

A New Method for Calculating IBNP Health Reserves with Low Variance

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Abstract

A new statistical approach is presented for calculation of Incurred But Not yet Paid (IBNP) claim amounts. The new approach is based on the projection of paid claims per covered member by lag month based on adjusted average monthly paid amounts in historical data. Two variant methods of this approach are presented, the Simple Projected Paid Lag method, which assumes that future paid claim amounts are independent of claims incurred and already paid, and the Regressed Projected Paid Lag method, which assumes that future paid claims are correlated with cumulative incurred and paid claims through the valuation date. Both variants of this method were applied to real sets of data and shown to give significantly more accurate results than the traditional Completion Factor and Incurred Claims methods.

Introduction

Currently, liability reserves for Incurred But Not Paid (IBNP) claims under health insurance contracts are usually calculated using the “Completion Factor” method. This method relies on the principle assumption that incurred claims will be reported to and paid by the health insurance payer at a constant rate over time. From historical data, a completion percentage for each month of lag payment following the month of claims incurral is estimated (where claims paid in the same month as incurral have a lag time of $l = 0$, those paid in the following month have a lag time of $l = 1$, and so on.) For each month prior to the valuation date, the amount of claims incurred and paid as of the valuation date for each of the respective months of claims incurral is multiplied by the reciprocal of the claims completion percentage to derive an estimate of the claims incurred in each respective month, but not yet paid as of the valuation date.

The completion factor method and its many variants (including the “Chain ladder” and “Link ratio” methods) have been discussed in detail in a number of textbooks and periodical publications. (Bluhm, et.al., 2003; Brown and Gottlieb, 2001; Litow, 1989) It has also been widely recognized that it suffers from a large error variance, sometimes described as a “low credibility”, especially in months immediately preceding the valuation data, where lies the bulk of IBNP claim liability amounts. (Bluhm, et.al., 2003; Guiahi, 1986; Khury, 1980)

Because of the high error variance associated with the completion factor method, a second method is frequently applied, the “Incurred claims” method. Under the incurred claims method, average amounts of incurred and paid claims from months well before the valuation date are “completed” (using the completion factor method) to yield *a priori* estimates of incurred claim amounts. Those monthly incurred claim estimates are then used to project total incurred claims for more recent months. Alternatively, incurred claims are estimated using the product of projected premium revenue and expected loss ratio. The IBNP reserve amount is then determined as the difference between the incurred claims estimate and actual paid claims, and the incurred claim amounts estimated in this manner. The incurred claims method suffers from the obvious shortcoming that, for purposes of estimating incurred claims, it totally ignores the amounts for claims incurred and already paid for the claims incurral months to which it is applied. This results in a negative correlation between claims already paid and claims not yet paid for any given month of incurral, which is the opposite relation from that assumed by the completion factor method. Furthermore, if the incurred claims method is applied to claim incurral months with more than two months of claims payment runoff, the amount of claims already paid for a month may exceed the projected total incurred claims amount. Since negative IBNP amounts are, in general, not allowed, this

situation results in an inherent bias in the incurred claims method towards over-estimation of incurred claims and IBNP amounts. The incurred claims method and its variations have also been discussed elsewhere. (Barnhart, 1988; Bluhm, et. al., 2003)

A third method, the Bornhuetter-Ferguson method (and its variant, the Stanard-Buhlmann “Cape Cod” method), represents a compromise between the completion factor and incurred claims methods (Bornhuetter and Ferguson, 1972; Stanard, 1985). Rather than multiplying the completion factor times the paid claims to arrive at an estimate for total incurred claims, the Bornhuetter-Ferguson approach multiplies the compliment of the reciprocal of the completion factor times an *a priori* estimate of total incurred claims to arrive at an estimate of IBNP claim liability. By avoiding the multiplication of a stochastically-derived parameter (the completion factor) times a random variable (the paid claims), the Bornhuetter-Ferguson method avoids the large variance associated with the completion factor method. It also avoids the undesirable negative correlation between paid claims and the IBNP claims estimate. Despite its apparent superiority to both \the completion factor and incurred claims methods, and its fairly extensive treatment in the casualty actuarial literature (Barnett and Zehnwith, 1998; Brown and Gottlieb, 2001; Gluck, 1997), the Bornhuetter-Ferguson method does not appear to have achieved any wide acceptance among health actuaries, perhaps due to the complexity of applying it in practice.

Despite their short-comings, the prevalence of the completion factor and incurred claims methods in actuarial practice is such that they are specified by the National Association of Insurance Commissioners (NAIC) as the methods of choice for calculation of claim reserves (NAIC, 2001).

The poor performance of these two estimation methods can be explained by an examination of the underlying process of claim incurral and payment which they are intended to quantify. As the previous statement suggests, the process can be broken down easily into two, more or less independent component processes; (1) claim incurral and (2) claim reporting, processing, and payment.

The first process, claims incurral, can be represented as a random variable (r.v.), $\Phi_{m,i}$, which represents the claim liability incurred by member m in month i . The total claims incurred in month i is then simply the summed r.v.:

$$\Phi_i^{Total} = \sum_m \Phi_{m,i} \quad \text{for all members } m \text{ in month } i$$

The claim reporting, processing and payment process can be represent by a second r.v., Θ_l , which measures the probability that a claim incurred in month i will be paid before the end of month $i + l$, where $l = 0, 1, 2, \dots$. The convolution of $\Phi_{m,i}$ and Θ_l ($\Phi_{m,i} \bullet \Theta_l$) then represents a measure of the amount of claims incurred by member m in month i , and paid before the end of month $i + l$. If we define $\Psi_{m,i,l}$ as the r.v. describing claims incurred by member m in month i and paid before the end of month $i + l$, then the total claims incurred and paid for month i by the end of month $i + l$ is the sum:

$$\Psi_{i,l}^{Total} = \sum_m \Psi_{m,i,l} = \sum_m [\Phi_{m,i} \bullet \Theta_l] \quad \text{for all members } m \text{ in month } i$$

Since all claims are paid or settled eventually, it is required that that as l gets large, $\Psi_{m,i,l}$ converges to $\Phi_{m,i}$, so Θ_l converges to the Identity function.

When $\Psi_{i,l}^{Total}$ is compared to the process implied by the completion factor method, it is clear that the completion factor method implicitly assumes that Θ_l is a deterministic function of l , so that the value assumed by Θ_l is fixed for any given lag period l . In other words, the only variability recognized by the completion factor method is in the process of claims incurral, and no allowance is made for variation in the rate of claims reporting, processing and payment. This implies that:

$$\Psi_{i,l}^{Total} = \sum_m \Psi_{m,i,l} = \left(\sum_m \Phi_{m,i} \right) * E[\Theta_l] \quad \text{for all members } m \text{ in month } i$$

which is false, since in general

$$\sum_m [\Phi_{m,i} \bullet \Theta_l] \neq \left(\sum_m \Phi_{m,i} \right) * E[\Theta_l] \quad .$$

The practical result of this attempt to estimate $\Psi_{i,l}^{Total}$ with an inappropriate model is that the error variance of the final result is very high. This is due to the fact that, even if

$$E[\Psi_{i,l}^{Total}] = E[\sum_m \Phi_{m,i}] * E[\Theta_l],$$

this estimator for $\Psi_{i,l}^{Total}$ is a product of two other distinct estimators. Thus, assuming that the covariance is small, the variance of the final estimator is approximately proportional to the product of the variances of the two estimating parameters separately.

Likewise, when $\Psi_{i,l}^{Total}$ is compared to the process implied by the incurred claims method, it is clear that the incurred claims method implicitly assumes that $\sum_m \Phi_{m,i}$ is a deterministic function of m and i . In other words, the only variance recognized is in the process of claims reporting, processing and payment, and no allowance is made for variance in the actual rate of claims incurral. This implies that:

$$\Psi_{i,l}^{Total} = \sum_m \Psi_{m,i,l} = \sum_m E[\Phi_{m,i}] * \Theta_l \quad \text{for all members } m \text{ in month } i$$

which is also false, since in general

$$\sum_m [\sum \Phi_{m,i} \bullet \Theta_l] \neq \sum_m E[\Phi_{m,i}] * \Theta_l .$$

Since dealing with the convolution $\Phi_{m,i} \bullet \Theta_l$ is impractical, the alternative is to work directly with the r.v. $\Psi_{m,i,l}$.

The Multiple Linear Model

The usual manner in which large amounts of claims data are collected and ordered is by month of incurral and month paid. This yields a “lower triangular” incurred and paid matrix similar to what is shown in Table 1.

Table 1

Claims Data Arranged by Months of Incurral and Payment

Paid Month	Claims by Calendar Month of Incurral				
	A	B	C	D	...
A	Claims Incurred in A & Paid in A	(empty)	(empty)	(empty)	(empty)
B	Claims Incurred in A & Paid in B	Claims Incurred in B & Paid in B	(empty)	(empty)	(empty)
C	Claims Incurred in A & Paid in C	Claims Incurred in B & Paid in C	Claims Incurred in C & Paid in C	(empty)	(empty)
D	Claims Incurred in A & Paid in D	Claims Incurred in B & Paid in D	Claims Incurred in C & Paid in D	Claims Incurred in D & Paid in D	(empty)
...

The claims data may be re-arranged by incurred month and paid lag month, that is, the number of months after the incurral month in which claims are paid. The result is an “upper triangular” matrix as shown in Table 2.

Table 2

Claims Data Re-arranged by Month of Incurral and Paid Lag Months

Paid Lag Month	Claims by Calendar Month of Incurral				
	...	A	B	C	D
0	...	Claims Incurred in A & Paid in A	Claims Incurred in B & Paid in B	Claims Incurred in C & Paid in C	Claims Incurred in D & Paid in D
1	...	Claims Incurred in A & Paid in B	Claims Incurred in B & Paid in C	Claims Incurred in C & Paid in D	<i>Claims Incurred in D & Not Yet Paid in E</i>
2	...	Claims Incurred in A & Paid in C	Claims Incurred in B & Paid in D	<i>Claims Incurred in C & Not Yet Paid in E</i>	<i>Claims Incurred in D & Not Yet Paid in F</i>
3	...	Claims Incurred in A & Paid in D	<i>Claims Incurred in B & Not Yet Paid in E</i>	<i>Claims Incurred in C & Not Yet Paid in F</i>	<i>Claims Incurred in D & Not Yet Paid in G</i>
4	...	<i>Claims Incurred in A & Not Yet Paid in E</i>	<i>Claims Incurred in B & Not Yet Paid in F</i>	<i>Claims Incurred in C & Not Yet Paid in G</i>	<i>Claims Incurred in D & Not Yet Paid in H</i>
...

Note that the contents of the cells in the lower right (below the double line) of Table 2 represent amounts of claims which have been incurred, but have not yet been paid. The summation of the contents of all the cells in the lower right half of Table 2 represents the total IBNP amount, which is exactly the amount which is desired to be estimated. Table 3 is a representation of Table 2 with the cell contents labeled with notation consistent with the previous discussion of estimating IBNP amounts.

Table 3

Re-arranged Claims Data from Table 2 Re-labeled

Paid Lag Month	Claims by Calendar Month of Incurral				
	...	N - 3	N - 2	N - 1	N
0	...	$\sum_m \Psi_{m,N-3,0}$	$\sum_m \Psi_{m,N-2,0}$	$\sum_m \Psi_{m,N-1,0}$	$\sum_m \Psi_{m,N,0}$
1	...	$\sum_m \Psi_{m,N-3,1}$	$\sum_m \Psi_{m,N-2,1}$	$\sum_m \Psi_{m,N-1,1}$	$\sum_m \Psi_{m,N,1}$
2	...	$\sum_m \Psi_{m,N-3,2}$	$\sum_m \Psi_{m,N-2,2}$	$\sum_m \Psi_{m,N-1,2}$	$\sum_m \Psi_{m,N,2}$
3	...	$\sum_m \Psi_{m,N-3,3}$	$\sum_m \Psi_{m,N-2,3}$	$\sum_m \Psi_{m,N-1,3}$	$\sum_m \Psi_{m,N,3}$
4	...	$\sum_m \Psi_{m,N-3,4}$	$\sum_m \Psi_{m,N-2,4}$	$\sum_m \Psi_{m,N-1,4}$	$\sum_m \Psi_{m,N,4}$
...

If it is assumed that a linear relationship exists between values of $\Psi_{m,i,l}$ for any given values of i and $l = L$, and the values of $\Psi_{m,i,l}$ for all values of $l < L$, then the matrix represented by Table 3 can be thought of as a collection of distinct, independent linear models. So the overall model is one of multiple independent linear models. As such, standard linear statistical methods may be applied to calculate estimators for the values of $\Psi_{m,i,l}$ for months after the valuation date, i.e. “below the line” in the lower-right half of the upper-triangular claims matrix. By extension, the same can be said of the sum:

$$\Psi^{Total}(i,l) = \sum_m \Psi_{m,i,l}.$$

These linear methods would be based on the multivariate linear model where the expected incurred and paid claim lag amounts for a particular incurred month i and paid lag month L is related to claims incurred and paid in prior months by:

$$\sum_m \Psi_{m,i,L} = \alpha_{i,L} + \beta^0_{i,L} * \sum_m \Psi_{m,i,0} + \beta^1_{i,L} * \sum_m \Psi_{m,i,1} + \dots + \beta^{L-1}_{i,L} * \sum_m \Psi_{m,i,L-1}$$

Estimation of IBNP reserves through use of multivariate regression has been proposed previously (Weiss, 1985). However, due to computational complexity it has not been generally adopted.

For the sake of practical calculation, the multivariate linear model may be replaced by a bivariate linear model. In the bivariate model, the separate independent variables associated with each lag time, l , are replaced by a single independent variable representing the cumulative claims incurred in month i and paid through the valuation date, that is, paid in all lag months l prior to the lag month being evaluated,

$$\sum_m \Psi_{m,i,L} = \alpha_{i,L} + \beta_{i,L} * \sum_{l < L} \sum_m \Psi_{m,i,l}$$

For claims payment months other than those immediately following the valuation date, this model needs to be adapted to allow for the fact that claims payment data is not available for months after the valuation date. The adapted model relates the monthly incurred and paid claim amounts to the cumulative paid claims as of the valuation date:

$$\sum_m \Psi_{m,i,L} = \alpha_{i,L} + \beta_{i,L} * \sum_{l \leq L-I} \sum_m \Psi_{m,i,l}$$

Estimated values of the parameters of regression for each lag and cumulative payment time, $\hat{\alpha}_{i,L}$ and $\hat{\beta}_{i,L}$, respectively, would be determined using standard statistical techniques, usually least squares regression.

The model may be simplified by applying the assumption that claim lag amounts are independent of claims already paid. That is, for each claim lag time, l ,

$$\Psi_{m,i,L} = \alpha_{i,L}$$

so

$$\sum_m \Psi_{m,i,L} = M_i * \alpha_{i,L}$$

where M_i is the number of member in incurred month i .

It is of interest to note that the “zero-intercept” form of the bivariate linear model, that is,

$$\sum_m \Psi_{m,i,L} = \beta_{i,L} * \sum_{l \leq N-i} \sum_m \Psi_{m,i,l}$$

produces the basis for the Completion Factor method of IBNP claims estimation. Similarly, the Incurred Claims method for estimation of IBNP claims is arrived at by assuming that the amount of claim lag time is irrelevant, and subtracting paid claims from a scalar estimate of incurred claims,

$$\sum_m \Psi_{m,i,L} = M_i * \alpha_I - \sum_{l \leq N-i} \sum_m \Psi_{m,i,l}$$

In the rest of this paper, I will describe the method for calculating IBNP claim amounts (and from them the estimated incurred claims) using the method derived from the bivariate linear model, which I will refer to as the “Regressed Projected Paid Lag per Member per Month “ method, alternatively the “Regressed Paid Lag” method. I will refer to the variant method which assumes independence of past and future incurred and paid amounts (using only past average incurred and paid amounts to calculate the single parameter α) as the “Simple Paid Lag” method.

Description of the Methodology

In this section I will describe the generalized method using grids such as would be used in a spreadsheet application, side-by-side with a numerical example based on actual data which has been modified to preserve confidentiality.

Step 1 – Collection of Historic Raw Data into Initial (Lower Triangular) Matrix

The time period used in this description is months, since that is the most common time period used in reserve calculations, but any time period may be used.

Data is initially gathered in a matrix format with calendar month of claims incurred in columns going across and calendar month of claims payment in rows going down. In this lower-triangular format, the claim amount $C_{p,i}$ in row p and column i represent claim incurred in month i and paid in month p . This layout is represented for N months of claims incurred and paid data in the sample matrix in Table 4a. Sample data is shown in Table 4b.

While the method shown here is based on N months of claims incurred (with N being the most recent month for which paid claims are available) and N months of claims payment, the number of months of incurred may exceed the number of months of claims payment for older months if claims are deemed to be essentially completed before N months of claims payment run-out.

Step 2 – Rearrangement of Incurred and Paid Claims Data into Upper-Triangular Incurred and Lag Matrix

The data in the lower triangular data matrix is rearranged so that claim amounts in row l and column i represent claims incurred in month i and paid in lag month l , where $i + l = p$. Claims

paid in the same month as they are incurred are given a lag value of $l = 0$. The data from Table 4a is shown in Table 5, rearranged, but with the claim amounts still labeled according to paid month, p , and incurred month, i . In Table 6a, the data is relabeled to conform with the respective paid lag month, l , and incurred month i . The total claims incurred in month i and paid through month N remains unchanged since the data has only been rearranged by row, not by column. Table 6b shows the sample data from Table 4b.

In the rearranged matrix, the cells to the lower right (lag month $l > N - i$) are empty, since the amounts which would be entered in these cells represent claims incurred but not yet paid (IBNP). These IBNP amounts are the unknown amounts to be calculated. The sum of the amounts $C_{l,i}$ for all l greater than $N - i$ and all incurred months i , represents the incurred claim liability or reserve which is to be determined.

Step 3 – Conversion of Total Claim Amounts to Per Member Per Month (PMPM) Values.

Each gross amount $C_{l,i}$, is converted to the respective intrinsic PMPM value, $C'_{l,i}$, by dividing by the number of members in each incurred month, M_i .

$$C'_{l,i} = C_{l,i} / M_i \quad \text{for all } i \text{ and all } l \leq N$$

The resulting matrix is as appears in Table 7a. Table 7b shows the PMPM data from the sample data.

Step 4 – Adjustment of Claims Data for Seasonality Effects and Trend

Before proceeding further, the claims data may be adjusted for seasonality effects due to deterministic variables such as number of calendar days in each month, or estimated factors such

as seasonal morbidity or cumulative effects of benefit or patient cost-sharing limits. This step is implied in the example, and is not shown explicitly.

The incurred and paid data is also adjusted to remove the effects of trend, using either arithmetic or geometric parameter estimates. The end effect is to make the adjusted values trend-neutral.

Step 5 – Determination of Mean and Cumulative Values of $C'_{l,i}$

For each value of $l \in (0, 1, 2, \dots, N)$, define the mean value of $C'_{l,i}$ as

$$C^*_{l,i} = \Sigma C'_{l,i} / \Sigma M_i \quad \text{for all } i \leq N - l$$

Also define the cumulative PMPM claims incurred and paid

$$C^{\Sigma}_{\lambda,i} = \Sigma C'_{l,i} \quad \text{for all } i \text{ and all } l \leq \lambda$$

Step 6 – Regression of PMPM Values of $C'_{l,i}$ against Cumulative Values of $C^{\Sigma}_{l,i}$

Values of $C^*_{l,i}$ may be either used directly to project future claim liability reserves, or the estimates can be improved further by regressing the PMPM Values of $C'_{l,i}$ (the dependent random variable) against Cumulative values of $C^{\Sigma}_{l,i}$ (the independent random variable.) If a linear least-squares regression model is used, then for each combination of lag month l and cumulative lag months λ regression parameters of slope, $C^{\alpha}_{\lambda,l}$, and intercept, $C^{\beta}_{\lambda,l}$, will need to be calculated. The regression may be performed on values of $C'_{l,i}$ and $C^{\Sigma}_{l,i}$ weighted by the number of members in each incurral month, M_i , or other weighting parameter as appropriate to the circumstances. The results can be shown in matrices presented in Table 8a and Table 9a,

respectively. Regression parameters calculated from the sample data are shown in Table 8b and Table 9b, respectively.

Application of this step is characteristic of the Regressed Paid Lag method is used. If this step is not applied, then the result is the Simple Paid Lag method.

Step 7 – Initial Projected PMPM Incurred But Not Yet Paid Amounts

Table 10 shows the labeling scheme for the initial projected PMPM IBNP claim amounts, $C^*_{l,i}$. Values in the lower right of the matrix (below the double border) represent projected IBNP amounts by incurred month i and lag month l ($i + l > N$), while values in the upper left half of the matrix, above the double border, represent claims incurred in month i and already paid in lag month l ($i + l \leq N$).

If regressed values of C^*_l are used, then the PMPM IBNP amounts for claims incurred in or before month M_N but not paid until after month M_N are determined as:

$$C^*_{l,i} = C^{\beta}_{\lambda,l} + (C^{\alpha}_{\lambda,l} \text{ X } C^{\Sigma}_{\lambda,i})$$

If values of C^*_l are not regressed, then $C^*_{l,i} = C^*_l$ for all i .

Table 11a show the completed PMPM claims matrix if the values of $C^*_{l,i}$ if the projected values are not regressed. Table 12a shows the regressed values of $C^*_{l,i}$ if the PMPM claim amounts are regressed and projected using the values of $C^{\alpha}_{\lambda,l}$, and $C^{\beta}_{\lambda,l}$ as described. For clarity, the formulae for calculation of the various values of $C^*_{l,i}$ are shown in Table 12. In both Tables 11 and 12, the

values in the lower right half of the matrix (below the double border) are the initial projected PMPM incurred but not yet paid amounts.

Table 11b shows the sample data projected without regression, while Table 12b shows the results of projecting the sample data with regression.

Step 8 – Adjustment of Projected Values of $C^*_{l,i}$ for Trend and Seasonality

Projected values of PMPM IBNP claim amounts are then adjusted in the reverse of procedure used in Step 4. These adjusted PMPM values are designated as $\hat{C}_{l,i}$ for claims incurred in month i and projected to be paid in lag month l . Table 10 shows the completed PMPM claims matrix. Values in the upper left ($C'_{l,i}$) are incurred and paid PMPM amounts from Step 3 (Table 7a), while values in the lower right ($\hat{C}_{l,i}$) are the estimated PMPM IBNP claim amounts.

Comparison of Results of Three IBNP Calculation Methods

To compare the results achieved by applying these three methods, I have prepared a comparison of IBNP and actual incurred claim estimates calculated using each, together with corresponding realized “look-back” amounts. These calculations are made on real data, which has been transformed to preserve confidentiality. The data has also been adjusted in volume to represent a constant exposure of 100,000 members. The data is divided into three sets. One set of data represents claims incurred and paid under coverage of a closed-panel, integrated health care delivery system (IDS) or managed care organization (MCO). This data set is shown in Table 14a. The second data set represents claims for health care services from providers in a non-network setting, who have no connection to the payer organization, as would be the case with an indemnity or fee-for-service (FFS) health insurance plan. This data set is shown in Table 14b. The third data

set represents an open-panel, loosely held managed care plan, such as a point-of-service (POS) or preferred provider organization (PPO). This data set is shown in Table 14c.

The cost trend rate used for both the Incurred Claims and the Paid Lag methods was derived directly from the actual data. Determination of this parameter in this manner is of course not an option applicable in “real world” projection of IBNP claims. However, for purposes of this presentation it serves to eliminate any bias in the results caused by the application of an inappropriate trend value.

No set of claims data is ever truly complete. The most recent incurred and paid claims data in these data sets has six months of claims payment runout. In order to simulate truly complete claims as closely as possible, all claims were considered complete 23 months after the incurral month. For the most recently incurred months, claims were completed on a monthly basis using claims lag factors, and then had a randomization factor, derived from historical observed claim payment variations, applied to simulate actual claims variability.

Altogether, 24 data points were generated for each method using the 36 months of incurred claims available, paid over 42 months. It should finally be noted that the indicated incurral months for the data are not the actual calendar months from which the claims data was taken. This has been changed to preserve confidentiality but is not relevant to the analysis.

Actual “look-back” and estimated values of IBNP claim amounts calculated by the various methods from the data in Tables 14a, 14b, and 14c, are presented in Tables 15a, 15b and 15c, respectively.

The actual look-back IBNP amounts are simply the summation of actual claims paid in subsequent months as of the end-of-month valuation dates shown in the tables.

Completion Factor method IBNP amounts were calculated using a standard ratio method applied to the 18 months of incurred and paid claims ending in lag month zero. In the case of the oldest claims data, where less than 18 months of prior claims payment is included in the data, completion factors were based on all prior claims months. The completion factors for the first month of incurred claims estimated was therefore based 13 months of data, with additional claim payment months included for the succeeding months until a full 18 months was included for estimation of claims in the sixth month of data used.

The results of two different Incurred Claim method calculations are shown. The “3-Month Incurred Claims” method used the Completion Factor method to complete claims up to 3 months prior to the valuation date (a total of 15 claims incurral months). The completed claims from each respective 15-month period were then used to estimate incurred claim amounts for the final three months of the total 18-month period. The difference between total incurred claims estimated in this manner, and the claims incurred and paid through the valuation date was then taken as the estimate of IBNP claims as of the valuation date. The “6-Month Incurred Claims” method used a similar approach, but incurred claims for the final six months of the 18-month period were estimated based on claims from the prior 12 months completed using the Completion Factor method.

The IBNP claim estimates for the Simple Paid Lag and the Regressed Paid Lag methods were calculated using the procedures described above.

Scattergrams of the results of the various IBNP estimates versus the actual look-back IBNP claim amounts are shown in Figures 1a and 1b through 12a and 12b. For clarity of presentation, these scattergrams are shown in pairs (e.g., Figure 1a and Figure 1b form a pair.) In the first (“a”) plot of each pair, the IBNP estimates from the traditional Completion Factor and 6-month Incurred Claims Factors methods are plotted against the actual IBNP claim amounts. The values for the 3-month Incurred Claims method are not plotted, since they are generally intermediate between these two sets of results.) If the second (“b”) plot of each pair, the IBNP estimates from the Simple and Regressed Projected Paid Lag methods are similarly plotted against the actual IBNP claims amounts.

Examination of the respective pairs of figures reveal that, without exception, both the Completion Factor and the Incurred Claims methods yield a very poor “fit” with actual IBNP amounts, while the Projected Paid Lag method gives a consistently much better fit than the traditional methods.

I performed statistical analysis of the results yielded by the different methods, determining the standard error for each. The comparison of these standard error values with the standard deviation of the actual IBNP claims amounts is shown in Table 16 and Figure 13. It is readily apparent from this data that, even with three months’ of claims payment runout, the Completion Factor method yields poorer results than either the Simple or Regressed Projected Paid Lag methods.

As a corollary analysis of these results, I also present the estimates of incurred claims estimated by each of the respective methods compared to the actual incurred claims. Scattergrams of the results for rolling 3-month incurral periods are shown in Figures 17a, 17b, 18a, 18b, 19a, and 19b. Scattergrams of the results for rolling 12-month incurral periods are shown in Figures 20a, 20b, 21a, 21b, 22a, and 22b. As with the IBNP results, the scattergrams are presented in pairs to contrast the results from the traditional estimation methods versus the Projected Paid Lag methods. Only results for estimates with zero claims payment runout are shown.

Table 17 presents the statistical evaluation of the 3-month and 12-month rolling incurred claims estimates in terms of standard error. Figures 23 and 24 present this data in graphical format for estimates of 3-month and 12-month rolling incurred claim totals, respectively. As would be expected, the relative standard error measures for the incurred claims estimates from the respective methods parallel the IBNP claims results. Both the Simple and Regressed Projected Paid Lag methods give estimates with significantly smaller error than the Incurred Claims method, and much smaller than the Completion Factor method.

The figures also reveal that, when compared with the standard deviation of the actual incurred claims amounts, the Completion Factor and Incurred Claims methods universally yield standard errors of estimation greater than the standard deviation, while both the Simple and Regressed Projected Paid Lag methods consistently yield standard errors smaller than the standard deviation of actual incurred claims.

Conclusion

The Simple Projected Paid Lag and Regressed Projected Paid Lag methods for estimation of IBNP amounts shown here yield clearly superior results to those provided by the traditional methods of estimating these amounts. This superiority is due primarily to the fact that the Completion Factor and Incurred Claims methods for estimating IBNP are based on faulty assumptions implicit to the methodology itself, while the Projected Paid Lag methods are based on a sound statistical approach to the problem. Furthermore, since the Projected Paid Lag methods reflect sound linear statistical models, more advanced and sophisticated statistical methods, such as time-weighted regression, and tests, such as determination of confidence intervals, may be applied to the basic results in order to more precisely measure and communicate the results and implications of such analyses.

Note: A patent is pending on the “Simple Projected Paid Lag” and “Regressed Projected Paid Lag” calculation methods described in this paper.

References

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Table 4a.
Initial Claims Data in Lower-Triangular Matrix Format

		Incurral Month, <i>i</i>									
		<i>i</i> = 1	<i>i</i> = 2	<i>i</i> = 3	<i>i</i> = 4	....	....	<i>i</i> = N-3	<i>i</i> = N-2	<i>i</i> = N-1	<i>i</i> = N
Claims Paid Month, <i>p</i>	<i>p</i> = 1	$C_{1,1}$	\$0	\$0	\$0	....	....	\$0	\$0	\$0	\$0
	<i>p</i> = 2	$C_{2,1}$	$C_{2,2}$	\$0	\$0	....	....	\$0	\$0	\$0	\$0
	<i>p</i> = 3	$C_{3,1}$	$C_{3,2}$	$C_{3,3}$	\$0	....	....	\$0	\$0	\$0	\$0
	<i>p</i> = 4	$C_{4,1}$	$C_{4,2}$	$C_{4,3}$	$C_{4,4}$	....	....	\$0	\$0	\$0	\$0

	<i>p</i> = N-3	$C_{N-3,1}$	$C_{N-3,2}$	$C_{N-3,3}$	$C_{N-3,4}$	....	....	$C_{N-3,N-3}$	\$0	\$0	\$0
	<i>p</i> = N-2	$C_{N-2,1}$	$C_{N-2,2}$	$C_{N-2,3}$	$C_{N-2,4}$	....	....	$C_{N-2,N-3}$	$C_{N-2,N-2}$	\$0	\$0
	<i>p</i> = N-1	$C_{N-1,1}$	$C_{N-1,2}$	$C_{N-1,3}$	$C_{N-1,4}$	....	....	$C_{N-1,N-3}$	$C_{N-1,N-2}$	$C_{N-1,N-1}$	\$0
	<i>p</i> = N	$C_{N,1}$	$C_{N,2}$	$C_{N,3}$	$C_{N,4}$	....	....	$C_{N,N-3}$	$C_{N,N-2}$	$C_{N,N-1}$	$C_{N,N}$
Total Claims Incurred in Month <i>i</i> & Paid through Month <i>N</i>		$\sum_p C_{p,1}$	$\sum_p C_{p,2}$	$\sum_p C_{p,3}$	$\sum_p C_{p,4}$	....	....	$\sum_p C_{p,N-3}$	$\sum_p C_{p,N-2}$	$\sum_p C_{p,N-1}$	$\sum_p C_{p,N}$
Members in Month <i>i</i>		M_1	M_2	M_3	M_4	....	....	M_{N-3}	M_{N-2}	M_{N-1}	M_N

Table 4b.
Example Calculation: Initial Claims Data in Lower-Triangular Matrix Format

		Incurral Month, <i>i</i>											
		Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Claims Paid Month, <i>p</i>	Jan-02	\$71,069											
	Feb-02	2,919,144	\$374,213										
	Mar-02	4,541,404	3,054,559	\$249,774									
	Apr-02	1,190,801	4,620,221	4,956,069	\$986,992								
	May-02	307,455	562,947	2,108,702	5,247,828	\$1,086,713							
	Jun-02	266,916	393,854	467,029	1,935,111	5,976,282	\$2,494,735						
	Jul-02	181,812	125,650	371,690	482,434	991,339	4,671,415	\$1,613,996					
	Aug-02	101,655	40,215	151,804	362,452	481,892	1,176,038	4,671,851	\$1,045,905				
	Sep-02	64,161	72,195	206,305	203,341	446,280	765,400	1,958,490	5,414,633	\$1,805,765			
	Oct-02	(91,531)	64,853	127,068	303,230	267,802	532,668	667,439	1,514,893	5,444,666	\$1,172,586		
	Nov-02	33,250	42,891	116,754	304,820	313,209	334,759	451,427	415,969	1,926,061	5,055,924	\$1,192,505	
	Dec-02	46,659	34,604	85,591	90,829	143,469	268,573	255,729	348,400	761,543	2,649,822	6,971,624	\$1,538,940
	Jan-03	26,678	25,180	38,322	45,325	54,112	219,892	146,686	146,659	316,503	433,767	2,094,471	5,625,120
	Feb-03	7,541	18,597	34,646	36,215	45,320	118,593	103,275	289,850	351,167	456,584	1,019,984	2,321,627
	Mar-03	4,766	6,631	23,801	38,387	56,106	56,941	58,732	68,741	183,377	153,682	288,634	372,711
	Apr-03	(1,470)	(5,335)	34,865	14,999	45,033	58,199	56,874	66,097	278,243	134,345	372,835	414,122
	May-03	(23,711)	9,460	11,001	36,411	27,515	35,286	37,921	49,810	86,331	88,409	156,857	202,565
	Jun-03	17,130	14,684	46,870	26,784	36,957	19,804	58,168	37,604	94,239	86,480	119,230	148,967
	Jul-03	(22,690)	1,109	9,822	15,451	10,438	33,761	68,387	55,306	108,477	40,314	114,564	127,593
	Aug-03	(2,016)	2,349	6,974	20,663	18,917	(19,713)	41,396	51,358	31,275	38,788	61,700	50,194
	Sep-03	1,256	2,025	2,940	14,059	31,480	(2,649)	4,522	12,542	26,742	13,624	(150,637)	45,783
	Oct-03	820	717	479	14,514	6,632	(346)	4,036	5,670	(53,423)	15,767	25,103	25,488
	Nov-03	5,742	1,346	884	(662)	2,106	3,037	36	3,890	7,216	20,506	(32,508)	56,460
	Dec-03	462	1,774	(2,507)	4,054	26,803	(8,244)	2,541	(6,534)	(1,321)	7,751	20,228	37,725
Total Inc & Pd	\$9,647,304	\$9,464,739	\$9,048,885	\$10,183,238	\$10,068,404	\$10,758,150	\$10,201,505	\$9,520,794	\$11,366,862	\$10,368,348	\$12,254,590	\$10,967,295	
Members	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	

Table 4b (continued)
Example Calculation: Initial Claims Data in Lower-Triangular Matrix Format

		Incurral Month, <i>i</i>											
		Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03
Claims Paid Month, <i>p</i>	Jan-02												
	Feb-02												
	Mar-02												
	Apr-02												
	May-02												
	Jun-02												
	Jul-02												
	Aug-02												
	Sep-02												
	Oct-02												
	Nov-02												
	Dec-02												
	Jan-03	\$1,533,419											
	Feb-03	7,098,838	\$2,208,337										
	Mar-03	1,489,592	4,794,418	\$1,825,274									
	Apr-03	1,156,960	1,752,658	4,932,275	\$2,659,140								
	May-03	695,710	1,094,603	1,845,308	4,861,719	\$1,668,941							
	Jun-03	300,366	416,323	790,985	2,498,272	5,607,913	\$2,268,333						
	Jul-03	200,845	276,002	535,436	931,047	1,830,322	5,580,823	\$2,146,835					
	Aug-03	103,215	178,372	225,845	558,509	585,131	2,155,206	5,385,183	\$1,929,379				
Sep-03	78,468	93,460	182,601	170,018	653,315	568,733	2,021,000	5,087,302	\$2,194,777				
Oct-03	57,948	74,540	106,300	156,714	233,037	514,544	593,570	1,424,488	4,885,088	\$1,802,601			
Nov-03	20,564	76,926	98,274	159,639	241,999	456,264	380,771	671,813	3,577,305	6,130,328	\$3,407,719		
Dec-03	42,942	31,711	49,958	298,191	310,249	186,491	321,228	464,433	955,810	1,879,497	5,799,572	\$3,438,225	
Total Inc & Pd	\$12,778,865	\$10,997,348	\$10,592,255	\$12,293,249	\$11,130,905	\$11,730,392	\$10,848,587	\$9,577,415	\$11,612,980	\$9,812,427	\$9,207,291	\$3,438,225	
Members	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	

Table 5a.
Initial Claims Data Rearranged to Upper-Triangular Matrix Format

		Incurral Month, i									
		$i = 1$	$i = 2$	$i = 3$	$i = 4$	....	....	$i = N-3$	$i = N-2$	$i = N-1$	$i = N$
Claims Paid Lag Month, l	$l = 0$	$C_{p=1,1}$	$C_{p=2,2}$	$C_{p=3,3}$	$C_{p=4,4}$	....	....	$C_{p=N-3,N-3}$	$C_{p=N-2,N-2}$	$C_{p=N-1,N-1}$	$C_{p=N,N}$
	$l = 1$	$C_{p=2,1}$	$C_{p=3,2}$	$C_{p=4,3}$	$C_{p=5,3}$	....	....	$C_{p=N-2,N-3}$	$C_{p=N-1,N-2}$	$C_{p=N,N-1}$	
	$l = 2$	$C_{p=3,1}$	$C_{p=4,2}$	$C_{p=5,3}$	$C_{p=6,3}$	....	....	$C_{p=N-1,N-3}$	$C_{p=N,N-2}$		
	$l = 3$	$C_{p=4,1}$	$C_{p=5,2}$	$C_{p=6,3}$	$C_{p=7,3}$	....	....	$C_{p=N,N-3}$			
				
					
	$l = N-4$	$C_{p=N-3,1}$	$C_{p=N-2,2}$	$C_{p=N-1,3}$	$C_{p=N,4}$						
	$l = N-3$	$C_{p=N-2,1}$	$C_{p=N-1,2}$	$C_{p=N,3}$							
	$l = N-2$	$C_{p=N-1,1}$	$C_{p=N,2}$								
	$l = N-1$	$C_{p=N,1}$									
Total Claims Incurred in Month i & Paid through Month N		$\sum_p C_{p,1}$	$\sum_p C_{p,2}$	$\sum_p C_{p,3}$	$\sum_p C_{p,4}$	....	....	$\sum_p C_{p,N-3}$	$\sum_p C_{p,N-2}$	$\sum_p C_{p,N-1}$	$\sum_p C_{p,N}$
Members in Month i		M_1	M_2	M_3	M_4	....	....	M_{N-3}	M_{N-2}	M_{N-1}	M_N

Table 5b.
Example Calculation: Initial Claims Data Rearranged to Upper-Triangular Matrix Format

		Incurral Month, <i>i</i>											
		Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Claims Payment Lag Month, <i>l</i>	Jan-02	\$71,069	\$374,213	\$249,774	\$986,992	\$1,086,713	\$2,494,735	\$1,613,996	\$1,045,905	\$1,805,765	\$1,172,586	\$1,192,505	\$1,538,940
	Feb-02	2,919,144	3,054,559	4,956,069	5,247,828	5,976,282	4,671,415	4,671,851	5,414,633	5,444,666	5,055,924	6,971,624	5,625,120
	Mar-02	4,541,404	4,620,221	2,108,702	1,935,111	991,339	1,176,038	1,958,490	1,514,893	1,926,061	2,649,822	2,094,471	2,321,627
	Apr-02	1,190,801	562,947	467,029	482,434	481,892	765,400	667,439	415,969	761,543	433,767	1,019,984	372,711
	May-02	307,455	393,854	371,690	362,452	446,280	532,668	451,427	348,400	316,503	456,584	288,634	414,122
	Jun-02	266,916	125,650	151,804	203,341	267,802	334,759	255,729	146,659	351,167	153,682	372,835	202,565
	Jul-02	181,812	40,215	206,305	303,230	313,209	268,573	146,686	289,850	183,377	134,345	156,857	148,967
	Aug-02	101,655	72,195	127,068	304,820	143,469	219,892	103,275	68,741	278,243	88,409	119,230	127,593
	Sep-02	64,161	64,853	116,754	90,829	54,112	118,593	58,732	66,097	86,331	86,480	114,564	50,194
	Oct-02	(91,531)	42,891	85,591	45,325	45,320	56,941	56,874	49,810	94,239	40,314	61,700	45,783
	Nov-02	33,250	34,604	38,322	36,215	56,106	58,199	37,921	37,604	108,477	38,788	(150,637)	25,488
	Dec-02	46,659	25,180	34,646	38,387	45,033	35,286	58,168	55,306	31,275	13,624	25,103	56,460
	Jan-03	26,678	18,597	23,801	14,999	27,515	19,804	68,387	51,358	26,742	15,767	(32,508)	37,725
	Feb-03	7,541	6,631	34,865	36,411	36,957	33,761	41,396	12,542	(53,423)	20,506	20,228	
	Mar-03	4,766	(5,335)	11,001	26,784	10,438	(19,713)	4,522	5,670	7,216	7,751		
	Apr-03	(1,470)	9,460	46,870	15,451	18,917	(2,649)	4,036	3,890	(1,321)			
	May-03	(23,711)	14,684	9,822	20,663	31,480	(346)	36	(6,534)				
	Jun-03	17,130	1,109	6,974	14,059	6,632	3,037	2,541					
	Jul-03	(22,690)	2,349	2,940	14,514	2,106	(8,244)						
	Aug-03	(2,016)	2,025	479	(662)	26,803							
Sep-03	1,256	717	884	4,054									
Oct-03	820	1,346	(2,507)										
Nov-03	5,742	1,774											
Dec-03	462												
Total Inc & Pd	\$9,647,304	\$9,464,739	\$9,048,885	\$10,183,238	\$10,068,404	\$10,758,150	\$10,201,505	\$9,520,794	\$11,366,862	\$10,368,348	\$12,254,590	\$10,967,295	
Members	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	

Table 5b (continued)
Example Calculation: Initial Claims Data Rearranged to Upper-Triangular Matrix Format

		Incurral Month, <i>i</i>											
		Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03
Claims Payment Lag Month, <i>l</i>	Jan-02	\$1,533,419	\$2,208,337	\$1,825,274	\$2,659,140	\$1,668,941	\$2,268,333	\$2,146,835	\$1,929,379	\$2,194,777	\$1,802,601	\$3,407,719	\$3,438,225
	Feb-02	7,098,838	4,794,418	4,932,275	4,861,719	5,607,913	5,580,823	5,385,183	5,087,302	4,885,088	6,130,328	5,799,572	
	Mar-02	1,489,592	1,752,658	1,845,308	2,498,272	1,830,322	2,155,206	2,021,000	1,424,488	3,577,305	1,879,497		
	Apr-02	1,156,960	1,094,603	790,985	931,047	585,131	568,733	593,570	671,813	955,810			
	May-02	695,710	416,323	535,436	558,509	653,315	514,544	380,771	464,433				
	Jun-02	300,366	276,002	225,845	170,018	233,037	456,264	321,228					
	Jul-02	200,845	178,372	182,601	156,714	241,999	186,491						
	Aug-02	103,215	93,460	106,300	159,639	310,249							
	Sep-02	78,468	74,540	98,274	298,191								
	Oct-02	57,948	76,926	49,958									
	Nov-02	20,564	31,711										
	Dec-02	42,942											
	Jan-03												
	Feb-03												
	Mar-03												
	Apr-03												
	May-03												
	Jun-03												
	Jul-03												
	Aug-03												
Sep-03													
Oct-03													
Nov-03													
Dec-03													
Total Inc & Pd	\$12,778,865	\$10,997,348	\$10,592,255	\$12,293,249	\$11,130,905	\$11,730,392	\$10,848,587	\$9,577,415	\$11,612,980	\$9,812,427	\$9,207,291	\$3,438,225	
Members	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	

Table 6.
Initial Claims Data Relabeled to Upper-Triangular Incurred vs. Lag Matrix Format

		Incurral Month, <i>i</i>									
		<i>i</i> = 1	<i>i</i> = 2	<i>i</i> = 3	<i>i</i> = 4	....	....	<i>i</i> = N-3	<i>i</i> = N-2	<i>i</i> = N-1	<i>i</i> = N
Claims Paid Lag Month, <i>l</i>	<i>l</i> = 0	$C_{0,1}$	$C_{0,2}$	$C_{0,3}$	$C_{0,4}$	....	....	$C_{0,N-3}$	$C_{0,N-2}$	$C_{0,N-1}$	$C_{0,N}$
	<i>l</i> = 1	$C_{1,1}$	$C_{1,2}$	$C_{1,3}$	$C_{1,4}$	....	....	$C_{1,N-3}$	$C_{1,N-2}$	$C_{1,N-1}$	
	<i>l</i> = 2	$C_{2,1}$	$C_{2,2}$	$C_{2,3}$	$C_{2,3}$	....	....	$C_{2,N-3}$	$C_{2,N-2}$		
	<i>l</i> = 3	$C_{3,1}$	$C_{3,2}$	$C_{3,3}$	$C_{3,3}$	....	....	$C_{3,N-3}$			
				
					
	<i>l</i> = N-4	$C_{N-4,1}$	$C_{N-4,2}$	$C_{N-4,3}$	$C_{N-4,4}$						
	<i>l</i> = N-3	$C_{N-3,1}$	$C_{N-3,2}$	$C_{N-3,3}$							
	<i>l</i> = N-2	$C_{N-2,1}$	$C_{N-2,2}$								
	<i>l</i> = N-1	$C_{N-1,1}$									
Total Claims Incurred in Month <i>i</i> & Paid through Month <i>N</i>	$\sum_{l < N} C_{l,1}$	$\sum_{l < N-1} C_{l,2}$	$\sum_{l < N-2} C_{l,3}$	$\sum_{l < N-3} C_{l,4}$	....	....	$\sum_{l < 4} C_{l,N-3}$	$\sum_{l=0,1,2} C_{l,N-2}$	$\sum_{l=0,1} C_{l,N-1}$	$\sum_{l=0} C_{l,N}$	
Members in Month <i>i</i>	M_1	M_2	M_3	M_4	....	....	M_{N-3}	M_{N-2}	M_{N-1}	M_N	

Table 7a.
Claims Data Normalized to PMPM Values, $C'_{l,i}$

		Incurral Month, i									
		$i = 1$	$i = 2$	$i = 3$	$i = 4$	....	....	$i = N-3$	$i = N-2$	$i = N-1$	$i = N$
Claims Paid Lag Month, l	$l = 0$	$C'_{0,1}$	$C'_{0,2}$	$C'_{0,3}$	$C'_{0,4}$	....	....	$C'_{0,N-3}$	$C'_{0,N-2}$	$C'_{0,N-1}$	$C'_{0,N}$
	$l = 1$	$C'_{1,1}$	$C'_{1,2}$	$C'_{1,3}$	$C'_{1,4}$	....	....	$C'_{1,N-3}$	$C'_{1,N-2}$	$C'_{1,N-1}$	
	$l = 2$	$C'_{2,1}$	$C'_{2,2}$	$C'_{2,3}$	$C'_{2,3}$	....	....	$C'_{2,N-3}$	$C'_{2,N-2}$		
	$l = 3$	$C'_{3,1}$	$C'_{3,2}$	$C'_{3,3}$	$C'_{3,3}$	....	....	$C'_{3,N-3}$			
				
					
	$l = N-4$	$C'_{N-4,1}$	$C'_{N-4,2}$	$C'_{N-4,3}$	$C'_{N-4,4}$						
	$l = N-3$	$C'_{N-3,1}$	$C'_{N-3,2}$	$C'_{N-3,3}$							
	$l = N-2$	$C'_{N-2,1}$	$C'_{N-2,2}$								
	$l = N-1$	$C'_{N-1,1}$									
Total PMPM Claims Incurred in Month i & Paid through Month N		$\sum_{l < N} C'_{l,1}$	$\sum_{l < N-1} C'_{l,2}$	$\sum_{l < N-2} C'_{l,3}$	$\sum_{l < N-3} C'_{l,4}$	....	....	$\sum_{l < 4} C'_{l,N-3}$	$\sum_{l=0,1,2} C'_{l,N-2}$	$\sum_{l=0,1} C'_{l,N-1}$	$\sum_{l=0} C'_{l,N}$
Members in Month i		M_1	M_2	M_3	M_4	....	....	M_{N-3}	M_{N-2}	M_{N-1}	M_N

Table 7b.
Example Calculation: Claims Data Normalized to PMPM Values and Adjusted for Trend

		Incurral Month, <i>i</i>											
		Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Claims Payment Lag Month, <i>l</i>	0	\$0.88	\$4.58	\$3.03	\$11.86	\$12.94	\$29.42	\$18.86	\$12.81	\$20.81	\$13.32	\$13.42	\$17.15
	1	\$36.09	\$37.41	\$60.13	\$63.07	\$71.15	\$55.09	\$54.58	\$66.29	\$62.73	\$57.42	\$78.43	\$62.69
	2	\$56.15	\$56.59	\$25.58	\$23.26	\$11.80	\$13.87	\$22.88	\$18.55	\$22.19	\$30.09	\$23.56	\$25.87
	3	\$14.72	\$6.89	\$5.67	\$5.80	\$5.74	\$9.03	\$7.80	\$5.09	\$8.77	\$4.93	\$11.47	\$4.15
	4	\$3.80	\$4.82	\$4.51	\$4.36	\$5.31	\$6.28	\$5.27	\$4.27	\$3.65	\$5.19	\$3.25	\$4.62
	5	\$3.30	\$1.54	\$1.84	\$2.44	\$3.19	\$3.95	\$2.99	\$1.80	\$4.05	\$1.75	\$4.19	\$2.26
	6	\$2.25	\$0.49	\$2.50	\$3.64	\$3.73	\$3.17	\$1.71	\$3.55	\$2.11	\$1.53	\$1.76	\$1.66
	7	\$1.26	\$0.88	\$1.54	\$3.66	\$1.71	\$2.59	\$1.21	\$0.84	\$3.21	\$1.00	\$1.34	\$1.42
	8	\$0.79	\$0.79	\$1.42	\$1.09	\$0.64	\$1.40	\$0.69	\$0.81	\$0.99	\$0.98	\$1.29	\$0.56
	9	(\$1.13)	\$0.53	\$1.04	\$0.54	\$0.54	\$0.67	\$0.66	\$0.61	\$1.09	\$0.46	\$0.69	\$0.51
	10	\$0.41	\$0.42	\$0.46	\$0.44	\$0.67	\$0.69	\$0.44	\$0.46	\$1.25	\$0.44	(\$1.69)	\$0.28
	11	\$0.58	\$0.31	\$0.42	\$0.46	\$0.54	\$0.42	\$0.68	\$0.68	\$0.36	\$0.15	\$0.28	\$0.63
	12	\$0.33	\$0.23	\$0.29	\$0.18	\$0.33	\$0.23	\$0.80	\$0.63	\$0.31	\$0.18	(\$0.37)	\$0.42
	13	\$0.09	\$0.08	\$0.42	\$0.44	\$0.44	\$0.40	\$0.48	\$0.15	(\$0.62)	\$0.23	\$0.23	
	14	\$0.06	(\$0.07)	\$0.13	\$0.32	\$0.12	(\$0.23)	\$0.05	\$0.07	\$0.08	\$0.09		
	15	(\$0.02)	\$0.12	\$0.57	\$0.19	\$0.23	(\$0.03)	\$0.05	\$0.05	(\$0.02)			
	16	(\$0.29)	\$0.18	\$0.12	\$0.25	\$0.37	(\$0.00)	\$0.00	(\$0.08)				
	17	\$0.21	\$0.01	\$0.08	\$0.17	\$0.08	\$0.04	\$0.03					
	18	(\$0.28)	\$0.03	\$0.04	\$0.17	\$0.03	(\$0.10)						
	19	(\$0.02)	\$0.02	\$0.01	(\$0.01)	\$0.32							
	20	\$0.02	\$0.01	\$0.01	\$0.05								
	21	\$0.01	\$0.02	(\$0.03)									
	22	\$0.07	\$0.02										
	23	\$0.01											
Total Inc & Pd		\$119.28	\$115.92	\$109.79	\$122.39	\$119.87	\$126.88	\$119.19	\$116.57	\$130.97	\$117.75	\$137.86	\$122.22
Members		100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000

Table 7b (continued)
Example Calculation: Claims Data Normalized to PMPM Values and Adjusted for Trend

		Incurral Month, <i>i</i>											
		Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03
Claims Payment Lag Month, <i>l</i>	0	\$16.93	\$24.15	\$19.77	\$28.54	\$17.74	\$23.89	\$22.39	\$21.09	\$22.58	\$18.28	\$34.23	\$34.21
	1	\$78.37	\$52.43	\$53.43	\$52.17	\$59.61	\$58.77	\$56.17	\$55.61	\$50.25	\$62.16	\$58.25	
	2	\$16.44	\$19.17	\$19.99	\$26.81	\$19.46	\$22.70	\$21.08	\$15.57	\$36.80	\$19.06		
	3	\$12.77	\$11.97	\$8.57	\$9.99	\$6.22	\$5.99	\$6.19	\$7.34	\$9.83			
	4	\$7.68	\$4.55	\$5.80	\$5.99	\$6.94	\$5.42	\$3.97	\$5.08				
	5	\$3.32	\$3.02	\$2.45	\$1.82	\$2.48	\$4.80	\$3.35					
	6	\$2.22	\$1.95	\$1.98	\$1.68	\$2.57	\$1.96						
	7	\$1.14	\$1.02	\$1.15	\$1.71	\$3.30							
	8	\$0.87	\$0.82	\$1.06	\$3.20								
	9	\$0.64	\$0.84	\$0.54									
	10	\$0.23	\$0.35										
	11	\$0.47											
	12												
	13												
	14												
	15												
	16												
	17												
	18												
	19												
	20												
	21												
	22												
	23												
Total Inc & Pd		\$141.07	\$120.26	\$114.75	\$131.92	\$118.32	\$123.53	\$113.17	\$104.70	\$119.47	\$99.50	\$92.48	\$34.21
Members		100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000

Table 8.
Slope Regression Parameters from Linear Regression of PMPM Values of $C'_{l,i}$ against Cumulative values of $C^{\Sigma}_{l,ii}$

		Cumulative Incurred and Paid Claim Lags, λ									
		$\lambda = 0$	$\lambda = 1$	$\lambda = 2$	$\lambda = 3$	....	....	$\lambda = N-4$	$\lambda = N-3$	$\lambda = N-2$	$\lambda = N-1$
Claims Paid Lag Month, l	$l = 1$	$C^{\alpha}_{0,1}$									
	$l = 2$	$C^{\alpha}_{0,2}$	$C^{\alpha}_{1,2}$								
	$l = 3$	$C^{\alpha}_{0,3}$	$C^{\alpha}_{1,3}$	$C^{\alpha}_{2,3}$							
	$l = 4$	$C^{\alpha}_{0,4}$	$C^{\alpha}_{1,4}$	$C^{\alpha}_{2,4}$	$C^{\alpha}_{3,4}$						
					
				
	$l = N-3$	$C^{\alpha}_{0,N-3}$	$C^{\alpha}_{1,N-3}$	$C^{\alpha}_{2,N-3}$	$C^{\alpha}_{3,N-3}$	....	....	$C^{\alpha}_{N-4,N-3}$			
	$l = N-2$	$C^{\alpha}_{0,N-2}$	$C^{\alpha}_{1,N-2}$	$C^{\alpha}_{2,N-2}$	$C^{\alpha}_{3,N-2}$	....	....	$C^{\alpha}_{N-4,N-2}$	$C^{\alpha}_{N-3,N-2}$		
	$l = N-1$	$C^{\alpha}_{0,N-1}$	$C^{\alpha}_{1,N-1}$	$C^{\alpha}_{2,N-1}$	$C^{\alpha}_{3,N-1}$	....	....	$C^{\alpha}_{N-4,N-1}$	$C^{\alpha}_{N-3,N-1}$	$C^{\alpha}_{N-2,N-1}$	
	$l = N$	$C^{\alpha}_{0,N}$	$C^{\alpha}_{1,N}$	$C^{\alpha}_{2,N}$	$C^{\alpha}_{3,N}$	....	....	$C^{\alpha}_{N-4,N}$	$C^{\alpha}_{N-3,N}$	$C^{\alpha}_{N-2,N}$	$C^{\alpha}_{N-1,N}$

Table 8b.
Example Calculation: Slope Regression Parameters from
Linear Regression of PMPM Values of $C'_{l,i}$ against Cumulative values of $C^{\Sigma}_{l,ii}$

		Cumulative Incurred and Paid Claim Lags, λ											
		0	1	2	3	4	5	5	6	8	9	10	11
Claims Payment Lag Month, l	1	0.133	-	-	-	-	-	-	-	-	-	-	-
	2	(0.872)	(0.739)	-	-	-	-	-	-	-	-	-	-
	3	0.016	(0.019)	0.106	-	-	-	-	-	-	-	-	-
	4	0.052	0.023	0.008	0.008	-	-	-	-	-	-	-	-
	5	0.044	0.027	0.054	0.055	0.052	-	-	-	-	-	-	-
	6	0.002	0.018	(0.034)	(0.031)	(0.030)	(0.025)	-	-	-	-	-	-
	7	0.027	0.014	0.001	(0.006)	(0.005)	(0.002)	0.003	-	-	-	-	-
	8	0.031	0.006	0.021	0.019	0.020	0.017	0.017	0.018	-	-	-	-
	9	0.031	0.019	0.014	0.001	0.002	0.001	0.002	0.003	0.003	-	-	-
	10	0.011	(0.008)	(0.048)	(0.042)	(0.038)	(0.035)	(0.034)	(0.032)	(0.032)	(0.031)	-	-
	11	0.001	0.000	(0.006)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	-
	12	0.004	(0.003)	(0.023)	(0.022)	(0.023)	(0.021)	(0.021)	(0.020)	(0.021)	(0.021)	(0.021)	(0.020)
	13	(0.002)	0.001	(0.017)	(0.016)	(0.015)	(0.014)	(0.013)	(0.013)	(0.013)	(0.013)	(0.015)	(0.015)
	14	(0.007)	0.001	(0.004)	(0.008)	(0.010)	(0.009)	(0.008)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
	15	(0.010)	0.000	(0.027)	(0.030)	(0.031)	(0.027)	(0.027)	(0.023)	(0.022)	(0.021)	(0.020)	(0.021)
	16	0.002	0.006	0.011	(0.020)	(0.016)	(0.014)	(0.012)	(0.008)	(0.008)	(0.005)	(0.005)	(0.005)
	17	(0.003)	(0.001)	(0.006)	0.002	(0.000)	0.000	0.001	0.002	0.002	0.001	0.001	0.001
	18	0.001	0.006	0.009	(0.015)	(0.013)	(0.013)	(0.011)	(0.008)	(0.008)	(0.006)	(0.006)	(0.006)
	19	0.017	0.000	0.006	(0.004)	(0.002)	0.000	0.003	0.002	0.002	0.003	0.004	0.004
	20	0.003	(0.000)	0.002	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002
	21	0.000	0.001	0.005	0.003	0.004	0.003	0.003	0.003	0.003	0.004	0.004	0.004
	22	(0.013)	0.000	(0.009)	0.021	0.037	0.016	0.010	0.009	0.009	0.014	0.014	0.013
	23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 8b (continued)
Example Calculation: Slope Regression Parameters from
Linear Regression of PMPM Values of $C'_{l,i}$ against Cumulative values of $C^{\Sigma}_{l,ii}$

		Cumulative Incurred and Paid Claim Lags, λ											
		12	13	14	15	16	17	18	19	20	21	22	23
Claims Payment Lag Month, l	1	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-	-	-	-
	13	(0.016)	-	-	-	-	-	-	-	-	-	-	-
	14	(0.006)	(0.006)	-	-	-	-	-	-	-	-	-	-
	15	(0.021)	(0.022)	(0.022)	-	-	-	-	-	-	-	-	-
	16	(0.006)	(0.005)	(0.005)	(0.004)	-	-	-	-	-	-	-	-
	17	0.001	0.001	0.001	0.001	0.001	-	-	-	-	-	-	-
	18	(0.006)	(0.006)	(0.005)	(0.005)	(0.004)	(0.005)	-	-	-	-	-	-
	19	0.004	0.005	0.004	0.005	0.006	0.006	0.006	-	-	-	-	-
	20	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	-	-	-	-
	21	0.004	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.005	-	-	-
	22	0.013	0.012	0.012	0.013	0.014	0.013	0.015	0.014	0.014	0.014	-	-
	23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-
	24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 9a.

Intercept Regression Parameters from Linear Regression of PMPM Values of C'_{li} against Cumulative values of C^{Σ}_{lii}

		Cumulative Incurred and Paid Claim Lags, λ									
		$\lambda = 0$	$\lambda = 1$	$\lambda = 2$	$\lambda = 3$	....	....	$\lambda = N-4$	$\lambda = N-3$	$\lambda = N-2$	$\lambda = N-1$
Claims Paid Lag Month, l	$l = 1$	$C^{\beta}_{0,1}$									
	$l = 2$	$C^{\beta}_{0,2}$	$C^{\beta}_{1,2}$								
	$l = 3$	$C^{\beta}_{0,3}$	$C^{\beta}_{1,3}$	$C^{\beta}_{2,3}$							
	$l = 4$	$C^{\beta}_{0,4}$	$C^{\beta}_{1,4}$	$C^{\beta}_{2,4}$	$C^{\beta}_{3,4}$						
					
				
	$l = N-3$	$C^{\beta}_{0,N-3}$	$C^{\beta}_{1,N-3}$	$C^{\beta}_{2,N-3}$	$C^{\beta}_{3,N-3}$	....	....	$C^{\beta}_{N-4,N-3}$			
	$l = N-2$	$C^{\beta}_{0,N-2}$	$C^{\beta}_{1,N-2}$	$C^{\beta}_{2,N-2}$	$C^{\beta}_{3,N-2}$	....	....	$C^{\beta}_{N-4,N-2}$	$C^{\beta}_{N-3,N-2}$		
	$l = N-1$	$C^{\beta}_{0,N-1}$	$C^{\beta}_{1,N-1}$	$C^{\beta}_{2,N-1}$	$C^{\beta}_{3,N-1}$	....	....	$C^{\beta}_{N-4,N-1}$	$C^{\beta}_{N-3,N-1}$	$C^{\beta}_{N-2,N-1}$	
	$l = N$	$C^{\beta}_{0,N}$	$C^{\beta}_{1,N}$	$C^{\beta}_{2,N}$	$C^{\beta}_{3,N}$	....	....	$C^{\beta}_{N-4,N}$	$C^{\beta}_{N-3,N}$	$C^{\beta}_{N-2,N}$	$C^{\beta}_{N-1,N}$

Table 9b.
Example Calculation: Intercept Regression Parameters from
Linear Regression of PMPM Values of $C'_{l,i}$ against Cumulative values of $C^{\Sigma}_{l,ii}$

		Cumulative Incurred and Paid Claim Lags, λ											
		0	1	2	3	4	5	5	6	8	9	10	11
Claims Payment Lag Month, l	1	55.997	-	-	-	-	-	-	-	-	-	-	-
	2	39.725	80.626	-	-	-	-	-	-	-	-	-	-
	3	7.766	9.468	(2.558)	-	-	-	-	-	-	-	-	-
	4	4.170	3.311	4.238	4.220	-	-	-	-	-	-	-	-
	5	2.141	0.844	(2.535)	(3.107)	(2.989)	-	-	-	-	-	-	-
	6	2.209	0.882	5.661	5.647	5.626	5.174	-	-	-	-	-	-
	7	1.283	0.659	1.607	2.393	2.290	1.924	1.397	-	-	-	-	-
	8	0.611	0.626	(0.999)	(0.997)	(1.210)	(0.914)	(0.965)	(1.080)	-	-	-	-
	9	0.098	(0.854)	(0.867)	0.470	0.356	0.382	0.359	0.232	0.175	-	-	-
	10	0.190	0.947	5.154	4.858	4.606	4.358	4.406	4.140	4.200	4.163	-	-
	11	0.449	0.452	1.093	0.944	0.930	0.889	0.837	0.856	0.887	0.909	0.907	-
	12	0.249	0.457	2.603	2.641	2.837	2.645	2.749	2.725	2.788	2.787	2.773	2.746
	13	0.245	0.508	1.943	1.920	1.925	1.807	1.759	1.793	1.766	1.772	2.018	2.025
	14	0.150	0.150	0.417	0.864	1.207	1.115	0.994	0.723	0.749	0.748	0.722	0.721
	15	0.252	0.024	2.789	3.246	3.550	3.170	3.244	2.800	2.765	2.657	2.554	2.601
	16	0.046	0.120	(0.980)	2.138	1.762	1.613	1.428	0.975	0.986	0.689	0.643	0.695
	17	0.130	(0.294)	0.691	(0.108)	0.116	0.074	(0.063)	(0.133)	(0.135)	(0.012)	0.002	(0.008)
	18	(0.033)	0.161	(0.908)	1.505	1.407	1.419	1.259	0.905	0.900	0.681	0.671	0.691
	19	(0.052)	(0.338)	(0.491)	0.501	0.261	0.062	(0.269)	(0.189)	(0.116)	(0.300)	(0.374)	(0.388)
	20	0.003	(0.001)	(0.152)	(0.037)	(0.038)	(0.044)	(0.107)	(0.160)	(0.177)	(0.228)	(0.230)	(0.229)
	21	(0.002)	0.017	(0.433)	(0.350)	(0.381)	(0.353)	(0.356)	(0.362)	(0.379)	(0.470)	(0.474)	(0.466)
	22	0.083	(0.037)	0.911	(2.174)	(4.021)	(1.753)	(1.117)	(1.044)	(1.052)	(1.557)	(1.568)	(1.461)
	23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 9b (continued)
Example Calculation: Intercept Regression Parameters from
Linear Regression of PMPM Values of $C'_{l,i}$ against Cumulative values of $C^{\Sigma}_{l,ii}$

		Cumulative Incurred and Paid Claim Lags, λ											
		12	13	14	15	16	17	18	19	20	21	22	23
Claims Payment Lag Month, l	1	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-	-	-	-	-
	13	2.092	-	-	-	-	-	-	-	-	-	-	-
	14	0.731	0.761	-	-	-	-	-	-	-	-	-	-
	15	2.658	2.736	2.730	-	-	-	-	-	-	-	-	-
	16	0.773	0.690	0.655	0.594	-	-	-	-	-	-	-	-
	17	0.009	0.019	(0.012)	(0.017)	0.005	-	-	-	-	-	-	-
	18	0.715	0.666	0.633	0.612	0.510	0.521	-	-	-	-	-	-
	19	(0.411)	(0.473)	(0.462)	(0.512)	(0.628)	(0.597)	(0.282)	-	-	-	-	-
	20	(0.228)	(0.242)	(0.247)	(0.266)	(0.276)	(0.274)	(0.545)	(0.547)	-	-	-	-
	21	(0.464)	(0.476)	(0.477)	(0.503)	(0.533)	(0.523)	(1.681)	(1.707)	(1.704)	-	-	-
	22	(1.425)	(1.422)	(1.377)	(1.426)	(1.626)	(1.537)	0.000	0.000	0.000	0.000	-	-
	23	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-
	24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 10.
Projected Values of PMPM Incurred But Not Paid Claims, $C^*_{l,i}$

		Incurral Month, i									
		$i = 1$	$i = 2$	$i = 3$	$i = 4$	....	....	$i = N-3$	$i = N-2$	$i = N-1$	$i = N$
Claims Paid Lag Month, l	$l = 0$	$C'_{0,1}$	$C'_{0,2}$	$C'_{0,3}$	$C'_{0,4}$	....	....	$C'_{0,N-3}$	$C'_{0,N-2}$	$C'_{0,N-1}$	$C'_{0,N}$
	$l = 1$	$C'_{1,1}$	$C'_{1,2}$	$C'_{1,3}$	$C'_{1,4}$	....	....	$C'_{1,N-3}$	$C'_{1,N-2}$	$C'_{1,N-1}$	$C^*_{1,N}$
	$l = 2$	$C'_{2,1}$	$C'_{2,2}$	$C'_{2,3}$	$C'_{2,4}$	....	....	$C'_{2,N-3}$	$C'_{2,N-2}$	$C^*_{2,N-1}$	$C^*_{2,N}$
	$l = 3$	$C'_{3,1}$	$C'_{3,2}$	$C'_{3,3}$	$C'_{3,4}$	....	....	$C'_{3,N-3}$	$C^*_{3,N-2}$	$C^*_{3,N-1}$	$C^*_{3,N}$

	$l = N-4$	$C'_{N-4,1}$	$C'_{N-4,2}$	$C'_{N-4,3}$	$C'_{N-4,4}$	....	....	$C^*_{N-4,N-3}$	$C^*_{N-4,N-2}$	$C^*_{N-4,N-1}$	$C^*_{N-4,N}$
	$l = N-3$	$C'_{N-3,1}$	$C'_{N-3,2}$	$C'_{N-3,3}$	$C^*_{N-3,4}$	....	....	$C^*_{N-3,N-3}$	$C^*_{N-3,N-2}$	$C^*_{N-3,N-1}$	$C^*_{N-3,N}$
	$l = N-2$	$C'_{N-2,1}$	$C'_{N-2,2}$	$C^*_{N-2,3}$	$C^*_{N-2,4}$	....	....	$C^*_{N-2,N-3}$	$C^*_{N-2,N-2}$	$C^*_{N-2,N-1}$	$C^*_{N-2,N}$
$l = N-1$	$C'_{N-1,1}$	$C^*_{N-1,2}$	$C^*_{N-1,3}$	$C^*_{N-1,4}$	....	....	$C^*_{N-1,N-3}$	$C^*_{N-1,N-2}$	$C^*_{N-1,N-1}$	$C^*_{N-1,N}$	
Total PMPM Claims Incurred in Month i & Paid through Month N	$\sum_{l < N} C'_{l,1}$	$\sum_{l < N-1} C'_{l,2}$	$\sum_{l < N-2} C'_{l,3}$	$\sum_{l < N-3} C'_{l,4}$	....	....	$\sum_{l < 4} C'_{l,N-3}$	$\sum_{l=0,1,2} C'_{l,N-2}$	$\sum_{l=0,1} C'_{l,N-1}$	$\sum_{l=0} C'_{l,N}$	
Members in Month i	M_1	M_2	M_3	M_4	....	....	M_{N-3}	M_{N-2}	M_{N-1}	M_N	

Table 11a.
Projected Values of PMPM Incurred But Not Paid Claims, $C^*_{l,i}$, without Regression
 ($C^*_{l,i} = C^*_l$)

		Incurral Month, i									
		$i = 1$	$i = 2$	$i = 3$	$i = 4$	....	....	$i = N-3$	$i = N-2$	$i = N-1$	$i = N$
Claims Paid Lag Month, l	$l = 0$	$C'_{0,1}$	$C'_{0,2}$	$C'_{0,3}$	$C'_{0,4}$	....	....	$C'_{0,N-3}$	$C'_{0,N-2}$	$C'_{0,N-1}$	$C'_{0,N}$
	$l = 1$	$C'_{1,1}$	$C'_{1,2}$	$C'_{1,3}$	$C'_{1,4}$	....	....	$C'_{1,N-3}$	$C'_{1,N-2}$	$C'_{1,N-1}$	C^*_1
	$l = 2$	$C'_{2,1}$	$C'_{2,2}$	$C'_{2,3}$	$C'_{2,4}$	....	....	$C'_{2,N-3}$	$C'_{2,N-2}$	C^*_2	C^*_2
	$l = 3$	$C'_{3,1}$	$C'_{3,2}$	$C'_{3,3}$	$C'_{3,4}$	....	....	$C'_{3,N-3}$	C^*_3	C^*_3	C^*_3

	$l = N-4$	$C'_{N-4,1}$	$C'_{N-4,2}$	$C'_{N-4,3}$	$C'_{N-4,4}$	....	....	C^*_{N-4}	C^*_{N-4}	C^*_{N-4}	C^*_{N-4}
	$l = N-3$	$C'_{N-3,1}$	$C'_{N-3,2}$	$C'_{N-3,3}$	C^*_{N-3}	....	....	C^*_{N-3}	C^*_{N-3}	C^*_{N-3}	C^*_{N-3}
	$l = N-2$	$C'_{N-2,1}$	$C'_{N-2,2}$	C^*_{N-2}	C^*_{N-2}	....	....	C^*_{N-2}	C^*_{N-2}	C^*_{N-2}	C^*_{N-2}
$l = N-1$	$C'_{N-1,1}$	C^*_{N-1}	C^*_{N-1}	C^*_{N-1}	....	....	C^*_{N-1}	C^*_{N-1}	C^*_{N-1}	C^*_{N-1}	
Members in Month i	M_1	M_2	M_3	M_4	....	....	M_{N-3}	M_{N-2}	M_{N-1}	M_N	

Table 11b.
Example Calculation: Projected Values of PMPM Incurred But Not Paid Claims, $C^*_{l,i}$, without Regression

		Incurral Month											
		Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Claims Payment Lag Month, <i>l</i>	1	\$0.88	\$4.58	\$3.03	\$11.86	\$12.94	\$29.42	\$18.86	\$12.81	\$20.81	\$13.32	\$13.42	\$17.15
	2	\$36.09	\$37.41	\$60.13	\$63.07	\$71.15	\$55.09	\$54.58	\$66.29	\$62.73	\$57.42	\$78.43	\$62.69
	3	\$56.15	\$56.59	\$25.58	\$23.26	\$11.80	\$13.87	\$22.88	\$18.55	\$22.19	\$30.09	\$23.56	\$25.87
	4	\$14.72	\$6.89	\$5.67	\$5.80	\$5.74	\$9.03	\$7.80	\$5.09	\$8.77	\$4.93	\$11.47	\$4.15
	5	\$3.80	\$4.82	\$4.51	\$4.36	\$5.31	\$6.28	\$5.27	\$4.27	\$3.65	\$5.19	\$3.25	\$4.62
	6	\$3.30	\$1.54	\$1.84	\$2.44	\$3.19	\$3.95	\$2.99	\$1.80	\$4.05	\$1.75	\$4.19	\$2.26
	7	\$2.25	\$0.49	\$2.50	\$3.64	\$3.73	\$3.17	\$1.71	\$3.55	\$2.11	\$1.53	\$1.76	\$1.66
	8	\$1.26	\$0.88	\$1.54	\$3.66	\$1.71	\$2.59	\$1.21	\$0.84	\$3.21	\$1.00	\$1.34	\$1.42
	9	\$0.79	\$0.79	\$1.42	\$1.09	\$0.64	\$1.40	\$0.69	\$0.81	\$0.99	\$0.98	\$1.29	\$0.56
	10	(\$1.13)	\$0.53	\$1.04	\$0.54	\$0.54	\$0.67	\$0.66	\$0.61	\$1.09	\$0.46	\$0.69	\$0.51
	11	\$0.41	\$0.42	\$0.46	\$0.44	\$0.67	\$0.69	\$0.44	\$0.46	\$1.25	\$0.44	(\$1.69)	\$0.28
	12	\$0.58	\$0.31	\$0.42	\$0.46	\$0.54	\$0.42	\$0.68	\$0.68	\$0.36	\$0.15	\$0.28	\$0.63
	13	\$0.33	\$0.23	\$0.29	\$0.18	\$0.33	\$0.23	\$0.80	\$0.63	\$0.31	\$0.18	(\$0.37)	\$0.42
	14	\$0.09	\$0.08	\$0.42	\$0.44	\$0.44	\$0.40	\$0.48	\$0.15	(\$0.62)	\$0.23	\$0.23	\$0.08
	15	\$0.06	(\$0.07)	\$0.13	\$0.32	\$0.12	(\$0.23)	\$0.05	\$0.07	\$0.08	\$0.09	\$0.03	\$0.03
	16	(\$0.02)	\$0.12	\$0.57	\$0.19	\$0.23	(\$0.03)	\$0.05	\$0.05	(\$0.02)	\$0.04	\$0.04	\$0.04
	17	(\$0.29)	\$0.18	\$0.12	\$0.25	\$0.37	(\$0.00)	\$0.00	(\$0.08)	\$0.02	\$0.02	\$0.02	\$0.02
	18	\$0.21	\$0.01	\$0.08	\$0.17	\$0.08	\$0.04	\$0.03	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02
	19	(\$0.28)	\$0.03	\$0.04	\$0.17	\$0.03	(\$0.10)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	20	(\$0.02)	\$0.02	\$0.01	(\$0.01)	\$0.32	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
	21	\$0.02	\$0.01	\$0.01	\$0.05	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
	22	\$0.01	\$0.02	(\$0.03)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	23	\$0.07	\$0.02	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	24	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total Inc & Pd	\$119.28	\$115.92	\$109.79	\$122.39	\$119.87	\$126.88	\$119.19	\$116.57	\$130.97	\$117.75	\$137.86	\$122.22	
Total IBNP	\$0.00	\$0.00	\$0.01	\$0.01	\$0.02	\$0.03	\$0.03	\$0.05	\$0.07	\$0.12	\$0.15	\$0.23	
Total Incurred	\$119.28	\$115.92	\$109.80	\$122.40	\$119.87	\$126.91	\$119.22	\$116.62	\$131.04	\$117.87	\$138.01	\$122.45	
Members	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	

Table 11b (continued)
Example Calculation: Projected Values of PMPM Incurred But Not Paid Claims, $C^*_{l,i}$, without Regression

		Incurral Month											
		Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03
Claims Payment Lag Month, <i>l</i>	1	\$16.93	\$24.15	\$19.77	\$28.54	\$17.74	\$23.89	\$22.39	\$21.09	\$22.58	\$18.28	\$34.23	\$34.21
	2	\$78.37	\$52.43	\$53.43	\$52.17	\$59.61	\$58.77	\$56.17	\$55.61	\$50.25	\$62.16	\$58.25	\$54.42
	3	\$16.44	\$19.17	\$19.99	\$26.81	\$19.46	\$22.70	\$21.08	\$15.57	\$36.80	\$19.06	\$22.66	\$22.66
	4	\$12.77	\$11.97	\$8.57	\$9.99	\$6.22	\$5.99	\$6.19	\$7.34	\$9.83	\$6.93	\$6.93	\$6.93
	5	\$7.68	\$4.55	\$5.80	\$5.99	\$6.94	\$5.42	\$3.97	\$5.08	\$3.98	\$3.98	\$3.98	\$3.98
	6	\$3.32	\$3.02	\$2.45	\$1.82	\$2.48	\$4.80	\$3.35	\$2.21	\$2.21	\$2.21	\$2.21	\$2.21
	7	\$2.22	\$1.95	\$1.98	\$1.68	\$2.57	\$1.96	\$1.52	\$1.52	\$1.52	\$1.52	\$1.52	\$1.52
	8	\$1.14	\$1.02	\$1.15	\$1.71	\$3.30	\$1.15	\$1.15	\$1.15	\$1.15	\$1.15	\$1.15	\$1.15
	9	\$0.87	\$0.82	\$1.06	\$3.20	\$0.67	\$0.67	\$0.67	\$0.67	\$0.67	\$0.67	\$0.67	\$0.67
	10	\$0.64	\$0.84	\$0.54	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34	\$0.34
	11	\$0.23	\$0.35	\$0.17	\$0.17	\$0.17	\$0.17	\$0.17	\$0.17	\$0.17	\$0.17	\$0.17	\$0.17
	12	\$0.47	\$0.20	\$0.20	\$0.20	\$0.20	\$0.20	\$0.20	\$0.20	\$0.20	\$0.20	\$0.20	\$0.20
	13	\$0.11	\$0.11	\$0.11	\$0.11	\$0.11	\$0.11	\$0.11	\$0.11	\$0.11	\$0.11	\$0.11	\$0.11
	14	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08
	15	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03
	16	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04	\$0.04
	17	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02
	18	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02
	19	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	20	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
	21	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01
	22	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	23	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	24	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total Inc & Pd		\$127.79	\$109.97	\$105.92	\$122.93	\$111.31	\$117.30	\$108.49	\$95.77	\$116.13	\$98.12	\$92.07	\$34.38
Total IBNP		\$0.34	\$0.54	\$0.70	\$1.04	\$1.71	\$2.86	\$4.39	\$6.60	\$10.58	\$17.51	\$40.17	\$94.58
Total Incurred		\$128.13	\$110.51	\$106.62	\$123.97	\$113.02	\$120.16	\$112.88	\$102.37	\$126.71	\$115.63	\$132.24	\$129.06
Members		100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000

Table 12a.
Projected Values of PMPM Incurred But Not Paid Claims, $C^*_{i,l}$, with Regression

		Incurral Month, i							
		$i = 1$	$i = 2$	$i = 3$	....	....	$i = N-2$	$i = N-1$	$i = N$
Claims Paid Lag Month, l	$l = 0$	$C'_{0,1}$	$C'_{0,2}$	$C'_{0,3}$	....	....	$C'_{0,N-2}$	$C'_{0,N-1}$	$C'_{0,N}$
	$l = 1$	$C'_{1,1}$	$C'_{1,2}$	$C'_{1,3}$	....	....	$C'_{1,N-2}$	$C'_{1,N-1}$	$C^*_{1,N} = C^{\beta}_{0,1} + (C^{\alpha}_{0,1} \times C^{\Sigma}_{0,N})$
	$l = 2$	$C'_{2,1}$	$C'_{2,2}$	$C'_{2,3}$	....	....	$C'_{2,N-2}$	$C^*_{2,N-1} = C^{\beta}_{1,2} + (C^{\alpha}_{1,2} \times C^{\Sigma}_{1,N-1})$	$C^*_{2,N} = C^{\beta}_{0,2} + (C^{\alpha}_{0,2} \times C^{\Sigma}_{0,N})$
	$l = 3$	$C'_{3,1}$	$C'_{3,2}$	$C'_{3,3}$	....	....	$C^*_{3,N-2} = C^{\beta}_{2,3} + (C^{\alpha}_{2,3} \times C^{\Sigma}_{2,N-2})$	$C^*_{3,N-1} = C^{\beta}_{1,3} + (C^{\alpha}_{1,3} \times C^{\Sigma}_{1,N-1})$	$C^*_{3,N} = C^{\beta}_{0,3} + (C^{\alpha}_{0,3} \times C^{\Sigma}_{0,N})$

	$l = N-3$	$C'_{N-3,1}$	$C'_{N-3,2}$	$C'_{N-3,3}$	....	....	$C^*_{N-3,N-2} = C^{\beta}_{2,N-3} + (C^{\alpha}_{2,N-3} \times C^{\Sigma}_{2,N-2})$	$C^*_{N-3,N-1} = C^{\beta}_{1,N-3} + (C^{\alpha}_{1,N-3} \times C^{\Sigma}_{1,N-1})$	$C^*_{N-3,N} = C^{\beta}_{0,N-3} + (C^{\alpha}_{0,N-3} \times C^{\Sigma}_{0,N})$
	$l = N-2$	$C'_{N-2,1}$	$C'_{N-2,2}$	$C^*_{N-2,3} = C^{\beta}_{N-3,N-2} + (C^{\alpha}_{N-3,N-2} \times C^{\Sigma}_{N-3,3})$	....	....	$C^*_{N-2,N-2} = C^{\beta}_{2,N-2} + (C^{\alpha}_{2,N-2} \times C^{\Sigma}_{2,N-2})$	$C^*_{N-2,N-1} = C^{\beta}_{1,N-2} + (C^{\alpha}_{1,N-2} \times C^{\Sigma}_{1,N-1})$	$C^*_{N-2,N} = C^{\beta}_{0,N-2} + (C^{\alpha}_{0,N-2} \times C^{\Sigma}_{0,N})$
	$l = N-1$	$C'_{N-1,1}$	$C^*_{N-1,2} = C^{\beta}_{N-2,N-1} + (C^{\alpha}_{N-2,N-1} \times C^{\Sigma}_{N-2,2})$	$C^*_{N-1,3} = C^{\beta}_{N-3,N-1} + (C^{\alpha}_{N-3,N-1} \times C^{\Sigma}_{N-3,3})$	....	....	$C^*_{N-1,N-2} = C^{\beta}_{2,N-1} + (C^{\alpha}_{2,N-1} \times C^{\Sigma}_{2,N-2})$	$C^*_{N-1,N-1} = C^{\beta}_{1,N-1} + (C^{\alpha}_{1,N-1} \times C^{\Sigma}_{1,N-1})$	$C^*_{N-1,N} = C^{\beta}_{0,N-1} + (C^{\alpha}_{0,N-1} \times C^{\Sigma}_{0,N})$
	Members in Month i	M_1	M_2	M_3	....	....	M_{N-2}	M_{N-1}	M_N

Table 12b.
Example Calculation: Projected Values of PMPM Incurred But Not Paid Claims, $C^*_{l,i}$ with Regression

		Incurral Month											
		Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Claims Payment Lag Month, <i>l</i>	1	\$0.88	\$4.58	\$3.03	\$11.86	\$12.94	\$29.42	\$18.86	\$12.81	\$20.81	\$13.32	\$13.42	\$17.15
	2	\$36.09	\$37.41	\$60.13	\$63.07	\$71.15	\$55.09	\$54.58	\$66.29	\$62.73	\$57.42	\$78.43	\$62.69
	3	\$56.15	\$56.59	\$25.58	\$23.26	\$11.80	\$13.87	\$22.88	\$18.55	\$22.19	\$30.09	\$23.56	\$25.87
	4	\$14.72	\$6.89	\$5.67	\$5.80	\$5.74	\$9.03	\$7.80	\$5.09	\$8.77	\$4.93	\$11.47	\$4.15
	5	\$3.80	\$4.82	\$4.51	\$4.36	\$5.31	\$6.28	\$5.27	\$4.27	\$3.65	\$5.19	\$3.25	\$4.62
	6	\$3.30	\$1.54	\$1.84	\$2.44	\$3.19	\$3.95	\$2.99	\$1.80	\$4.05	\$1.75	\$4.19	\$2.26
	7	\$2.25	\$0.49	\$2.50	\$3.64	\$3.73	\$3.17	\$1.71	\$3.55	\$2.11	\$1.53	\$1.76	\$1.66
	8	\$1.26	\$0.88	\$1.54	\$3.66	\$1.71	\$2.59	\$1.21	\$0.84	\$3.21	\$1.00	\$1.34	\$1.42
	9	\$0.79	\$0.79	\$1.42	\$1.09	\$0.64	\$1.40	\$0.69	\$0.81	\$0.99	\$0.98	\$1.29	\$0.56
	10	(\$1.13)	\$0.53	\$1.04	\$0.54	\$0.54	\$0.67	\$0.66	\$0.61	\$1.09	\$0.46	\$0.69	\$0.51
	11	\$0.41	\$0.42	\$0.46	\$0.44	\$0.67	\$0.69	\$0.44	\$0.46	\$1.25	\$0.44	(\$1.69)	\$0.28
	12	\$0.58	\$0.31	\$0.42	\$0.46	\$0.54	\$0.42	\$0.68	\$0.68	\$0.36	\$0.15	\$0.28	\$0.63
	13	\$0.33	\$0.23	\$0.29	\$0.18	\$0.33	\$0.23	\$0.80	\$0.63	\$0.31	\$0.18	(\$0.37)	\$0.42
	14	\$0.09	\$0.08	\$0.42	\$0.44	\$0.44	\$0.40	\$0.48	\$0.15	(\$0.62)	\$0.23	\$0.23	\$0.47
	15	\$0.06	(\$0.07)	\$0.13	\$0.32	\$0.12	(\$0.23)	\$0.05	\$0.07	\$0.08	\$0.09	(\$0.53)	(\$0.26)
	16	(\$0.02)	\$0.12	\$0.57	\$0.19	\$0.23	(\$0.03)	\$0.05	\$0.05	(\$0.02)	(\$0.96)	(\$1.01)	(\$0.66)
	17	(\$0.29)	\$0.18	\$0.12	\$0.25	\$0.37	(\$0.00)	\$0.00	(\$0.08)	(\$2.03)	(\$1.19)	(\$1.23)	(\$0.69)
	18	\$0.21	\$0.01	\$0.08	\$0.17	\$0.08	\$0.04	\$0.03	(\$0.73)	\$0.23	(\$0.04)	\$0.04	\$0.17
	19	(\$0.28)	\$0.03	\$0.04	\$0.17	\$0.03	(\$0.10)	\$1.18	\$1.59	(\$1.32)	(\$0.92)	(\$1.12)	(\$0.66)
	20	(\$0.02)	\$0.02	\$0.01	(\$0.01)	\$0.32	\$1.92	(\$0.60)	\$0.05	(\$1.07)	(\$0.68)	(\$0.47)	(\$0.05)
	21	\$0.02	\$0.01	\$0.01	\$0.05	(\$0.13)	(\$0.10)	(\$0.29)	(\$0.06)	(\$0.19)	(\$0.18)	(\$0.16)	(\$0.09)
	22	\$0.01	\$0.02	(\$0.03)	(\$1.65)	(\$1.65)	(\$1.63)	(\$0.37)	\$0.01	(\$0.06)	(\$0.06)	(\$0.03)	(\$0.07)
	23	\$0.07	\$0.02	(\$1.46)	(\$1.63)	(\$1.59)	(\$1.69)	(\$1.54)	(\$2.68)	\$1.30	\$2.94	\$0.77	(\$0.19)
	24	\$0.01	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total Inc & Pd	\$119.28	\$115.92	\$109.79	\$122.39	\$119.87	\$126.88	\$119.19	\$116.57	\$130.97	\$117.75	\$137.86	\$122.22	
Total IBNP	\$0.00	\$0.00	(\$1.46)	(\$3.28)	(\$3.38)	(\$1.50)	(\$1.61)	(\$1.82)	(\$3.13)	(\$1.08)	(\$3.75)	(\$2.03)	
Total Incurred	\$119.28	\$115.92	\$108.33	\$119.11	\$116.49	\$125.38	\$117.58	\$114.75	\$127.84	\$116.67	\$134.11	\$120.19	
Members	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	

Table 12b (continued)
Example Calculation: Projected Values of PMPM Incurred But Not Paid Claims, $C^*_{l,i}$ with Regression

		Incurral Month											
		Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03
Claims Payment Lag Month, <i>l</i>	1	\$16.93	\$24.15	\$19.77	\$28.54	\$17.74	\$23.89	\$22.39	\$21.09	\$22.58	\$18.28	\$34.23	\$34.21
	2	\$78.37	\$52.43	\$53.43	\$52.17	\$59.61	\$58.77	\$56.17	\$55.61	\$50.25	\$62.16	\$58.25	\$60.55
	3	\$16.44	\$19.17	\$19.99	\$26.81	\$19.46	\$22.70	\$21.08	\$15.57	\$36.80	\$19.06	\$12.24	\$9.90
	4	\$12.77	\$11.97	\$8.57	\$9.99	\$6.22	\$5.99	\$6.19	\$7.34	\$9.83	\$7.96	\$7.72	\$8.33
	5	\$7.68	\$4.55	\$5.80	\$5.99	\$6.94	\$5.42	\$3.97	\$5.08	\$5.13	\$5.04	\$5.43	\$5.95
	6	\$3.32	\$3.02	\$2.45	\$1.82	\$2.48	\$4.80	\$3.35	\$2.43	\$3.49	\$2.83	\$3.34	\$3.66
	7	\$2.22	\$1.95	\$1.98	\$1.68	\$2.57	\$1.96	\$2.33	\$2.51	\$1.90	\$2.28	\$2.57	\$2.29
	8	\$1.14	\$1.02	\$1.15	\$1.71	\$3.30	\$1.72	\$1.71	\$1.75	\$1.63	\$1.71	\$1.96	\$2.21
	9	\$0.87	\$0.82	\$1.06	\$3.20	\$1.06	\$1.18	\$1.04	\$0.91	\$1.30	\$1.07	\$1.20	\$1.66
	10	\$0.64	\$0.84	\$0.54	\$0.58	\$0.55	\$0.56	\$0.55	\$0.53	\$0.56	\$0.55	\$0.90	\$1.15
	11	\$0.23	\$0.35	\$0.56	(\$0.01)	\$0.40	\$0.17	\$0.44	\$0.67	(\$0.12)	\$0.38	\$0.20	\$0.56
	12	\$0.47	\$0.48	\$0.48	\$0.42	\$0.47	\$0.44	\$0.47	\$0.50	\$0.41	\$0.47	\$0.45	\$0.48
	13	(\$0.15)	\$0.26	\$0.40	\$0.04	\$0.30	\$0.15	\$0.32	\$0.45	\$0.02	\$0.30	\$0.17	\$0.37
	14	\$0.14	\$0.45	\$0.28	\$0.05	\$0.21	\$0.12	\$0.23	\$0.32	\$0.01	\$0.21	\$0.59	\$0.16
	15	(\$0.08)	\$0.02	\$0.08	(\$0.02)	\$0.05	(\$0.01)	\$0.05	\$0.11	(\$0.05)	\$0.06	\$0.20	(\$0.08)
	16	(\$0.64)	(\$0.15)	\$0.20	(\$0.20)	\$0.09	(\$0.11)	\$0.10	\$0.27	(\$0.32)	\$0.06	\$0.06	(\$0.09)
	17	(\$0.41)	(\$0.31)	\$0.08	(\$0.06)	\$0.04	(\$0.05)	\$0.04	\$0.12	(\$0.25)	\$0.11	\$0.66	\$0.11
	18	\$0.26	\$0.23	\$0.09	\$0.12	\$0.09	\$0.10	\$0.09	\$0.09	\$0.12	\$0.06	(\$0.38)	\$0.01
	19	(\$0.44)	(\$0.28)	(\$0.01)	(\$0.14)	(\$0.04)	(\$0.13)	(\$0.05)	\$0.03	(\$0.25)	\$0.02	\$0.68	\$0.01
	20	(\$0.08)	(\$0.19)	\$0.06	\$0.09	\$0.07	\$0.10	\$0.06	\$0.07	(\$0.01)	\$0.09	(\$0.34)	\$0.54
	21	(\$0.00)	(\$0.02)	\$0.02	\$0.05	\$0.03	\$0.03	\$0.02	\$0.02	\$0.03	\$0.03	(\$0.01)	\$0.12
	22	(\$0.01)	(\$0.07)	\$0.00	\$0.06	\$0.02	\$0.04	\$0.01	(\$0.01)	\$0.06	\$0.03	\$0.13	\$0.01
	23	(\$0.13)	(\$0.44)	\$0.02	\$0.19	\$0.07	\$0.14	\$0.04	(\$0.18)	\$0.31	\$0.01	(\$0.04)	(\$0.37)
	24	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total Inc & Pd	\$127.79	\$109.97	\$105.92	\$122.93	\$111.31	\$117.30	\$108.49	\$95.77	\$116.13	\$98.12	\$92.07	\$34.38	
Total IBNP	(\$1.53)	\$0.01	\$2.28	\$1.18	\$3.41	\$4.45	\$7.46	\$10.59	\$13.98	\$23.23	\$37.72	\$97.54	
Total Incurred	\$126.26	\$109.98	\$108.20	\$114.72	\$114.72	\$121.75	\$115.95	\$106.36	\$130.11	\$121.35	\$129.79	\$131.92	
Members	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	

Table 13.
Completed Estimates of PMPM IBNP Claim Amounts, $\hat{C}_{l,i}$, Incurred in Month i and Paid in Lag Month l

		Incurral Month, i									
		$i = 1$	$i = 2$	$i = 3$	$i = 4$	....	....	$i = N-3$	$i = N-2$	$i = N-1$	$i = N$
Claims Paid Lag Month, l	$l = 0$	$C'_{0,1}$	$C'_{0,2}$	$C'_{0,3}$	$C'_{0,4}$	....	....	$C'_{0,N-3}$	$C'_{0,N-2}$	$C'_{0,N-1}$	$C'_{0,N}$
	$l = 1$	$C'_{1,1}$	$C'_{1,2}$	$C'_{1,3}$	$C'_{1,4}$	....	....	$C'_{1,N-3}$	$C'_{1,N-2}$	$C'_{1,N-1}$	\hat{C}_1
	$l = 2$	$C'_{2,1}$	$C'_{2,2}$	$C'_{2,3}$	$C'_{2,4}$	....	....	$C'_{2,N-3}$	$C'_{2,N-2}$	\hat{C}_2	\hat{C}_2
	$l = 3$	$C'_{3,1}$	$C'_{3,2}$	$C'_{3,3}$	$C'_{3,4}$	....	....	$C'_{3,N-3}$	\hat{C}_3	\hat{C}_3	\hat{C}_3

	$l = N-4$	$C'_{N-4,1}$	$C'_{N-4,2}$	$C'_{N-4,3}$	$C'_{N-4,4}$	....	....	$\hat{C}_{N-4,N-3}$	$\hat{C}_{N-4,N-2}$	$\hat{C}_{N-4,N-1}$	$\hat{C}_{N-4,N}$
	$l = N-3$	$C'_{N-3,1}$	$C'_{N-3,2}$	$C'_{N-3,3}$	$\hat{C}_{N-3,4}$	....	....	$\hat{C}_{N-3,N-3}$	$\hat{C}_{N-3,N-2}$	$\hat{C}_{N-3,N-1}$	$\hat{C}_{N-3,N}$
	$l = N-2$	$C'_{N-2,1}$	$C'_{N-2,2}$	$\hat{C}_{N-2,3}$	$\hat{C}_{N-2,4}$	....	....	$\hat{C}_{N-2,N-3}$	$\hat{C}_{N-2,N-2}$	$\hat{C}_{N-2,N-1}$	$\hat{C}_{N-2,N}$
	$l = N-1$	$C'_{N-1,1}$	$\hat{C}_{N-1,2}$	$\hat{C}_{N-1,3}$	$\hat{C}_{N-1,4}$	....	....	$\hat{C}_{N-1,N-3}$	$\hat{C}_{N-1,N-2}$	$\hat{C}_{N-1,N-1}$	$\hat{C}_{N-1,N}$
Total PMPM Claims Incurred in Month i & Paid through Month N	$\sum_{l < N} C'_{l,1}$	$\sum_{l < N-1} C'_{l,2}$	$\sum_{l < N-2} C'_{l,3}$	$\sum_{l < N-3} C'_{l,4}$	....	....	$\sum_{l < 4} C'_{l,N-3}$	$\sum_{l < 3} C'_{l,N-2}$	$\sum_{l < 2} C'_{l,N-1}$	$\sum_{l=0} C'_{l,N}$	
Estimated Total PMPM IBNP Claims Incurred in Month l$	....	\sum_{l=N-1} \hat{C}_{l,2}$	$\sum_{l > N-3} \hat{C}_{l,3}$	$\sum_{l > N-4} \hat{C}_{l,4}$	....	....	$\sum_{l > 3} \hat{C}_{l,N-3}$	$\sum_{l > 2} \hat{C}_{l,N-2}$	$\sum_{l > 1} \hat{C}_{l,N-1}$	$\sum_{l > 0} \hat{C}_{l,N}$	
Members in Month i	M_1	M_2	M_3	M_4	....	....	M_{N-3}	M_{N-2}	M_{N-1}	M_N	

Table 14a
Claims Incurred and Payment Data: Closely-Held Integrated Delivery System of MCO
(Data reflects exposure of 100,000 members each month)

	Incurred Month										
	Apr-00	May-00	Jun-00	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01
Lag Mo. 0	\$1,749,527	\$1,345,537	\$1,223,307	\$1,486,451	\$1,138,829	\$1,410,991	\$1,505,813	\$1,178,509	\$1,390,489	\$1,478,493	\$1,357,089
Lag Mo. 1	1,719,159	2,944,576	1,842,945	2,266,554	2,631,659	2,543,083	2,562,751	1,821,086	2,832,494	2,164,555	2,906,623
Lag Mo. 2	160,316	648,102	363,174	437,655	367,788	1,105,429	387,347	681,560	797,489	684,684	530,446
Lag Mo. 3	196,710	374,366	321,595	56,401	481,078	281,128	79,248	349,877	372,189	384,988	417,299
Lag Mo. 4	95,099	169,550	256,057	56,042	228,077	155,155	42,700	115,704	256,320	90,343	82,590
Lag Mo. 5	76,180	103,899	111,621	35,425	122,892	44,825	16,753	98,741	131,058	82,554	96,379
Lag Mo. 6	32,752	45,620	129,241	6,903	72,969	84,327	13,590	61,717	69,996	33,412	89,542
Lag Mo. 7	20,289	66,074	104,642	24,116	15,322	(11,210)	3,458	39,226	68,351	15,643	30,970
Lag Mo. 8	12,951	40,277	50,592	13,014	15,769	22,114	13,671	2,690	45,055	6,779	41,480
Lag Mo. 9	8,002	33,502	17,287	9,816	17,423	32,555	9,511	14,402	41,348	17,184	20,278
Lag Mo. 10	2,237	54,989	15,119	2,371	(6,439)	36,073	2,490	4,796	19,495	2,403	16,730
Lag Mo. 11	4,557	3,516	14,224	5,129	3,977	9,752	5,440	(6,126)	30,660	(3,504)	14,724
Lag Mo. 12	2,351	8,175	7,030	2,313	2,052	16,713	2,559	655	53,036	780	3,238
Lag Mo. 13	2,593	(557)	6,248	2,572	198	5,169	3,119	(730)	36,419	550	1,885
Lag Mo. 14	(566)	(753)	(2,911)	(583)	1,536	1,865	(564)	(2,202)	(10,884)	(630)	3,872
Lag Mo. 15	258	(40)	(3,225)	261	264	3,075	299	533	(2,611)	88	1,181
Lag Mo. 16	(213)	647	(491)	(242)	(2,708)	2,931	(231)	199	(3,310)	(1,371)	2,018
Lag Mo. 17	(1)	364	(1,689)	(1)	(40)	(88)	(1)	(2,033)	1,322	102	3,175
Lag Mo. 18	(215)	(1,568)	(3,635)	(223)	(143)	633	(237)	(16)	6,554	74	376
Lag Mo. 19	716	1,441	9,733	755	(43)	162	681	(3)	105	743	1,425
Lag Mo. 20	69	(331)	567	84	(10)	896	75	0	46	96	1,620
Lag Mo. 21	499	(26)	861	566	(6)	593	532	583	169	589	121
Lag Mo. 22	213	(2,084)	0	244	264	1,110	242	214	0	272	3,692
Lag Mo. 23	(707)	(2,862)	(2,402)	(762)	(901)	(937)	(755)	(729)	37	(795)	0

Table 14a (continued)

	Incurred Month										
	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01	Jan-02
Lag Mo. 0	\$1,510,524	\$1,326,321	\$1,998,965	\$1,918,169	\$867,852	\$2,049,773	\$1,137,798	\$2,086,303	\$1,466,978	\$979,745	\$1,766,932
Lag Mo. 1	2,196,185	2,558,423	2,400,427	2,481,098	2,804,237	2,735,754	3,017,215	2,848,762	2,019,148	2,884,721	2,323,989
Lag Mo. 2	802,732	479,613	309,036	386,751	610,788	261,344	939,420	468,394	647,735	461,857	805,344
Lag Mo. 3	255,024	193,078	120,603	150,132	285,117	53,052	187,748	183,913	166,152	301,528	264,155
Lag Mo. 4	64,590	111,766	78,696	23,967	36,372	7,378	213,980	7,465	16,389	249,519	132,558
Lag Mo. 5	56,837	34,779	27,765	232,619	253,871	(4,325)	98,901	85,948	(16,722)	147,914	45,046
Lag Mo. 6	15,514	3,308	687	(2,885)	61,248	1,007	219,290	27,278	22,064	113,715	54,736
Lag Mo. 7	6,076	2,490	13,458	(8,671)	31,136	(535)	39,215	14,834	11,918	84,882	3,002
Lag Mo. 8	3,623	720	3,017	2,889	46,722	2,928	42,000	3,371	4,191	41,821	(10,156)
Lag Mo. 9	1,044	(12,074)	9,029	2,964	5,332	34,127	31,004	8,817	6,591	22,117	5,288
Lag Mo. 10	(2,972)	1,328	0	2,209	(10,597)	0	12,408	1,573	0	19,688	1,790
Lag Mo. 11	(197)	262	2,158	3,474	4,207	2,989	24,610	1,213	1,038	28,153	12
Lag Mo. 12	1,694	(75)	29	1,695	(2,886)	1,455	15,169	823	0	8,061	(1,515)
Lag Mo. 13	102	3,233	817	1,997	1,175	1,799	1,686	910	704	18,177	(717)
Lag Mo. 14	(621)	(613)	419	0	795	127	289	467	369	1,062	164
Lag Mo. 15	328	337	0	0	92	0	475	0	0	6,463	121
Lag Mo. 16	(257)	(248)	0	0	(66)	0	1,174	0	0	20,937	0
Lag Mo. 17	(1)	(1)	0	0	361	0	(707)	0	0	(4,056)	0
Lag Mo. 18	(231)	(246)	100	130	101	277	395	71	55	856	0
Lag Mo. 19	857	771	485	854	148	490	(394)	599	440	3,226	920
Lag Mo. 20	87	82	0	0	(828)	0	(37)	27	0	(682)	67
Lag Mo. 21	563	626	311	343	0	317	105	501	363	215	658
Lag Mo. 22	235	252	79	77	0	79	0	195	142	44	294
Lag Mo. 23	(907)	(931)	0	0	26	0	0	0	1	275	0

Table 14a (continued)

	Incurred Month										
	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Lag Mo. 0	\$1,252,105	\$1,147,069	\$1,604,698	\$2,083,736	\$1,819,251	\$955,446	\$1,127,543	\$1,581,394	\$1,678,842	\$1,691,495	\$1,528,565
Lag Mo. 1	2,413,181	2,871,942	2,656,891	3,064,964	2,698,146	1,891,050	2,471,380	2,623,180	2,054,300	2,632,790	2,323,560
Lag Mo. 2	796,221	1,167,414	379,249	415,770	619,984	872,672	818,445	443,323	617,317	789,123	491,734
Lag Mo. 3	111,881	220,049	232,441	56,147	156,248	257,489	314,368	287,954	234,060	147,317	348,781
Lag Mo. 4	141,799	398,129	261,289	108,324	57,081	235,074	278,214	254,173	185,249	117,529	90,159
Lag Mo. 5	61,541	96,498	105,828	88,528	206,964	82,030	124,798	70,778	52,003	103,567	168,391
Lag Mo. 6	50,077	44,592	96,395	26,638	4,701	68,191	227,361	24,676	19,427	78,788	12,820
Lag Mo. 7	50,517	18,269	76,955	13,375	1,761	45,690	262,606	27,772	14,800	38,525	(1,241)
Lag Mo. 8	15,237	43,272	50,044	2,860	(29,023)	8,910	121,143	3,872	10,298	82,249	1,103
Lag Mo. 9	5,806	14,864	43,600	9,106	1,188	7,115	33,810	6,998	1,980	10,431	1,924
Lag Mo. 10	3,707	12,524	17,360	1,497	872	16,518	27,690	586	1,766	37,044	630
Lag Mo. 11	3,379	12,508	14,430	1,130	2,643	964	29,736	695	2,587	27,675	16
Lag Mo. 12	2,972	4,149	11,937	734	2,009	349	7,603	448	469	13,433	31
Lag Mo. 13	957	2,421	26,424	923	2,643	275	6,672	113	66	9,633	45
Lag Mo. 14	492	1,967	2,609	474	0	31	7,193	(100)	4,910	3,850	1,407
Lag Mo. 15	(2,114)	(693)	560	91	0	32	6,814	(240)	212	2,250	328
Lag Mo. 16	(340)	(1,136)	1,273	0	233	(1,014)	1,281	(1,023)	118	(11,961)	(264)
Lag Mo. 17	(90)	(251)	1,087	0	0	(388)	5,430	(178)	(1)	5,601	(1)
Lag Mo. 18	(214)	2,851	414	85	161	4	(2,843)	0	(253)	3,268	(260)
Lag Mo. 19	(1,473)	(47)	3,060	708	986	55	(1,172)	894	749	491	826
Lag Mo. 20	(8)	100	288	30	0	89	1,489	96	79	966	88
Lag Mo. 21	(49)	(2,130)	(972)	535	361	508	13,456	669	553	302	614
Lag Mo. 22	20	(21)	7,619	207	81	252	143	286	234	387	254
Lag Mo. 23	0	0	(548)	0	0	(844)	(7,210)	0	(892)	(919)	(816)

Table 14b
Claims Incurral and Payment Data: Open Indemnity or Fee-For-Service Health Plan
(Data reflects exposure of 100,000 members each month)

	Incurred Month										
	Apr-00	May-00	Jun-00	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01
Lag Mo. 0	\$1,441,188	\$643,985	\$1,033,747	\$1,367,827	\$255,053	\$337	\$1,125,394	\$840,932	\$753,076	\$993,758	\$1,472,861
Lag Mo. 1	2,321,882	2,895,424	2,597,741	3,867,287	4,049,145	1,736,954	4,240,540	2,864,014	2,746,369	2,692,546	2,237,282
Lag Mo. 2	1,083,175	1,451,423	830,695	1,446,071	1,154,092	2,819,505	1,196,183	1,257,529	1,433,794	1,839,960	631,800
Lag Mo. 3	453,497	425,910	490,950	384,217	504,091	362,141	631,128	807,376	468,846	468,112	240,014
Lag Mo. 4	231,600	204,325	235,364	80,148	452,708	254,715	266,217	281,126	242,940	464,178	149,652
Lag Mo. 5	156,478	211,237	187,264	83,387	195,906	94,708	92,580	168,104	170,805	120,669	98,143
Lag Mo. 6	102,025	117,092	119,363	92,598	114,756	202	110,560	102,438	94,737	152,693	46,068
Lag Mo. 7	80,475	235,962	70,360	108,883	97,332	46,661	65,957	77,961	55,384	145,993	19,300
Lag Mo. 8	55,309	57,269	47,878	75,929	52,983	43,416	74,546	72,717	35,432	242,620	48,171
Lag Mo. 9	37,996	49,860	33,297	50,616	56,586	18,502	56,097	77,284	34,169	139,234	25,264
Lag Mo. 10	26,618	33,756	62,235	34,968	43,701	18,920	40,145	45,000	7,575	51,580	8,098
Lag Mo. 11	26,489	16,883	23,405	30,531	38,287	15,709	32,939	42,122	35,029	36,050	16,140
Lag Mo. 12	16,035	4,033	8,731	19,518	5,245	17,257	20,701	14,634	12,649	17,284	1,115
Lag Mo. 13	11,205	(30,382)	18,171	11,793	27,455	1,874	13,407	14,528	28,128	8,446	5,147
Lag Mo. 14	9,384	13,295	23,309	11,813	19,939	999	12,914	43,993	31,711	8,359	15,646
Lag Mo. 15	7,460	1,110	(1,759)	9,567	6,455	5,525	10,159	2,357	4,089	22,296	6,106
Lag Mo. 16	3,592	3,046	5,208	5,000	6,051	10,542	5,135	3,527	3,845	3,593	291
Lag Mo. 17	2,820	655	2,252	3,543	3,246	970	3,582	2,432	6,023	(601)	4,138
Lag Mo. 18	2,745	3,710	(331)	3,200	4,497	3,154	3,622	5,075	1,356	(1,324)	627
Lag Mo. 19	9,480	364	2,376	12,111	(663)	643	14,250	1,780	225	12,770	747
Lag Mo. 20	1,427	3,200	944	1,864	116	8	1,868	917	1,135	1,596	1,689
Lag Mo. 21	1,598	2,342	256	2,031	354	3,130	2,372	1,718	937	2,039	(343)
Lag Mo. 22	525	1,359	6,220	760	629	1,331	772	685	57	733	(2,413)
Lag Mo. 23	531	886	3,126	587	562	1,101	670	513	1,052	604	0

Table 14b (continued)

	Incurred Month										
	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01	Jan-02
Lag Mo. 0	\$512,496	\$470,214	\$1,143,557	\$1,397,145	\$165,438	\$1,245,473	\$409,959	\$1,316,252	\$944,775	\$324,660	\$436,359
Lag Mo. 1	2,554,804	3,901,343	4,122,602	4,221,296	3,635,408	4,261,755	3,826,241	4,549,579	3,398,587	3,749,961	3,466,996
Lag Mo. 2	2,740,904	1,725,598	1,333,076	1,279,829	1,325,898	1,369,236	1,047,600	1,215,215	966,298	660,189	1,479,085
Lag Mo. 3	713,002	673,803	369,427	460,378	571,889	488,466	526,502	276,206	324,526	249,933	450,165
Lag Mo. 4	293,496	307,696	248,344	239,350	209,878	183,102	239,041	310,822	146,732	184,314	414,224
Lag Mo. 5	233,744	116,234	108,478	122,842	354,802	121,443	99,740	201,693	92,577	122,390	372,786
Lag Mo. 6	122,312	98,705	50,393	88,146	92,113	117,002	82,687	146,548	113,573	140,939	243,261
Lag Mo. 7	103,459	66,365	57,722	54,065	63,976	25,918	73,141	107,195	91,175	79,595	96,740
Lag Mo. 8	52,879	45,729	37,287	(7,623)	45,685	23,667	67,593	82,569	56,552	36,576	117,790
Lag Mo. 9	59,455	30,862	52,323	60,055	39,261	15,145	34,400	54,882	43,487	19,096	76,771
Lag Mo. 10	43,538	27,633	33,661	17,266	13,496	40,337	58,219	42,723	32,717	29,562	16,051
Lag Mo. 11	41,796	1,109	29,334	29,850	22,578	28,896	39,506	36,122	25,727	17,779	32,401
Lag Mo. 12	29,046	16,282	19,245	19,006	15,546	21,774	29,848	21,099	17,569	12,335	30,277
Lag Mo. 13	3,956	11,996	13,262	12,612	14,387	14,008	8,106	14,859	10,287	10,182	3,883
Lag Mo. 14	12,223	12,239	12,593	13,869	2,389	14,043	5,520	12,454	10,482	5,885	325
Lag Mo. 15	9,747	9,353	8,828	10,521	451	8,727	4,448	10,480	6,913	13,302	1,774
Lag Mo. 16	4,378	4,860	4,157	5,186	(2,643)	4,868	(4,525)	5,556	4,075	12,463	4,220
Lag Mo. 17	3,155	3,665	3,600	3,729	7,664	3,316	7,373	3,958	3,049	(6,193)	3,206
Lag Mo. 18	3,150	3,602	3,674	3,639	7,961	3,817	2,347	4,028	3,119	873	3,486
Lag Mo. 19	13,728	12,549	11,813	12,764	3,175	12,822	4,076	14,828	9,775	17,876	12,484
Lag Mo. 20	1,716	1,730	1,661	2,020	6,483	1,735	995	1,895	1,646	(1,878)	1,770
Lag Mo. 21	2,250	2,106	1,934	2,184	2,081	2,321	1,727	2,132	1,816	4,810	2,121
Lag Mo. 22	658	754	701	803	(387)	709	1,719	819	646	496	633
Lag Mo. 23	603	575	638	643	(12,483)	573	3,062	657	466	5,523	510

Table 14b (continued)

	Incurred Month										
	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Lag Mo. 0	\$316,102	\$330,251	\$925,488	\$1,498,109	\$1,200,397	\$772,745	\$540,379	\$362,254	\$490,195	\$1,165,724	\$501,268
Lag Mo. 1	3,389,410	3,391,827	3,043,374	3,801,115	3,807,931	3,049,376	3,216,478	3,650,456	3,393,921	3,432,872	3,698,760
Lag Mo. 2	1,642,106	2,424,164	685,491	1,330,007	1,367,064	1,127,817	1,442,340	1,725,518	1,646,939	1,897,148	1,537,276
Lag Mo. 3	320,148	376,554	355,254	389,894	535,284	765,301	366,180	438,174	426,517	261,549	784,363
Lag Mo. 4	314,196	358,048	178,444	337,631	230,547	266,537	130,361	309,883	329,730	295,824	644,878
Lag Mo. 5	216,696	113,743	80,529	217,959	156,726	184,620	100,823	321,789	395,058	210,731	278,873
Lag Mo. 6	109,814	137,055	110,396	131,357	93,597	125,069	107,520	269,600	190,724	11,091	102,862
Lag Mo. 7	71,116	70,581	74,749	100,304	71,249	127,712	66,387	258,203	181,453	25,315	115,130
Lag Mo. 8	44,903	68,957	67,699	68,740	57,166	115,672	35,594	99,967	81,548	6,844	74,258
Lag Mo. 9	37,588	32,772	76,445	54,452	(10,545)	52,190	23,499	70,613	61,600	44,322	26,636
Lag Mo. 10	25,976	(49,340)	34,131	37,119	56,051	45,721	36,450	51,314	53,477	19,479	48,599
Lag Mo. 11	34,998	5,955	42,027	32,110	20,675	31,636	18,595	27,327	35,994	20,699	39,741
Lag Mo. 12	26,168	13,338	11,666	21,951	20,035	28,100	13,958	16,643	16,109	23,351	20,371
Lag Mo. 13	8,283	15,852	32,802	13,392	13,083	14,787	21,007	16,209	10,814	14,072	21,961
Lag Mo. 14	1,799	8,399	6,661	12,381	12,491	4,439	20,945	9,780	656	21,147	3,139
Lag Mo. 15	2,653	12,460	41,200	9,523	8,392	2,433	46,613	4,950	3,175	66	8,841
Lag Mo. 16	8,879	658	13,131	4,608	4,824	5,769	2,465	3,611	770	760	5,093
Lag Mo. 17	6,157	1,978	5,654	3,438	3,295	959	6,489	1,472	3,149	11,314	3,757
Lag Mo. 18	10,738	2,940	220	3,988	3,295	(137)	2,287	3,812	3,055	(4,452)	3,662
Lag Mo. 19	3,192	967	(2,284)	12,982	12,210	11,078	1,590	12,110	12,738	(2,621)	12,602
Lag Mo. 20	740	1,401	978	1,946	1,739	1,675	3,118	1,784	1,685	2,031	1,956
Lag Mo. 21	162	4,063	487	2,389	2,310	1,952	1,524	2,168	2,019	1,303	2,277
Lag Mo. 22	82	(308)	(10,547)	740	687	608	2,246	648	615	5,965	731
Lag Mo. 23	565	1,120	2,277	650	672	570	9,829	614	538	1,305	622

Table 14c
Claims Incurred and Payment Data: Open-Panel, Loosely-Held Health Plan (PPO or POS)
(Data reflects exposure of 100,000 members each month)

	Incurred Month										
	Apr-00	May-00	Jun-00	Jul-00	Aug-00	Sep-00	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01
Lag Mo. 0	\$1,621,218	\$1,053,599	\$1,144,425	\$1,437,088	\$771,062	\$823,974	\$1,347,509	\$1,038,033	\$1,125,241	\$1,276,780	\$1,405,265
Lag Mo. 1	1,969,971	2,924,122	2,157,039	2,932,669	3,221,519	2,207,628	3,260,931	2,255,081	2,796,655	2,384,268	2,628,089
Lag Mo. 2	544,347	982,389	557,724	857,288	694,994	1,818,709	723,929	921,238	1,062,275	1,165,430	572,623
Lag Mo. 3	303,567	395,815	392,069	192,816	490,654	314,840	308,903	540,257	412,411	419,578	343,525
Lag Mo. 4	151,901	184,021	247,446	66,073	321,553	196,585	135,713	184,541	250,752	245,907	110,497
Lag Mo. 5	109,594	148,565	143,098	55,383	153,276	65,583	48,307	127,605	147,598	98,415	97,113
Lag Mo. 6	61,579	75,362	125,130	42,564	90,358	49,320	53,942	78,662	80,292	83,049	71,451
Lag Mo. 7	45,334	136,769	90,376	59,390	49,448	12,872	29,466	55,345	62,955	69,886	26,114
Lag Mo. 8	30,577	47,348	49,462	39,195	31,255	30,979	39,003	31,830	41,050	104,920	44,264
Lag Mo. 9	20,483	40,309	23,950	26,794	33,720	26,707	28,897	40,569	38,360	67,973	22,353
Lag Mo. 10	12,382	46,153	34,725	15,936	14,426	28,935	18,160	21,526	14,535	22,867	13,138
Lag Mo. 11	13,683	9,078	18,045	15,700	18,254	12,231	16,883	13,951	32,478	12,955	15,313
Lag Mo. 12	8,046	6,451	7,738	9,473	3,381	16,939	10,108	6,472	36,230	7,648	2,355
Lag Mo. 13	6,177	(12,968)	11,210	6,409	11,540	3,798	7,400	5,619	32,969	3,836	3,242
Lag Mo. 14	3,574	5,093	8,000	4,575	9,194	1,505	5,045	17,021	6,841	3,111	8,772
Lag Mo. 15	3,255	439	(2,615)	4,133	2,840	4,094	4,402	1,292	177	9,329	3,230
Lag Mo. 16	1,370	1,646	1,881	1,939	937	6,098	2,002	1,584	(333)	695	1,299
Lag Mo. 17	1,173	485	(49)	1,474	1,327	352	1,490	(175)	3,278	(191)	3,576
Lag Mo. 18	1,017	628	(2,260)	1,201	1,788	1,682	1,369	2,102	4,391	(508)	480
Lag Mo. 19	4,363	993	6,672	5,481	(301)	362	6,327	739	155	5,748	1,143
Lag Mo. 20	634	1,138	724	825	42	527	821	382	499	720	1,649
Lag Mo. 21	956	959	609	1,176	144	1,649	1,298	1,055	489	1,193	(72)
Lag Mo. 22	343	(651)	2,589	459	416	1,202	462	410	24	464	1,151
Lag Mo. 23	(192)	(1,303)	(101)	(201)	(292)	(89)	(162)	(212)	459	(213)	0

Table 14c (continued)

	Incurred Month										
	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01	Jan-02
Lag Mo. 0	\$1,095,214	\$970,068	\$1,643,003	\$1,701,355	\$575,555	\$1,715,079	\$834,922	\$1,765,861	\$1,249,673	\$707,144	\$1,213,239
Lag Mo. 1	2,345,418	3,117,254	3,117,078	3,205,249	3,150,113	3,370,770	3,353,876	3,556,525	2,593,176	3,244,775	2,799,630
Lag Mo. 2	1,609,266	998,106	735,171	758,389	908,368	722,372	984,437	779,170	780,299	544,389	1,085,709
Lag Mo. 3	445,603	393,122	224,147	279,235	404,452	234,241	328,714	222,319	232,056	280,058	341,559
Lag Mo. 4	159,845	193,299	149,292	113,595	108,573	80,502	224,409	133,701	70,629	222,385	249,768
Lag Mo. 5	130,453	68,675	61,352	186,938	295,871	48,011	99,250	134,113	28,761	137,293	181,429
Lag Mo. 6	59,956	43,005	21,371	34,996	74,092	49,276	162,445	76,910	60,144	125,044	133,187
Lag Mo. 7	46,600	29,071	31,878	17,435	44,802	10,473	53,332	53,268	44,899	82,682	42,009
Lag Mo. 8	24,120	19,450	17,277	(1,485)	46,291	11,558	52,650	36,328	25,980	39,639	43,086
Lag Mo. 9	25,351	5,793	27,045	26,722	19,451	26,228	32,418	27,986	21,945	20,860	35,034
Lag Mo. 10	16,382	12,274	14,008	8,475	(571)	16,785	31,471	18,697	13,615	23,797	7,724
Lag Mo. 11	17,278	615	13,467	14,450	11,852	13,770	30,809	15,740	11,312	23,836	13,490
Lag Mo. 12	13,076	6,731	8,025	8,898	4,784	9,910	21,278	9,261	7,311	9,839	11,715
Lag Mo. 13	1,706	6,880	5,996	6,414	6,673	6,880	4,357	6,714	4,692	14,850	1,197
Lag Mo. 14	4,724	4,735	5,485	5,771	1,458	5,918	2,466	5,455	4,577	3,069	231
Lag Mo. 15	4,248	4,089	3,674	4,378	242	3,631	2,128	4,361	2,877	9,309	809
Lag Mo. 16	1,672	1,878	1,730	2,158	(1,138)	2,026	(1,198)	2,312	1,696	17,411	1,756
Lag Mo. 17	1,312	1,525	1,498	1,552	3,400	1,380	2,655	1,647	1,269	(4,945)	1,334
Lag Mo. 18	1,176	1,355	1,587	1,590	3,371	1,750	1,208	1,717	1,330	863	1,451
Lag Mo. 19	6,213	5,672	5,199	5,810	1,407	5,622	1,466	6,520	4,325	9,322	5,732
Lag Mo. 20	765	768	691	841	2,214	722	393	805	685	(1,180)	776
Lag Mo. 21	1,265	1,242	987	1,109	866	1,151	780	1,179	968	2,127	1,267
Lag Mo. 22	411	461	338	379	(161)	341	715	455	352	232	435
Lag Mo. 23	(279)	(304)	266	268	(5,179)	238	1,274	273	195	2,459	212

Table 14c (continued)

	Incurred Month										
	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Lag Mo. 0	\$862,605	\$807,165	\$1,322,058	\$1,840,038	\$1,561,727	\$879,419	\$883,206	\$1,074,072	\$1,184,208	\$1,472,705	\$1,101,075
Lag Mo. 1	2,819,420	3,088,283	2,817,719	3,371,299	3,159,962	2,373,065	2,781,438	3,050,662	2,611,758	2,965,729	2,895,824
Lag Mo. 2	1,148,220	1,690,387	506,686	796,213	930,867	978,845	1,078,067	976,884	1,045,775	1,250,207	926,817
Lag Mo. 3	198,548	285,176	283,547	195,030	313,977	468,805	335,928	350,466	314,147	194,853	530,040
Lag Mo. 4	213,539	381,450	226,815	203,746	129,266	248,167	216,687	277,356	245,372	191,723	320,995
Lag Mo. 5	126,106	103,674	95,300	142,388	186,058	124,721	114,821	175,232	194,759	148,161	214,366
Lag Mo. 6	74,936	83,069	102,221	70,215	41,693	91,860	177,491	126,596	90,709	50,617	50,290
Lag Mo. 7	59,089	40,038	76,037	49,549	30,677	79,822	180,953	123,662	84,150	33,028	47,184
Lag Mo. 8	27,582	53,961	57,391	30,275	6,843	53,337	85,544	43,860	39,947	50,871	31,545
Lag Mo. 9	19,032	22,316	57,268	27,976	(3,694)	25,872	29,519	33,471	26,790	24,534	12,208
Lag Mo. 10	12,974	(13,220)	24,339	16,321	23,834	28,670	31,335	21,695	23,285	29,735	20,591
Lag Mo. 11	16,536	9,781	25,914	14,022	10,147	13,727	25,100	11,777	16,488	24,772	16,546
Lag Mo. 12	12,624	7,973	11,824	9,563	9,510	11,897	10,247	7,188	6,977	17,560	8,495
Lag Mo. 13	4,006	8,010	29,078	6,111	6,987	6,314	12,637	6,811	4,539	11,480	9,165
Lag Mo. 14	1,036	4,644	4,295	5,428	5,198	1,865	12,916	4,012	3,140	11,048	2,128
Lag Mo. 15	(130)	4,780	17,472	4,016	3,492	1,031	23,375	1,920	1,445	1,341	3,871
Lag Mo. 16	3,497	(390)	6,207	1,917	2,144	1,808	1,774	905	389	(6,668)	1,966
Lag Mo. 17	2,510	676	2,988	1,431	1,371	173	5,871	509	1,310	7,978	1,563
Lag Mo. 18	4,344	2,888	333	1,710	1,465	(54)	(709)	1,586	1,124	55	1,372
Lag Mo. 19	469	375	836	5,816	5,657	4,642	(23)	5,561	5,738	(804)	5,726
Lag Mo. 20	303	641	576	827	723	749	2,167	799	748	1,409	866
Lag Mo. 21	38	447	(365)	1,307	1,172	1,109	8,491	1,293	1,163	718	1,306
Lag Mo. 22	46	(140)	59	429	333	400	1,018	436	393	2,708	453
Lag Mo. 23	235	466	628	271	279	(256)	(120)	256	(297)	6	(218)

Table 15a
Actual and Calculated IBNP Values from Claims Data by the Various Estimation Methods:
Closely-Held Integrated Delivery System of MCO (100,000 Members)

IBNP Estimation Method	Total IBNP Estimate as of End of Month with Zero Claims Payment Runout:											
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
Actual IBNP	\$7,114,261	\$7,801,694	\$6,862,462	\$6,697,305	\$5,477,816	\$5,272,249	\$6,087,494	\$5,498,681	\$6,604,882	\$6,534,874	\$5,213,941	\$6,592,945
Completion Factor	7,215,448	6,828,028	7,497,321	6,795,644	8,597,820	8,199,733	5,380,084	8,132,413	5,944,023	8,198,226	6,793,258	5,155,576
6-Mo Incurred	6,566,909	5,955,331	6,021,440	6,603,825	5,187,838	5,271,575	6,482,610	6,129,094	6,402,073	5,542,968	5,163,059	6,726,229
3-Mo Incurred	6,566,909	5,955,331	6,125,928	6,628,271	6,008,953	5,809,412	6,605,897	6,314,214	6,648,700	5,544,832	5,284,801	7,078,196
Simple Paid Lag	6,883,938	6,928,041	7,019,108	6,999,877	6,978,191	6,863,295	6,750,271	6,699,155	6,621,309	6,612,734	6,605,695	6,532,608
Regressed Paid Lag	6,592,007	6,776,243	6,544,288	6,907,438	6,240,827	6,212,263	7,225,075	6,279,302	6,889,928	6,077,785	6,462,517	7,318,342
IBNP Estimation Method	Total IBNP Estimate as of End of Month with One Month Claims Payment Runout:											
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
Actual IBNP	\$3,383,106	\$3,355,599	\$3,226,524	\$2,438,629	\$1,924,442	\$1,888,782	\$2,357,637	\$1,710,856	\$2,854,561	\$2,323,471	\$2,182,452	\$2,554,860
Completion Factor	3,226,562	3,215,170	3,411,669	3,265,246	3,301,672	3,345,069	3,246,506	2,933,587	3,158,234	2,945,852	3,193,587	2,782,359
6-Mo Incurred	2,281,877	2,339,365	2,778,849	2,125,961	1,977,441	2,123,579	2,912,372	2,275,936	2,401,838	1,404,295	2,470,120	2,886,086
3-Mo Incurred	2,281,877	2,443,853	2,803,294	2,947,076	2,515,277	2,246,866	3,097,492	2,522,564	2,403,702	1,526,037	2,822,086	3,483,457
Simple Paid Lag	3,153,633	3,186,098	3,194,010	3,198,064	3,136,059	3,048,295	2,966,094	2,923,039	2,847,991	2,845,358	2,815,653	2,783,484
Regressed Paid Lag	2,905,397	2,819,057	2,997,472	2,980,293	2,866,807	2,859,251	3,047,768	2,777,212	2,867,681	2,655,817	3,044,466	3,064,209
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Two Months Claims Payment Runout:											
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
Actual IBNP	\$1,945,016	\$1,984,669	\$1,597,414	\$1,343,988	\$1,073,640	\$1,011,647	\$1,343,342	\$1,008,944	\$1,511,521	\$1,318,065	\$1,029,089	\$1,778,532
Completion Factor	1,841,075	1,959,253	1,934,497	1,991,272	1,973,779	1,889,654	1,866,613	1,818,040	1,692,910	1,744,748	1,727,561	1,780,925
6-Mo Incurred	1,673,916	1,361,782	930,550	1,374,296	1,362,109	1,406,063	1,832,745	1,324,110	1,131,529	737,439	1,514,698	2,127,300
3-Mo Incurred	1,778,404	1,386,228	1,751,666	1,912,133	1,485,396	1,591,183	2,079,372	1,325,974	1,253,270	1,089,405	2,112,069	1,957,757
Simple Paid Lag	1,871,444	1,870,621	1,881,458	1,856,011	1,818,209	1,763,660	1,711,621	1,686,206	1,645,568	1,636,344	1,617,045	1,584,702
Regressed Paid Lag	1,680,157	1,702,012	1,729,950	1,752,823	1,741,137	1,729,128	1,754,939	1,671,831	1,664,724	1,662,762	1,779,795	1,755,600
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Three Months Claims Payment Runout:											
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
Actual IBNP	\$1,123,034	\$1,183,447	\$995,723	\$809,728	\$591,295	\$618,701	\$906,383	\$615,036	\$977,732	\$814,661	\$714,617	\$1,102,249
Completion Factor	1,269,727	1,162,487	1,209,672	1,198,794	1,224,503	1,194,412	1,147,735	1,124,674	1,089,405	1,029,347	1,048,227	1,047,840
6-Mo Incurred	1,245,281	341,372	671,836	1,075,508	1,039,383	947,784	1,145,871	1,002,933	737,439	431,976	1,217,769	1,803,512
3-Mo Incurred	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Simple Paid Lag	1,148,692	1,146,820	1,148,090	1,137,949	1,113,135	1,076,435	1,045,423	1,036,441	1,011,245	1,006,935	991,716	978,036
Regressed Paid Lag	1,090,542	1,098,372	1,110,561	1,120,696	1,112,745	1,104,339	1,070,407	1,065,277	1,082,318	1,115,674	1,103,019	1,082,683

Table 15a (continued)

IBNP Estimation Method	Total IBNP Estimate as of End of Month with Zero Claims Payment Runout:											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Actual IBNP	\$6,168,205	\$6,704,374	\$7,970,883	\$7,735,863	\$6,865,528	\$6,550,066	\$6,044,172	\$7,670,998	\$7,555,322	\$6,754,190	\$7,358,843	\$6,798,581
Completion Factor	7,101,934	5,783,980	5,473,358	6,843,459	8,250,575	7,659,258	5,393,607	5,310,298	6,504,943	6,918,214	6,811,335	6,560,628
6-Mo Incurred	6,351,479	7,259,033	7,872,057	7,160,043	5,144,090	4,885,642	6,098,753	7,121,023	7,463,008	7,514,727	8,241,075	8,363,184
3-Mo Incurred	6,948,849	7,089,490	7,116,385	6,602,848	4,967,780	5,020,093	6,153,916	7,827,063	8,158,505	6,898,548	7,279,334	7,217,414
Simple Paid Lag	6,530,639	6,509,380	6,518,252	6,578,259	6,626,541	6,637,246	6,635,761	6,615,221	6,652,466	6,684,715	6,689,609	6,712,515
Regressed Paid Lag	6,596,765	7,007,116	7,169,632	6,623,867	6,041,942	6,177,885	7,164,672	7,508,609	7,014,726	6,706,227	6,782,821	6,796,206
IBNP Estimation Method	Total IBNP Estimate as of End of Month with One Month Claims Payment Runout:											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Actual IBNP	\$3,075,842	\$2,828,813	\$3,478,295	\$3,135,300	\$2,898,105	\$2,640,812	\$3,050,076	\$3,923,349	\$3,661,251	\$3,418,003	\$3,496,287	\$3,064,767
Completion Factor	2,722,709	2,718,848	2,656,233	2,815,573	3,025,615	3,180,831	3,068,643	2,547,883	2,577,861	2,774,254	2,687,383	2,852,228
6-Mo Incurred	3,276,658	3,735,967	3,444,575	1,940,833	1,409,607	1,767,960	2,971,440	3,706,743	3,825,401	4,540,454	4,496,716	3,709,039
3-Mo Incurred	3,107,115	2,980,295	2,887,380	1,764,523	1,544,058	1,823,124	3,677,480	4,402,240	3,209,222	3,578,712	3,350,946	3,011,702
Simple Paid Lag	2,767,813	2,781,072	2,782,412	2,811,834	2,825,740	2,830,082	2,823,830	2,832,410	2,870,380	2,898,540	2,916,727	2,936,781
Regressed Paid Lag	2,983,596	3,043,411	2,922,344	2,782,168	2,665,565	2,846,234	3,346,046	3,266,227	3,042,111	3,125,000	2,984,702	3,021,656
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Two Months Claims Payment Runout:											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Actual IBNP	\$1,596,971	\$1,463,035	\$1,819,037	\$2,180,747	\$1,632,060	\$1,492,922	\$1,706,943	\$2,572,753	\$2,310,127	\$2,090,795	\$1,992,376	\$1,923,923
Completion Factor	1,622,887	1,538,140	1,597,497	1,567,993	1,666,933	1,662,886	1,774,789	1,743,093	1,540,433	1,525,412	1,587,513	1,582,038
6-Mo Incurred	2,150,282	2,435,294	1,166,671	1,219,221	935,134	486,853	1,961,676	2,612,611	2,836,190	3,331,443	2,072,475	2,610,923
3-Mo Incurred	1,394,610	1,878,099	990,361	1,353,672	990,298	1,192,893	2,657,173	1,996,431	1,874,448	2,185,672	1,375,137	2,140,753
Simple Paid Lag	1,593,245	1,592,774	1,588,281	1,598,696	1,622,804	1,624,003	1,619,893	1,623,801	1,657,240	1,679,744	1,694,543	1,705,330
Regressed Paid Lag	1,699,453	1,743,534	1,672,936	1,698,948	1,710,784	1,773,380	1,885,440	1,814,088	1,772,300	1,779,894	1,692,733	1,714,393
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Three Months Claims Payment Runout:											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Actual IBNP	\$1,021,973	\$959,246	\$1,238,568	\$1,323,406	\$1,091,530	\$1,001,766	\$1,152,649	\$1,651,481	\$1,579,430	\$1,346,801	\$1,323,446	\$1,108,609
Completion Factor	1,083,194	990,361	953,593	990,298	967,427	1,024,563	1,047,666	1,091,510	1,077,920	969,781	976,103	1,010,634
6-Mo Incurred	1,640,389	1,166,671	819,142	935,134	261,388	329,066	1,663,845	2,053,251	2,223,690	1,667,118	1,446,273	1,923,603
3-Mo Incurred	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Simple Paid Lag	983,523	986,471	986,485	997,627	1,011,186	1,015,017	1,015,423	1,021,291	1,043,059	1,061,926	1,072,337	1,081,413
Regressed Paid Lag	1,097,731	1,091,001	1,083,390	1,132,234	1,166,533	1,187,845	1,159,664	1,131,394	1,119,384	1,078,853	1,051,613	1,047,488

Table 15b
Actual and Calculated IBNP Values from Claims Data by the Various Estimation Methods:
Open Indemnity or Fee-For-Service Health Plan (100,000 Members)

IBNP Estimation Method	Total IBNP Estimate as of End of Month with Zero Claims Payment Runout:											
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
Actual IBNP	\$13,833,747	\$11,627,820	\$13,490,913	\$16,173,262	\$14,741,872	\$14,168,141	\$13,465,410	\$13,958,539	\$13,089,002	\$13,534,544	\$12,088,323	\$11,362,776
Completion Factor	14,050,723	17,515,906	10,494,296	9,580,582	15,883,291	18,396,818	10,169,739	16,598,255	11,441,909	17,249,408	15,178,634	9,966,462
6-Mo Incurred	12,751,495	12,661,186	12,658,585	15,068,238	13,140,472	11,234,577	11,601,519	9,894,753	10,759,332	10,773,493	11,017,161	12,536,965
3-Mo Incurred	12,751,495	12,661,186	13,447,845	15,822,849	12,246,905	10,887,997	11,384,336	11,669,259	12,711,163	11,621,783	12,249,762	13,061,425
Simple Paid Lag	13,052,140	13,228,323	13,158,323	13,235,675	13,513,523	13,643,520	13,730,763	13,743,480	13,778,285	13,751,506	13,732,868	13,646,310
Regressed Paid Lag	13,348,528	13,185,245	13,661,764	13,922,377	13,278,368	12,963,288	13,378,395	13,514,436	13,367,429	13,393,089	13,094,016	13,794,171
IBNP Estimation Method	Total IBNP Estimate as of End of Month with One Month Claims Payment Runout:											
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
Actual IBNP	\$7,951,220	\$6,238,886	\$8,911,064	\$8,068,194	\$7,386,668	\$6,923,134	\$7,101,465	\$6,865,956	\$6,379,249	\$6,716,926	\$6,013,288	\$5,590,559
Completion Factor	6,885,416	7,017,895	7,198,908	6,393,255	7,778,824	8,688,227	9,086,974	7,800,836	8,636,089	7,887,378	8,628,657	7,768,041
6-Mo Incurred	7,165,141	6,379,074	8,515,506	7,275,743	5,692,106	4,728,227	4,283,092	4,223,573	5,087,548	4,894,271	5,714,830	6,981,144
3-Mo Incurred	7,165,141	7,168,334	9,270,118	6,382,176	5,345,526	4,511,045	6,057,599	6,175,404	5,935,837	6,126,872	6,239,290	8,149,209
Simple Paid Lag	7,079,801	7,234,473	7,201,078	7,384,430	7,475,464	7,521,748	7,513,574	7,511,421	7,487,015	7,430,525	7,390,712	7,318,604
Regressed Paid Lag	7,234,840	7,312,493	7,554,973	7,186,592	6,973,604	6,884,805	7,459,249	6,972,346	7,362,994	6,912,781	7,363,220	7,460,383
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Two Months Claims Payment Runout:											
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
Actual IBNP	\$4,877,603	\$4,293,902	\$4,815,826	\$4,935,729	\$4,450,693	\$4,257,454	\$4,329,484	\$4,022,002	\$4,142,514	\$4,052,150	\$3,991,032	\$3,826,627
Completion Factor	4,331,321	4,312,880	4,375,576	4,171,238	4,396,617	4,668,170	4,971,397	5,130,308	4,764,066	5,004,614	4,676,537	4,940,908
6-Mo Incurred	3,198,346	4,870,861	4,732,842	4,050,116	3,494,788	1,108,066	2,932,515	2,417,588	3,789,208	3,002,200	3,908,970	5,923,526
3-Mo Incurred	3,987,606	5,625,472	3,839,275	3,703,536	3,277,605	2,882,573	4,884,346	3,265,877	5,021,809	3,526,659	5,077,035	5,841,605
Simple Paid Lag	4,250,815	4,364,888	4,399,788	4,470,197	4,556,049	4,580,732	4,584,103	4,582,661	4,556,540	4,536,837	4,511,530	4,480,526
Regressed Paid Lag	4,388,409	4,431,648	4,455,100	4,507,602	4,519,331	4,543,125	4,562,098	4,568,700	4,597,690	4,591,994	4,605,569	4,573,140
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Three Months Claims Payment Runout:											
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
Actual IBNP	\$3,586,457	\$3,025,460	\$3,456,943	\$3,365,210	\$3,091,442	\$2,834,296	\$2,873,673	\$2,843,697	\$2,701,314	\$2,999,511	\$2,887,290	\$2,911,174
Completion Factor	3,098,581	3,021,425	2,934,217	3,001,072	2,882,573	3,058,144	3,265,877	3,410,279	3,526,659	3,334,021	3,429,621	3,260,593
6-Mo Incurred	2,343,970	3,914,992	3,280,797	3,218,255	1,108,066	1,106,312	2,417,588	2,177,678	3,002,200	2,165,956	3,511,542	4,819,541
3-Mo Incurred	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Simple Paid Lag	2,910,074	3,012,905	3,049,675	3,131,031	3,179,954	3,198,964	3,190,629	3,178,831	3,163,498	3,142,204	3,131,247	3,115,919
Regressed Paid Lag	3,082,518	3,095,265	3,145,790	3,153,994	3,189,950	3,233,616	3,234,851	3,285,463	3,272,951	3,298,346	3,274,233	3,244,921

Table 15b (continued)

IBNP Estimation Method	Total IBNP Estimate as of End of Month with Zero Claims Payment Runout:											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Actual IBNP	\$12,387,479	\$13,401,896	\$14,567,229	\$13,224,027	\$13,024,164	\$13,413,016	\$12,691,211	\$12,781,737	\$14,204,843	\$14,068,952	\$14,012,290	\$14,655,965
Completion Factor	10,204,990	8,910,788	8,900,545	13,481,581	17,996,165	16,078,497	12,979,758	10,633,022	9,105,828	10,208,589	15,182,948	10,674,366
6-Mo Incurred	13,665,899	16,017,761	16,895,197	17,428,326	15,710,142	14,237,133	14,156,072	14,636,365	15,971,913	14,609,555	14,865,660	15,871,715
3-Mo Incurred	14,833,964	15,935,840	15,336,249	14,980,869	13,226,163	13,449,617	12,112,647	13,691,492	15,479,011	14,681,588	13,796,806	14,072,108
Simple Paid Lag	13,529,071	13,465,467	13,456,848	13,502,086	13,493,216	13,475,178	13,472,929	13,442,983	13,419,755	13,445,302	13,464,589	13,482,356
Regressed Paid Lag	13,847,186	13,917,605	13,950,072	13,700,321	13,379,477	13,117,950	13,358,888	13,813,574	13,903,160	13,775,805	13,564,893	13,616,316
IBNP Estimation Method	Total IBNP Estimate as of End of Month with One Month Claims Payment Runout:											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Actual IBNP	\$7,168,417	\$7,646,172	\$8,440,257	\$6,550,797	\$7,076,570	\$6,869,348	\$7,260,172	\$7,130,611	\$7,657,314	\$7,946,448	\$7,975,236	\$8,071,189
Completion Factor	7,173,715	6,680,878	6,493,463	6,508,187	6,877,583	7,460,681	7,545,456	6,844,211	6,570,684	6,679,453	6,649,348	7,078,703
6-Mo Incurred	9,153,151	10,073,503	11,122,437	10,008,902	8,310,543	7,801,984	8,077,930	9,232,034	8,047,769	8,917,542	9,265,612	8,522,698
3-Mo Incurred	9,071,230	8,514,556	8,674,979	7,524,924	7,523,027	5,758,559	7,133,057	8,739,132	8,119,802	7,848,687	7,466,005	6,889,700
Simple Paid Lag	7,228,190	7,218,329	7,235,108	7,285,739	7,257,338	7,250,443	7,234,948	7,234,862	7,230,922	7,244,161	7,266,938	7,290,343
Regressed Paid Lag	7,482,359	7,520,007	7,505,009	7,408,406	7,028,026	7,100,097	7,463,182	7,482,860	7,404,548	7,453,586	7,248,020	7,368,743
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Two Months Claims Payment Runout:											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Actual IBNP	\$4,778,941	\$4,876,319	\$4,768,949	\$4,339,712	\$4,263,300	\$4,415,373	\$4,738,501	\$4,122,617	\$4,814,342	\$5,215,211	\$4,940,134	\$5,267,353
Completion Factor	4,569,737	4,237,127	4,152,898	4,138,376	4,321,540	4,089,869	4,401,741	4,479,236	4,235,967	4,196,626	4,220,647	4,192,361
6-Mo Incurred	6,575,143	7,657,863	6,704,935	6,345,812	5,605,792	4,700,906	5,803,054	4,847,426	5,635,288	6,623,311	5,466,269	4,781,974
3-Mo Incurred	5,016,195	5,210,405	4,220,957	5,558,296	3,562,367	3,756,033	5,310,152	4,919,459	4,566,434	4,823,704	3,833,270	4,514,523
Simple Paid Lag	4,443,388	4,455,325	4,473,425	4,486,398	4,480,628	4,471,082	4,468,213	4,476,709	4,464,079	4,475,640	4,500,120	4,515,829
Regressed Paid Lag	4,548,963	4,535,085	4,506,497	4,507,533	4,490,376	4,507,253	4,504,456	4,495,561	4,504,058	4,497,455	4,500,997	4,500,671
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Three Months Claims Payment Runout:											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Actual IBNP	\$3,639,974	\$3,604,369	\$3,234,018	\$2,833,844	\$3,148,554	\$2,994,773	\$3,133,824	\$2,952,733	\$3,674,535	\$4,007,041	\$3,611,611	\$3,482,566
Completion Factor	3,342,929	3,155,741	2,930,483	2,905,039	2,899,070	3,034,200	2,893,795	3,039,179	3,132,880	3,017,901	2,933,407	2,936,130
6-Mo Incurred	5,790,387	5,639,719	3,717,999	4,948,464	3,843,943	3,527,102	2,821,762	4,108,033	4,932,488	4,650,900	3,200,858	3,110,207
3-Mo Incurred	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Simple Paid Lag	3,102,952	3,125,568	3,146,539	3,150,159	3,136,637	3,136,140	3,129,976	3,129,142	3,123,233	3,141,722	3,170,774	3,186,218
Regressed Paid Lag	3,230,776	3,195,335	3,202,506	3,175,579	3,194,573	3,207,769	3,199,579	3,200,862	3,198,276	3,189,648	3,198,446	3,192,872

Table 15c
Actual and Calculated IBNP Values from Claims Data by the Various Estimation Methods:
Open-Panel, Loosely-Held Health Plan (PPO or POS) (100,000 Members)

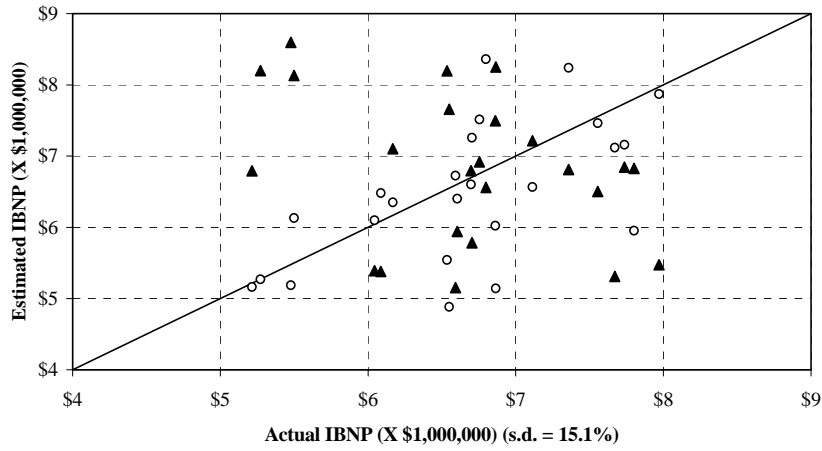
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Zero Claims Payment Runout:											
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
Actual IBNP	\$9,910,449	\$9,393,864	\$9,620,768	\$10,640,547	\$9,332,879	\$8,974,107	\$9,157,675	\$9,019,092	\$9,303,126	\$9,447,655	\$8,074,586	\$8,577,820
Completion Factor	10,011,218	10,471,844	9,325,321	8,488,622	11,690,897	12,038,800	7,690,876	11,590,299	8,514,036	11,814,005	10,112,309	7,420,680
6-Mo Incurred	9,134,771	8,672,372	8,498,361	9,873,404	8,137,082	7,504,907	8,226,906	7,402,699	7,904,774	7,542,288	7,545,951	9,048,772
3-Mo Incurred	9,134,771	8,672,372	9,195,163	10,456,051	8,599,478	7,941,253	8,605,529	8,550,651	9,193,798	8,032,077	8,168,421	9,538,275
Simple Paid Lag	9,450,719	9,549,785	9,573,827	9,594,787	9,697,747	9,684,758	9,655,071	9,630,518	9,599,550	9,583,400	9,571,040	9,493,752
Regressed Paid Lag	9,445,549	9,460,590	9,533,144	9,976,113	9,242,488	8,892,673	9,396,173	9,205,243	9,294,632	9,003,315	8,879,763	9,690,717
IBNP Estimation Method	Total IBNP Estimate as of End of Month with One Month Claims Payment Runout:											
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
Actual IBNP	\$5,284,041	\$4,555,424	\$5,592,039	\$4,781,267	\$4,197,445	\$3,983,733	\$4,331,692	\$3,856,054	\$4,321,293	\$4,151,725	\$3,776,582	\$3,818,109
Completion Factor	4,838,807	4,832,655	5,071,152	4,679,045	5,144,664	5,485,269	5,541,199	4,923,408	5,366,394	4,980,043	5,387,927	4,784,796
6-Mo Incurred	4,240,481	3,735,412	4,913,324	3,908,851	3,275,170	2,821,612	3,189,368	2,775,918	3,342,180	2,803,401	3,724,859	4,353,432
3-Mo Incurred	4,240,481	4,432,214	5,495,970	4,371,246	3,711,516	3,200,235	4,337,320	4,064,943	3,831,969	3,425,871	4,214,363	5,401,940
Simple Paid Lag	4,787,434	4,870,754	4,861,476	4,940,142	4,941,821	4,909,839	4,858,442	4,832,408	4,778,433	4,753,389	4,719,478	4,670,689
Regressed Paid Lag	4,794,904	4,683,319	5,051,163	4,706,441	4,387,135	4,237,872	4,693,736	4,268,582	4,502,573	4,079,483	4,577,632	4,778,921
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Two Months Claims Payment Runout:											
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
Actual IBNP	\$3,165,357	\$2,945,613	\$2,936,696	\$2,838,623	\$2,478,937	\$2,362,328	\$2,585,969	\$2,262,771	\$2,606,359	\$2,455,803	\$2,261,646	\$2,630,808
Completion Factor	2,872,230	2,965,693	2,964,722	2,946,108	3,012,322	3,049,150	3,137,352	3,157,167	2,946,761	3,066,466	2,951,347	3,079,424
6-Mo Incurred	2,023,277	2,569,292	2,152,707	2,239,730	1,863,741	988,654	1,979,903	1,601,875	2,184,290	1,584,390	2,274,294	3,475,303
3-Mo Incurred	2,720,079	3,151,938	2,615,103	2,676,075	2,242,364	2,136,606	3,268,928	2,091,664	2,806,760	2,073,894	3,322,802	3,544,372
Simple Paid Lag	2,861,575	2,908,564	2,929,413	2,943,855	2,957,509	2,935,932	2,906,950	2,891,511	2,856,914	2,843,329	2,821,531	2,789,745
Regressed Paid Lag	2,814,919	2,904,827	2,850,013	2,830,473	2,740,247	2,654,754	2,836,486	2,659,972	2,737,546	2,567,955	2,811,838	2,977,443
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Three Months Claims Payment Runout:											
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01
Actual IBNP	\$2,148,141	\$1,949,966	\$2,019,913	\$1,873,144	\$1,631,684	\$1,540,679	\$1,725,034	\$1,542,451	\$1,694,968	\$1,723,845	\$1,618,734	\$1,854,999
Completion Factor	2,032,399	1,930,768	1,945,793	1,959,953	1,952,886	1,992,287	2,027,996	2,061,069	2,073,894	1,965,312	2,009,623	1,962,091
6-Mo Incurred	1,449,752	1,468,372	1,509,447	1,581,329	804,934	703,262	1,538,207	1,438,599	1,584,390	916,804	1,940,555	3,043,562
3-Mo Incurred	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Simple Paid Lag	1,881,658	1,923,356	1,939,399	1,967,332	1,973,203	1,959,685	1,938,110	1,927,957	1,906,865	1,895,487	1,882,042	1,867,676
Regressed Paid Lag	1,901,071	1,944,076	1,928,678	1,927,491	1,876,118	1,821,105	1,904,751	1,835,724	1,869,255	1,779,810	1,913,796	1,997,414

Table 15c (continued)

IBNP Estimation Method	Total IBNP Estimate as of End of Month with Zero Claims Payment Runout:											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Actual IBNP	\$8,756,239	\$9,491,422	\$10,715,828	\$10,019,660	\$9,428,329	\$9,405,954	\$8,810,213	\$9,797,736	\$10,322,395	\$9,798,091	\$10,127,550	\$10,068,284
Completion Factor	9,180,897	7,684,384	7,387,471	9,622,493	11,879,909	10,957,392	8,241,837	7,621,122	8,334,085	8,958,843	9,946,362	8,761,571
6-Mo Incurred	9,158,502	10,672,088	11,611,853	11,422,802	9,413,482	8,510,827	9,179,179	9,985,192	10,897,611	10,472,830	11,002,407	11,498,055
3-Mo Incurred	10,207,010	10,741,156	10,530,382	10,079,490	8,310,592	8,538,769	8,521,835	10,281,150	11,223,482	10,175,496	10,023,212	10,091,337
Simple Paid Lag	9,443,359	9,404,294	9,405,835	9,459,522	9,483,757	9,482,506	9,480,692	9,456,185	9,467,901	9,497,072	9,507,992	9,528,785
Regressed Paid Lag	9,607,197	9,951,754	10,090,361	9,721,247	9,168,360	9,026,382	9,406,700	10,030,672	10,052,698	9,821,993	9,782,829	9,794,873
IBNP Estimation Method	Total IBNP Estimate as of End of Month with One Month Claims Payment Runout:											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Actual IBNP	\$4,778,890	\$4,833,466	\$5,543,122	\$4,556,595	\$4,636,894	\$4,400,438	\$4,802,029	\$5,257,991	\$5,324,137	\$5,302,431	\$5,360,117	\$5,148,095
Completion Factor	4,567,559	4,410,651	4,293,613	4,440,263	4,727,513	5,020,254	4,949,131	4,296,128	4,253,705	4,443,228	4,349,086	4,612,638
6-Mo Incurred	5,490,325	6,358,199	6,629,378	5,170,736	4,015,040	4,006,430	4,833,210	5,899,772	5,588,184	6,366,532	6,491,539	5,733,511
3-Mo Incurred	5,559,394	5,276,728	5,286,067	4,067,847	4,042,981	3,349,086	5,129,168	6,225,643	5,290,849	5,387,338	5,084,821	4,632,575
Simple Paid Lag	4,623,915	4,627,553	4,635,317	4,673,565	4,669,866	4,669,532	4,659,434	4,664,408	4,684,938	4,706,889	4,726,986	4,748,434
Regressed Paid Lag	4,923,549	5,029,664	4,946,918	4,679,789	4,380,675	4,379,759	5,003,776	5,129,426	4,956,620	5,073,472	4,880,463	4,930,842
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Two Months Claims Payment Runout:											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Actual IBNP	\$2,921,088	\$2,883,409	\$3,046,587	\$3,079,160	\$2,727,001	\$2,709,045	\$2,968,469	\$3,217,699	\$3,352,209	\$3,390,962	\$3,219,030	\$3,315,228
Completion Factor	2,837,129	2,668,917	2,685,646	2,657,649	2,798,151	2,724,766	2,909,800	2,910,891	2,674,343	2,648,304	2,695,124	2,674,895
6-Mo Incurred	3,976,590	4,598,374	3,343,843	3,086,294	2,606,265	1,977,253	3,453,975	3,548,310	4,005,618	4,711,628	3,506,097	3,529,397
3-Mo Incurred	2,895,119	3,255,062	2,240,954	3,114,235	1,948,921	2,273,211	3,779,847	3,250,976	3,026,423	3,304,910	2,405,161	3,141,618
Simple Paid Lag	2,779,278	2,783,971	2,788,880	2,800,359	2,812,034	2,808,761	2,805,168	2,810,985	2,825,254	2,843,203	2,862,031	2,874,867
Regressed Paid Lag	2,931,493	3,010,773	2,854,282	2,933,779	2,711,960	2,691,679	2,990,662	3,010,634	2,980,261	3,056,548	2,912,168	2,987,011
IBNP Estimation Method	Total IBNP Estimate as of End of Month with Three Months Claims Payment Runout:											
	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
Actual IBNP	\$2,111,405	\$2,059,964	\$2,068,937	\$1,951,946	\$1,947,522	\$1,831,119	\$1,977,078	\$2,192,973	\$2,451,268	\$2,453,810	\$2,275,623	\$2,096,487
Completion Factor	2,013,827	1,883,039	1,787,127	1,802,855	1,784,959	1,879,522	1,854,080	1,933,751	1,954,524	1,829,185	1,803,663	1,824,401
6-Mo Incurred	3,357,139	2,985,928	1,759,185	2,460,198	1,489,001	1,553,651	2,151,414	2,912,946	3,361,242	2,930,121	2,191,442	2,427,643
3-Mo Incurred	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Simple Paid Lag	1,865,483	1,876,616	1,885,350	1,893,363	1,895,652	1,897,682	1,895,355	1,898,434	1,908,685	1,927,394	1,945,562	1,957,288
Regressed Paid Lag	2,013,798	2,056,129	1,930,850	1,960,511	1,858,703	1,846,078	1,973,149	2,016,378	2,033,278	2,066,039	1,974,087	1,983,788

Figure 1a

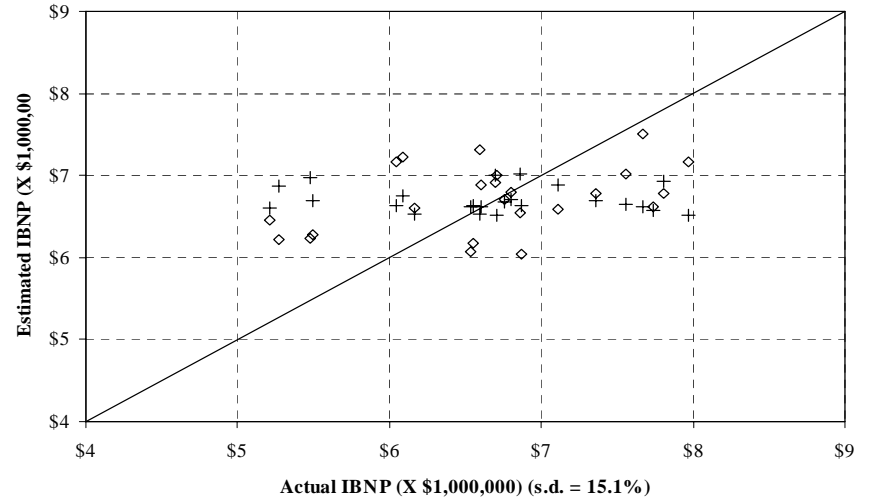
Zero-Runout Actual Versus Estimated IBNP
Closed-Panel MCO: Completion Factor & Incurred PMPM Methods



▲ Completion Factor (s.e. = 28.5%) ○ Incurred PMPM (s.e. = 15.8%) — "Perfect Fit"

Figure 1b

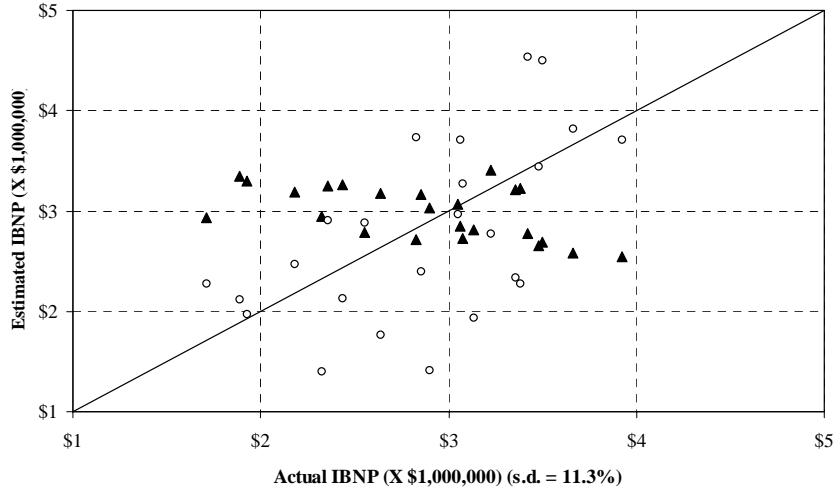
Zero Runout Actual Versus Estimated IBNP
Closed-Panel MCO: Simple & Regressed Paid PMPM Methods



+ Simple Paid Lag (s.e. = 15.4%) ◇ Regressed Paid Lag (s.e. = 13.4%) — "Perfect Fit"

Figure 2a

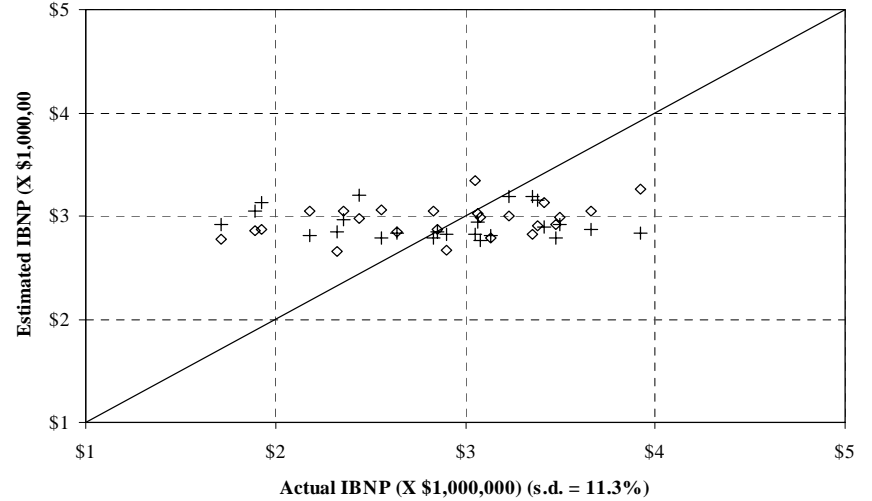
1 Month-Runout Actual Versus Estimated IBNP
Closed-Panel MCO: Completion Factor & Incurred PMPM Methods



▲ Completion Factor (s.e. = 14.5%) ○ Incurred PMPM (s.e. = 13.7%) — "Perfect Fit"

Figure 2b

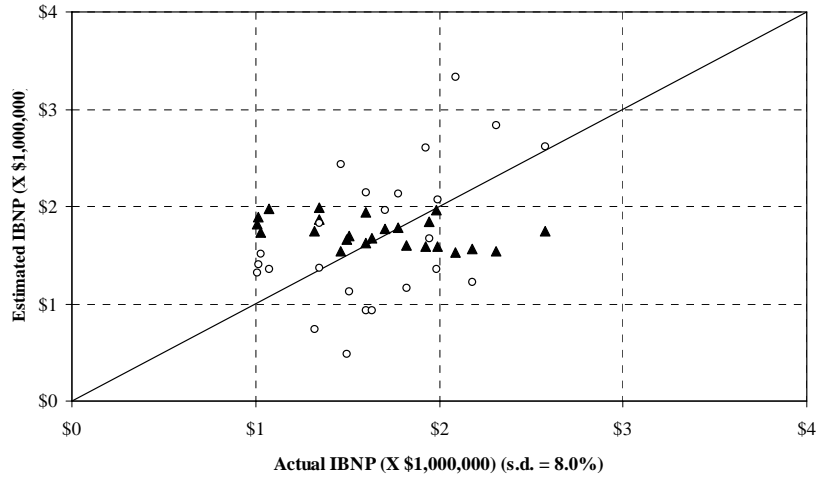
1-Month Runout Actual Versus Estimated IBNP
Closed-Panel MCO: Simple & Regressed Paid PMPM Methods



+ Simple Paid Lag (s.e. = 11.8%) ◇ Regressed Paid Lag (s.e. = 10.4%) — "Perfect Fit"

Figure 3a

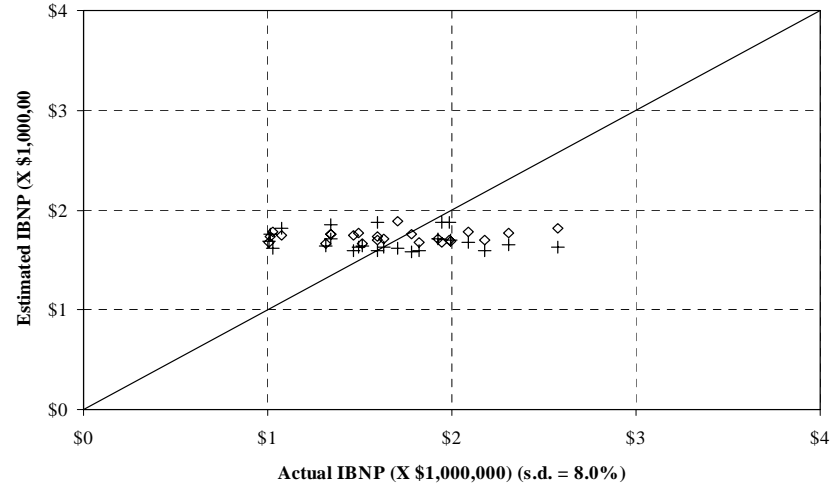
2-Month Runout Actual Versus Estimated IBNP
 Closed-Panel MCO: Completion Factor & Incurred PMPM Methods



▲ Completion Factor (s.e. = 9.6%) ○ Incurred PMPM (s.e. = 11.5%) — "Perfect Fit"

Figure 3b

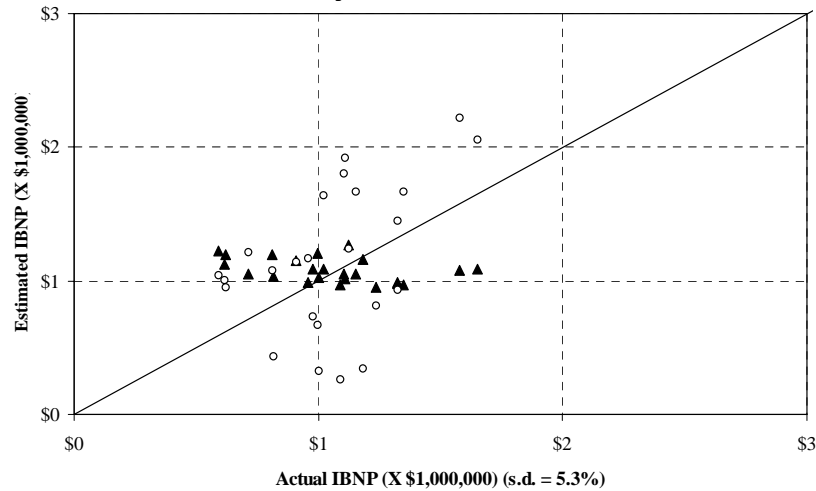
2-Month Runout Actual Versus Estimated IBNP
 Closed-Panel MCO: Simple & Regressed Paid PMPM Methods



+ Simple Paid Lag (s.e. = 8.3%) ◇ Regressed Paid Lag (s.e. = 7.9%) — "Perfect Fit"

Figure 4a

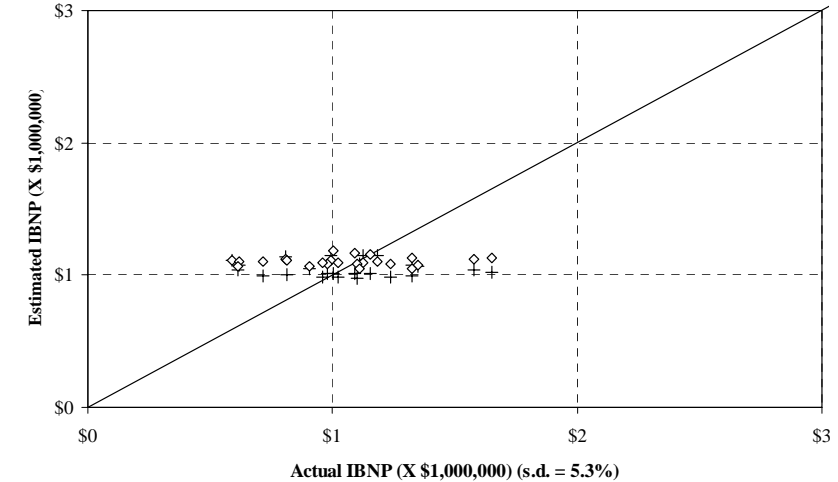
3-Month Runout Actual Versus Estimated IBNP
 Closed-Panel MCO: Completion Factor & Incurred PMPM Methods



▲ Completion Factor (s.e. = 6.1%) ○ Incurred PMPM (s.e. = 9.4%) — "Perfect Fit"

Figure 4b

3-Month Runout Actual Versus Estimated IBNP
 Closed-Panel MCO: Simple and Regressed Paid PMPM Methods

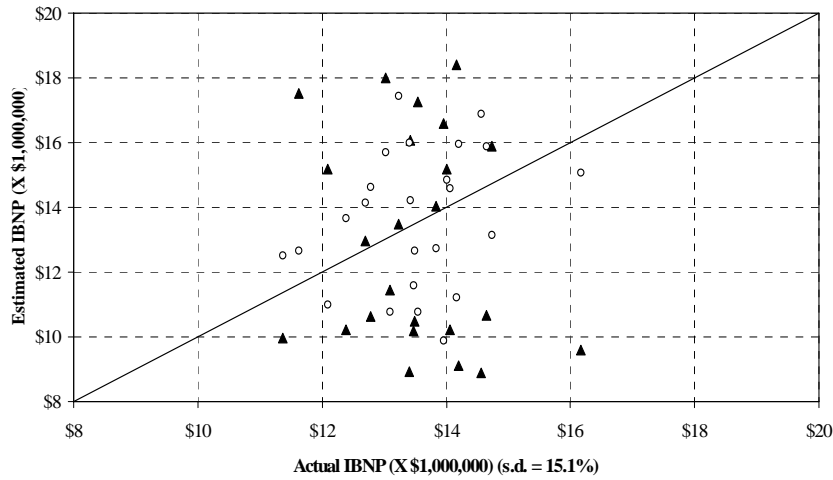


+ Simple Paid Lag (s.e. = 5.4%) ◇ Regressed Paid Lag (s.e. = 5.3%) — "Perfect Fit"

Figure 5a

Zero-Runout Actual Versus Estimated IBNP

Open-Panel Indemnity or FFS Plan: Completion Factor & Incurred PMPM Methods

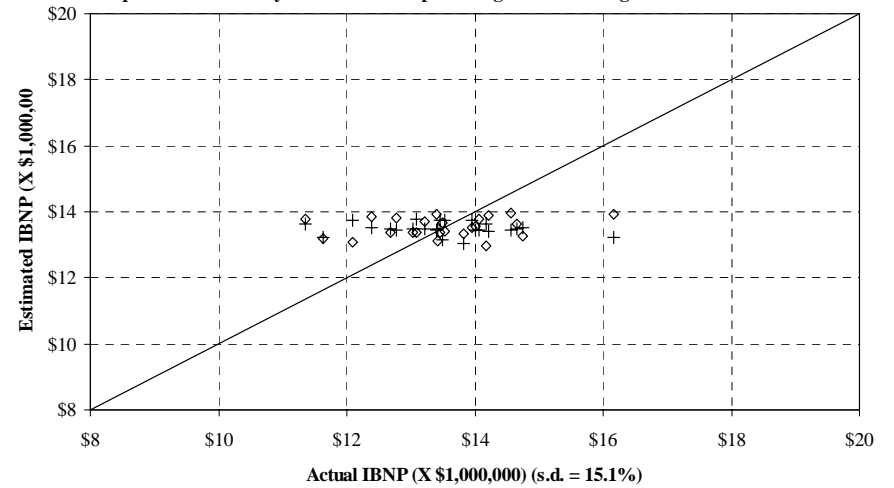


▲ Completion Factor (s.e. = 50.5%) ○ Incurred PMPM (s.e. = 29.2%) — "Perfect Fit"

Figure 5b

Zero Runout Actual Versus Estimated IBNP

Open-Panel Indemnity or FFS Plan: Simple & Regressed Paid Lag PMPM Methods

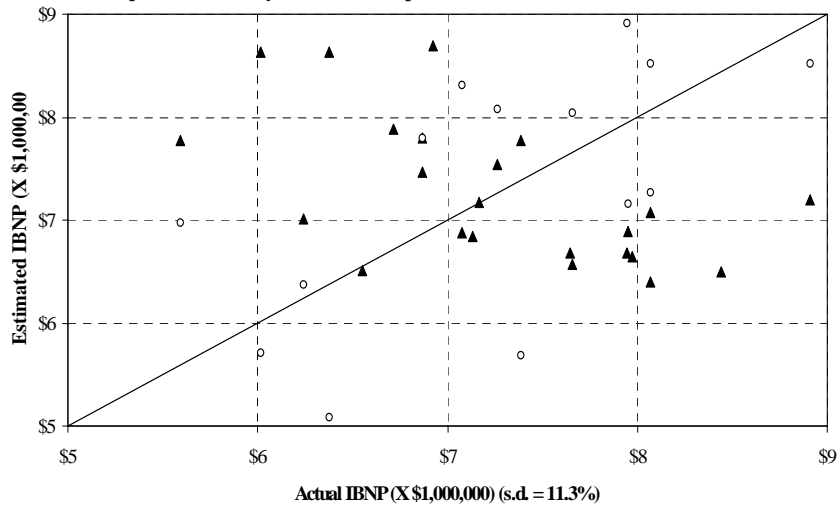


+ Simple Paid Lag (s.e. = 15.5%) ◇ Regressed Paid Lag (s.e. = 14.4%) — "Perfect Fit"

Figure 6a

1 Month Runout Actual Versus Estimated IBNP

Open Panel Indemnity or FFS Plan: Completion Factor & Incurred PMPM Methods

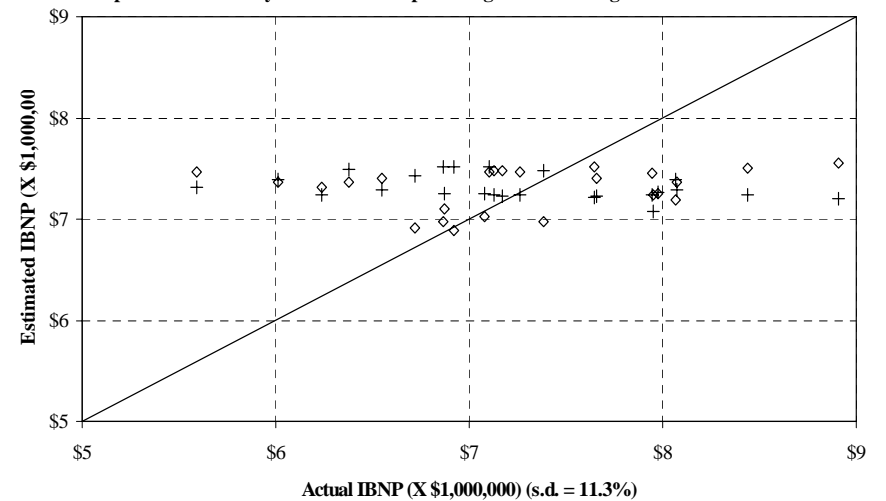


▲ Completion Factor (s.e. = 19.3%) ○ Incurred PMPM (s.e. = 24.3%) — "Perfect Fit"

Figure 6b

1 Month Runout Actual Versus Estimated IBNP

Open Panel Indemnity or FFS Plan: Simple & Regressed Paid Lag PMPM Methods



+ Simple Paid Lag (s.e. = 11.9%) ◇ Regressed Paid Lag (s.e. = 10.9%) — "Perfect Fit"

Figure 7a

2 Month Runout Actual Versus Estimated IBNP
Open Panel Indemnity or FFS Plan: Completion Factor & Incurred PMPM Methods

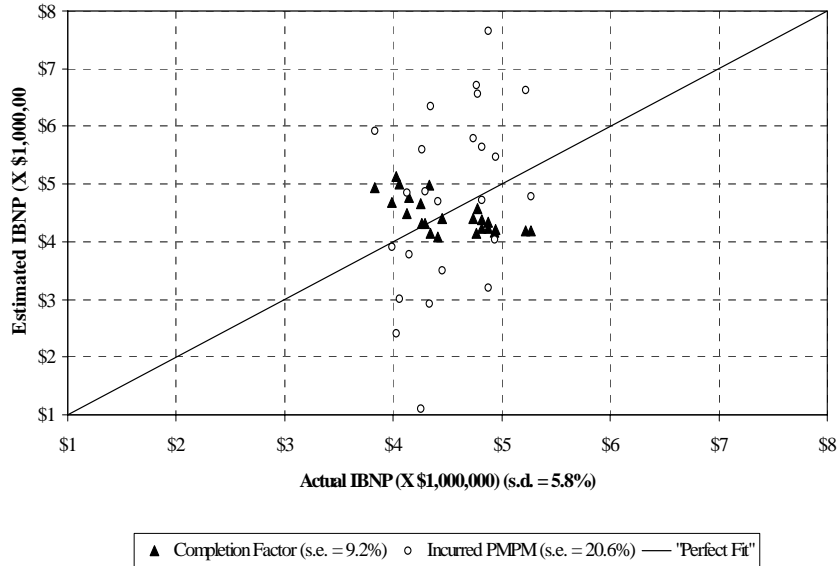


Figure 7b

2 Month Runout Actual Versus Estimated IBNP
Open Panel Indemnity or FFS Plan: Simple and Regressed Paid Lag PMPM Methods

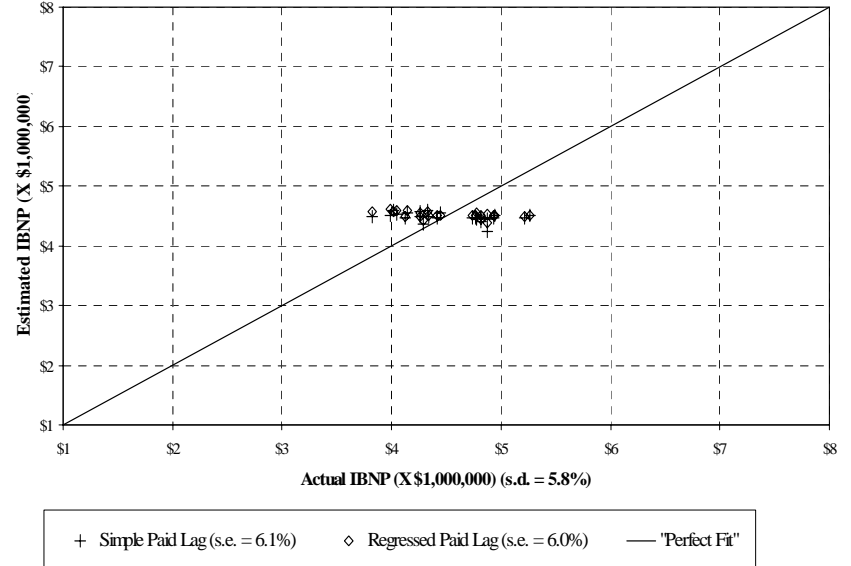


Figure 8a

3 Month Runout Actual Versus Estimated IBNP
Open Panel Indemnity or FFS Plan: Completion Factor & Incurred PMPM Methods

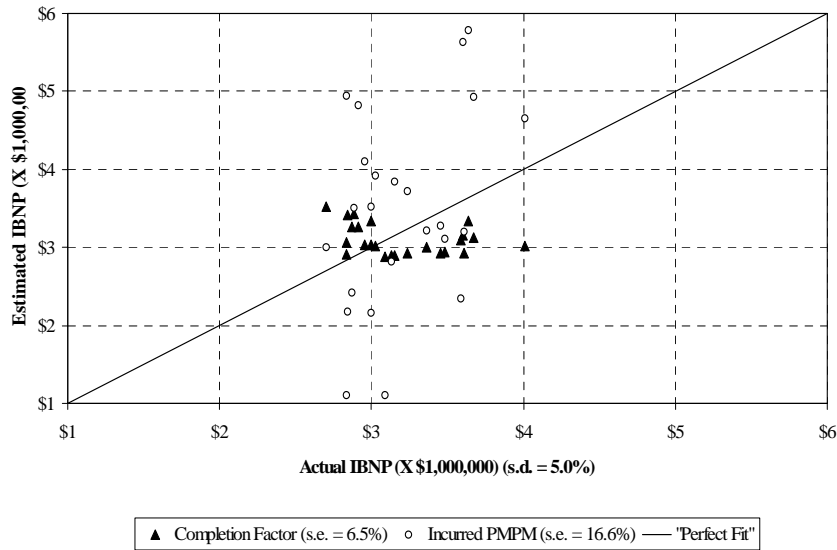


Figure 8b

3 Month Runout Actual Versus Estimated IBNP
Open Panel Indemnity or FFS Plan: Simple and Regressed Paid Lag PMPM Methods

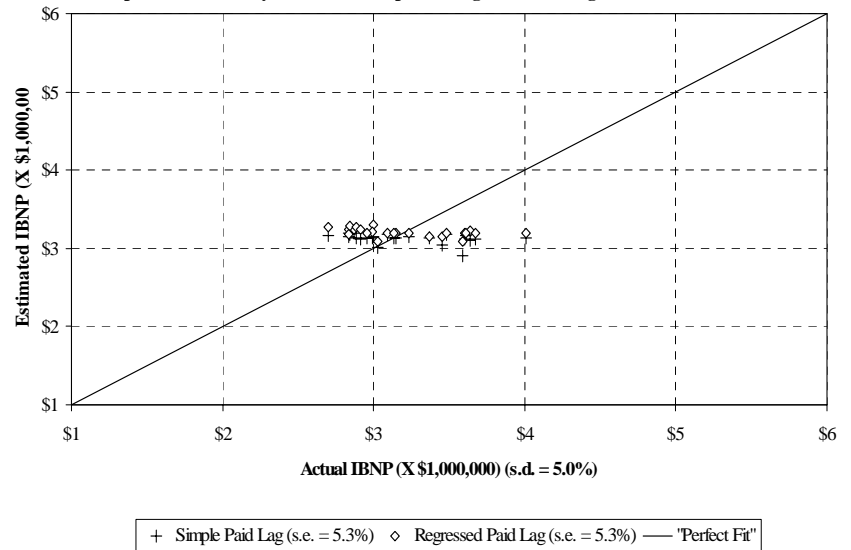
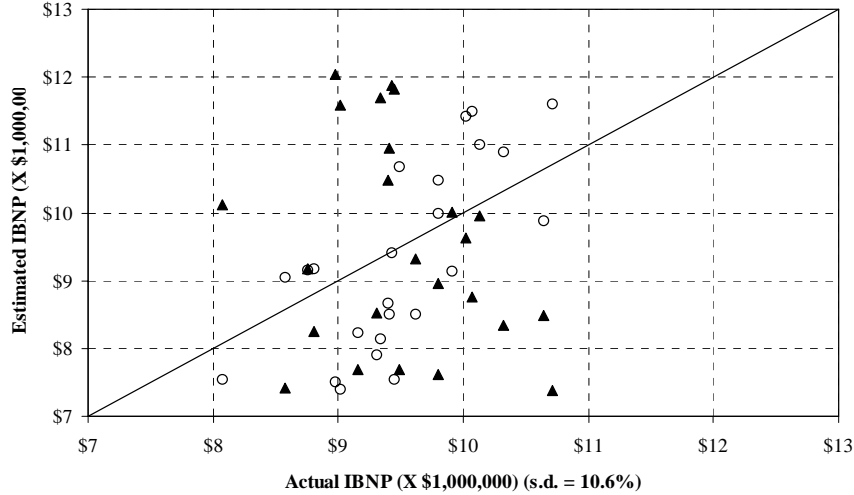


Figure 9a

Zero-Runout Actual Versus Estimated IBNP

Open-Access PPO or POS Plan: Completion Factor & Incurred PMPM Methods

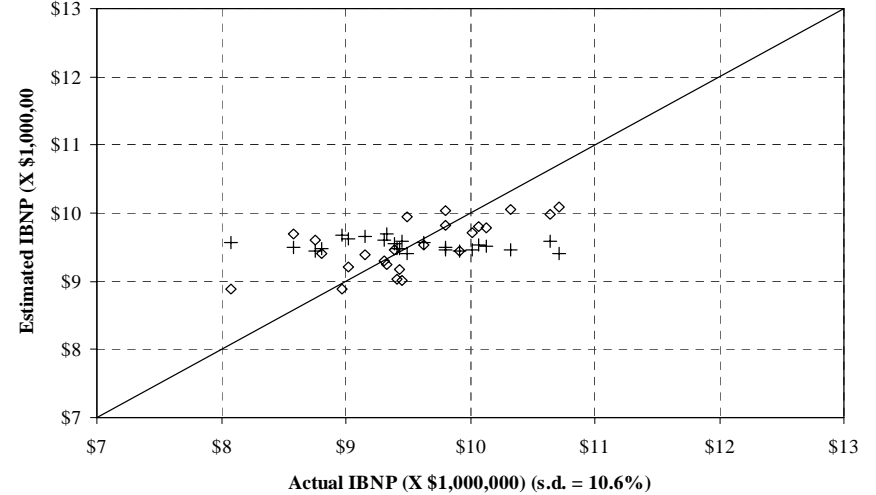


▲ Completion Factor (s.e. = 29.6%) ○ Incurred PMPM (s.e. = 17.0%) — "Perfect Fit"

Figure 9b

Zero-Runout Actual Versus Estimated IBNP

Open-Access PPO or POS Plan: Simple & Regressed Paid PMPM Methods

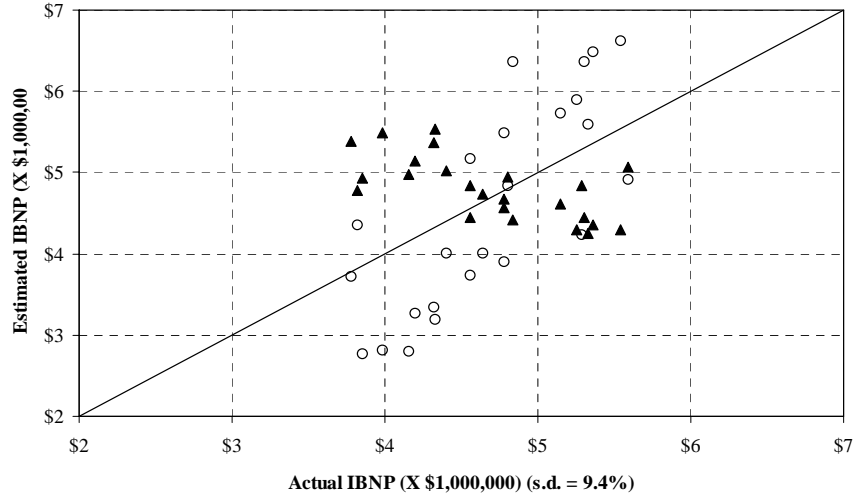


+ Simple Paid Lag (s.e. = 10.9%) ◇ Regressed Paid Lag (s.e. = 7.7%) — "Perfect Fit"

Figure 10a

1 Month Runout Actual Versus Estimated IBNP

Open-Access PPO or POS Plan: Completion Factor & Incurred PMPM Methods

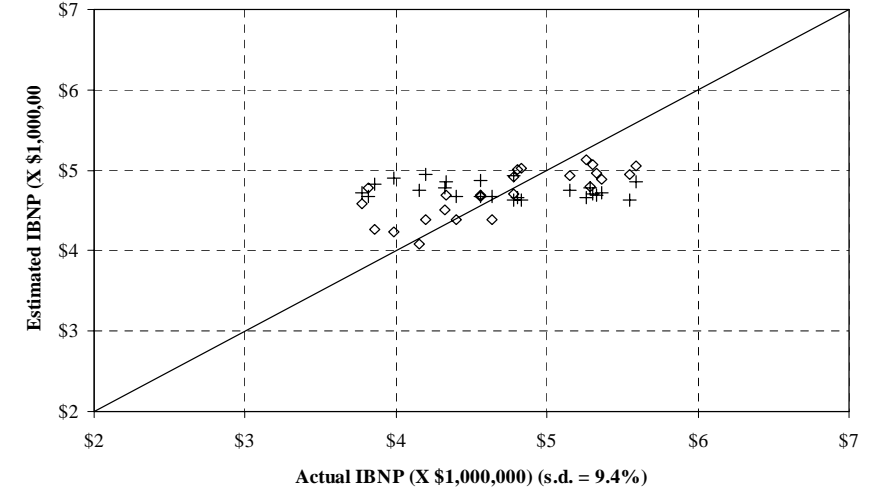


▲ Completion Factor (s.e. = 14.4%) ○ Incurred PMPM (s.e. = 14.7%) — "Perfect Fit"

Figure 10b

1 Month Runout Actual Versus Estimated IBNP

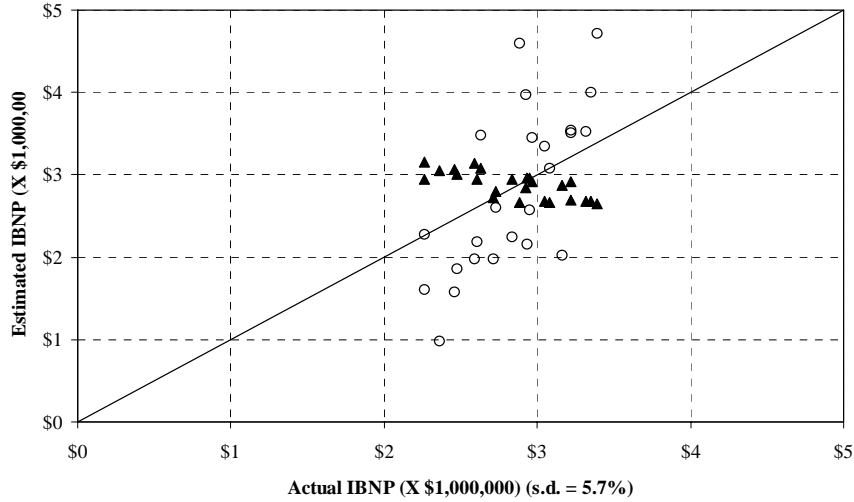
Open-Access PPO or POS Plan: Simple & Regressed Paid PMPM Methods



+ Simple Paid Lag (s.e. = 9.8%) ◇ Regressed Paid Lag (s.e. = 6.4%) — "Perfect Fit"

Figure 11a

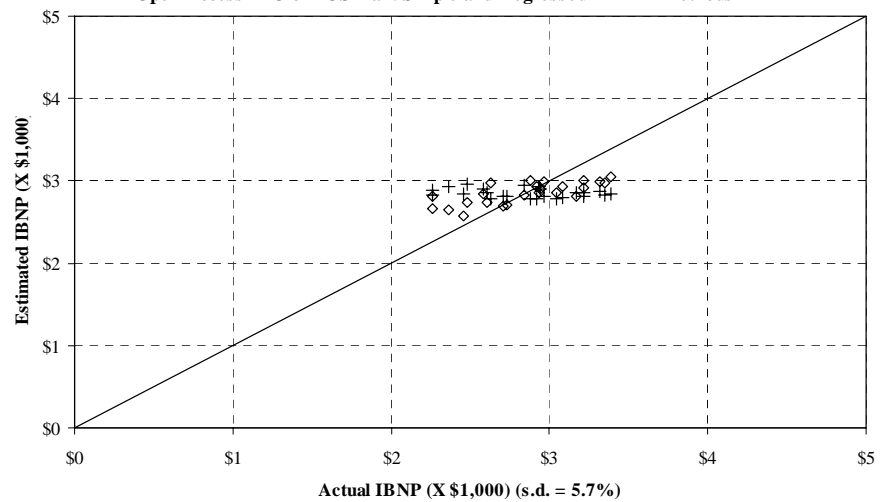
2 Month Runout Actual Versus Estimated IBNP
Open-Access PPO or POS Plan: Completion Factor & Incurred PMPM Methods



▲ Completion Factor (s.e. = 7.8%) ○ Incurred PMPM (s.e. = 12.9%) — "Perfect Fit"

Figure 11b

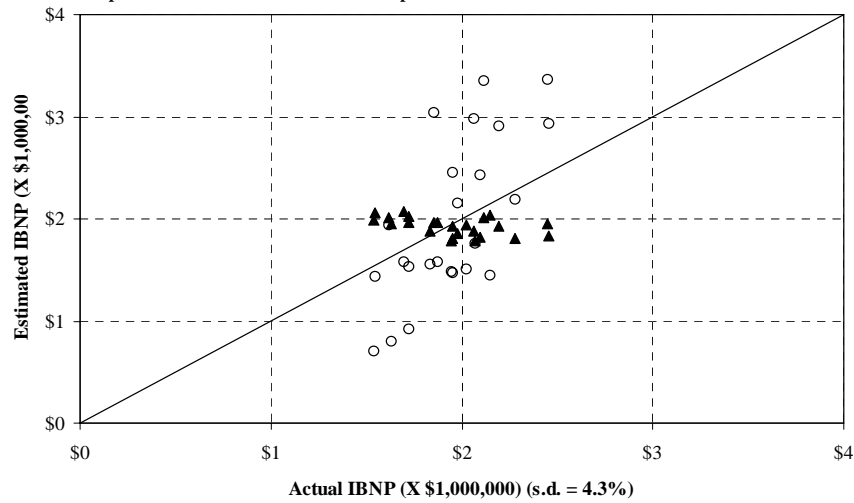
2 Month Runout Actual Versus Estimated IBNP
Open-Access PPO or POS Plan: Simple and Regressed PMPM Methods



+ Simple Paid Lag (s.e. = 5.9%) ◇ Regressed Paid Lag (s.e. = 4.2%) — "Perfect Fit"

Figure 12a

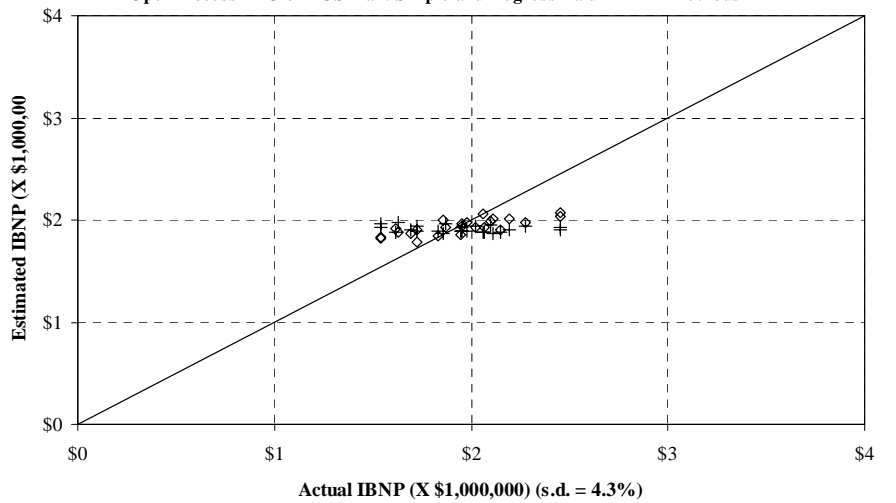
3 Month Runout Actual Versus Estimated IBNP
Open-Access PPO or POS Plan: Completion Factor & Incurred PMPM Methods



▲ Completion Factor (s.e. = 5.1%) ○ Incurred PMPM (s.e. = 10.4%) — "Perfect Fit"

Figure 12b

3 Month Runout Actual Versus Estimated IBNP
Open-Access PPO or POS Plan: Simple and Regress Paid PMPM Methods



+ Simple Paid Lag (s.e. = 4.4%) ◇ Regressed Paid Lag (s.e. = 3.3%) — "Perfect Fit"

Figure 13
Comparison of Error of IBNP Estimators:
Zero Claims Payment Runout

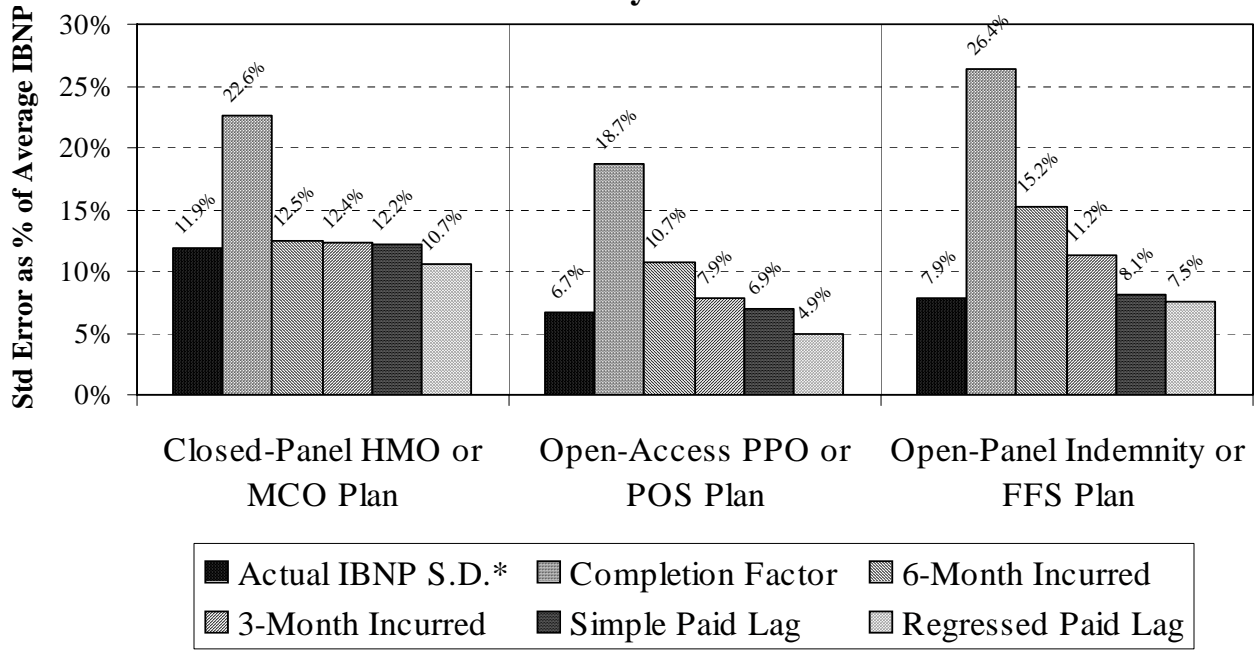


Figure 14
Comparison of Error of IBNP Estimators:
One Month Claims Payment Runout

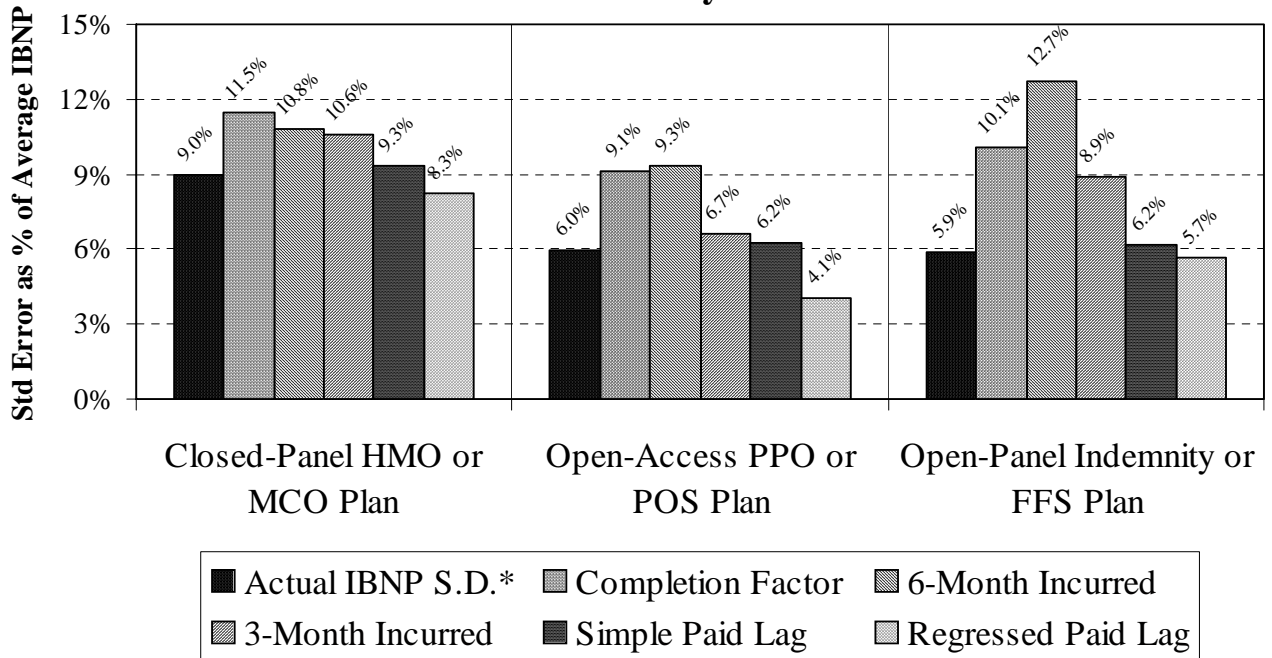


Figure 15
Comparison of Error of IBNP Estimators:
Two Months Claims Payment Runout

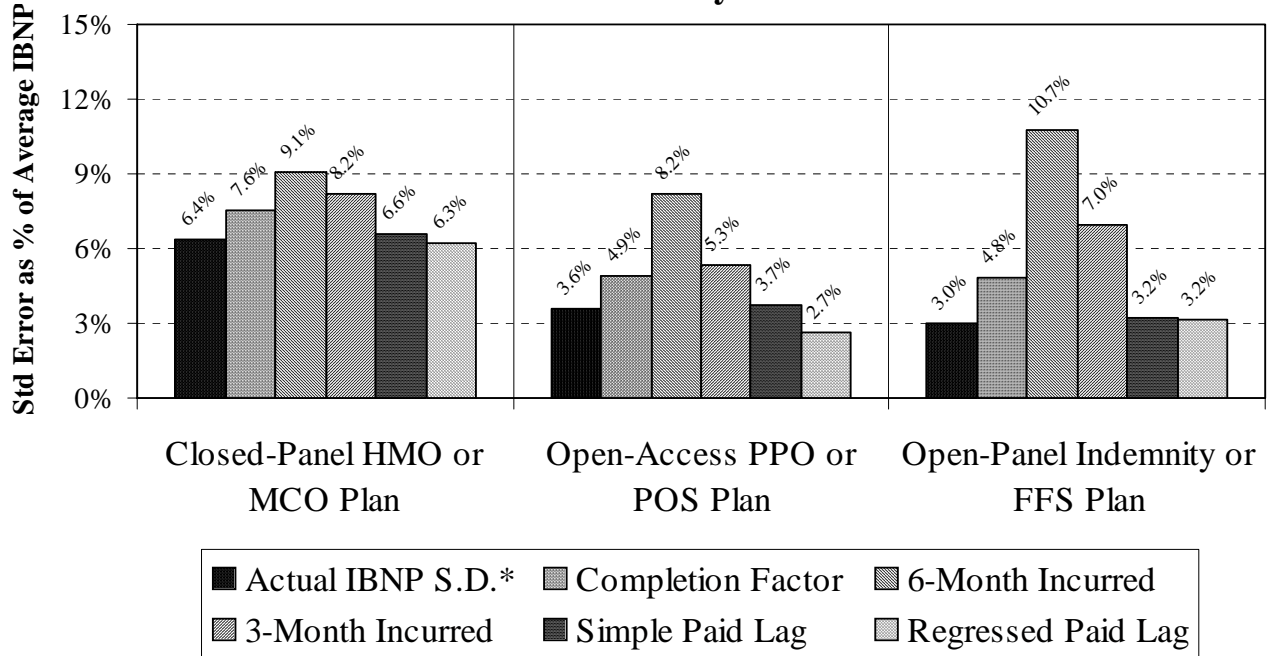


Figure 16
Comparison of Error of IBNP Estimators:
Three Months Claims Payment Runout

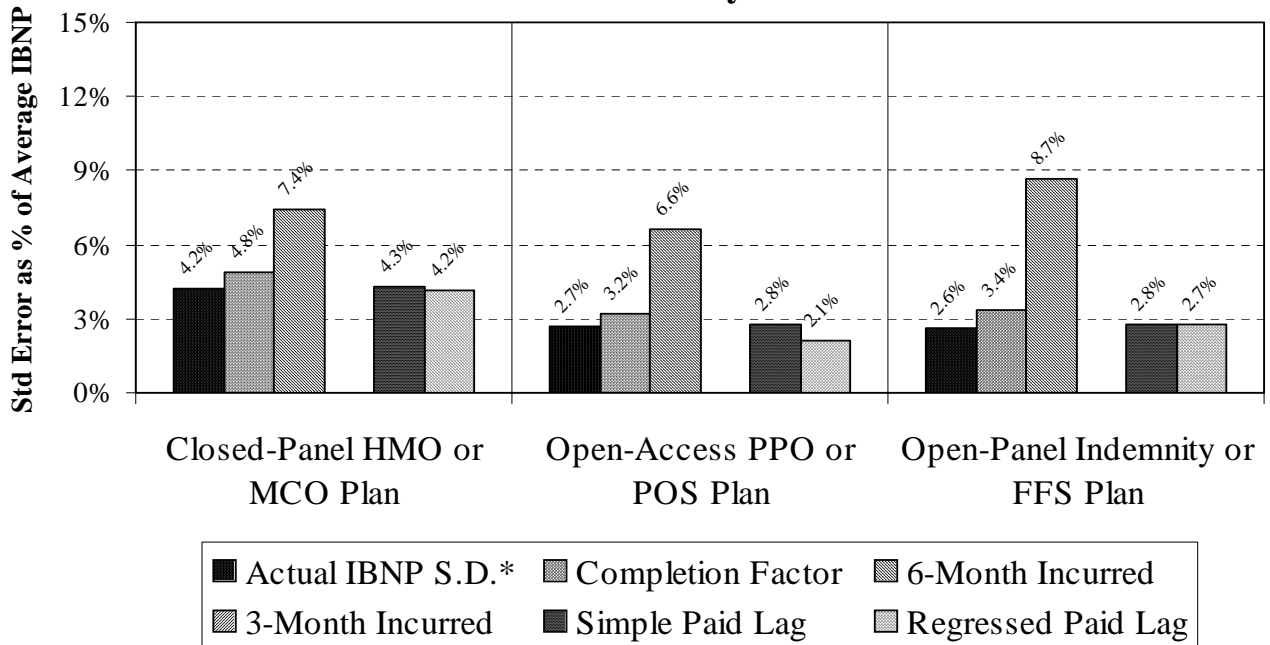
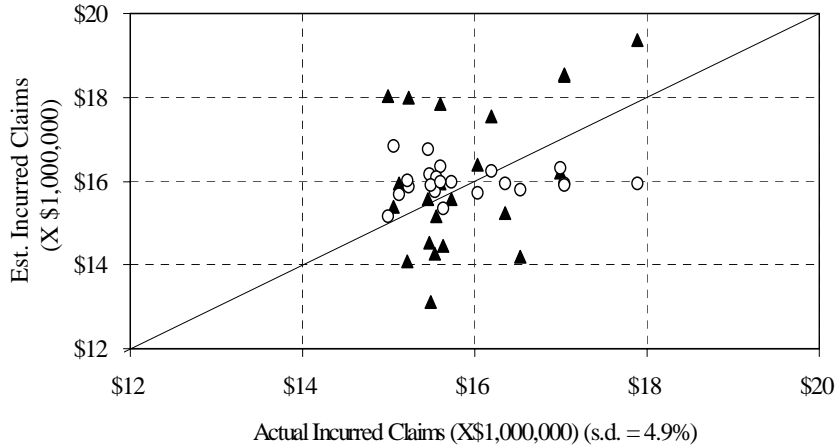


Figure 17a

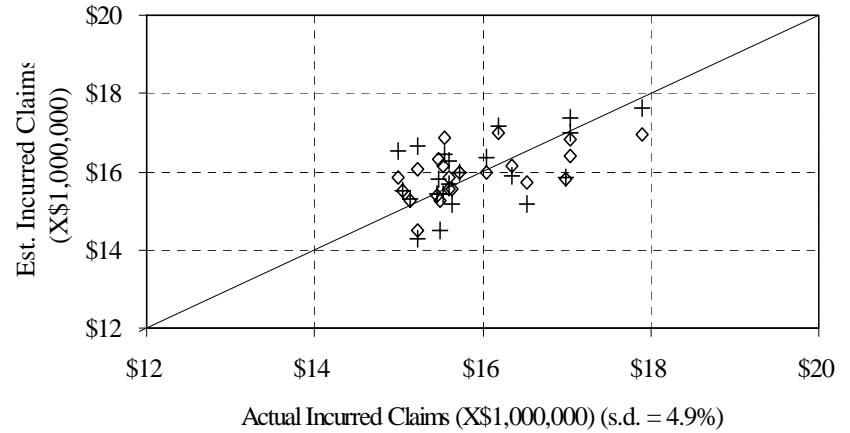
3-Month Rolling Total Incurred Claims Estimates
Zero Runout - Closed-Panel HMO or MCO



▲ Completion Factor (s.e. = 9.4%) ○ 6-Month Incurred (s.e. = 5.3%) — "Perfect Fit"

Figure 17b

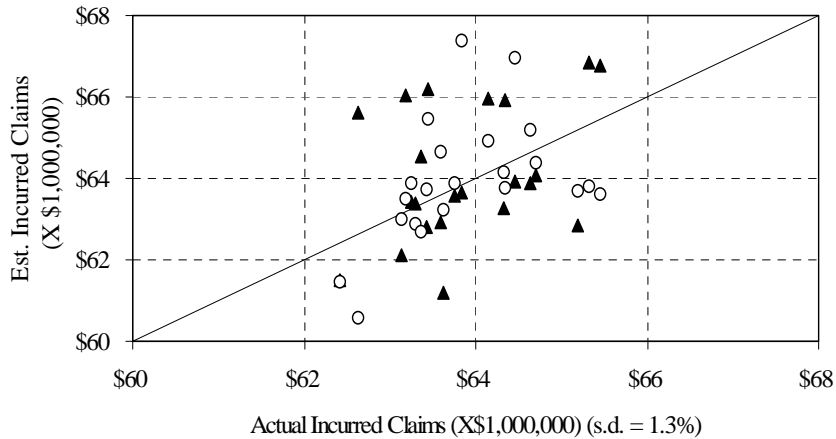
3-Month Rolling Total Incurred Claims Estimates
Zero Runout - Closed-Panel HMO or MCO



+ Simple Paid (s.e. = 4.8%) ◇ Regressed Paid (s.e. = 4.1%) — "Perfect Fit"

Figure 18a

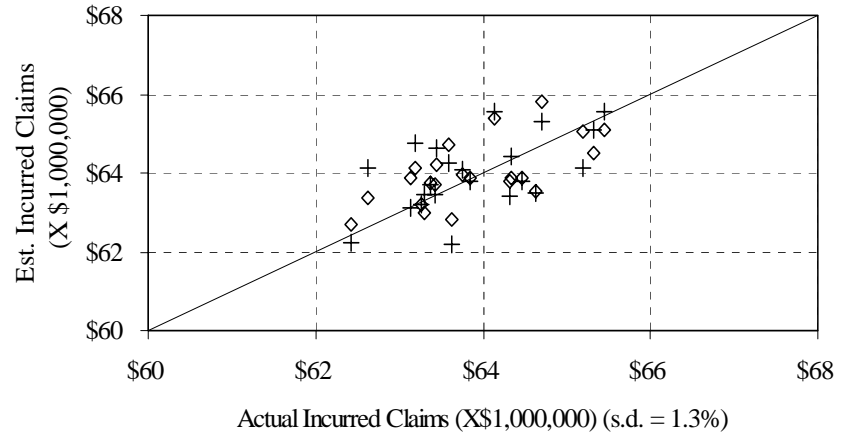
12-Month Rolling Total Incurred Claims Estimates
Zero Runout - Closed-Panel HMO or MCO



▲ Completion Factor (s.e. = 2.4%) ○ 6-Month Incurred (s.e. = 2.1%) — "Perfect Fit"

Figure 18b

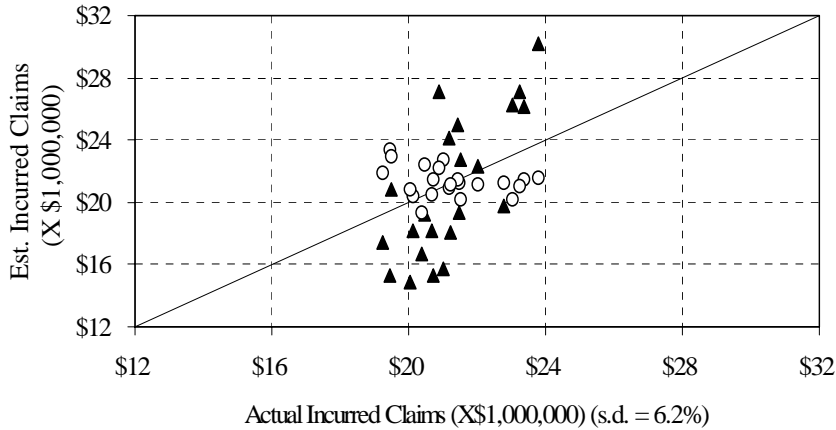
12-Month Rolling Total Incurred Claims Estimates
Zero Runout - Closed-Panel HMO or MCO



+ Simple Paid (s.e. = 1.3%) ◇ Regressed Paid (s.e. = 1.1%) — "Perfect Fit"

Figure 19a

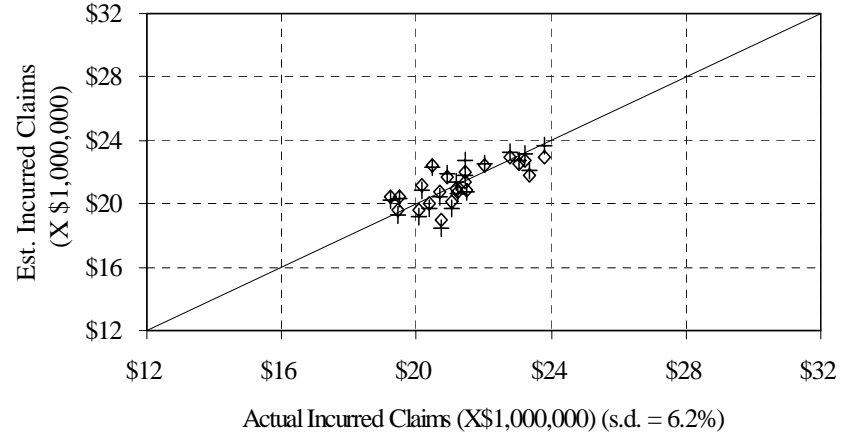
3-Month Rolling Total Incurred Claims Estimates
Zero Runout - Open-Panel Indemnity or FFS Plan



▲ Completion Factor (s.e. = 17.1%) ○ 6-Month Incurred (s.e. = 8.5%) — "Perfect Fit"

Figure 19b

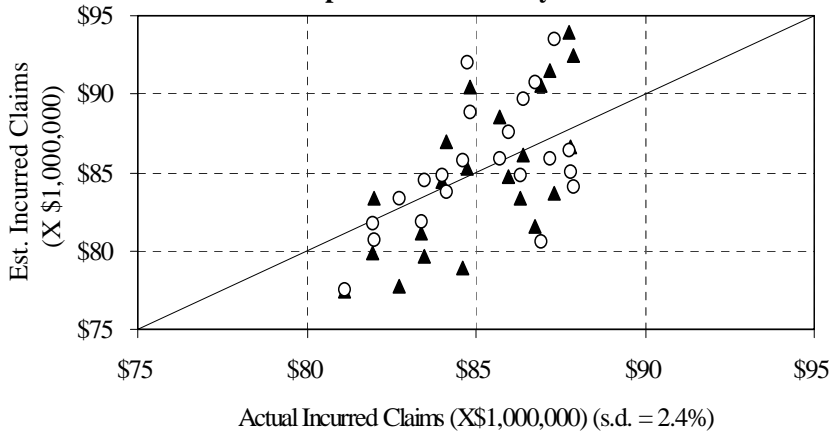
3-Month Rolling Total Incurred Claims Estimates
Zero Runout - Open-Panel Indemnity or FFS Plan



+ Simple Paid (s.e. = 4.4%) ◇ Regressed Paid (s.e. = 4.1%) — "Perfect Fit"

Figure 20a

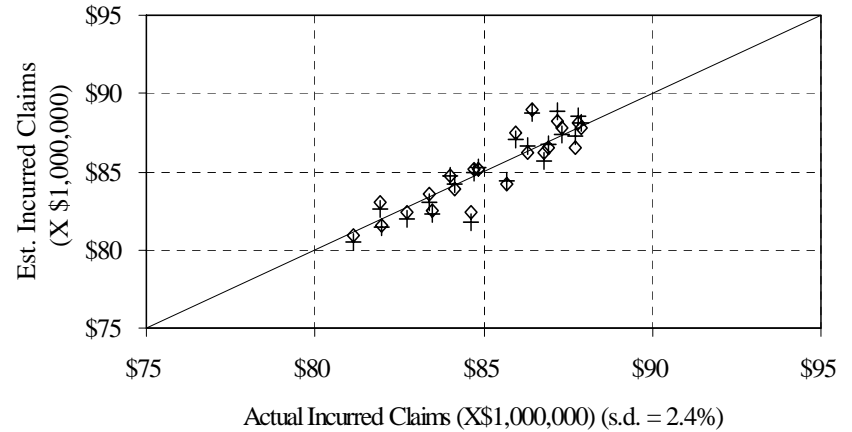
12-Month Rolling Total Incurred Claims Estimates
Zero Runout - Open-Panel Indemnity or FFS Plan



▲ Completion Factor (s.e. = 4.3%) ○ 6-Month Incurred (s.e. = 3.8%) — "Perfect Fit"

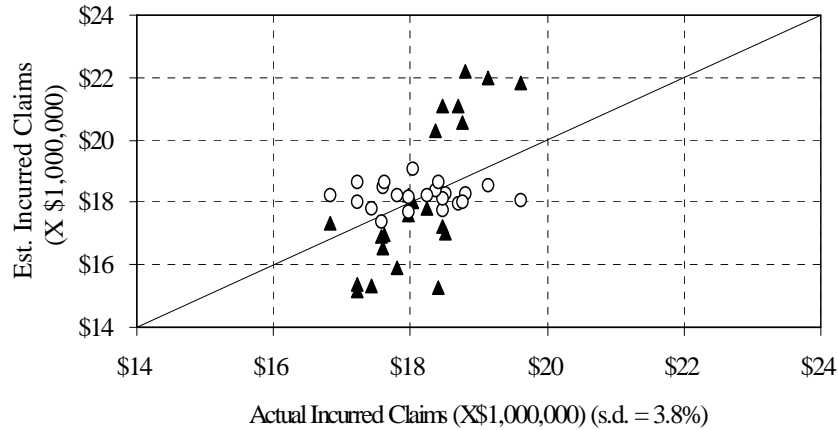
Figure 20b

12-Month Rolling Total Incurred Claims Estimates
Zero Runout - Open-Panel Indemnity of FFS Plan



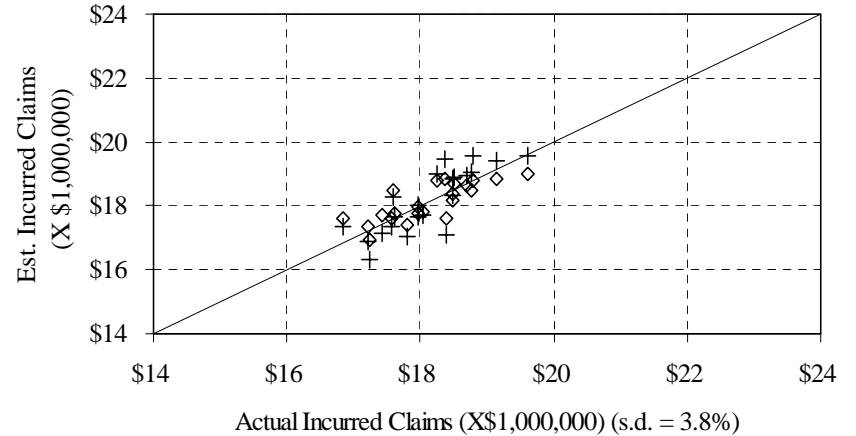
+ Simple Paid (s.e. = 1.3%) ◇ Regressed Paid (s.e. = 1.2%) — "Perfect Fit"

Figure 21a
3-Month Rolling Total Incurred Claims Estimates
Zero Runout - Open-Access POS or PPO Plan



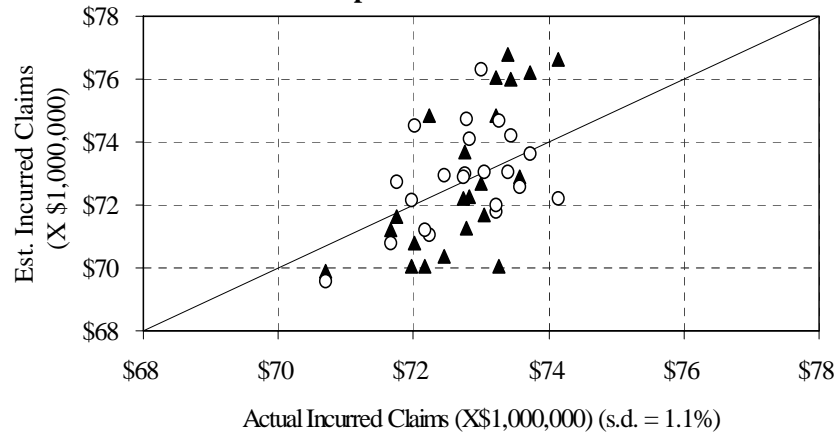
▲ Completion Factor (s.e. = 10.2%) ○ 6-Month Incurred (s.e. = 4.3%) — "Perfect Fit"

Figure 21b
3-Month Rolling Total Incurred Claims Estimates
Zero Runout - Open-Access POS or PPO Plan



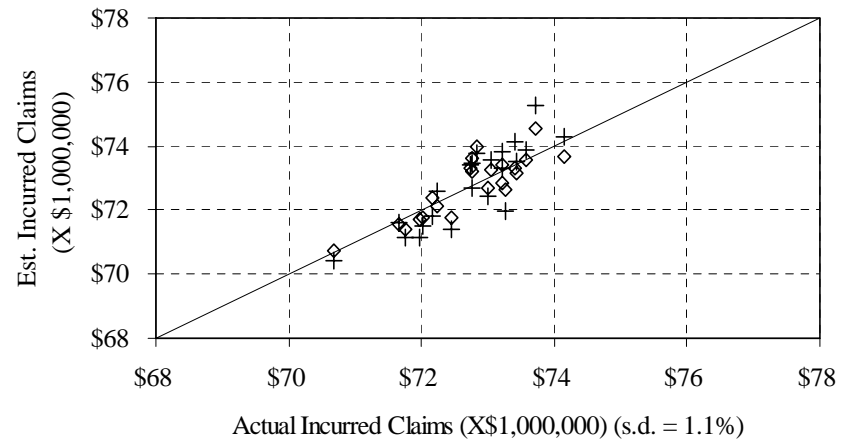
+ Simple Paid (s.e. = 3.2%) ◇ Regressed Paid (s.e. = 2.3%) — "Perfect Fit"

Figure 22a
12-Month Rolling Total Incurred Claims Estimates
Zero Runout - Open-Access POS or PPO Plan



▲ Completion Factor (s.e. = 2.6%) ○ 6-Month Incurred (s.e. = 1.8%) — "Perfect Fit"

Figure 22b
12-Month Rolling Total Incurred Claims Estimates
Zero Runout - Open-Access POS or PPO Plan



+ Simple Paid (s.e. = 0.9%) ◇ Regressed Paid (s.e. = 0.7%) — "Perfect Fit"

Figure 23
Comparison of Error of Rolling 3-Month Incurred
Claim Estimates with Zero Claims Payment Runout

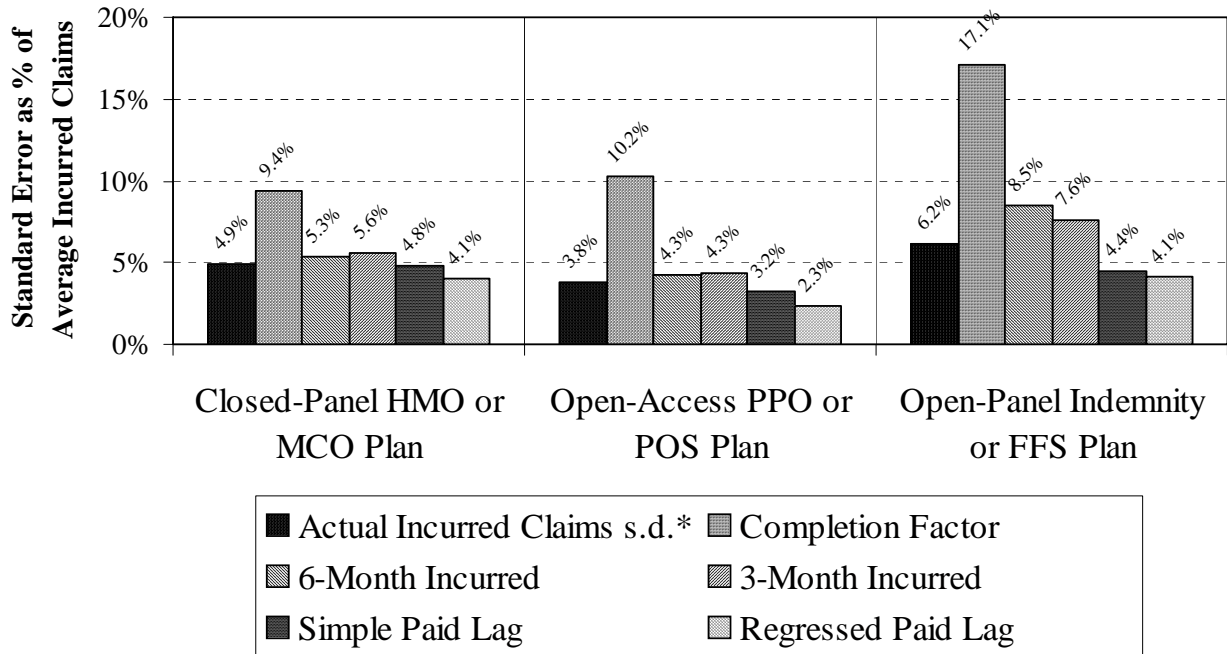


Figure 24
Comparison of Error of Rolling 12-Month Incurred
Claim Estimates with Zero Claims Payment Runout

