A Portrait of the Actuary as a Young Man

A FICTIONAL ACCOUNT OF THE VOLATILITY OF LONG-TERM CARE INSURANCE

By Roger Loomis

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Pete Granger, FSA, was sitting at his desk, catching up on miscellaneous emails. He had booked the LTC reserves the prior evening and spent most of the morning compiling and organizing his work papers that documented the valuation work. It was only 11:30 a.m., but Pete was thinking about lunch. He glanced at the window, and wondered if it was too early to start asking his friends if they were ready to start heading out. It was Thursday and that meant that as far as Pete was concerned, lunch would be at Ricco's Bistreaux in the French Quarter, with its weekly special of Crawfish and Artichoke soup.

Just then, the phone rang. Pete glanced at the caller ID and saw that it was Glen Maitland, the chief actuary. "Hi Pete. Do you have a minute to go over the LTC financial results?"

"On my way." Pete replied. In one motion he hung up the phone, stood up, and picked up the file folder that was waiting on the desk. He walked between the rows of cubicles to Glen's spacious corner office.

Glen's office featured a large leather chair between a desk and credenza, both of which had tall yet neat piles of file folders. In front of the desk was a large area occupied by an empty round table and four matching side chairs. Glen walked around his desk with a single file folder and started to sit down at the round table just as Pete entered the room. Knowing the routine, Pete sat down next to Glen, and they simultaneously opened up their folders, revealing matching reserve reports on top.

Glen got right to the point. "Second quarter results are disappointing. On the LTC line alone, our quarterly profits are $2.1 million below plan."

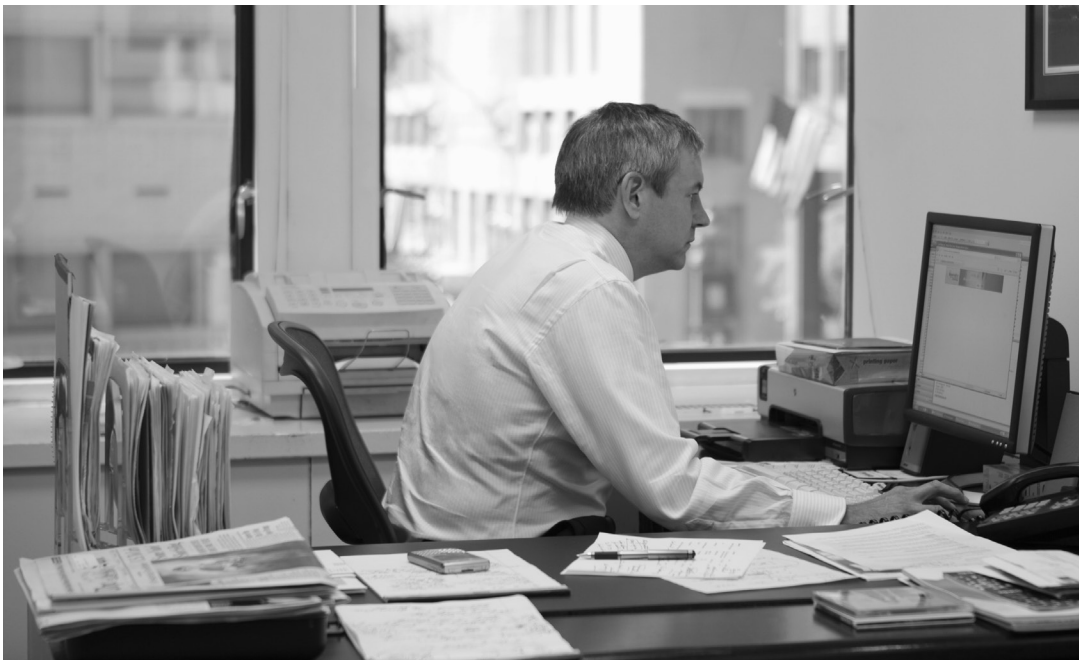
Glen paused for emphasis. Pete wanted to demonstrate that he'd already analyzed this, so he finished Glen's thought process. "And the plan numbers came from a new projection based on more conservative assumptions that were developed in conjunction with the painful rate increase from last year. If we compare the projection to actual results line by line, we came very close to hitting the projected premiums, commissions, expenses, paid claims, and even investment income. Almost all of the deviation from the plan is due to the reserves being two million higher than projected."

Glen had a frown on his face, but nodded because Pete knew the numbers and had already analyzed this outcome. Glen wasn't an LTC expert, and so far only saw conflicting messages in these numbers. He reasoned that if there were problems related to operations or morbidity that they'd show up in the financials. Premiums and paid claims being very close to plan seemed to establish that the actual experience was fine. But the reserves, other than IBNR, were deterministic and based on the actual experience. "So what's going on Pete? Is there a problem with the reserves?"

"No," Pete answered, "the reserves are consistent with the actual operational experience of the quarter. Let's start by looking at that." Peter turned to a report in his folder that compared the actual new claims, deaths, recoveries, and lapses to what was projected (see Exhibit 1).

Exhibit 1

Key LTC Metrics, 2Q, 2014			
	(1) Actual	(2) Expected	(1)/(2) A/E
New Claims	80	70.4	1.14
Recoveries	17	16.7	1.02
Deaths	56	53.2	1.05
Lapses	151	157.0	0.96



This was a standard report that management was accustomed to seeing, but Pete didn't like it. He thought that point estimates for what was "expected" implied an unrealistic precision to the forecasts that was misleading to senior management.

Glen looked at the report, and quickly noticed that high new claims and somewhat low lapses were likely the main drivers of the unfavorable experience, and that these effects were somewhat offset by favorable mortality. "I hope this news on the incidence rates doesn't last—I'd hate to go back to the regulators and request another 15 percent rate increase."

"Is it really news?" Asked Pete. "After all, we weren't really expecting to see exactly 70.4 new claims this quarter, were we?"

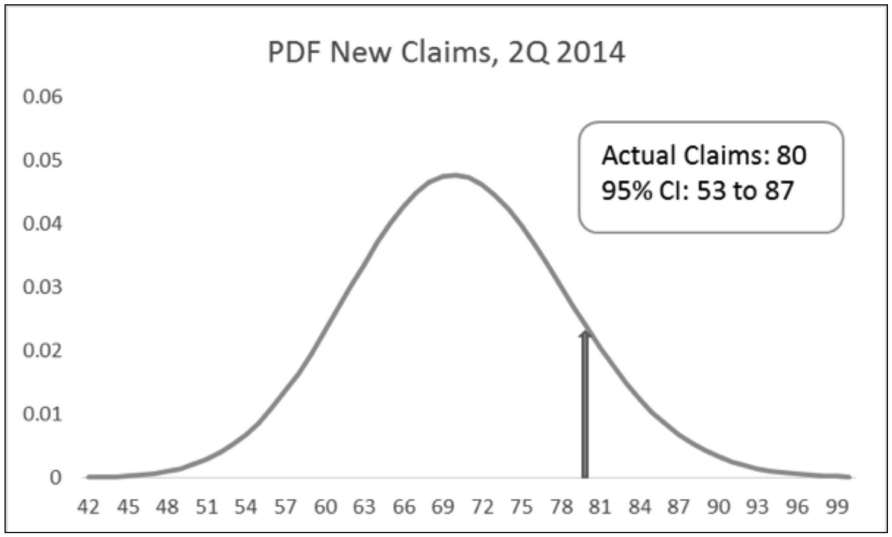
Although he was sure Pete must have understood this, as a reflex Glen began to explain what the expected numbers mean. "Of course we don't expect to get that number exactly. All we're saying is that that is the statistical mean—if all of the other assumptions in the model are correct, then the law of numbers says we'll be close to 70.4 claims."

"That's the real question then," responded Pete, finally getting to his point. "Are 80 claims 'close' to 70.4?" Glen wasn't sure. Pete proceeded to pull out of his stack of reports a graph with a picture of a bell curve (Exhibit 2).

"If we begin with the known number of policies at the start of this period, and if we assume that our incidence rate assumptions are precisely the true probability of each policy going on claim, then this graph shows the probability distribution function of the number of new claims. In essence, we know that if our assumptions are correct, then we can be 95 percent certain that the number of new claims will be between 54 and 87."

"I see that the 80 claims that were incurred is higher than the mean, but well within this distribution," said Glen. "So really, as far as new claims, our

Exhibit 2



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"Some product designs not only reduce the risk to the insurance company, but also to the people they insure."

actual experience is in fact consistent with our assumptions."

"Exactly," replied Pete. "From a statistical perspective, there is no evidence that our assumed incidence rates are wrong, or that there is an operational problem with claim adjudication."

"Okay. I see that the number of new claims is within the expected range, but what about the reserve increase? Is there a way to set a prediction interval around the change in reserves?"

"Yes, and I've already done the calculations" said Pete, excited that he now had interest in his project. "We put together a model that stochastically forecasts claims, recoveries, deaths, and lapses using Monte Carlo simulation. We did 200 simulations of the development of our entire portfolio of LTC policies. As each policy matured, went on claim, recovered, lapsed, and eventually died, we simulated what the actual cash flows and reserves would be, according to that scenario."

"By modeling the business stochastically this way, we see that every operational and financial metric that is a function of claims, recoveries, lapses, and deaths is a random variable in its own right, with its own PDF. The simulation process allows us to simultaneously estimate the pdf of every one of these variables. We went back and reran the budget forecast this way, as-of Dec. 31, 2013. The simulated results show that the actual 95 percent prediction interval for both profits and change in reserves is the expected value of the metric, plus or minus five million."

"Five million?" Glen responded with surprise. "You are telling me that we could have missed the plan by up to five million dollars and still been able to claim that the results were consistent with expectations?"

"Exactly. If our assumed incidence, lapse, recovery, and death probabilities are correct, we can be 95 percent confident that we will hit our best estimate of the quarter, *plus-or-minus five million*."

"This business is a riskier than I thought."

"Yes and no. Over longer reporting horizons, period-by-period deviations in financial results tend to cancel each other out. Companies in this business need to take a long-term perspective and shouldn't overreact to the monthly fluctuations that are inherent to the risks they are insuring. Actuaries need to do a better job of explaining to management our level of confidence in our forecasts by providing prediction intervals rather than point forecasts."

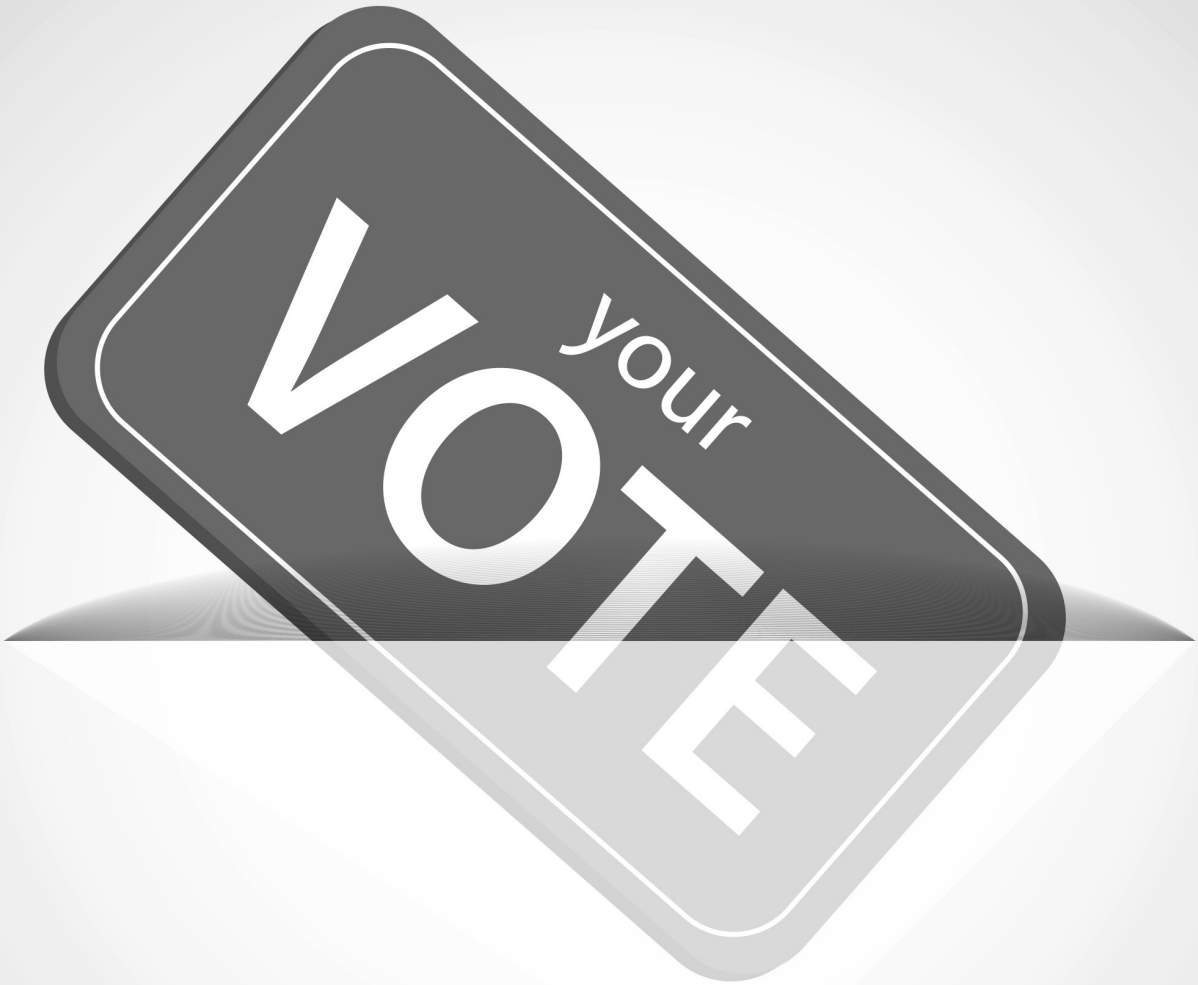
"Where can I read more about this?"

"ARC just finished a study for the SOA on how to better understand the riskiness of LTC by using Monte Carlo simulation. The paper not only explains how you can use models to better understand the riskiness of a block of business, it also discusses the implications this has for pricing margins and rate increases. It also goes on to discuss how the risk can be mitigated by product designs. Some product designs not only reduce the risk to the insurance company, but also to the people they insure."

Glen was excited to hear more, but his stomach growled. "I'm starved," he said, looking at his watch. "Do you have plans for lunch? If not, we can continue this conversation over a bowl of crawfish and artichoke soup at Ricco's Bistreaux."

"*Understanding the Volatility of Experience and Pricing Assumptions in Long-Term Care Insurance*" is now available at *http://www.soa.org/research/researchprojects/ltc/research-2014-understanding-volatility.aspx.* ■

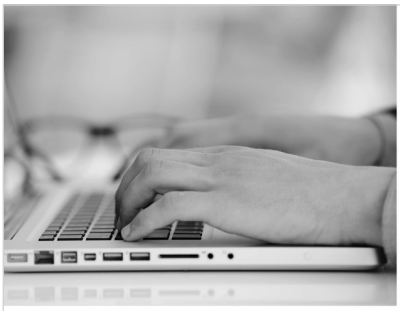
SOA ELECTIONS 2014



CALLING ALL ELIGIBLE VOTERS

This year, elections open August 18 and close September 5 at 5 p.m. Complete election information can be found at ***SOA.org/elections***. Questions?

Send them to ***elections@soa.org.***



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