

Statistical Tools for Actuaries— First in New Series of Guides Available

by Steven Siegel

See if you can answer this question: What do the following four items have in common?

- A. Part 2
- B. Exam 110
- C. Course 1
- D. Exam P

If you answered that they have been or are SOA examinations on Probability and/or Statistics, you are correct! (You get partial credit if you answered No. 2 pencils, writer's cramp or Tylenol). Indeed, it's come in a variety of incarnations over the years, but being tested on their knowledge of probability and statistics is one thing almost all actuaries have in common. Yet, I would imagine that many of you reading this may find yourself like me with dimming memories of studying this material and passing the applicable exam.

Likewise, over the years I've heard from many health actuaries of their desire to incorporate more statistical concepts into their daily responsibilities, such as reserve estimates, benefit pricing, etc. At the same time, as a result of greater scrutiny on financial reports because of Sarbanes-Oxley and other measures, the pressure on health actuaries to demonstrate validity in their estimates has grown steadily.

Recognizing an opportunity to help serve its members in this age of increased financial oversight, the Health Section of the Society of Actuaries commissioned a series of guides on the use of statistical techniques specifically geared for the work of health actuaries. In the recently released first guide in the series, the topic is an estimate well-known to health actuaries—the calculation of incurred but not reported (IBNR) health claims reserves. In particular, the guide focuses on the development of confidence intervals around IBNR estimates. Future guides to be published in this series include applications of credibility theory to health actuarial tasks.

The guide, co-authored by Jinadasa Gamage, Jed Linfield, Krzysztof Ostaszewski and myself, was written with a number of distinct audiences in mind, and these audiences will likely want to use

the guide differently. An experienced health actuary with distant, yet pleasant (well, maybe not so pleasant) memories of actuarial exams may choose to skip over the introductory chapters and concentrate more on the later chapters. For beginning health actuaries, the statistical concepts in the guide may be fresh on their minds, but they might not yet have actually calculated an IBNR claims reserve. These actuaries can use the guide as an introduction to how IBNR claims reserves are typically calculated in practice and then move on to the statistical perspective.

The guide includes an overview of health care liabilities and the completion factor method, as well as step-by-step descriptions of how to use regression and simulation techniques to calculate confidence intervals for IBNR estimates. Accompanying the guide are two Excel workbooks that can be used for educational purposes to demonstrate how to use the techniques. All of the material is available to download from the SOA Web site at:

<http://www.soa.org/research/health/research-stats-hlth-act.aspx>

The guide would have not have been possible without the advice and wise counsel of the Project Oversight Group appointed to oversee its development: Rowen Bell, David Dickson, Doug Fearington, Chuck Fuhrer, Eric Smithback, Tony Wittman and Kurt Wrobel.

Special thanks also to Claire Bilodeau, Elaine Canlas, Walter James, Stuart Klugman, Jim Mange and Jeanne Nallon for their invaluable assistance.

Finally, for experienced health actuaries who have already incorporated statistical techniques into their daily practice, it is the hope of the authors of the guide that this inspires them to further their work and devise new methods that they might want to share with the health actuarial community. And it is my own personal wish that this guide sparks continued interest in this topic and that when health actuaries think Monte Carlo, it's for more than casinos and famous celebrity sightings. 📊



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