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The Actuarial Ethicist: Responses to Stochastic Cherry Orchard

by Frank Grossman



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THE CASE STUDY

Briefly summarized¹, Lennie the FSA has been asked by his manager, Anita the FSA, to update the five-year-old analysis of the investment guarantees embedded in their firm's large inforce block of universal life [UL] policies. At that time, the cost of the minimum crediting rates was modest, but prevailing fixed income yields have declined significantly since then. The pre-read document distribution deadline for the upcoming divisional risk management committee meeting is in two weeks' time.

Lennie received 6,000 economic scenarios from Mike the quantitative analyst who works in the investments division, and plans to run two sets of stochastic seriatim asset-liability projections: one with, and the other without, the inforce model's minimum crediting rate logic invoked. Anita suggested that Lennie stratify the scenarios by estimated asset portfolio total returns over 20 years, and then run only those with the lowest (or worst) 500 total returns. Lennie suggested that "negative cherry picking" scenarios might not be the best idea. Anita disagreed, stating, "That's how the work was done last time." Lennie asked who performed the prior analysis, and Anita responded, "I did."

READER RESPONSES

Comments and suggestions regarding Lennie's next move ranged from the advancing technological imperative of actuarial software, to concerns about relying on the work performed by others. Responses have been edited for space considerations.

Square One

One reader succinctly described the dilemma in a single sentence: "*Lennie has two weeks to replicate an analysis his boss completed and he feels her approach lacks the analytical rigor he would prefer to use.*" Therein lay two basic challenges for Lennie. On the technical front, is selecting "*500 low-rate scenarios out of a set of 6,000 ... sufficient to quantify the cost of the minimum guarantees?*" Lennie has already suggested to Anita that her prior method

of identifying which adverse scenarios to run may not be appropriate, but there appears to be some additional need to establish what actually constitutes an adverse scenario for the UL block.

Lennie's second challenge is "*How a junior actuary should go about dealing with an instruction from a senior actuary to follow a method he/she believes to be unsound.*" Several readers noted Lennie's urgent need to confer with Anita, specifically addressing the potential impact of taking methodological shortcuts, as well as finding some way to suggest use of a better scenario selection technique.

There is no indication in the case that Anita's suggestion to run only a subset of the scenarios was other than well-intentioned direction based on her past experience. From Anita's perspective, Lennie needs to avoid blindly adopting a brute-force approach (i.e. running all 6,000 scenarios) and failing to complete his analysis in the available time.

And the clock is ticking for Lennie. A couple of readers noted that he is already running out of time. "*He can't waste any time. Depending upon the modeling tools at his disposal, two weeks is not much time to perform, review, prepare to present and document the analysis.*"

"Negative" Cherry Picking

Cherry picking is generally understood to mean the selective use of information or data to make a point not likely to be borne out based on a broader sample. It often underlies an attempt to make things seem better than they actually are. (After all, we're picking cherries and not gooseberries!) Thus, using the term "cherry pick" also speaks to the intention(s) of the individual said to be employing this approach. That data has been cherry-picked may not be apparent to all—as opposed to garden-variety "window dress-

FOOTNOTES

¹ See the July 2010 issue of *The Stepping Stone* for the complete description of this case study.

ing”—hence, this technique, if not plainly disclosed, has a decidedly underhanded taint. (Those actuaries curious to learn more about this arcane practice might well reach out to their friendly neighborhood accountant for a more thorough explanation.)

Within the case, Anita sought to identify individual scenarios within the universe of 6,000 that would trigger minimum interest guarantee payments—outcomes that will presumably have an adverse influence on UL earnings. Hence, Lennie described sampling the scenarios based on the lowest 20-year returns as “negative” cherry picking. This was not meant as a disparaging comment about Anita or her work five years ago.

Finding a Haystack’s Needles

Several readers suggested that Lennie rejoin with Anita to learn why she thinks her prior scenario selection approach is still appropriate. *“Even if the method was appropriate five years ago, things have changed since then. It is not clear that the old method would still apply.”* Anita’s “because this was the way I did it five years ago” reply was described simply by one actuary as *“lame reasoning.”* There is such a thing as a bad precedent.

“If Anita doesn’t have a reason other than her initial reaction, it would be up to Lennie to develop an alternative that meets Anita’s goal of fewer scenarios.” A more effective cherry picking approach would target the economic scenarios for which guarantee payments were apt to be made. One reader mentioned *“some scenarios that have extreme negative returns over one- or three-year periods to test the impact of a short-term market drop”* need to be considered, while another respondent made the fundamental point that *“it can be difficult to project portfolio yields without running an asset-liability model.”*

One actuary cited the dynamic policyholder behavior assumptions present in Lennie’s UL model, and noted that *“the value of the embedded policyholder options are path dependent and the risk level*

within the block most likely won’t be captured with the (worst 20-year return statistic) approach. ... Perhaps Lennie could show Anita a comparison of the worst 200 scenarios selected using total return versus 200 scenarios selected using the total return divided by standard deviation (of annual returns).” Another suggested that, given the general decline in interest rates over the past five years, the proper observation interval when compiling return statistics today was likely to be longer than 20 years.

At length, Lennie might consider *“analyzing some deterministic scenarios to identify when the guarantees come into play ... and use this information to update the method of picking scenarios.”* Of course, a conclusive finding of exactly which of the 6,000 scenarios will trigger UL interest guarantee payments entails running the entire scenario set—something that Lennie apparently doesn’t have time to do.

Potential Efficiency Gains

Several readers distinguished the basic effectiveness of the selected scenarios (as discussed above) from the efficiency of Lennie’s analysis—the number of scenarios required to achieve an acceptable UL interest rate guarantee cost estimate. Three respondents felt that actuarial models are much quicker today, and can execute more runs within a given time period than they were capable of five years ago. Hence, it may be possible to execute 500 asset-liability model runs in less time than Anita originally thought based on her past work.

In particular, one actuary wrote: *“I would suggest that Lennie start by looking at the time he has available and figure out how many scenarios he can run rather than letting Anita dictate to him what he should do. I’d also note that the technology issue probably came into play when Anita did the original work. Whether her shortcut was ideal or not, she may have made a good faith effort to get the most information out of the tools available to her then.”* Another reader suggested, *“If there is only time for 500 scenarios, then it makes sense to choose some*

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good and bad scenarios.” The inclusion of some “good” scenarios (that do not trigger the guarantees) would serve as a check on the UL model’s logic.

Let’s Ask Mikey

Mike the quantitative analyst prepared the set of 6,000 economic scenarios for Lennie, and Lennie’s analysis of the UL guarantees relies on the quality of Mike’s work. One respondent noted that, “*Data is defined to include numerical information. I think the scenarios qualify.*” referencing the Actuarial Standard Board’s Data Quality Actuarial Standard of Practice [ASOP] 23, which permits the actuary to rely on data supplied by others subject to a review of that data.

ASOP 23 (Data Quality) §3.5 Review of Data (in part): ... the actuary should review the data for reasonableness and consistency, unless, in the actuary’s professional judgment, such review is not necessary or not practical. In exercising such professional judgment, the actuary should take into account the extent of any checking, verification, or auditing that has already been performed on the data, the purpose and nature of the assignment, and relevant constraints.

When determining the nature and extent of such a review, the actuary should consider the following: a) Data Definitions ...; b) Identify Questionable Data Values ...; c) Review of Prior Data ...

“If Lennie is familiar with using Mike’s scenarios for other work, that may be okay with regard to the data definitions, but he still needs to make sure that the data makes sense. Maybe Mike used the same process as usual from his perspective, but a bug in a new release of the computer program that generated the scenarios might be enough to make the UL scenarios nonsense. In a world where actuaries are dependent on computers, we can’t afford not to do reasonableness checks on our data.”

Mike might also be able to provide useful information as to whether (and how) the 6,000 scenarios were calibrated. Though it may be difficult to pursue a review of the prior data per ASOP 23 §3.5c—as the case study doesn’t mention whether Mike prepared the scenarios for Anita’s earlier analysis—it still might be wise for Lennie to ask Mike whether there have been any intervening changes to the scenario generation process.

The same actuary also noted: “*Is Mike capable of generating 1,000 scenarios rather than 6,000? Can Lennie choose 1,000 random scenarios and ensure that they capture the full scope of economic outcomes? ... It seems that Lennie ought to be able to specify the number of scenarios he needs.*”

Tact and Diplomacy

Lennie should prepare carefully for his discussion with Anita. One actuary wrote that “*Lennie needs to think about his relationship with Anita and how he can best persuade her to change her thinking. He also needs to avoid any career-limiting moves like showing up his boss in front of the risk committee.*” Another actuary suggested, “*The key is to ‘agree in public, disagree in private’. If anyone is challenged in a public arena (e.g. staff meeting, water cooler, etc.) they may get defensive and entrenched. But if Lennie asks for a private meeting with Anita, he can lay out his arguments without an audience, and that will reduce the possible tensions.*”

The foregoing is consistent with the guidance contained in the SOA’s Code of Professional Conduct

[COPC] which recognizes that actuaries can have differences of opinion.

COPC Annotation 10-1 (in part): Differences of opinion among actuaries may arise, particularly in choices of assumptions and methods. Discussions of such differences between an Actuary and another actuary ... should be conducted objectively and with courtesy and respect.

It's important that Lennie assemble as much information as he can about his UL model and Mike's scenarios, including how varying the quality and number of scenarios will affect his analysis and its comparability to Anita's prior work. *"Lennie could start their discussion with the points of agreement. For example, perhaps he thinks some form of scenario sampling is a valid approach to control run-time. He should start with that agreement, build consensus, and address the differences from common ground."* In particular, Lennie must try to anticipate and understand Anita's concerns and potential objections to his suggestions—and be ready to respond clearly with solid options.

One actuary wrote that *"Lennie needs to prepare his arguments carefully. He can't go in with vague notions of 'what's right'—that's what Anita has!"*

Closing the ALM Barn Door

With only two weeks to complete his work, Lennie needs to take shortcuts. It's important that the shortcuts, as well as their effect on Lennie's analysis, be both disclosed to and understood by the divisional risk management committee. *"Otherwise, they might make a business decision (e.g. approving a hedging program) that they would not make with a fuller set of information."*

For example, *"It cannot be concluded without extensive testing that the financial implications of future scenarios are negatively correlated with the total returns under those scenarios."* And given the heterogeneity of the UL block, the reader suggested that *"the degree of negative correlation may vary by UL product."*

Several respondents suggested that Lennie ask Anita

(and by extension the risk management committee) for additional time to undertake a more thorough analysis. One actuary wrote *"Anita isn't likely to give it, but if Lennie goes to the entire committee, he might get the time, but offend her. That can be risky."* Another thought, *"It seems unlikely that the divisional risk management committee, after receiving no such reports for five years, needs a final answer by the next meeting. An interim report with an initial assessment would seem to suffice."* Yet another actuary suggested that *"Lennie should also ask Anita to schedule a special divisional risk management meeting ... so that group can be fully prepared to make decisions."*

Since fixed income yields have declined significantly, one respondent dryly observed: *"Of course, it is unlikely that our hypothetical insurance company's management would quickly decide to implement hedges that would 'lock-in' relatively low rates and earnings, thereby almost certainly reducing their own incentive compensation."* No need to close the barn door now.

Casting a Wider Shadow

Several actuaries suggested that Lennie view this situation as an opportunity to extend and improve—and not merely update—Anita's prior analysis. *"Lennie should not wash his hands of the problem and simply refresh the analysis. It would be too easy to take a 'well, it was good enough for my boss and the risk management committee only asked for a refresh anyway' attitude. ... Lennie would be doing a disservice to himself, his company and the profession if he did that."* At the minimum, there would seem to be some need to establish a process for continual risk monitoring and reporting regarding UL minimum interest rate guarantees.

The actuary who advocated preparation of an interim report with an initial assessment (see prior section) suggested this: *"Lennie should attempt to persuade Anita that a rushed production of a single number is not the best way to assist the divisional risk management committee to address the possible interest rate risk. Better than addressing which scenarios are of*

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most concern would be to address the question of which UL blocks are of most concern. To do this means analyzing the full scenario set for each block of business.”

One definite area for improvement mentioned by a couple of actuaries was the preparation and retention of adequate documentation per the Actuarial Communications ASOP.

ASOP 41 (Actuarial Communications) §3.6 Documentation (in part): The actuary should create records and other appropriate documentation supporting an actuarial communication and, to the extent practicable, should take reasonable steps to ensure that this documentation will be retained for a reasonable period of time ... Such documentation should identify the data, assumptions, and methods used by the actuary with sufficient clarity that another actuary qualified in the same practice area could evaluate the reasonableness of the actuary’s work. ...

At the very least, Lennie has to do a better job with his documentation than Anita did five years ago. A cinch; maybe even as easy as (making a cherry) pie!

CONCLUDING THOUGHTS

A sincere thank you to all who contributed their comments and suggestions about Lennie’s next step. A point of clarification might be apropos: the case described Anita’s suggested scenario selection measure as a “20-year total return statistic”; perhaps “20-year *cumulative* return statistic” would have been clearer.

The contents of this article should not in any way be construed as a definitive interpretation of the various actuarial guidance documents referenced within the article. This hypothetical case study and its discussion are intended for the personal use and (possible) edification of members of the Management & Personal Development Section. ●