

Health Section Issues

New IBNR Study

by Cabe Chadick and Steven Siegel



If you were to take a poll of health actuaries on what they consider their “bread and butter” responsibilities, there is no doubt that estimating Incurred but Not Reported Reserves (IBNR) would rank high. Furthermore, for many health actuaries, working on estimation of IBNR is their first assignment when embarking on their careers. Given the importance of IBNR estimation for the profession, a number of approaches for calculating it have been developed over the years. But, up until now, there has been very little by way of comparative information on the approaches.

Recognizing this lack of comparative information, the Health Section Council of the Society of Actuaries commissioned a research project to assess the accuracy of commonly used IBNR estimation methods over a wide range of scenarios. Lewis & Ellis, Inc. (“L&E”) was awarded the contract to perform this research. The resulting report and supporting material are available on the SOA Web site at: <http://www.soa.org/research/health/research-ibnr-report.aspx>

To conduct the study, a stochastic model was constructed to compare and score estimates produced by the IBNR methods that were selected for testing. The testing was done over a significant number of

iterations and alternative business situations. (See box on page 17 for a listing of the IBNR methods which were tested.)

With the wide variety of policy types, adjudication practices, lag times, and other variables, it is impossible to say that a given method is the appropriate one in all cases. Even in the testing performed, different methods for a particular block performed better under different scenario tests. L&E analyzed the results in an effort to provide some basic guidelines to help health actuaries determine the appropriate method to choose for particular circumstances.

General observations from the study include:

1. Lag methods tend to be the most common methods used by health actuaries; however, the study results consistently show them to have the highest standard deviation in the scenarios that were tested. If lag methods are the desired approach, the more advanced average lag methods and hybrid methods are much better alternatives to the straight average methods. The hybrid methods, especially, produce fairly low mean errors and standard deviations.
2. For rapidly completing blocks in virtually all tested scenarios, the results of the Paid PMPM method appeared the closest to the mean and had the lowest standard deviation. This method was designed to have a lower variance than other methods, and the testing corroborated that design under certain conditions. Subject to caveats mentioned in the study, the Paid PMPM method had the lowest standard deviation in virtually all of the tests on all blocks. The Paid PMPM method, however, also has some weaknesses that are described in the report. Robert Lynch, who has written articles about the Paid PMPM method, indicated in the course of the research that it is under patent protection and proprietary. In light of this, those who would like to use the method may want to consult with legal counsel before doing so for their particular application and circumstances.
3. Seasonality of claims can have a material impact on the mean error. For example, seasonality exhibited by claim concentration early in a calendar year resulted in typical material positive

... up until now, there has been very little by way of comparative information on the approaches.

errors (i.e., reserve sufficiencies) for the recent incurral months for a number of the IBNR calculation methods, when applied to a year-end valuation date. Seasonality exhibited by claim concentration later in the calendar year (e.g., large deductibles) exhibited the opposite typical results across most IBNR calculation methods.

4. Applying an IBNR method (e.g., Benktander) that relies on premium for its calculations requires adjustment and likely actuarial judgment.
5. There is a material risk to IBNR accuracy when removing large claims from the dataset in which the IBNR calculation method (e.g., traditional lag, Paid PMPM, etc.) is applied.
6. Care should be taken in determining which IBNR method to choose for different medical insurance block types. For example, the self-funded block type and the HMO Inpatient block type had the highest standard deviation of error results observed across most IBNR methods tested.

The study is intended to serve as a practical guide for the calculation of claim reserves, focusing on the different methodologies available for IBNR calculations. In keeping with this goal, the study does not endorse one method over the other—the choice really comes down to what method will work best in a given situation and set of unique circumstances. It is the authors' hope that the guide will serve as a starting point for any actuary establishing a new reserving process or wishing to re-examine an existing process.

This study reviewed the following IBNR methods:

- Exposure Methods:
 - Loss Ratio Method
 - PMPM Method
- Basic Development Methods:
 - Straight-Average Lag with Average Periods of 3, 6, 9, 12 Months
 - Straight-Average Lag without Outliers
 - Geometric Average Lag
 - Harmonic Average Lag
 - Dollar-Weighted Average Lag
- Cross-Incurral Period Method
- Hybrid Chain-Ladder Methods
 - Hybrid Loss Ratio Method with Outliers Removed
 - Bornhuetter-Ferguson with Straight-Average Lag
 - Gunnar-Benklander with Straight-Average Lag
 - Credibility-Weighted with Straight-Average Lag
- Paid PMPM Method
- Stochastic Methods

More information on each of the methods above, including additional details and formulas, can be found in Appendix B of this study. ■



Cabe W Chadick, FSA, MAAA, is a consulting actuary and principal with Lewis & Ellis, Inc. in Richardson, Texas. He can be reached at 972.850.0850 or cchadick@lewisellis.com.



Steven Siegel, ASA, MAAA, is a research actuary for the Society of Actuaries, in Schaumburg, Ill. He can be reached at ssiegel@soa.org.