,898,875	0	0	0	0
7/2001	19,072	6,027	6,873	30,755	30,195	104,679	158,112	886,083	4,707,380	4,79,279	0	0	0
8/2001	26,950	21,788	31,004	33,806	12,982	77,515	45,477	852,134	930,678	4,955,004	5,378,101	0	0
9/2001	33,028	23,219	6,904	27,343	16,382	29,002	139,890	376,830	294,043	782,446	5,575,433	3,690,272	0
10/2001	72,132	121,670	23,277	61,421	16,408	42,386	79,817	191,836	273,343	843,764	1,187,411	3,486,128	3,290,229
Total	\$12,452,364	\$6,627,641	\$6,391,454	\$6,749,895	\$6,015,460	\$6,924,809	\$6,523,596	\$11,809,059	\$11,104,319	\$11,330,492	\$12,140,945	\$7,176,399	\$3,290,229

Table 6
CUMULATIVE REPORTED CLAIMS BY INCURRED MONTH AND REPORTING DURATION

Reporting Duration	Month Incurred											
	11/2000	12/2000	1/2001	2/2001	3/2001	4/2001	5/2001	6/2001	7/2001	8/2001	9/2001	10/2001
0	2,286,775	2,382,922	2,720,349	2,205,323	3,073,811	2,864,386	4,509,465	4,898,875	4,749,279	5,378,101	3,690,272	\$3,290,229
1	5,252,056	5,270,897	5,309,896	4,961,387	5,889,747	5,646,453	9,502,175	9,606,255	9,704,282	10,953,534	\$7,176,399	-
2	5,872,456	6,061,283	6,119,993	5,529,819	6,557,049	6,100,301	10,388,259	10,536,933	10,486,729	\$12,140,945	-	-
3	6,162,835	6,224,197	6,372,988	5,886,841	6,671,227	6,258,413	11,240,392	10,830,977	\$11,330,492	-	-	-
4	6,282,050	6,293,695	6,507,544	5,939,494	6,775,907	6,303,889	11,617,222	\$11,104,319	-	-	-	-
5	6,413,578	6,311,326	6,596,570	5,969,689	6,853,421	6,443,779	\$11,809,059	-	-	-	-	-
6	6,450,072	6,323,396	6,627,324	5,982,670	6,882,423	\$6,523,596	-	-	-	-	-	-
7	6,454,937	6,330,270	6,66,130	5,999,052	\$6,924,809	-	-	-	-	-	-	-
8	6,460,964	6,361,273	6,688,473	\$6,015,460	-	-	-	-	-	-	-	-
9	6,482,752	6,368,177	\$6,749,895	-	-	-	-	-	-	-	-	-
10	6,505,971	\$6,391,454	-	-	-	-	-	-	-	-	-	-
11	\$6,627,641	-	-	-	-	-	-	-	-	-	-	-

(continued on page 14)

80 percent, the incurred claim estimates obtained from the 3D method should probably be assigned a high credibility.

It is worth noting that reported completion factors are not only higher than paid completion factors, they appear to have a lower variability, at least with respect to a single estimate of the RBNP. In essence, the variability in paid completion percentages caused by variations in the rate of claim payment has been replaced with the variation in estimates of the RBNP claims. In order to test the variability of the reported completion percentages, it is necessary to calculate them using alternate assumptions concerning the RBNP claims.

Hindsight Analyses

As with the 2D method, judgment must also be used with the 3D method, but in this case, judgment can be applied separately to both the RBNP estimate and the IBNR estimate. The reasonableness of the RBNP estimates were discussed when Table 4 was presented. The RBNP estimates can be subjected to additional scrutiny along with the IBNR and claims PMPM estimates. Tables 9, 10 and 11 are a three-part report package that provides hindsight estimates of the total UCL (for each available end-of-month valuation date), the split of the UCL into RBNP and IBNR parts, and a split of the IBNR into claims "run out" and a residual IBNR as of 10/31/2001.

Obtaining Table 9 on page 16 is a straightforward application of previously developed information. The

...insurance companies have always been required to perform an "aging analysis" that estimates the RBNP at the end of the financial reporting period...

function of Table 10 is to obtain information about claims that were unreported at some point during the experience period but were reported by 10/31/2001. It is calculated along the same lines as Table 4.

First, take the sums of rows and columns from Tables 2 and 3 and insert in columns 2, 3 and 7 of Table 10 on page 17. Then, convert the monthly information to cumulative information to create columns 4, 5 and 8. Finally, subtract what has been reported through 10/31/2001 from what was reported through the valuation date to obtain what was reported through 10/31/2001 but was unreported as of the valuation date. The two IBNR columns (6 and 10) are transferred to Table 11.

Exposure information is included in Table 11 on page 17 to help estimate the impact of the change in enrollment on the IBNR. As is the case with the 2D method, the focus should be on recent months. The IBNR is a function of the level of incurred claims and

the time lag between the incurred date and the reported date and is independent of variations in claim processing time. The time lag between incurred date and reported date can be analyzed to produce weights for the monthly enrollment prior to the valuation date. For purposes of the example, I created an exposure unit equal to the weighted average of the enrollment for the valuation month (weight = 4/7), the previous month (2/7) and the month before that (1/7). The analysis suggests that perhaps the IBNR as of 8/31/2001 is a little high while the IBNR as of 10/31/2001 may be a little low. Although we already suspected this was the case, the analysis suggests that we should check the portion of our estimated RBNP as of 10/31/2001 for claims that were incurred in August 2001 but were reported after that date.

Estimating the RBNP Claims

A key step in applying the 3D development method is to estimate the RBNP as of the end of the experience period, 10/31/2001 in the example. It is necessary to estimate both the dollar value of claims and the distribution of those dollars by their incurred dates. For statutory reporting purposes, insurance companies have always been required to perform an "aging analysis" that estimates the RBNP at the end of the financial reporting period and distributes the estimate on the basis of dates that the claims were reported to the company. There are a variety of techniques that can be used to obtain the required distribution by incurred date, depending on the available information.

The Electronic Backlog

For many companies, a combination of electronic claim submissions and scanning of manually submitted claim forms results in an RBNP database that includes submitted charges, date of service, date reported and type of claim (e.g. institutional vs. non-institutional). The appropriately quantified RBNP can be obtained by estimating a set of claim-to-charge ratios that vary by month incurred, type of service and any other promising variable (e.g. month reported). The claim-to-charge ratios are obviously influenced by applicable provider contracting arrangements and may also be influenced by more subtle factors. These factors include, for example, practices regarding the reporting of encounter data on capitated services, an increase in duplicate claims due to delays in making timely payments, changes in provider filing practices or changes in claim payment practices.

In any event, the estimated claim-to-charge ratios should be supported by a historical analysis of all claims submitted and eventually adjudicated. As is always the case, the actuary must apply judgment in using historical studies.

The Paper Backlog

Part of the claim backlog may be in a "pre-processed" state and not as quantified as the

**Table 6A
CUMMULATIVE PAID CLAIMS BY INCURRED MONTH AND PAID DURATION**

Paid Duration	Month Incurred											
	11/2000	12/2000	1/2001	2/2001	3/2001	4/2001	5/2001	6/2001	7/2001	8/2001	9/2001	10/2001
0	\$248,344	\$259,892	\$238,791	\$307,053	\$835,362	\$814,215	\$672,211	\$423,563	\$791,360	\$953,356	\$733,247	\$1,112,352
1	1,597,954	2,010,151	1,975,834	2,596,864	3,012,550	3,089,226	2,340,270	2,506,516	2,792,356	2,902,247	\$4,581,994	-
2	4,575,414	3,913,910	4,880,805	4,690,768	5,437,771	4,801,565	6,673,762	7,587,576	6,390,208	\$9,553,899	-	-
3	5,344,040	5,759,777	5,907,952	5,170,550	6,047,510	5,688,538	9,347,727	9,166,250	\$9,966,844	-	-	-
4	5,824,378	6,108,023	6,329,665	5,655,995	6,507,427	6,093,832	10,205,178	\$10,545,908	-	-	-	-
5	6,205,367	6,224,135	6,431,436	5,776,455	6,656,708	6,194,822	\$10,746,731	-	-	-	-	-
6	6,296,088	6,282,315	6,479,972	5,842,808	6,776,010	\$6,321,254	-	-	-	-	-	-
7	6,444,412	6,294,443	6,493,018	5,952,408	\$6,855,458	-	-	-	-	-	-	-
8	6,451,154	6,302,019	\$6,611,737	\$5,987,106	-	-	-	-	-	-	-	-
9	6,445,724	6,326,238	\$6,641,129	-	-	-	-	-	-	-	-	-
10	6,471,019	\$6,336,813	-	-	-	-	-	-	-	-	-	-
11	\$6,491,685	-	-	-	-	-	-	-	-	-	-	-

**Table 7
DEVELOPMENT OF COMPLETION FACTORS**

Reporting Duration	REPORTED Completion Factors				PAID Completion Factors				
	Numerator	Denominator	Completion Ratio	Reported Completion Factor	Paired Duration	Numerator	Denominator	Completion Ratio	Paired Completion Factor
11 & Up		Assumption:	1.00000	100.00%	11 & Up	Assumption:	1.00000	100.00%	
10	6,505,971	6,627,641	0.98164	98.16%	10	6,471,019	6,491,685	0.99682	99.68%
9	12,850,929	12,897,425	0.99639	97.81%	9	12,771,962	12,807,832	0.99720	99.40%
8i	19,510,711	19,600,824	0.99540	97.36%	8	19,364,910	19,413,091	0.99752	99.16%
7	25,445,389	25,526,171	0.99684	97.05%	7	25,184,281	25,352,015	0.99338	98.50%
6	32,265,886	32,370,198	0.99678	96.74%	6	31,677,192	32,039,740	0.98868	97.39%
5	38,588,363	38,789,482	0.99482	96.24%	5	37,488,923	37,998,446	0.98659	96.08%
4	49,719,801	50,397,421	0.98655	94.94%	4	46,724,497	48,235,654	0.96867	93.07%
3	59,647,871	60,824,120	0.98066	93.11%	3	52,432,344	57,270,405	0.91552	85.21%
2	67,652,821	70,978,363	0.95315	88.75%	2	48,951,780	62,399,188	0.78449	66.84%
1	72,096,682	79,793,766	0.90354	80.19%	1	24,823,969	58,505,678	0.42430	28.36%
0	38,759,557	79,273,082	0.48894	39.21%	0	6,277,394	29,405,963	0.21347	6.05%

(continued on page 16)

Table 8
ESTIMATES OF INCURRED CLAIMS AND UCL AS OF 10/31/2001

	Inc. In Month Reported* Through 10/31/02	Reported Completion Factor	Estimate 1 of Incurred Claims*	Inc. In Month Paid* Through 10/31/02	Estimate 2 of Incurred Claims*	Estimate 1 UCL As of 10/31/02	Estimate 2 UCL As of 10/31/02	Members Enrolled	Estimate 1 Incurred Claims PMPM	Estimate 2 Incurred Claims PMPM	Estimate 1 Divided By Estimate 2
Pre-Nov/00	\$12,452,364	-	\$12,452,364	\$12,339,961	\$12,339,961	\$112,404	\$0	-	-	-	-
11/2000	6,627,641	100.0%	6,627,641	6,491,685	6,491,685	135,956	0	55,408	\$119.62	\$117.16	1.021
12/2000	6,391,454	98.16%	6,510,982	6,336,813	6,357,051	174,170	20,238	54,668	119.06	116.24	1.024
1/2001	6,749,895	97.81%	6,901,005	6,641,129	6,681,049	259,876	39,921	49,862	138.40	133.99	1.033
2/2001	6,015,460	97.36%	6,178,534	5,987,106	6,038,081	191,428	50,975	50,240	122.98	120.19	1.023
3/2001	6,924,809	97.05%	7,135,115	6,855,458	6,959,875	279,656	104,416	53,524	133.31	130.03	1.025
4/2001	6,523,596	96.74%	6,743,447	6,321,254	6,490,983	422,193	169,729	53,830	125.27	120.58	1.039
5/2001	11,809,059	96.24%	12,270,657	10,746,731	11,185,270	1,523,926	438,539	92,762	132.28	120.58	1.097
6/2001	11,104,319	94.94%	11,695,625	10,545,908	11,331,244	1,149,717	785,336	92,756	126.09	122.16	1.032
7/2001	11,330,492	93.11%	12,169,175	9,966,844	11,697,209	2,202,331	1,730,365	93,597	130.02	124.97	1.040
8/2001	12,140,945	88.75%	13,680,593	9,553,899	14,292,746	4,126,695	4,738,848	92,734	147.52	154.13	0.957
9/2001	7,176,399	80.19%	8,949,787	4,581,994	16,155,349	4,367,794	11,573,355	91,677	97.62	176.22	0.554
10/2001	3,290,229	39.21%	8,392,264	1,112,352	18,372,159	7,279,912	17,259,806	89,851	93.40	204.47	0.457
Total	\$108,536,663	-	\$119,707,190	\$97,481,133	\$134,392,661	\$22,226,057	\$36,911,528	-	-	-	-
12 Months Ending 10/31/2001			\$107,254,825		122,052,700			870,928	\$123.15	\$140.14	0.879

* Less those claims paid prior to 11/1/2000

Table 9
HINDSIGHT ANALYSIS: UNPAID CLAIM LIABILITY

Valuation Date	Incurred Through Valuation Date*	Inc. & Paid Through Valuation Date*	UCL as of Valuation Date	RBNP as of Valuation Date	IBNR as of Valuation Date
10/31/00	12,452,364	0	12,452,364	\$6,517,377	\$5,934,987
11/30/00	19,080,005	5,379,233	13,700,772	\$7,230,457	\$6,470,315
12/31/00	25,590,988	10,454,322	15,136,666	\$8,366,539	\$6,770,127
1/31/01	32,491,992	16,966,928	15,525,065	\$8,585,298	\$6,939,766
2/28/01	38,670,526	22,567,414	16,103,112	\$9,217,005	\$6,886,107
3/31/01	45,805,641	31,471,784	14,333,857	\$7,387,005	\$6,946,852
4/30/2001	52,549,088	38,695,636	13,853,452	\$6,915,219	\$6,938,233
5/31/01	64,819,745	45,548,917	19,270,828	\$8,600,470	\$10,670,358
6/30/01	76,515,369	50,951,637	25,563,733	\$13,836,522	\$11,727,211
7/31/01	88,684,545	59,517,751	29,166,793	\$15,968,862	\$13,197,931
8/31/01	102,65,138	70,722,600	31,642,538	\$17,129,450	\$14,513,088
9/30/01	111,314,925	80,030,967	31,283,958	\$18,815,875	\$12,468,083
10/31/01	\$119,707,190	\$97,481,133	\$22,226,057	\$11,055,531	\$11,170,527

* Less those claims paid prior to 11/1/2000

Table 10: HINDSIGHT: IBNR ON CLAIMS REPORTED AFTER VALUATION DATE

Claims Paid Through 10/31/01

RBNP as of 10/31/01

Valuation Date	Incurred Through Valuation Date*	Reported Through Valuation Date*	Cummulative Reported Through Val. Date*	IBNR as of Val. Date Paid By 10/31/02	Estimated Incurred in Month	Estimated Incurred Through Month	Estimated Reported Through Month	IBNR as of Val. Date RBNP by 10/31/02
(1)	(2)	(3)	(4)	(5)	(7)	(8)	(9)	(10)
10/31/00	\$12,339,961	\$6,517,377	\$12,339,961	\$6,517,377	\$112,404	\$112,404	\$0	\$112,404
11/30/00	6,491,685	6,092,313	18,831,646	12,609,690	135,956	248,359	0	248,359
12/31/00	6,336,813	6,211,170	25,168,459	18,820,861	54,641	303,001	0	303,001
1/31/01	6,641,129	6,731,365	31,809,587	25,552,226	108,766	411,766	0	411,766
2/28/01	5,987,106	6,232,192	37,796,693	31,784,419	28,354	440,121	0	440,121
3/31/01	6,855,458	7,074,370	44,652,152	38,858,788	69,351	509,471	0	509,471
4/30/01	6,321,254	6,752,067	50,973,406	45,610,855	202,342	711,813	0	711,813
5/31/01	10,746,731	8,538,531	61,720,136	54,149,386	1,062,328	1,774,141	0	1,774,141
6/30/01	10,545,908	10,568,423	72,266,044	64,717,810	558,412	2,332,553	70,349	2,262,204
7/31/01	9,966,844	10,584,747	82,232,888	75,302,557	1,363,649	3,696,202	184,056	3,512,145
8/31/01	9,553,899	11,229,072	91,786,787	86,531,629	2,587,047	6,283,248	1,320,420	4,962,828
9/30/01	4,581,994	8,050,057	96,368,780	94,581,686	2,594,406	8,877,654	4,265,156	4,612,498
10/31/01	\$1,112,352	\$2,899,446	\$97,481,133	\$97,481,133	\$2,177,877	\$11,055,531	\$11,055,531	\$0

*Less those claims paid prior to 11/1/2000

Table 11: HINDSIGHT ANALYSIS: IBNR

* Less those claims paid prior to 11/1/2000 ** Weighted average of enrollment for three months ending with valuation date.

Valuation Date	IBNR as of Valuation Date*	IBNR as of Val. Date, RBNP by 10/31/02	Residual IBNR as of 10/31/02	Members Enrolled	IBNR Exposure**	IBNR Per Exposure**	Vs. Average IBNR Per Exposure**
8/31/00	-	-	-	54,033	-	-	-
9/30/00	-	-	-	55,603	-	-	-
10/31/00	\$5,934,987	\$5,822,583	\$0	55,590	55,371	107.19	81.9%
11/30/00	6,470,315	6,221,955	0	55,408	55,488	116.61	89.1%
12/31/00	6,770,127	6,347,598	119,528	54,688	55,023	123.04	94.0%
1/31/01	6,939,766	6,257,361	270,639	49,862	52,033	133.37	101.9%
2/28/01	6,886,107	6,012,275	433,712	50,240	50,767	135.64	103.7%
3/31/01	6,946,852	5,793,363	644,018	53,524	52,063	133.43	102.0%
4/30/01	6,938,233	5,362,550	863,869	53,830	53,230	130.34	99.6%
5/31/01	10,670,358	7,570,750	1,325,467	92,762	76,033	140.34	107.3%
6/30/01	11,727,211	7,548,235	1,916,772	92,756	87,197	134.49	102.8%
7/31/01	13,197,931	6,930,331	2,755,455	93,597	93,237	141.55	108.2%
8/31/01	14,513,088	5,255,157	4,295,103	92,734	92,984	156.08	119.3%
9/30/01	12,468,083	1,787,094	6,068,491	91,677	92,253	135.15	103.3%
10/31/01	\$11,170,527	\$0	\$11,170,527	89,851	90,784	123.04	94.0%
						130.83	100.0%

Average, 10/00 through 7/01

** Weighted average of enrollment for three months ending with valuation date.

* Less those claims paid prior to 11/1/00

(continued on page 18)

electronic backlog. For example, there may be a delay between receipt of a claim form in the mail room and the scanning of the claim form into a nicely quantified record. Fortunately, the pre-processed portion of the total claims inventory is often only a relatively small portion of the total inventory.

It is possible that only a claim form count (by type of claim form) may be available for such claims. These pre-processed claims can be distributed by incurred date on an estimated basis by using an assumed distribution of incurred dates based on an appropriate study of the available claims history. The distributed claim counts can be converted to submitted charges or estimated claims by making assumptions about charges per claim and claim-to-billed ratios.

Almost Fully Adjudicated Claims

Part of the claim backlog may consist of claims for which a claim amount has been estimated or accurately determined. If, for example, claims are paid only once a week, there may be a substantial number of claims in which the insurance company's liability is known. For these claims it makes sense to use the estimated or actual claims amount to determine the value of the RBNP claims.

Denied Claims

Claims that have been denied are technically not part of the RBNP. However, in some situations it is a good idea to review the denied claims as well as the paid and RBNP claims. For example, if historically 10 percent of all claims submitted have been denied, but in recent months the denial rate has increased to 30 percent, then questions should be asked regarding this change. It is possible, for purposes of estimating the UCL, that the actuary should assume a certain percentage of the denials will be overturned.

Conclusion

To properly estimate the RBNP claims of an insurance company, the actuary must become very familiar with many aspects of the company's claims administration practices, the claims system itself, available claims history and any claim inventory data.

For the HMO that generated the data used in the example, there was no backlog information prior to 10/31/2001 and time did not allow for the creation of historical studies to estimate claim-to-charge ratios. Fortunately, the bulk of the inventory as of that date was an electronic backlog, including a substantial number of almost fully adjudicated claims, as described above. I tested various claim-to-charge ratios before settling on a set of ratios for different parts of the backlog (e.g., electronically submitted claims vs. manually submitted claims) that seemed reasonable.

[With the benefit of 10 months of additional hindsight, the incurred claims for the nine months ending 7/31/01 proved to be 1.8 percent lower and 2.3 percent higher than the estimates obtained using the 3D and 2D methods, respectively. The incurred claims for August 2001 proved to be one percent lower than the estimate obtained using the 3D method and more than five percent lower than the estimate obtained using the 2D method.

Actuarial Education, Standards of Practice and Disclosure

To my knowledge, neither the 3D method nor methods for quantifying the claims backlog has been part of the SOA examination syllabus. Fortunately for my own education, my early employment experience was with a company that always calculated its UCL by separately estimating the IBNR and the RBNP. In those days when estimating the UCL was largely a manual calculation done on very large sheets of paper, we did not use the 3D method as outlined here and the only available measure of the claim backlog was an item count, but at least it was always clear how we "considered" claims "processing fluctuations," as required by ASOP No. 5.

According to our Society's motto, scientists are supposed to use facts and demonstrations, not appearances and impressions. In my opinion, practitioners of the 2D method must often supplement science with appearances, impressions and "judgment" that are not supported by a quantification of backlog fluctuations. *Worrying about* is not the same as *considering* the impact of backlog fluctuations.

The ability to properly quantify the claims backlog and use that information to estimate the UCL is an achievable skill, the acquisition of which is too important to be left to chance. Appropriate material should be included in the examination syllabus.

ASOP #41, Actuarial Communications, requires that an actuarial report include any actuarial findings and also "*identify the data, assumptions and methods used by the actuary with sufficient clarity that another actuary qualified in the same practice area could make an objective appraisal of the reasonableness of the actuary's work.*" I believe that since ASOP #5 requires consideration of backlog fluctuations, the actuarial report should describe *how* the backlog fluctuations were considered in establishing the UCL. If information pertaining to backlog fluctuations is not available or not reliable, then the actuary should also disclose that fact in the actuarial report.

I look forward to participating in any discussion that this article may generate. 📧



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