

# A Radical New Approach to Mortality Table Development

BY CHARLES E. RITZKE

It's time to completely rethink how we develop valuation mortality tables. Mortality table development seems like a mundane actuarial topic, but our current approach is a major problem. The profession has been developing tables in pretty much the same way for a century or more. Certainly technology has improved and the quality of our data and methods has evolved. But we still basically follow the same steps. We classify risks; we gather experience for each class; we fit a curve to match the experience; we decide what margins, if any, need to be added; and we end up with new tables.

This just doesn't cut it anymore, as evidenced by the issues surrounding the development and implementation of the 2001 CSO tables, implementation of the XXX regulation, and progress toward greater reliance on actuarial judgment in setting reserves, as embodied by the Unified Valuation System (UVS) project. The problems that continually arise can't be satisfactorily solved until we rethink our approach.

## The Continuum of Risk Classes

This isn't a newly discovered problem. The saga of XXX best illustrates it. The story began decades ago as companies started offering lower and lower term insurance rates through preferred risk underwriting. The problem was that our current valuation mortality tables, along with an "actuarially appropriate" interpretation of the Standard Valuation Law (SVL), didn't allow us to reflect the favorable emerging preferred experience in our reserves.

This situation would have impaired our ability to continue to write this successful business and carry the preferred concept further. So actuaries got creative. By using the unitary reserve method, along with a judicious pattern of renewal premiums, we could expose a loophole in the SVL that allowed us to justify term reserves at virtually any level we needed.

Unfortunately, while many actuaries could reasonably argue that their reserves were still adequate, the unitary method made a mockery of the SVL. The patterns of reserves held made no sense, and our adequacy arguments were weakened by the fact that some actuaries held little or no reserve on level term insurance plans.

## The XXX Solution

The answer to this problem was regulation XXX. We knew that the real problem was our inability to reflect preferred underwriting, but we didn't know how to build a table to reflect preferred underwriting. Preferred underwriting wasn't a homogeneous well-defined classification. What was (and still is) emerging was a continuum of preferred (and nonpreferred) underwriting classifications with different expected mortality experience.

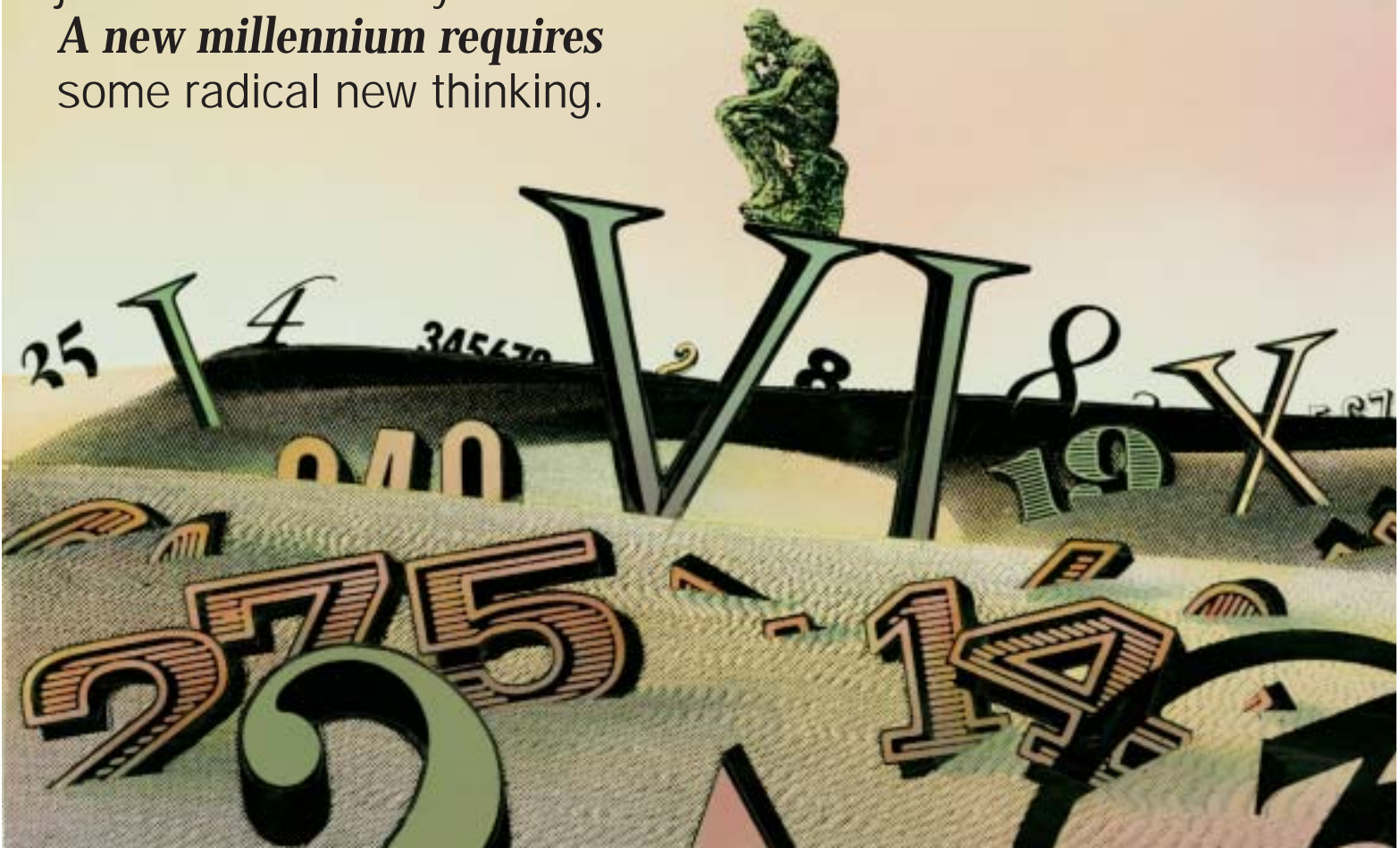
And even if we could classify preferred risks, we didn't have enough experience to develop a table. So we just ignored the need to classify preferred risks. The prevailing thought was that we needed to study the issue and perhaps eventually could generate adequate experience to reflect preferred risks. "Eventually" hasn't arrived even yet, as the task force that created the 2001 CSO table continues to ignore the preferred risk issue.

The XXX regulation closed the unitary loophole, but without some type of mortality relief, it would also close the preferred term market. So we made an actuarially ugly compromise. We split the mortality basis for the basic reserve and the

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The tried-and-true methods  
*of developing mortality tables*  
just don't cut it anymore.  
*A new millennium requires*  
some radical new thinking.



minimum standard deficiency reserve. We somehow argued that the basic reserve using our standard valuation table was adequate, and we got regulatory permission to use the X factor and new select factors to avoid or minimize deficiencies. The X factor allows us to reflect preferred underwriting for deficiency reserve purposes. We're relying on actuarial judgment to set the X factor.

An obvious preferable solution would be to move quickly to the UVS, where the actuary has the flexibility to set mortality and other valuation assumptions. But we have sticky problems with company tax reserves and 7702/7702A tax issues and the need for a prescribed table. And frankly, regulators aren't prepared yet to trust us completely. The XXX compromise is somewhat of a middle ground that addressed these problems.

### Actuarial Ugliness

Why is the compromise actuarially ugly? First, I don't understand how we can say that a basic reserve is actuarially adequate when there's no attempt to determine whether the underlying pattern of mortality rates is in any way consistent with the pattern of experience expected to emerge. I also don't know how we can say whether the basic reserves are adequate when the basic reserve is funded by a phantom net premium. How can the reserve in year three be determined to be adequate when there is no basis for this reserve and the premiums to accumulate to the supposedly adequate reserve in year five?

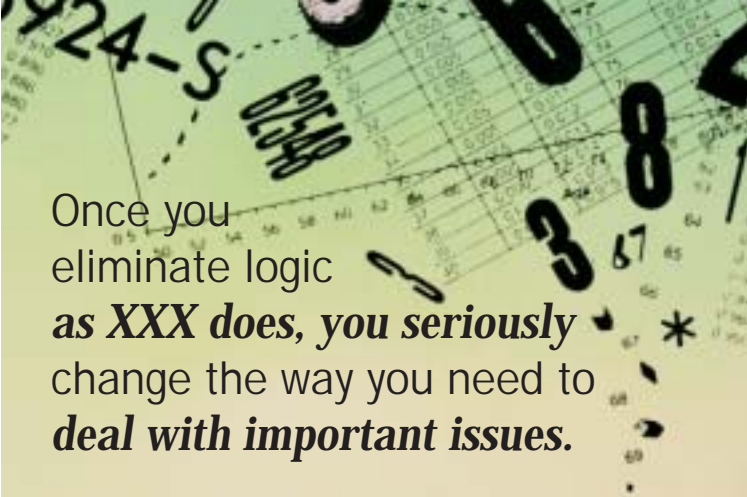
Is this just an unimportant theoretical concern? After all, we have things like ALM, AOMR, and such to make sure reserves are reasonable. Regardless, I still think it's a very important problem. Once you eliminate logic, as XXX does, you seriously change the way you need to deal with important issues.

For example, one of the XXX issues currently being addressed is whether it makes sense to use select factors for deficiency reserves and not do so for basic reserves. It makes a big difference. Of course, we know that it doesn't make theoretical sense to do so, but XXX already doesn't make sense, so it becomes a meaningless question. All we can say is that if we have to use select factors for basic reserves, then the reserves seem way too high. Because logic doesn't apply, every single issue requires us to revisit and endlessly debate the overall adequacy of the resulting reserves for a continuum of products with a continuum of expected experience.

I also think that the XXX solution creates a mindset that fosters the problem it was intended to address. When you have a nonsensical regulation filled with excruciating detail, it focuses the actuary's efforts on getting around the regulation instead of setting reserves responsibly. The game we create is not in any way controlled by a sense of actuarial integrity. Experience has shown that the game continues to be played with product variations, shadow accounts, and the like.

### The 2001 CSO Problem

As mentioned above, we haven't yet addressed the continuum of risk classes. The rates are too high for many super-preferred classes. They're too low for simplified issue or substandard business. We like getting to hold lower term reserves, lower minimum cash values, and avoiding deficiencies. We don't like lowering our tax



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reserves or reducing premium limits under IRC 7702 and 7702A. So we debate whether the table is "adequate." The SOA experience shows adequate margins. Other studies show smaller margins. In the old days, the "standard class" was sufficiently consistent from company to company. Today the underlying exposure is just not homogeneous enough. We need refinement.

I think most everyone involved recognizes this problem. But the response continues to be that we don't currently have sufficient homogeneous experience to build more refined tables. But in reality, we've been selling tons of preferred class business for 15 years or more. We can try waiting another 15 years, but we will *never* have sufficient experience to build appropriate tables using the methods we currently use. The experience from business sold 15, 10, or even 5 years ago isn't homogeneous and doesn't adequately relate to the expectations of business sold today. Nor will today's experience reflect the underwriting advances and technology we'll see in the next 15 years (genetic markers, anyone?).

We need a new approach that gives us the following:

- Prescribed tables. The tax issues aren't going to go away. In particular, UVS will never happen unless we figure out a way to do UVS and still have statutorily prescribed tables that will satisfy the IRS. We need tables that do not unnecessarily penalize us when setting tax reserves and 7702/7702A limits.
- Risk classification. We need tables that allow us to adequately reflect the expected experience under the continuum of risk classification methods used currently and into the future.
- Speed. We can't wait 15 years for experience to develop and then fit a table. We need a dynamic approach that allows us to generate tables as new classifications and new underwriting technology emerge.
- Regulatory controls. We can argue that the actuary's professional judgment needs to be trusted in setting reserves, but this just isn't going to happen in the U.S. environment unless we give the regulators something to hang their hats on. They need to know that companies and their actuaries aren't making a mockery of the reserve-setting process. They need to have controls that ensure a company's "preferred-risk, guaranteed-issue term plan" has the appropriate reserve assumptions.
- Validation. We need an industrywide method to monitor, validate, and refine our mortality tables in ways that are both meaningful and timely. Comparing a single CSO table to the non-homogeneous 1990 to 1995 experience of a dozen major companies is neither meaningful nor timely enough.

## How Do We Do This?

Some might say these goals are impossible to achieve, and they'd be right under our current approach. How can we create a range of appropriate mortality tables from a myriad of risk classification methods? How do we ensure that the correct tables are used in a given situation? How do we validate their adequacy and keep them up-to-date in a timely fashion?

The first step is to recognize that we have many professionals in the industry who have been doing what needs to be done for many years. They've been creating timely tables and assigning them to the appropriate situations and doing it well. These professionals are called pricing actuaries and underwriters! We just need to figure out a way to tap into what they do and use their collective judgment and methods to generate the tables we need.

I think we can be confident that, collectively, actuaries and underwriters do a good job of classifying risks and projecting mortality rates. Collectively, I think it can be demonstrated that the preferred products sold to date have been successful. Under a pure UVS approach, though, the concern that regulators would have is with the outliers. How can they be sure that any particular company or any particular valuation actuary is assigning the appropriate mortality for their particular circumstances?

If we can somehow translate this collective judgment into a formula for translating underwriting rules into mortality assumptions, and if we can also then compare individual situations against this collective judgment, then I think we'll have a valid way to solve the problem.

## The Proposed Solution

In this article, I'm going to be like the consultants in a recent television commercial. In the commercial, when the company executive asks the consultants to implement their recommendations, they indignantly reply that they never actually implement what they propose. Similarly, I don't exactly know how to implement what I'm proposing; I just know it should be done. Here's what I'm suggesting:

- We collect data on underwriting rules, risk classifications, and how companies translate these data into mortality assumptions. We would need to categorize all the different factors a company may or may not use in making underwriting decisions (lab test results, medical history, family history, etc.). The SOAs Task Force on Preferred Mortality has already made progress in this area. This will need to be an ongoing effort because underwriting technology and uses continually change.
- We need to create empirical formulae that turn sets of underwriting rules into expected mortality. My over-simplified thought is to look at the way underwriters classify risks by scoring debits and credits under their various rules. We should study how the actuaries, underwriters, and medical professionals initially extrapolate new underwriting methods into pricing assumptions. We should then take this a step further and translate this score into a level and pattern of mortality.
- Instead of having a few discrete tables, we should develop a "mortality table engine" that generates a valuation table for a

product based on the underwriting rules that are going to be used for that product. One way to do this would be to develop a standardized set of hypothetical applications the company must score per its underwriting rules. Determine what applications fall into what rate class, then the mortality engine would generate a table for each risk class based on the score of the applications accepted into each of the company's risk classes.

- We initially validate this engine by comparing how well the engine fits the mortality tables that underwriters and pricing actuaries actually assign to their products.
- We keep companies honest by requiring that they maintain a database of their actual underwriting data as applications get accepted for a particular risk class. Actual applications are scored against the mortality engine. If their actual underwriting decisions vary significantly from their initial scoring, they may be required to change their prescribed valuation table.
- We would then have a means for collecting more meaningful mortality results from the continuum of risk classes that are used. Instead of measuring mortality experience against a static table, we measure emerging mortality experience against the results of the mortality table engine. Our engine can be continually refined without waiting for a statistically significant homogeneous group of risks to appear.
- With this approach, we would have the prescribed tables needed for tax purposes. Companies selling accumulation products with less stringent underwriting would have higher prescribed mortality, higher tax reserves, and higher 7702/7702A limits. Companies with super-preferred underwriting would have prescribed tables that generated lower tax reserves and limits. The IRS should happily accept this approach, compared to the game we're trying to play today—having it both ways with a single table.
- The regulators would have the tools and controls to monitor the reserve tables that the outliers use. At the same time, the reliance on actuarial judgment will be advanced because the underlying foundation of the mortality table engine will be the collective actuarial judgment of practicing actuaries.
- As new underwriting methodologies and technologies emerge, the mortality table engine can be refined and enhanced on a timely basis.
- Finally, this approach will maintain responsible competition and an open market. One of the big problems with XXX and the X factor is that it will tend to bar new entrants and small companies from the competitive term marketplace, because you need mortality experience to justify an X factor before you can sell a product. That's not a healthy way to regulate this business.

Obviously, there are details to work out. Safe harbors for middle-of-the-road products should be considered to allow companies (particularly small companies) to avoid some of the complexities this approach would involve. However, the complexities would also be offset by improvements elsewhere. The endless XXX and 2001 CSO debates, loophole revisions, and the like could be avoided once such a system is in place. I think we should get started now. ●

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