



Article from

Reinsurance News

November 2016

Issue 86

VBT Tables—A Perspective from Munich Re Contributors

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Mike Taht, SVP, individual reinsurance, and Dieter Gaubatz, 2VP, client liaison, participated in the creation of a series of tables that are critical for the life insurance industry. In the interview below they share their insight and experiences developing the 2001, 2008, and the 2015 VBT tables (VBT stands for Valuation Basic Table). This series of tables are referred to as the 01VBT, 08VBT and 15VBT by industry insiders). The VBT tables are the mortality tables that represent actual life insurance experience at a particular point in time. They are the base to which margins are added to create the valuation tables known as the Commissioners Standard Ordinary or CSO tables. The VBT tables are used to determine the expected basis in mortality studies, as the starting point for pricing mortality, and in setting yearly renewable term (YRT) reinsurance rates.

Product design and underwriting methodologies have changed over time and the actuarial tables used to price, reserve, create mortality studies, and reinsure life insurance have evolved to keep pace. Over the last two decades, three versions of the Valuation Basic Tables were developed. The 2001 VBT tables were the first ones published. They served as the experience underlying the 2001 CSO tables, the prescribed tables for the calculation of statutory and tax reserves. The 2001 CSO tables were the first valuation tables which recognized the differences in mortality created by preferred risk programs. Using the increasing amount of preferred experience, the 2008 was the first VBT to incorporate preferred into its experience tables. Limited underwriting tables, representing smaller size policies were also added. Most recently, the 2015 VBT and 2017 CSO tables were developed to provide a foundation for the introduction of principle-based reserving (PBR) into the statutory reserve process.

Michelle Lerch, AVP and actuary – Knowledge Management, interviewed both Mike and Dieter on their experiences participating in the creation of the tables and the importance of the tables for the industry.

ML: HOW DID YOU BECOME PART OF THE CREATION OF THE MORTALITY TABLES?

DG: I volunteered to join the Society of Actuaries (SOA) Individual Life Experience Studies Committee (ILEC) when the



opportunity became available. Being an active participant gave me more exposure to industry mortality experience and the opportunity to participate in the SOA's 01VBT preferred tables work. My contributions and experience resulted in my continued participation in the development of the 08VBT and 15VBT.

MT: I volunteered for the 01VBT task force. At the time, I worked for a consulting company and was viewed as having an unbiased perspective. I was relatively new to the U.S. market and this was a great opportunity to get more involved with the SOA.

ML: HOW DID THE EVOLUTION OF UNDERWRITING AFFECT THE VBT TABLES?

DG: I assume that you are talking about the advent of preferred products, not age and amount standard/sub-standard underwriting. Both had impacts but in very different ways. The mortality rates in the valuation (CSO) and underlying industry experience (VBT) tables need to reflect current standards. The table structures needed to be changed to recognize preferred products. This resulted in the introduction of the relative risk (RR) experience tables and the CSO preferred structure tables. But the actual mortality rates, including the relative mortality, and rate slopes, need to reflect current underwriting practices. Unfortu-

nately, experience reflects practices from five to 10 years ago and can be different than current practices. One of the biggest challenges in creating rates for new tables is the types of adjustments needed to reflect those changes over time. When experience is insufficient or nonexistent, judgment comes in. One important reason for moving to a new generation of tables is to reflect actual experience as it emerges and replace the judgment used in the creation of the prior versions.

The traditional U.S. approach to calculate reserves was to use the CSO table for all types of risks. That approach didn't work well and was an impetus for the development of principle-based reserves (PBR). As a side note, I was on the PBR committee for a few years at its inception somewhere around 2006. With the development of the new PBR concepts and expected implementation in 2011 (yes, 2011 was the initial expected implementation year!), the question arose, "What mortality assumptions should be used in the calculation of the reserves for the various risk classes?"

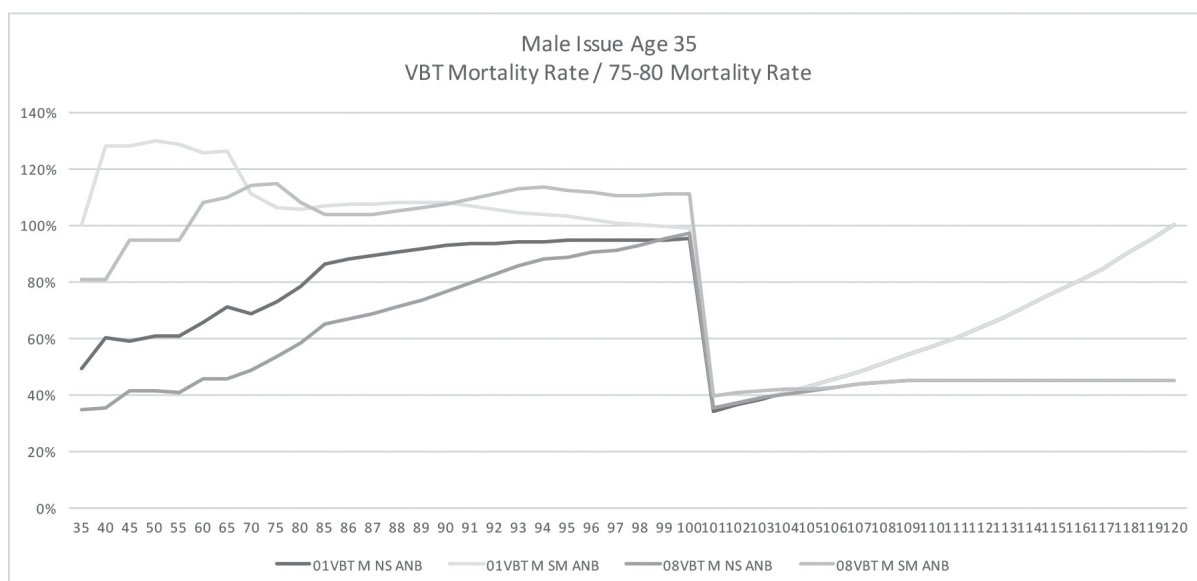
The question first came up before PBR work was formally started. The initial response was to create the 2001 CSO preferred tables, and the best person to do that was a consultant, Mike Taht. Looking forward, the goal was to introduce the relative risk table concept and the underwriting criteria score calculator—renamed "RRTool" in the 2015/2017 version—into the 08VBT tables.

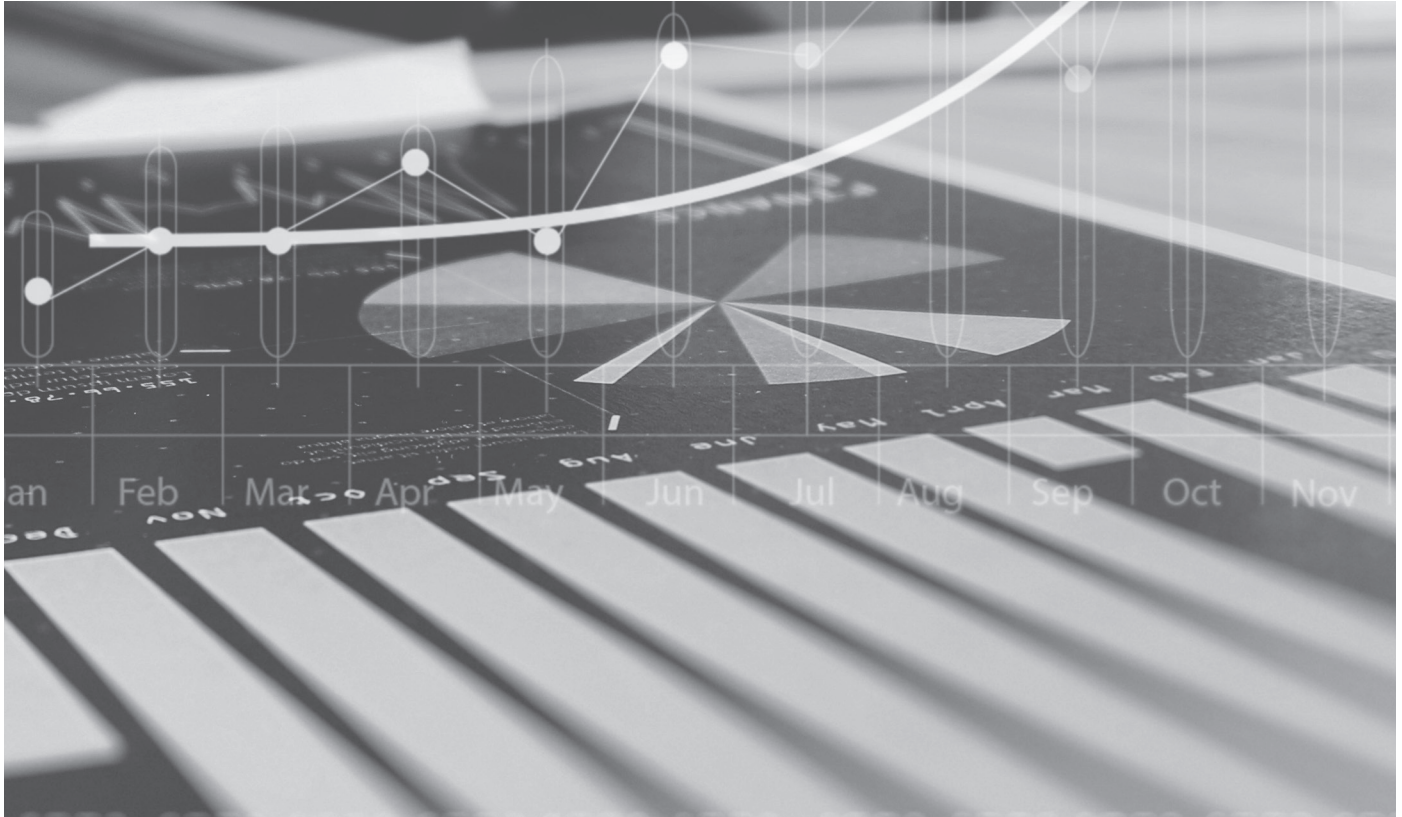
MT: The development of the base 2001 VBT tables was influenced in a number of ways by the evolution of underwriting. The experience underlying the table, experience years 1990-95, covered a number of different underwriting eras: aggregate, nonsmoker/smoker risk classes, reduced blood testing limits in reaction to AIDS, and the advent of preferred risk programs. As a task force, we believed that these changes would improve

industry mortality, but we did not have a generally accepted way of quantifying the mortality impact of each individual underwriting change. Also, as this was going to be the experience basis of the valuation mortality table (2001 CSO), the task force believed that reflecting the experience as is, with no adjustment for underwriting, was conservative. However, this did lead to a select mortality table with a steeper slope than previous industry mortality tables. Subsequent to the release of the 01VBT mortality tables, I was asked to develop a set of tables that reflected preferred risk classes.

ML: HOW DO THE SOCIETY OF ACTUARIES 1975-80 BASIC MORTALITY TABLES (SOA 75-80) RELATE TO THE VBT TABLES?

DG: The SOA 75-80 tables are conceptually the same as the VBT tables. They represent the underlying experience of the time. The structure and relative rates have changed dramatically. The newer tables have older issue ages. Those older ages weren't needed in the 1970s. The SOA 75-80 doesn't have smoker/non-smoker rates, which weren't needed in the life insurance world until the 1980s. Sometimes it is necessary to adjust the SOA 75-80 tables for specific purposes like YRT reinsurance rates to better align with the future expectation of mortality. The actual relative mortality rates of the SOA 75-80 tables can be adjusted by a flat percentage fairly well for the younger ages. Just a note, a flat percent of an older mortality table is appropriate if the mortality improvement rate is the same across all policy characteristics such as age and gender. This also requires that the changes in insurance practices have an equal impact on all policy characteristics since the time the older mortality tables were constructed. However, the likelihood of that actually happening gets smaller and smaller as the time since table construction increases—like the expertise of us old guys as we continue to age.





MT: I believe that the biggest difference between the SOA 75–80 tables and the VBT tables is related to slope. The benefits of underwriting advancements results in a greater decrease in mortality in early policy durations. However, the mortality at very high attained ages, is not affected by the underwriting advancements that we have experienced in the market. This results in a materially different slope between VBT tables and the SOA 75–80. The graph is a comparison of the 01VBT and the 08VBT to the 75–80 for a sample gender, issue age, and smoking status.

One of the biggest mistakes the life insurance industry has made in terms of pricing was using a flat percentage of the SOA 75–80 mortality table to price permanent insurance products. As issue age distributions have changed, and interest rates dropped, the impact of this pricing error has grown.

ML: WHAT CHALLENGES WERE ENCOUNTERED IN THE DEVELOPMENT OF THE VBT TABLES?

DG: In concept, the challenges in constructing any table are the same. What is different are the details that need to be addressed. I believe that the biggest challenge is always addressing recent developments. Of course, there will always be some change for which there is virtually no credible experience; but the committee does not have the luxury of simply ignoring the changes. Some type of assumption needs to be created. Ignoring a change

is also an assumption. Although professional judgment is not always completely accurate, it will almost always be closer to actual experience than ignoring the situation.

The older age rates were a particular challenge for all of the VBT tables. The 2001 tables needed to add older ages, but there was no credible experience. The 2008 tables had the same issue. There was more experience, but still limited and not enough. In addition, the issue ages in the 08VBT tables were extended even further. The 2015 tables had more experience, but the approach to older age underwriting was changing dramatically. There is no experience based on the newer types of underwriting.

There were a lot of other challenges. Off the top of my head, these included the later duration assumptions due to the changes in the 1980s and 1990s such as smoker/non-smoker and preferred classes and the complexity of the preferred concept. New statistical approaches were emerging. Various methods were tested to graduate the crude experience rates. Most statistical approaches provide very similar results in the interpolated areas, but provide wildly different extrapolations. Data integrity issues are always a concern. More data is needed to reflect the increasing sophistication of the environment. It is difficult to justify the work and cost required to collect more data because there MAY be a need to increase understanding.

MT: For the 01VBT table, the biggest challenge was how to reflect the underlying heterogeneity of the underwriting supporting the experience. In the end we used the experience as it was. This was a time when regulators were questioning any modification of the underlying experience; the task force did not believe that a material divergence from the experience would be supported by regulators. Additionally, experience underlying the table was from 1990–1995. There was not sufficient experience available to assess the medium-term or long-term mortality coming from recently underwritten business. We were also asked to consider reflecting individual company experience into the valuation mortality framework. However, it was deemed much more important to develop a new table as the existing valuation table in use at that time was the 1980 CSO mortality table. Finally, there was the issue of preferred risk classes. This was addressed with the 01VBT table, but only after the initial tables were adopted.

ML: HOW DID THE CHOICE OF THE TABLES' OMEGA (THE OLDEST ATTAINED AGE SHOWN IN THE TABLES) INFLUENCE THE DEVELOPMENT OF THE LATER DURATIONS?

DG: Can I let you in on a secret? Mortality at the oldest ages is important, but no one really accurately knows what the mortality is. The assumptions are largely based on professional judgement, even those of the government. It's a great topic for research papers and it does have financial implications. You may have noticed that the VBT tables no longer have an omega age. They have an omega rate. This is because of the theories; yes, I mean theories; that say that the mortality at the oldest ages starts to flatten out. We have never had enough folks at those ages to really observe a credible rate, but we are starting to. We are better at actually knowing the verified ages of individuals. It also helps in experience studies to have a mortality rate in case we actually get anyone that is older than the assumed omega age. Before the 01VBT, the omega age was 100. That caused problems. Note, however, that the CSO tables still have an omega age. An omega age is needed for valuation formulas that calculate reserves.

MT: For 01VBT, it really was a matter of how far out do we need to go with omega, so that it does not cause operational issues. When we were developing the 01VBT tables, we knew that an omega of 100 was too low and developed the tables with an omega that we thought was sufficiently high to not cause an issue. That said, in 20 years, maybe there will be complaints that an omega of 121 is too low.

ML: HOW DID THE TABLES EVOLVE WITH EACH NEW RELEASE?

DG: Naturally, the first item is the recognition of ongoing mortality improvement. Each table has relative mortality rate slope changes from the prior one. Over the years, tables have changed

to incorporate gender distinct mortality, different mortality for smokers and non-smokers, preferred underwriting, and, most recently, relative risk.

ML: ARE THERE APPROPRIATE USES OF THE TABLES?

DG: This is a great question. I have seen these tables being abused, molested and misused in unimaginable ways. No one seems to read the caveats included in the written reports. They are there for a reason. These are tables constructed to represent average industry experience and for the basis for valuation tables. They do not recognize the broad differences in mortality experience across insurers. The valuation process usually simplifies the calculations with fairly broad characteristic groupings. They do not have the necessary granularity needed in the pricing process. They are useful for general industry comparisons because they are understood by the industry. However, those comparisons need to be at a relatively high level.

The appropriateness at only a high level is intentional. First and most importantly, a published sound pricing table appropriate

The key to using the VBT mortality tables appropriately, is to really understand the construction methodology and the implicit assumptions underlying its construction.

for all situations would put me out of a job. But seriously, there are legal considerations. The SOA and the actuarial community always need to consider anti-trust laws. The tables cannot provide, nor even indicate a hint of, any types of pricing signals to the industry.

MT: The key to using the VBT mortality tables appropriately, is to really understand the construction methodology and the implicit assumptions underlying its construction. When you do this, you can assess if these assumptions make sense for your particular use of a VBT table. Things that need to be considered include target market, distribution, underwriting, risk class structure, and product. All of these items can have a material impact on mortality and each particular situation may be different than the experience underlying a particular VBT table. You also must consider these factors with a factor that is more complex than simply a single factor. With the broader use of Generalized Linear Models (GLM) statistical techniques, you can more accurately reflect the impact of all of these factor



ML: COMPANIES SUBMIT DATA TO SUPPORT THE CREATION OF THE VBT TABLES, SO WHY WOULD A COMPANY'S EXPERIENCE DIFFER FROM THEM?

DG: There were approximately 50 companies which provided their experience underlying the development of the 15VBT table. The average mortality was 92 percent of the 08VBT table. The individual company experience ranged from 36 percent to 1,164 percent. Naturally, the first conclusion is random deviation. This is more likely for smaller companies, but there is a very large list of other items which impact the mortality results. I will start with the obvious one: guidelines—risk evaluation tools used by the underwriters, underwriting guidelines dictated by a company's manual and preferred risk criteria are examples. Others may include: target market including differences in socio-economic class, reasons for purchasing insurance, competitiveness of the market; distribution system and the way that they are managed and incentivized; professional expertise of the companies' risk decision makers such as underwriters, medical directors, claims examiners, and pricing actuaries; policy contract provisions and wordings; motivation of the decision-makers when making "ad hoc exceptions"; internal training programs; business decision monitoring procedures; and policy application wordings. I would also add internal attitude and company culture sometimes enables or prohibits the continued search for improvements in the risk evaluation process.

ML: HOW DO YOU SEE FUTURE TABLES DIFFERING FROM WHAT YOU CREATED?

DG: First, there will always be corrections in relative rates or slopes in those areas where professional judgment is replaced by experience. But I see the next change coming from the need to reflect the behaviors of products sold through "streamlined" or "accelerated" underwriting. I have no idea what those changes will be, but I think that is the major challenge that the up-and-coming generation will need to reflect in future tables.

MT: As a profession, we are continually asked to replace impressions with facts. As experience emerges, we will need to critically look at past assumptions and determine if they need to be modified. Additionally, as new statistical techniques are used more commonly by the actuarial profession, we will develop new, and potentially different, inferences from the experience that will shape future tables. Finally, the need to adapt to the changing underwriting paradigm, in an effective and efficient manner, will be a necessity.

ML: DO YOU SEE THE VBT TABLES PLAYING A BIGGER ROLE IN THE FUTURE?

DG: The VBT concept is a foundational component of principle-based reserves. It will be interesting to watch how the use of those tables will actually evolve as PBR matures.

MT: I agree. One of the key items of interest will be how future VBTs adapt to changing underwriting paradigms.

ML: PROFESSIONALLY, WHAT DID YOU GET OUT OF LEADING THE DEVELOPMENT OF THESE KEY INDUSTRY TABLES?

DG: The main motivation throughout my career has been to learn, keep learning and understand as much as I possibly can. I cherished the opportunity to hear the various thoughts of others throughout the industry and then apply what I learned from the SOA to solve issues for my organization as well as our customers. But this only came to fruition because I was willing to volunteer and put in the extra effort. It was well worth it.

ML: Thank you both for sharing your insights. Your inside perspective provides a better appreciation for the mortality tables that we use to evaluate life insurance industry experience and calculate reserves. It also highlights the need to understand the construction of the tables in order to incorporate them most effectively into our actuarial work. The evolution of the industry around product design, underwriting methods, reserving requirements, and whatever else the future holds will continue to challenge the future mortality table constructors. ■



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