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SECTION

Reinsurance News

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Reinsurance News

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Call for Articles for next issue of Reinsurance News.

While all articles are welcome, we
would especially like to receive articles on
topics that would be of particular interest to
Reinsurance Section members.

Please email your articles to
Richard Jennings ([richardcjennings@
gmail.com](mailto:richardcjennings@gmail.com)) or Ronald Poon-Affat
(rpoonaffat@rgare.com).

Some articles may be edited or
reduced in length for publication purposes.

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Chairperson's Corner

By Dustin Hetzler

Time flies! This is too common of a statement for many people, but for me, my past three years volunteering on the Reinsurance Section Council (RSC) have really passed by very quickly.

In my first chairperson's article of the year, back in March, I hinted that I would be preparing a Holiday-type letter at the end of the year, in which I would talk about some of the RSC's major accomplishments in 2016.

The time has finally come, so, here goes.

John Cathcart, the RSC leader of the SOA's LEARN (Life Education and Reinsurance Navigation) program, achieved quite a milestone with this program this year. The program, which I described in detail in March, recently received approval as a qualifying learning event by the National Association of Insurance Commissioners (NAIC). This means LEARN presentations can now count as continuing education for holders of an NAIC's Insurance Regulator Professional Designation, and earn them needed Designation Renewal Credits (DRCs).

This milestone came about as a result of a LEARN session with the Pennsylvania Insurance Department. Following this session, a participant asked if he could earn continuing education credits for it. John, along with Larry Stern, James Miles and many others, combined their efforts to work with the NAIC to accredit the LEARN program. It is a great accomplishment, and will continue to present opportunities for the RSC and for LEARN volunteers to deliver reinsurance-specific knowledge to the industry.

The Reinsurance Section Newsletter also underwent an important transition: This year Ronald Poon-Affat, who was appointed RSC leader for communication in 2015, successfully brought back in house the role of editor of this newsletter, following 10 years of it being edited offsite. Ronald has implemented this transition beautifully: the newsletter is now entirely planned and edited by Ronald with support from the RSC, and we plan to develop additional internal editorial support in 2017.

We also instituted a Best Reinsurance News Article competition! The first contest is on right now, and all 2016 articles are eligible. The winner will receive the significant prize of bragging rights.

Another milestone related to this newsletter is that as of press time, 22 articles from Reinsurance News have been converted to podcasts. SOA member Mark Tanner volunteered time and resources to complete this conversion, with top quality results. On

average, about 300 downloads have occurred for each podcast, which I view as a great success!

Tim Paris, RSC leader for marketing and membership and Mike Kaster, RSC Secretary and Treasurer, were instrumental this past year in focusing our efforts on strengthening all content we deliver to the membership. The areas we focused upon were first stated in our welcome letter to new members in 2016, and will be a topic in an upcoming survey of Reinsurance Section members that will be completed in early November.

The current content topic areas of focus include:

- Impact of streamlined underwriting and big data on mortality estimates;
- Annuities and longevity;
- Long-term care and critical illness;
- Captives;
- Principle-based approaches to reserving and capital; and
- Opportunities for reinsurance growth, both globally and across product lines.

Finally, in August the RSC held its fourth annual Advanced Reinsurance Seminar in Chicago. For the first time, the meeting was standalone: in the past, it followed major industry meetings. By all accounts, the seminar was a great success! Round of applause to seminar host Mike Kaster.

These are just a few of our many notable accomplishments this past year. These, along with ongoing successful delivery of reinsurance content for SOA-sponsored industry meetings, symposia, webcasts and ongoing research projects, have resulted in a terrific 2016!

I would also like to thank RSC members Katrina Spillane, George Hrischenko, Catherine Bierschbach, and Mary Broesch for their significant contributions this past year.

I would also like to welcome the new RSC members who will join in 2017: Jeremy Lane, Emily Roman, and David Vnenchak!

This is my last column as chair. Over the past three years, I have learned a tremendous amount—about the SOA, about how much hard work goes into development of the program for the industry meetings, about how research projects are identified and completed, and much more. This time has been extremely interesting, valuable, and rewarding to me, both personally and professionally. I would strongly encourage anyone considering joining the RSC to take the plunge and do so! ■



Dustin Hetzler, FSA, MAAA, is senior vice president and chief pricing actuary, Global Financial Solutions with RGA Reinsurance Company in St. Louis, Mo. Dustin can be reached at dhetzler@rgare.com.

Editorial: The Morality of Life Insurance

By Ronald Poon-Affat

For us who work in this industry, the provision of insurance is an inherently moral act. However, when discussing issues of insurance and morality—which I am defining as the principles that govern and concern distinctions between what is right and what is wrong—the landscape can be quite broad, and the issues many.

Life insurance, at its core, is a product that provides a financial benefit to the dependents of a buyer in the event of untimely

death. Insurers price and sell contracts based on assumptions made about the policyholder's health and potential lifespan. Does that mean life insurance has characteristics that might make it seem like a game of chance? I would say no, as everyone dies, and protecting loved ones is a responsible act. Yet, some insurance products do have features that could be viewed as such. In Brazil, for example, one of the most successful life insurance products, Capitalização, has a feature where the contingency of the probability of mortality is wholly replaced with the probability of the "government lottery weekly draw."

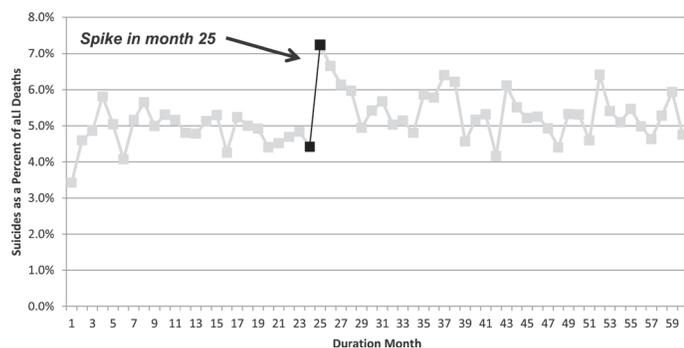
Far away from any type of chance or uncertainty is the product known as takaful. This type of insurance, which originated with adherents of Islam, is based on a cooperative system of shared reimbursement in the event of loss. Takaful is permissible under the laws of Islam because the products do not participate in forbidden financial activities such as gambling, usury (earning of interest) and excessive uncertainty. Today, takaful and its reinsurance coun-



in, retakaful, are not only well established in Muslim countries, markets are also developing in non-Muslim countries among individuals proactively seeking “moral” and “ethical” financial and insurance products.

Let’s also think about the morality inherent in the purchase of insurance—specifically among those covered individuals who commit suicide. Sadly, of the 10 leading causes of death in the U.S., only death rates by suicide are currently increasing. In this newsletter’s March 2016 issue, in the article “Suicide Facts and Prevention,” by Jason McKinley of RGA, an eye-opening trend highlighted was that in the U.S., suicides spike immediately after the end of the standard two-year suicide contestability period. Could some of these individuals have planned to end their lives when they bought the insurance? Perhaps. Yet how does a policy owner’s intent to take one’s life balance with the desire to protect the family financially after death? Would it be moral for someone to buy insurance when suicide is planned? On the other hand, what would be the most moral position for insurers to take? Food for thought indeed.

SUICIDES AS A PERCENT OF ALL DEATHS BY DURATION MONTH



I started thinking about issues pertaining to morality and insurance after reading the book “Sapiens: A Brief History of Humankind.” This thought-provoking tome by Israeli author Yuval Noah Harari is an ambitious, sweeping look at intellectual and social aspects of the history of humankind. It made me quite mindful of what a small footprint our species has on planet Earth, and yet, how far we as a species have come.

To me, Harari’s theory of how and why humans today are Earth’s dominant life form and how this came about was quite provocative. His theory hinges on the changes to human thought of the Cognitive Revolution, a name given to a developmental shift that occurred approximately 70,000 to 30,000 years ago. This spontaneous evolution gained for humans a cognitive expansion into the capability of abstract and conceptual communication, which changed to a remarkable extent how humans relate with one another and view the world.

To Harari, humans, compared to most (although not all) animals, are born with many vital systems still underdeveloped. We as a species need adult care far longer than any other life form on Earth. He posits that this need may have prompted the formation of communities (or social networks). The Cognitive Revolution also gave humans the unique capability of participating in flexible cooperation structures—both in large numbers and with complete strangers—which enabled them to engage in group activities such as child care as well as cooperative hunting and agriculture. This enhanced cooperation capability enabled humans to eventually dominate less cerebral food chain competitors.

How might this relate to morality and insurance? Stay with me. The Cognitive Revolution, writes Harari, opened the door not just to more complex social structures, but to more complex conceptual structures as well. In its early years, stories, myths and legends were born, which lay the groundwork for the formation of religious belief systems. These belief systems as they evolved came to govern the morality of adherents and also incorporated the concept of monogamy, which over time consolidated the family as the central social unit.

All of this made me wonder if the development of human religious thought may have prompted more than just the monogamous family unit and the morality that came to govern human life. Could these developments, along with the generally short life expectancies of ancient times, also have prompted the concept of protecting members of families bound together by holy wedlock from various risks that could result in death of a family’s head? Could all of these new conceptual frameworks have sparked the “eureka” that led to the development of the product we now know as life insurance? It’s an interesting idea to consider.

When looking at insurance and morality, there are many questions, but answers tend to be as complex as insurance products. For me, it’s simply interesting to muse about. Our industry has come a long way, and we as reinsurers continue to strive to offer our clients solutions to evolving protection needs of individuals and families. That, in and of itself, is definitely a moral act.

The views expressed in this article are solely those of the author and do not reflect the views of either his employer or the Society of Actuaries. ■



Ronald Poon-Affat, FSA, FIA, MAA, CFA, is Editor of the Society of Actuaries’ *Reinsurance News* newsletter and is a recipient of a 2016 SOA Presidential Award. He can be contacted at rpoonaffat@rgare.com

Q&A With Mary Forrest

By *Reinsurance News*

Mary Forrest, FSA, FCIA, is president and CEO, North America (Life) of Munich Re. She is responsible for Munich Re's Life and Health reinsurance operations in Canada, the Caribbean and the United States. Under her leadership, Munich Re has become the largest mortality risk taker in the Canadian market, and a market leader in the United States. These units are the two largest life reinsurance business units within the Munich Re Group, with more than 400 employees in North America.

Mary joined Munich Re in 1991 and was a member of the executive leadership team for a number of years before assuming her current role. She holds a Bachelor of Science from the University of Toronto, is a fellow of the Society of Actuaries and of the Canadian Institute of Actuaries.



Mary Forrest, FSA, FCIA, is president and CEO, North America (Life) of Munich Re.

I feel the industry is ripe with challenges: the life insurance products are too complex; the sales process is not customer friendly; the capital requirements may be too onerous.

Mary is a passionate member of the insurance community, serving as the chair of the board of directors of the Canadian Life and Health Insurance Association (CLHIA) from 2015 to 2016 as well being a participating member of the association for many years. She is the past chairman of the Munich American Reinsurance Company board and past director of the Munich Reinsurance Company of Canada, and Temple Insurance Company boards.

Mary was recognized for her accomplishments as a Women's Executive Network (WXN) Canada's Most Powerful Women: Top 100 award winner in 2014 and 2015.

Q: WHAT ARE THE GREATEST CHALLENGES THAT FACE THE LIFE REINSURANCE MARKET IN NORTH AMERICA RIGHT NOW?

A: In my view, the greatest challenge for the life reinsurance market right now is growth. The primary market is not growing, interest rates are at historic lows and expenses across our industry are under intense pressure. Clients are staffing up to look for innovative ways to do business so that they can not only expand their market share, but also grow the market by making it easier to buy insurance in the future.

Q: ARE THERE ANY GROWTH OPPORTUNITIES ON THE HORIZON?

A: Certainly. The best opportunity to grow is to find new ways to help our clients with their challenges. I feel the industry is ripe with challenges: the life insurance products are too complex; the sales process is not customer friendly; the capital requirements may be too onerous. We are creating solutions by partnering with our clients through innovative and simpler ways

of underwriting and distributing products. Specifically, we are (1) partnering with startups who have new means of distribution, (2) investing in automated underwriting methods and technology, and (3) staffing up a new predictive analytics unit to analyze data in a more sophisticated way than we have done in the past.

As for driving solutions in the financial challenges our clients face, we are also innovating in the capital management field through building up strong talent and resources in areas like structured reinsurance and reinsurance of variable annuities.

Q: CAN YOU GIVE MORE INSIGHT INTO HOW YOU ARE DRIVING INNOVATION WITHIN YOUR ORGANIZATION?

A: Within our business, I don't see innovation as anything new—we have been developing incremental innovations for years, and that will continue. For example, in the U.S., we worked with a client to develop the first insurance product available for those who are HIV positive. We connected a startup and its distribution platform to a client, and together we developed and launched a comprehensive program to offer life insurance to this previously uninsurable group. In Canada, we have created a dedicated innovation team that is focusing on leveraging technology advancements in developing new products and services in partnership with our clients.

For disruptive innovation, which I do see as something new, Munich Re has employees on the ground in innovation hubs all around the world. From Silicon Valley, to London, Berlin, Tel Aviv, and Singapore, we are deeply engrained in the innovation ecosystems and are bringing new ideas, concepts, and opportunities to our business every day. As a corporate sponsor at the Plug and Play accelerator in Silicon Valley, earlier this year Munich Re was the founding sponsor of their new InsureTech vertical. InsureTech has been their most successful vertical, with more corporate sponsors after two months than most get after two years. This is a big achievement, as Plug and Play has a great track record of success, being the accelerator that launched PayPal, Dropbox, and many others. We are working with startups that are developing ways to underwrite faster and less intrusively, ways to use data to drive sales and find new highly qualified consumers.

Q: YOU MENTIONED PUTTING MORE RESOURCES IN STRUCTURED REINSURANCE. HOW HAS THE DEMAND FOR THIS CHANGED IN RECENT YEARS?

A: While structured reinsurance has been around for a long time, traditionally this covered capital relief transactions for small to midsize companies to help them manage in times of growth. Over the last few years, larger companies have increasingly turned to reinsurers—particularly for redundant reserve

financing transactions. This specialty area of reinsurance and increased capital costs at banks in the post financial crisis world has made bank solutions less attractive.

Q: WHAT DOES REDUNDANT RESERVE FINANCING DO?

A: It allows us and other reinsurers to assist our clients in managing their financial objectives through structured reinsurance. It is another tool, in addition to bank financing and capital markets, that life insurers can use to improve balance sheet efficiencies, raise capital and provide liquidity.

Q: SHIFTING TO THE UNDERWRITING CHALLENGE FACING THE INDUSTRY—AS A REINSURER, DO YOU BELIEVE UNDERWRITING NEEDS TO CHANGE?

A: Most definitely. At one month average underwriting time for an insurance policy, underwriting takes far too long and we need to make dramatic changes to our entire process. As a reinsurer, we need to ensure that we really understand how mortality selection works—what causes of death are we selecting out during the traditional underwriting process and how long does this benefit persist. Second, we have to use new sources of data to replace the benefits of the collection of fluids. Lastly, we are going to have to diligently manage anti-selection. Predictive analytics ties it all together and provides us with the tools to answer these questions. This is an area of investment for us, and many of our clients.

Q: GENETIC TESTING IS A TOPIC THAT INSURERS AND REINSURERS ARE TAKING AN INTEREST IN. WHAT IS YOUR VIEW ON THIS CONTROVERSIAL TOPIC?

A: I am a big proponent of genetic testing. Personally I believe that everyone should have access to information that can help people be more proactive regarding their health. There is huge value in knowing this information early enough to be able to make either lifestyle changes or to take preventative steps. The issue is that the insurance industry simply wants to be in the position of having the same health information that the applicant has. If an applicant knows they have a gene which makes them a much greater risk and they do not need to disclose this to the insurer, individuals can purchase excess coverage which will eventually lead to higher than average insurance premiums. This asymmetry of information completely goes against the basic tenet of insurance. Insurance premiums already use medical and family history information when setting premiums so this shouldn't be treated differently.

Q: SOME PEOPLE DON'T SEE THE INSURANCE BUSINESS AS EXCITING ... BASED ON ALL WHAT YOU ARE TALKING ABOUT, IT SOUNDS LIKE ANYTHING BUT. HOW DO WE GET THAT MESSAGE OUT?

A: I think that message is already starting to get out. The number of startups and demand for venture capital funding in the



insurance space (both life and property and casualty) is booming. You cannot pick up an industry publication or attend an industry conference where innovation and new ideas are not one of the biggest topics being covered. But we need to do more. We need to hire more and more from outside of our industry when we consider new and innovative ways of doing business or trying to figure out an unmet insurance need. It's not that people who have spent their careers in insurance cannot be innovative, but their thinking is shaped by the environment they have worked in before. What's exciting about talking to startups is that they typically don't come from our industry. Once they learn of a problem we have in insurance, they bring a very different mindset to the solution. In Silicon Valley, failure is celebrated. If you haven't failed at a startup or two, you are seen as not being innovative enough. We need to bring some of this mindset into our industry. But we need to figure out how to fail small, learn from that failure and then move on.

Q: TALENT IS A BIG FOCUS FOR YOU. WHAT ARE YOUR KEY CHALLENGES IN THE AREA OF TALENT?

A: Talent is a key issue for everyone. In the reinsurance business, as in some other industries, we have a disproportionate amount of highly skilled experts who are highly marketable. This means

that attracting as well as retaining talent is key. Although compensation is important, it is also important that you excite people about the work they are doing and give them enough accountability and responsibility to make an impact on the business. In order to attract a greater pool of talent we also recently opened an office in New York. Although we have been successful attracting talent into our Atlanta, Toronto, Montreal and Chicago locations, we thought that having a presence in the largest actuarial talent markets in North America is key to delivering on our future plans.

You also need to challenge people, push them out of their comfort zone, give them development opportunities to stretch beyond their current role. Our North American life operation is relatively small when compared to some of our competitors. What this means for us is that when a large opportunity or new idea in innovation comes up, we allow our current staff to work on these initiatives. This gives them a chance to see new things, develop new skills or work on a deal that might be outside of their current responsibilities. The big challenge for management in this scenario is to make sure they help to balance the talent's day-to-day workload, which is easier said than done.

Q: WHAT ACCOMPLISHMENT ARE YOU THE MOST PROUD OF?

A: I'm the most proud of the teams that we have built in both Canada and the U.S. Our accomplishments in Canada and U.S. are very different and both markets have had very different challenges. I have been very fortunate to work with very smart and dedicated individuals and I am very proud of our accomplishments.

Q: WHAT MAKES A LEADER SUCCESSFUL?

A: There are very different types of leaders and one cannot say what type of leader is better than the other. Personally, I am very passionate about the business, very demanding of myself and others and very persistent in my beliefs. I think no matter what kind of leader you are, you cannot go very far unless you have a high performing team. Hiring great people and ensuring that you give them full support to be successful is key.

Q: WHAT ADVICE WOULD YOU GIVE SOMEONE STARTING A CAREER?

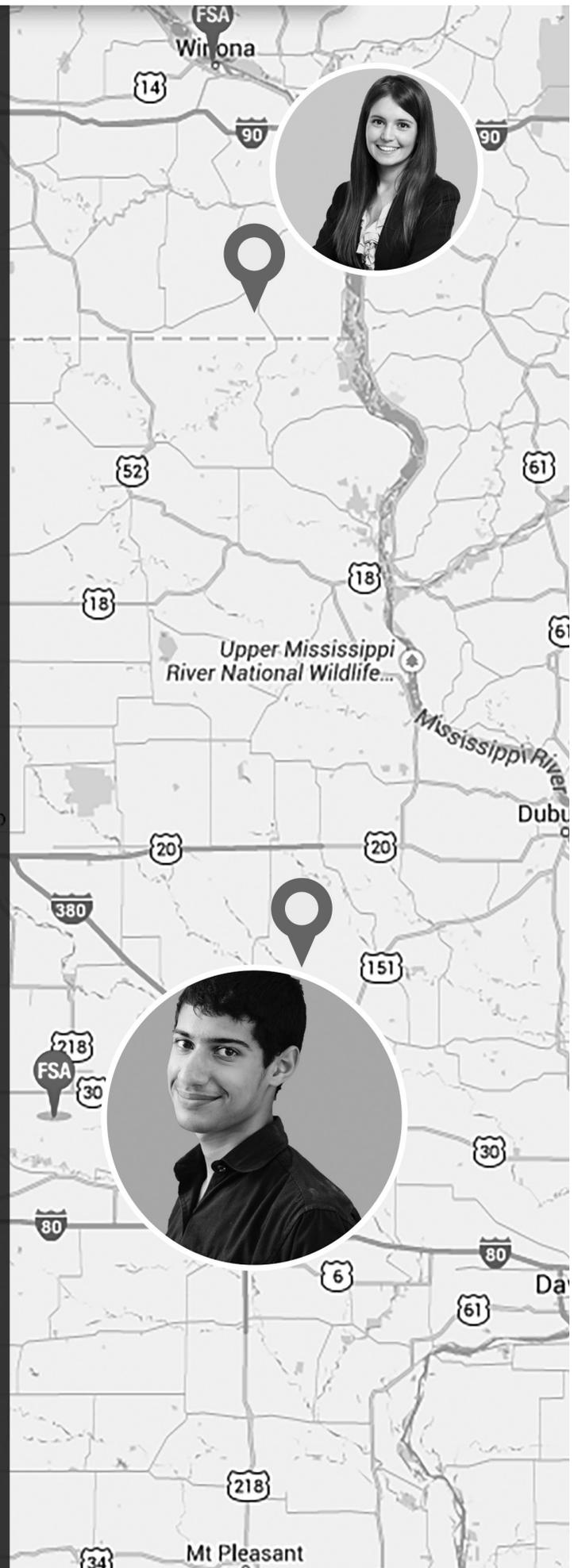
A: I think that most people that look for employment try to impress the interviewer and do not ask enough questions themselves—especially regarding the corporate culture of the company. You will likely change positions and work with different people in a company, but a corporate culture does not change very easily. I think it's critical that you work for a company where you can be yourself and you can fit in easily. Sharing common values with your employer makes for a far more pleasant working experience. ■

SOA Explorer Tool

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The SOA Explorer Tool is a global map showing locations of fellow SOA members and their employers, as well as actuarial universities and clubs.

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VBT Tables—A Perspective from Munich Re Contributors

By Michelle Lerch

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?"

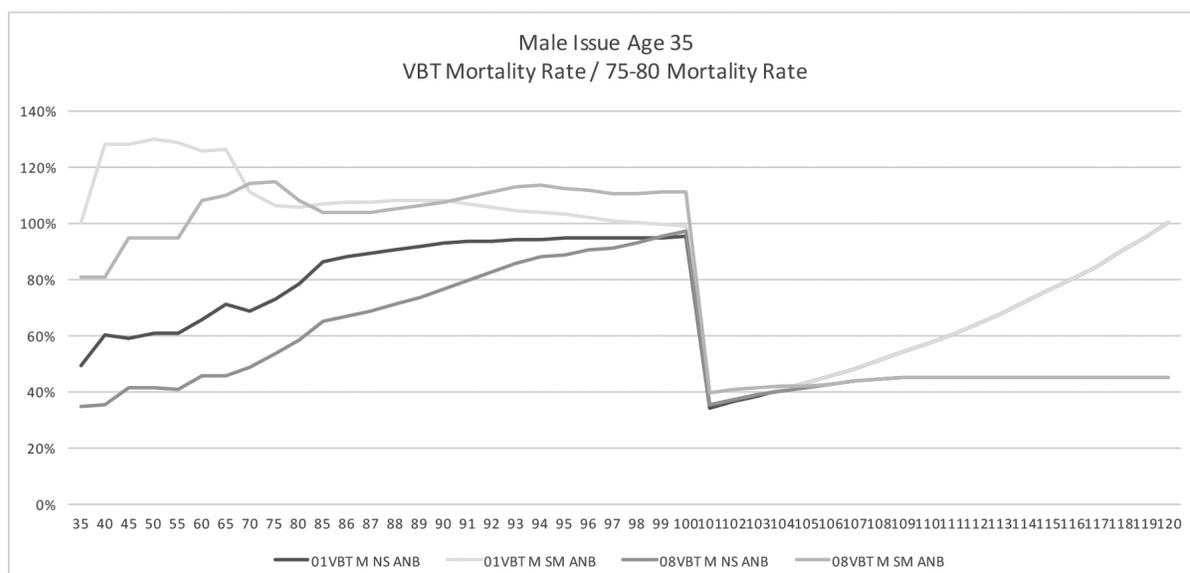
The question first came up before PBR work was formally started. The initial response was to create the 2001 CSO preferred tables, and the best person to do that was a consultant, Mike Taht. Looking forward, the goal was to introduce the relative risk table concept and the underwriting criteria score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

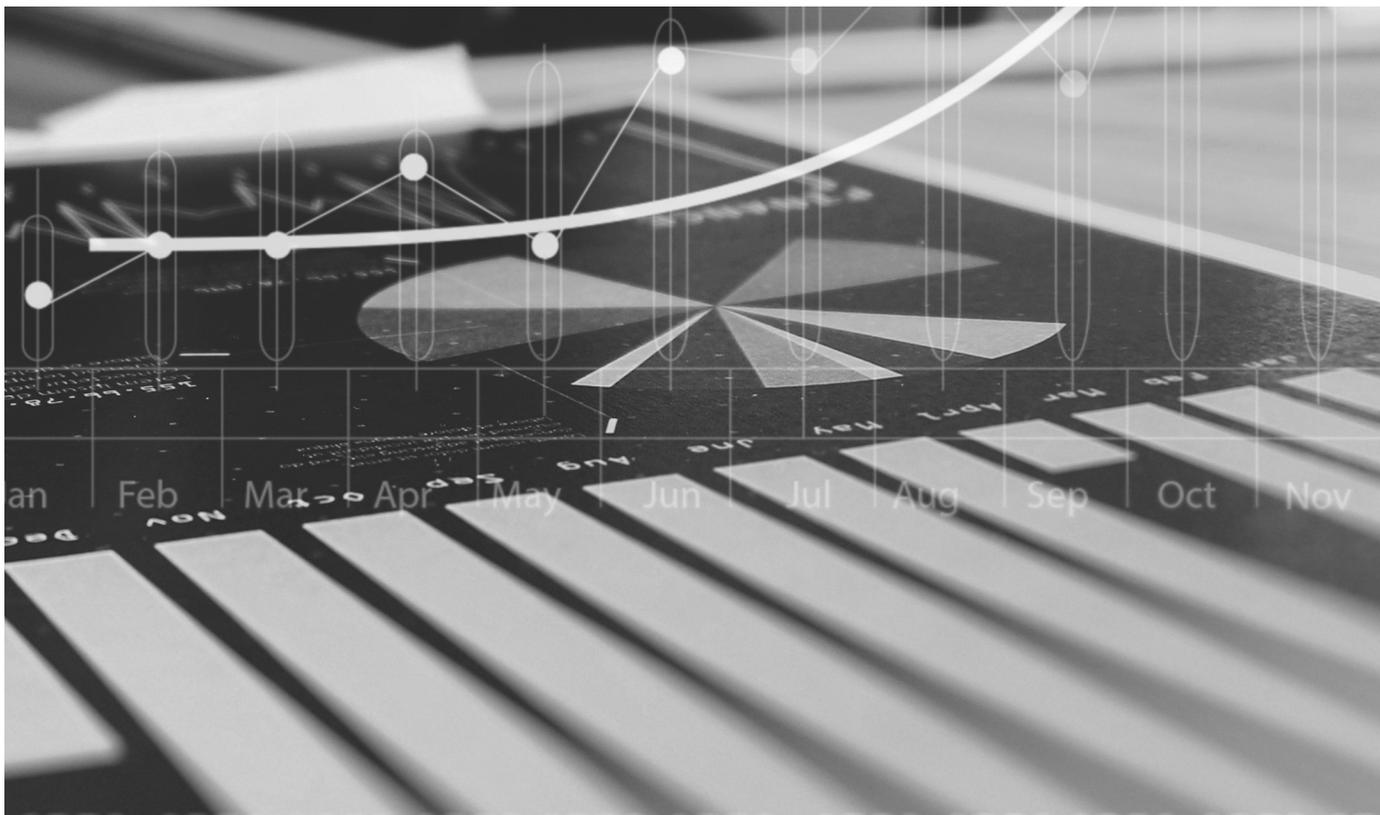
MT: The development of the base 2001 VBT tables was influenced in a number of ways by the evolution of underwriting. The experience underlying the table, experience years 1990-95, covered a number of different underwriting eras: aggregate, nonsmoker/smoker risk classes, reduced blood testing limits in 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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Meeting the Challenges of the Changing Actuarial Role

ACTUARIAL TRANSFORMATION® IN PROPERTY-CASUALTY INSURERS

By Jay Votta, Ian Sterling and Anthony Katz

As companies seek to drive profitable growth, both short term and long term, increasing the demands on the actuarial department, actuaries must reevaluate the current actuarial operating model relating to people, process, data and technology to address current needs and be prepared for the future needs of the business.

The business and competitive environment for insurers is challenging, and for companies to succeed now and in the future—to find profitable growth while managing risk and capital—they need integrated, high-performing actuarial functions. Insurers continue to face challenges and should be prepared for the changing face of insurance, new products and exposures, increased data/big data, technology advances, ongoing regulatory change, scrutiny around documentation and controls, and greater competition.

The actuarial function within many property-casualty insurers has historically remained constant, but the rising pressures and challenges have led to greater demands on actuaries. The actuary's work is growing more complicated; results and additional insights are expected sooner to enable faster action. Actuaries are asked to be better aligned with the company's finance and risk organizations and to play a bigger role in business decisions with a stronger commitment to advanced analytics and big data. As a result, insurance leaders are being driven to refocus the actuarial team on higher analytics while also improving efficiency through increased automation, responsiveness and transparency. This shifting landscape has given rise to a changing actuarial role within the company. This can be achieved through an actuarial transformation, which is a top-down assessment, redesign and deployment of a new actuarial operating model to enable companies to succeed now and in the future.

CURRENT STATE

Actuaries are involved in many of the company's competencies, including reserving, pricing, product development, price

monitoring, risk management and information technology (IT). Within each of these areas, the actuarial team is integral to the technical process and performs such functions as data preparation, assumption setting and analyses, as well as socializing indications to leadership. However, business decisions are sometimes left in the hands of others. For example, management relies on actuarial reserve estimates to determine recorded reserves. In pricing, underwriters base their decisions partially on actuarial pricing analyses. In both cases, actuaries are constantly pushed to provide results more quickly, with more insights and diagnostics, to drive better-informed business decisions.

Many companies currently face deficiencies that hinder the actuary's ability to meet these growing demands:

- **Data:** many companies have multiple, isolated or antiquated data architectures and systems, sometimes with incomplete history, which cause actuaries to spend a disproportionate amount of time on data preparation and reconciliations.
- **Systems:** actuarial analyses are often spreadsheet-driven without proper governance, increasing the likelihood of manual errors and delayed completion time, as well as limiting the flexibility to perform scenario tests, address ad hoc requests and perform more sophisticated and insightful analyses, such as predictive modeling, pricing monitoring and competitor analyses.
- **Actuarial utilization:** actuaries spend a significant amount of time performing manual tasks, such as updating spreadsheets. Considerable time is also spent on operational activities and routine reporting to fulfill a compliance or regulatory requirement, limiting availability to perform advanced analytical analyses and strategic activities. For example, the financial close process often requires allocations and reconciliations that are cumbersome and require manual adjustments. Finally, there is sometimes a misalignment of actuarial outputs to business objectives and operational needs.
- **Resources:** actuarial departments face resource challenges, which intensify demands on the individual actuary's time, cause improper alignment of actuarial staff and increase key person risk.
- **Communication and interaction:** some actuaries have only limited interactions with other functions, and the interaction that occurs seldom leads to actionable tasks. For example, the limited formal interaction with claims, along with the context of and information provided in the discussions that are held, does not allow for reflection of claims activity in the actuarial analyses. Additionally, limited interaction with business unit management keeps actuaries from fully understanding management's need for valuable diagnostics in making informed

business decisions. This communication gap has caused frustration and a lack of transparency into the actuarial process.

- **Controls:** due to inadequate tools and the time needed for proper documentation, actuarial analyses are sometimes insufficiently documented or lack a formalized controls environment around methodology and assumptions to meet the scrutiny of auditors, regulators and the Internal Revenue Service.

CURRENT AND EMERGING THEMES

The transformation of the actuarial role within the company is leading to a process that is more responsive and efficient through increased use of automation, enables better use of data and incorporates a more thorough governance environment:

- **Responsiveness:** a responsive process may permit advanced analytics that can enhance business decisions. This includes timely and insightful management reporting, integration of pricing and reserving, more sensitivity analyses, stress testing and decision support, and greater leverage of actuarial/analytical talent across the enterprise.
- **Efficiency and automation:** a more efficient process may result in more timely results, better controls and a reduction in expenses. This includes more appropriate alignment of skills to the work, such as actuarial focus on technical activities and IT or shared services function focus on data management. This also includes utilizing technology to standardize and automate routine processes and reports.
- **Data and data marts:** more complete, accurate, organized and consistent data, including the use of data warehouse or data mart, utilizing both internal and external data, and data processes, may allow the actuarial group to perform more analytics, such as predictive analytics and scenario testing, in a timely fashion. Self-service business intelligence (BI) tools like data visualization enable more insight into the company's data, such as exposure changes and data trends.
- **Governance:** a better-governed process will enable the actuaries to meet the growing demands for a better controls environment. This includes a process and controls environment of the actuarial functions and systems, with well-documented procedures, assumptions and risks. For example, the reserve-setting process between the actuarial central estimate and management's best estimate can be better documented.

WHAT IS ACTUARIAL TRANSFORMATION, AND WHY DO IT?

Transformation is a top-down assessment, redesign and deployment of a new operating model to enable companies to succeed and maintain relevance now and in the future. Transformation projects have been under way for several years. Most life insur-



ers are currently involved in major programs to improve their financial reporting models, driven by the complexity of principle-based reserving methods and other factors. Property and casualty actuaries have played a limited role in finance transformations, mostly in the reserve-booking process. The notion of a holistic property and casualty actuarial transformation is a relatively recent development.

Actuarial transformation creates a target actuarial operating model that is integrated with the company's business strategy. It enables the actuary to be better aligned with the business and contribute directly to the company's goals and objectives.

Actuarial transformation takes a strategic, integrated view and focuses on:

- What actuarial services should be delivered, both now and in the future;
- How these services are linked to the company's business strategy and operational objectives;
- How these services are aligned with the finance and risk functions;
- How these services are performed, both short term and long term; and

- How actuarial talent can be optimized.

Actuarial transformation provides benefits to the actuarial function and the company as a whole:

- Better positioned in the market;
- Better positioned for the future; and
- Better insights—faster action.

It should lead to improved:

- Information to make key business decisions;
- Understanding of company risks;
- Transparency of actuarial process and drivers of results;
- Coordination across all functions;
- Governance and controls;
- Actuarial stakeholder satisfaction;
- Leveraging of actuarial talent;
- Employee retention and satisfaction; and
- Efficiency and expense structure.

The main anchor of an actuarial transformation is a target operating model (TOM) focusing on people, process, data and technology.

It should also lead to reduced:

- Cycle and process times for routine reports;
- Risk and potential inaccuracies;
- Time to identify opportunities;
- Time to identify adverse experience/trends to mitigate risky exposures; and
- Key person risk.

ACTUARIAL TARGET OPERATING MODEL

The main anchor of an actuarial transformation is a target operating model (TOM) focusing on people, process, data and technology.

People

The TOM should incorporate an organization model that aligns the actuarial function with the business while clearly defining roles and responsibilities, minimizing key person dependency, matching skills to roles, training users of systems and tools, and developing capabilities and measurement tools to effectively assess people. For example, an actuarial department can be restructured so that (1) pricing actuaries work closely with

underwriting and have some reporting responsibilities to the chief underwriter, and (2) reserving actuaries work closely with finance and have some reporting responsibilities to the CFO. To encourage the commitment to such teaming, companies should base performance measurement on both individual and business goals and success.

Process

The TOM should create a more efficient process that provides insights, meets business requirements and leverages technology, including current and anticipated future technology, while incorporating a governance and controls environment to satisfy regulatory, actuarial, audit and legislative compliance. For example, actuarial reports can be co-developed with the business and well documented and transparent as to methods and assumptions such that users appreciate both the implications and limitations of the information provided.

Data and technology

The TOM should incorporate technology to drive advanced analytics and increase automation across the enterprise, as well as enhance pricing tools while standardizing data organization, routine reports and

reducing data preparation and reconciliation. Additionally, increased use of business intelligence (BI) tools should enable more insight into data and trends. Examples include implementing reserve software that limits manual errors and increases the opportunity for additional analyses; implementing pricing models such as predictive modeling, competitive analyses and price monitoring; and incorporating an

R&D team to build and test tools that will provide a competitive advantage.

When determining the TOM, companies should consider all the components and their interactions. An actuarial transformation could focus on all actuarial functions or a subset of the functions within the company's actuarial capabilities. Although the ideal model will vary by company, it must encourage collaboration, deploying both human and technological resources to their highest and best advantage.

ACHIEVING THE ACTUARIAL TARGET OPERATING MODEL

To improve the operating model, a company must understand where it currently stands, develop a future vision or TOM, identify gaps between the current state and the vision, and create a road map of initiatives required to close the gaps.

When implementing the TOM, companies will face many challenges, including resistance to change, lack of buy-in, system challenges, current workloads, and communication and level of

messaging. Successful companies put a structured and sustained emphasis on change management. Keys to success include:

- **Dedicated leadership:** the willingness for change must come from senior executives, including the chief actuary, CFO and chief information officer, setting the tone for collaboration to achieve shared corporate goals. The leaders need to support resource needs over the entire life cycle, as well as cascade information and accountability.
- **Clearly defined roles and responsibilities:** the role of each actuary, including key performance indicators, should be clearly defined to enable individual and company success. Each individual must feel engaged and optimistic about the role.
- **Communication of change:** the reason and benefits of change must be clearly communicated so that people understand how they and their organization will be stronger.
- **Collaboration:** the various functions within the company must collaborate with each other and understand how success in one area will lead to success in others.
- **Technology transition plan:** changing the technology environment is not a quick process. A plan should be in place to smoothly transition procedures and tools as well as manage information, with the proper amount of time allocated for testing.
- **Designing solutions to provide both automation and flexibility:** while increased automation leads to more efficiency and controls, systems should be adaptable to meet the need for decision support and ad hoc requests, such as sensitivity testing of various assumptions. A clear automation strategy should be incorporated across the enterprise, such as in the data extract, transform and load process, standard analysis procedures and reporting processes. Innovation and R&D teams should consider how to improve upon the systems and models to meet emerging needs.
- **Performance management:** to effectively manage a cross-functional team, the company will need to establish a set of monitoring protocols and measurements. The measurements should align with specific corporate scorecard goals and demonstrate incremental progress in achieving those goals. Effective management outcomes will be driven by a blend of quantitative and qualitative measurements that provide transparency into progress and status of key delivery milestones.

To enable success, a dedicated team, such as a transformation office, should be created. This team will help drive communication to those involved or affected by the transformation, provide status updates, guide the process, tackle challenges and provide insights. The team should consist of people who are completely

focused on the transformation, understand what works and what doesn't and provide insight into leading practices in the industry.

CONCLUSION

Companies and actuaries face a challenging time preparing for the changing face of insurance, new products and exposures, increased data/big data, regulatory changes, greater competition and technology advancements. Leadership understands the value actuaries bring to the company and are looking for actuaries to be more involved in the business decision process, including increased use of advanced analytics, and the mentality of better insights quicker. To meet these challenges and demands of today and the future, actuaries need to review their capabilities within the core actuarial functions and the current operating model around people, process, data and technology.

No single approach works for the entire industry. Once actuarial objectives are clearly understood and articulated, companies should assess their current state to better understand the gaps separating them from leading practice and their ideal future state, and to create a road map for achieving the actuarial TOM. This requires understanding and buy-in from company leadership, as well as a structured and dedicated actuarial transformation office that understands the transformation process. The road will not be easy, as change is usually met with resistance, but the time has come to consider the advantages of a refreshed operating model and to make sure you and your company are prepared for the changes in the environment and the actuarial role. ■

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Through Innovation, Global Reinsurers Race to Remain Relevant

By A.M. Best's Reinsurance Team

Declining rates, broader terms and conditions, unsustainable flow of net favorable loss reserve development, low investment yields and continued pressure from convergence capital are all negative factors that continue to adversely impact global reinsurance companies. These weak operating fundamentals in the reinsurance sector also are being exacerbated by continued weakened demand from primary insurers as they retain more business to leverage their own excess capacity. As a result, companies have intensified their efforts to develop new strategies in order to adapt to structural market changes.

These significant challenges prompted A.M. Best to revise its rating outlook to negative on the sector in August 2014 and has maintained it there since, citing how these obstacles are hindering the potential for positive rating actions over time and may eventually translate into negative rating pressures.

With regard to the low investment yields, the prospects for any meaningful relief have been delayed as a consequence of the decision by U.K. voters to leave the European Union in the so-called “Brexit” vote. Following the vote in late June 2016, A.M. Best said in a statement that it did not expect to take rating actions in the near term as a direct consequence of the referendum results though it would monitor exit negotiations and would discuss with rated companies what prospective changes will mean for their competitive positions and ability to continue to access business in the United Kingdom and the European Union (EU).

The full consequence of the “Brexit” vote is difficult to gauge at this point. A.M. Best noted that Solvency II’s market-consistent approach

to valuing the economic balance sheet meant that financial market volatility will be closely reflected in European insurers’ reported solvency capital ratios. However, operationally, the transacting of reinsurance business should not be affected as trade restrictions between the United Kingdom and EU are unlikely to apply to reinsurance.

The dearth of opportunities to enhance results with investment income remains an issue for primary and reinsurance companies. Management teams have reiterated intentions to remain disciplined and reduce books of business if necessary in order to achieve desired results. Due to the hyper-competition for reinsurance opportunities, limited in number by the strong balance sheets of primary insurers, risk portfolios of global reinsurers have begun to shift in terms of business mix. This underlying trend began several years back, when reinsurers, in an effort to better cycle manage their risk portfolio, looked for opportunities to grow in specialty insurance. Pricing for this business is proving to be a little more attractive than on the reinsurance side, although increased pressure is mounting in this sector as well, rendering some specialty classes as less than “special.” Over the recent term, property, marine, energy and aviation pricing pressures have become more acute, even on the primary side.

The reality is capital market capacity has triggered structural changes in the market. The trend started as a trickle but now is creating enough of an impact on the property catastrophe market that it is displacing capacity to other lines of business, distribution sources, and geographies. Recent indications of a market bottoming are emerging, but the overriding trend remains negative. A broader cyber (re)insurance solution in the market, as well as regulatory changes in the European Union and China, may over time provide some new business opportunities for reinsurers.

SEEKING SOLID FOOTING THROUGH M&A

A.M. Best’s annual analysis of the Top 50 reinsurers confirms some of the aforementioned industry themes. With robust capacity, the market remains competitive, and given the continued low investment yields, underwriting discipline continues to be critical. While some of the Top 50 reinsurers have grown organically, others have grown through acquisitions (Exhibit 1).

Most of these transactions can be characterized as attempts to build scale, product and distribution capability, while improving

EXHIBIT 1: NOTABLE CHANGES IN A.M. BEST’S RANKING OF TOP GLOBAL REINSURANCE GROUPS

UPWARD	2015	2016	Δ	DOWNWARD	2015	2016	Δ
Qatar Re	50	35	15	IRB - Brasil Resseguros	31	36	-5
RenaissanceRe	26	20	6	Allied World	37	41	-4
Arch Capital Group	27	22	5	Maiden Re	38	42	-4
Taiping Re	42	37	5	Sompo Japan Nipponkoa	44	48	-4
Third Point Re	49	44	5	QBE Insurance Group	20	24	-4

Source: A.M. Best data and research

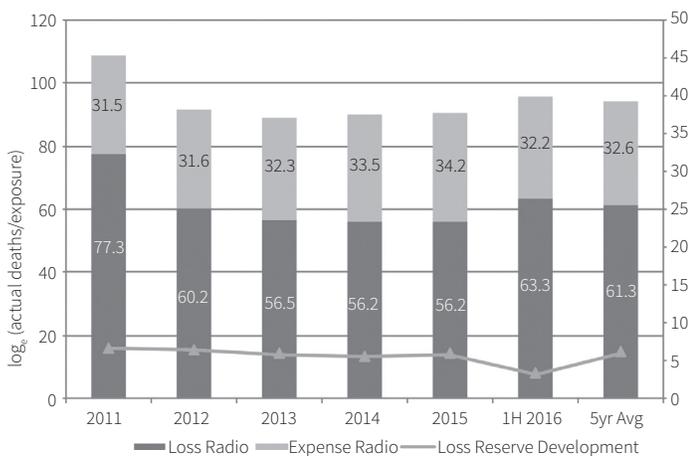
operating and capital efficiency. It is not yet clear if all these objectives have been fully realized for the recently merged organizations. What is evident is that the acquired entities, which, by and large, were focused on U.S. property catastrophe reinsurance, are better off as part of a larger, more broadly diversified organization. While these transactions have done little to alleviate the excess capacity that exists in the market, they have provided the respective organizations greater flexibility in deploying capacity across a broader spectrum of opportunities globally. The broader product and distribution capability also should be a significant advantage in attracting capital market capacity as money managers seek to expand their horizons beyond property catastrophe risk.

The market leaders continue to dominate, with the Top 10 reinsurers of 2015 remaining in the top quintile of the 2016 rankings, and writing more than 70 percent of the total life and non-life unaffiliated gross reinsurance premiums written. Munich Re, Swiss Re and Hannover Re have occupied the first, second and third spots, respectively, since 2010.

Overall, the year-over-year declines in premium have accelerated. In 2015, total life and non-life gross premiums declined 1.5 percent year-over-year, versus less than a 0.5 percent decline in the prior year. The decrease in premiums is attributable to discipline among many players in the market, but the significant depreciation in foreign currencies relative to U.S. dollars, on which the top 50 ranking is based, also accounts for some of the decline.

While 2015 was not devoid of severe natural catastrophes, many events were either away from population centers or were in areas of low insurance penetration. The relatively benign catastrophe environment has put significant downward pressure on rates. Still, reported operating performance among reinsurers remained buoyant (Exhibit 2). Combined ratios for nearly 90 percent of the

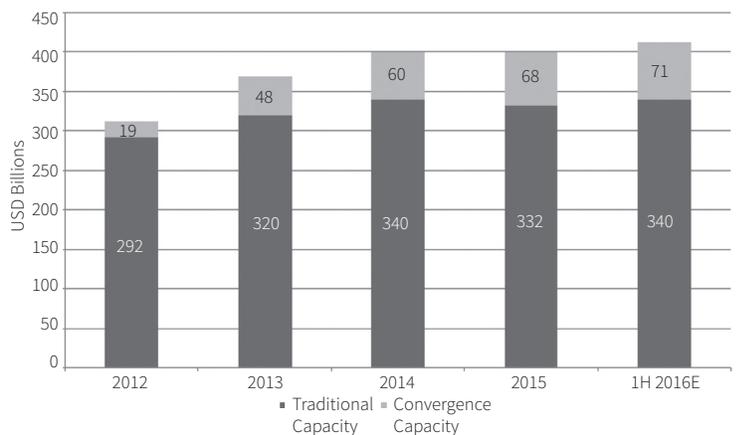
EXHIBIT 2: GLOBAL MARKET - COMBINED RATIO COMPONENTS



Source: A.M. Best data and research

Top 50 reinsurers were below 100, driven in part by continued favorable development and well-diversified books of business. Surplus growth once again outpaced net premium revenue growth. Alternative capacity in the form of catastrophe bonds, sidecars, and other structured products continue to fuel strong price competition. It is currently estimated that alternative capital represents approximately USD 71 billion of capacity, roughly 20 percent of the total dedicated capacity of the reinsurance market (Exhibit 3).

EXHIBIT 3: ESTIMATED DEDICATED REINSURANCE CAPITAL: 2012 TO MID-YEAR 2016



Source: A.M. Best data and Guy Carpenter

CONVERGENCE MARKET MATURING

Alternative capital will continue to flow to the reinsurance sector for the foreseeable future. Insurance-linked securities (ILS) fund managers will be major players in the reinsurance sector as more collateralized reinsurance programs covering nonpeak exposures are ceded to the capital market; catastrophe bond risk capital continues to grow; and the potential for longevity risk transfers becomes part of the ILS transaction mix. The next major catastrophe will be the first for most ILS fund managers. If capacity issues arise, history has shown that new capital will enter the market. However, A.M. Best expects that this additional capacity is more likely to come from capital market solutions than the more traditional creation of “brick and mortar” reinsurance/insurance companies.

Another manifestation of this convergence capital is the hedge-fund-sponsored reinsurer. In an environment where rate-online has become much more competitive and the peaks of the underwriting cycle have softened in recent history, reinsurers are looking for strategies to optimize the risk-reward balance. There are many ways to accomplish this, one of which is the hedge-fund-sponsored reinsurer model of which most are still in the start-up phase. To that end, it is uncertain what the specific long-term

EXHIBIT 4: HEDGE FUND COMPOSITE - TREND SUMMARY (USD MILLIONS)

	2-YR AVG	2015	2014
NPW (P&C only)	1,606.9	1,946.4	1,267.3
Net Earned Premiums (P&C only)	1,305.5	1,585.3	1,025.6
Net Investment Income	423.0	176.0	670.0
Realized Investment Gains / (Losses)	-	-	
Total Revenue	1,703.1	1,760.0	1,646.2
Net Income	(81.4)	(278.9)	116.1
Shareholders' Equity (End of Period)	5,510.3	5,982.7	5,037.9
Loss Ratio	67.2%	70.3%	64.1%
Expense Ratio	41.0%	41.1%	40.8%
Combined Ratio	108.2%	111.5%	104.9%
Loss Reserve Development - (Favorable) / Unfavorable	2.0%	3.2%	0.8%
Net Investment Ratio ¹	38.2%	11.1%	65.3%
Operating Ratio	70.0%	100.4%	39.6%
Return on Equity	-1.2%	-4.7%	2.4%
Return on Revenue	-4.4%	-15.8%	7.1%
NPW (P&C only) to Equity (End of Period)	28.8%	33%	25%
Net Reserves to Equity (End of Period)	13.6%	20%	8%
Gross Reserves to Equity (End of Period)	18.4%	22%	15%

Source: A.M. Best data and research

results will be compared with more traditional reinsurers.

Hedge-fund-sponsored reinsurers were not immune to the adverse market trends in 2015. Premium growth and underwriting performance was unfavorable across A.M. Best's composite of hedge-fund-sponsored reinsurers, with a combined ratio of 111.5 percent, a loss ratio of 70.3 percent and an underwriting expense ratio of 41.1 percent for 2015 (Exhibit 4). The start-up nature of most of these entities and related costs, along with less-than-optimal premium volumes compared with fixed expenses, led to the inflated expense ratio. A.M. Best also notes that none of the companies in its "hedge fund re" composite were able to avail themselves of prior-year reserve takedowns that have been heavily utilized by companies in A.M. Best's U.S.

and Bermuda composite, which for 2015, represented a six-point benefit to the loss and combined ratios.

Investment results for 2015 for the hedge-fund-sponsored composite were similarly disappointing, with a 0.9 percent investment yield, with the most adverse performance in the composite being down 22.2 percent and the most beneficial in the composite being up 25.9 percent. This composite also recorded an USD 279 million net loss for 2015.

While investment and overall performance has been poor, A.M. Best believes it is too early to jump to the conclusion that the "hedge fund re" model does not work. The level of investment volatility experienced is expected and is contemplated in A.M. Best's various stress tests as part of its stringent start-up require-

Clearly, capital market capacity is pressuring the reinsurance sector to work to charge less. With more capital in the market, the ultimate winner should be the insured client as this drives down the cost of insurance.

ments. The success of these strategies has to be evaluated over the long term and through various market cycles. The robust capitalization of these companies provides the bandwidth to achieve success. It generally takes several years for a strategy to take hold and reach adequate economies of scale.

CAPACITY CALLS FOR INNOVATION

Reinsurers increasingly seem to be viewing capital market capacity as an opportunity as opposed to a threat. Despite a progressive deterioration in pricing, terms and conditions, capital market capacity has continued to be attracted to the reinsurance sector and underwriters that have the market knowledge and distribution capability to assess risk are benefiting. Companies have been utilizing retrocessional capacity in various forms as a cycle management tool. Over the past few years, new sidecar facilities have been created or existing ones increased. The capability to transfer risk to capital market facilities in exchange for fees and profit sharing is a desirable alternative to have available for clients when risk-adjusted pricing prohibits the use of traditional on balance sheet capacity.

There have been a number of strategic acquisitions or investments in MGAs by reinsurance companies and capital market facilities seeking to strengthen their distribution channel as traditional access to business continues to contract. Direct ownership of a distribution source serves the dual purpose of stabilizing the flow of business and reducing acquisition costs, while providing the insured client with

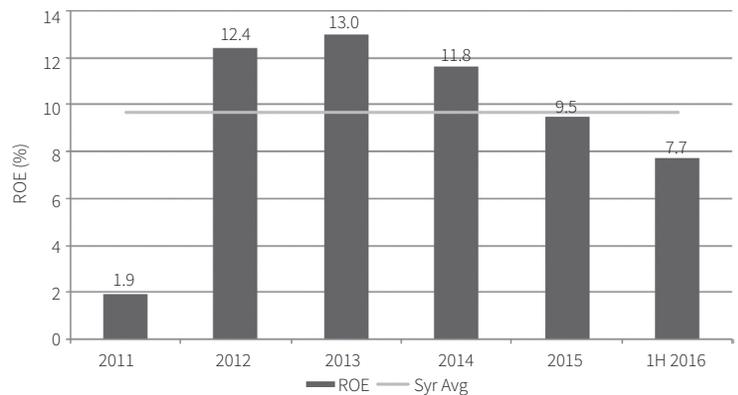
a competitively priced product. Owning the MGA as opposed to just providing the capacity has the added benefit of greater ability in maintaining quality underwriting standards.

There is also a push for innovation and trying to find ways to close the protection gap. Reinsurers appear to be leading the

initiative to penetrate uninsured and underinsured exposures such as flood, cyber and terror by working with government and taxpayer-backed pools to find risk transfer solutions to alleviate the post-loss burden on society. This is an area where ideas are plentiful but progress is slow. It remains a huge frontier with great potential and may be the ultimate solution to the excess capacity problem, providing for greater strategic alliances between traditional and capital market capacity.

Clearly, capital market capacity is pressuring the reinsurance sector to work to charge less. With more capital in the market, the ultimate winner should be the insured client as this drives down the cost of insurance. But it is the long-term value proposition that really matters for all parties involved and that outcome is still very unclear. Given where rate adequacy is, A.M. Best thinks it will continue to take optimal conditions, including benign or near-benign catastrophe years, a continued flow of net favorable loss reserve development, and stable financial markets to produce even low double-digit returns. Such return measures would have been considered average or perhaps mediocre just a few short years ago (Exhibit 5). The reality of the current situation is that a major catastrophe will occur at some point and the mask of redundant reserves will eventually be removed to reveal the true ramifications of current market conditions.

EXHIBIT 5: GLOBAL MARKET - RETURN ON EQUITY (ROE)



Source: A.M. Best data and research

It is A.M. Best's view that companies with diverse business portfolios, advanced distribution capabilities and broad geographic scope are better-positioned to withstand the pressures in this type of operating environment and have greater ability to target profitable opportunities as they arise. It also places increased emphasis on dynamic capital management in order for companies to manage the underwriting cycle and remain relevant to equity investors and the capital markets. ■

Reinsurance Considerations in the Determination of PBR Reserves

By Chris Whitney and Greg MacKenzie

With the adoption of Valuation Manual 20 (VM-20) on June 10, 2016, principle-based reserves (PBR) will become effective on Jan. 1, 2017 with an optional three year phase-in period.

The reserve credit for reinsurance under PBR is significantly different than the formulaic approach that insurers have become accustomed to and will require them to take a discerning look at their reinsurance arrangements as well as the assumptions used to model reinsurance cash flows.

This article highlights key PBR reinsurance considerations through a case study focused on the reserving impact of alternative reinsurance structures and assumptions.

BACKGROUND

Reserves under PBR

U.S. Statutory reserves under PBR are calculated as the maximum of the following three components, as specified under VM-20:

1. Net Premium Reserve (NPR)
2. Deterministic Reserve (DR)
3. Stochastic Reserve (SR)

Section 8 of VM-20 pertains to the impact that reinsurance has on these components.

The gross reserve and net reserve are each calculated using a separate PBR calculation. Put another way, the reserve credit is the difference between the gross and net PBR amounts:

$$\text{Max}(NPR_{Gross}, DR_{Gross}, SR_{Gross}) - \text{Max}(NPR_{Net}, DR_{Net}, SR_{Net})$$

Actuarial Guideline XLVIII

Under Actuarial Guideline XLVIII (AG 48), Term and Universal



Life writers that utilize XXX or AXXX captive reinsurance arrangements have been required to perform PBR calculations to determine the amount of Primary Security to be held.

Prior to the effective date of VM-20, the AG 48 calculation is performed gross of reinsurance and the Primary Security requirement is reduced by the portion of the business retained by the direct writer.

After VM-20 becomes effective, AG 48 calculations must include reinsurance. This applies retrospectively to all business subject to AG 48.

PBR REINSURANCE CONSIDERATIONS

Net Premium Reserve

The NPR is calculated formulaically at the policy level using

prescribed assumptions. The approach to calculating the NPR net of reinsurance is the same as that used for formulaic reserves prior to PBR:

- **Coinsurance:** The NPR is reduced by the percentage reinsured.
- **Yearly Renewable Term (YRT):** The NPR is reduced by the unearned cost of insurance that is reinsured.

Deterministic and Stochastic Reserves

The DR and SR are calculated using an asset-liability model for an aggregate segment of policies using prudent estimate assumptions. The DR and SR gross of reinsurance are calculated by excluding reinsurance cash flows from the model. The net DR and SR are calculated using the same approach, but including reinsurance cash flows.

VM-20 provides general guidance on the modeling of reinsurance cash flows, stating, “The company shall assume that the counterparties to a reinsurance agreement are knowledgeable about the contingencies involved in the agreement and likely to exercise the terms of the agreement to their respective advantage, taking into account the context of the agreement in the entire economic relationship between the parties.”

The proposed ASOP for VM-20 provides substantially the same guidance for the actuary.

CASE STUDY

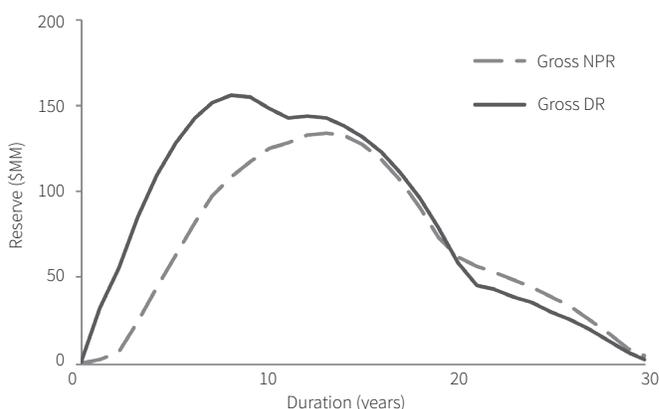
A cohort of new business with \$50MM of first year premium consisting of 10-, 20- and 30-year term products was projected for 30 years. In the projection, the NPR and DR were revalued annually using the terms of VM-20 and the following specifications:

- The prudent estimate DR mortality assumption was improved at a rate of 1 percent per year up to each valuation date.
- Valuation scenarios were regenerated at each valuation date in order to reflect the impact of changes in the yield curve on the scenario generator and mean reversion parameter.
- At each valuation date, starting assets used in the DR were solved for using the ‘Direct Iteration’ approach under VM-20.
- The NPR was calculated using the 2017 CSO table and a valuation interest rate of 4.5 percent.
- Mortality experience was assumed to be 30 percent credible with 10 years of sufficient data.
- The cohort is assumed to pass the Stochastic Exclusion Test (SET).
- Assumptions used and products modeled are for an illustrative term portfolio intended to be reasonably representative of products offered in the market today.

The DR and SR are calculated using an asset-liability model for an aggregate segment of policies using prudent estimate assumptions.

The gross NPR and DR for this cohort of new business are shown in Figure 1.

FIGURE 1: RESERVES GROSS OF REINSURANCE



As shown, the DR starts much higher than the NPR, but the gap closes over time and there is a crossover in year 19. The primary driver of this pattern is that the DR mortality assumption is unlocked for mortality improvement up to each valuation date, whereas the NPR mortality is not.

Coinsurance

Three 50 percent first dollar coinsurance agreements were modeled and are summarized in Table 1. As is typically the case, the coinsurance allowances were assumed to be guaranteed, requiring no additional assumptions to calculate the DR.

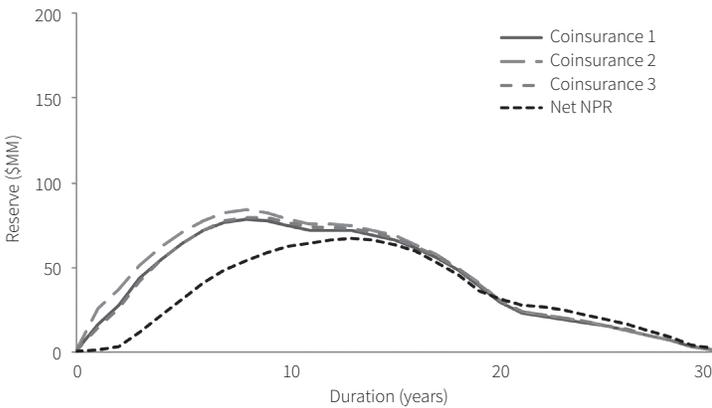
TABLE 1: COINSURANCE AGREEMENTS

Coinsurance	Description
Agreement 1	Reimburse proportion of VM-20 prudent expenses and commissions
Agreement 2	Reimburse proportion of best estimate expenses and commissions
Agreement 3	Prudent expense and commission allowance expressed as level percentage of premium

Once the reserve reaches the NPR floor in year 20, the ceding company will see a proportionate reserve reduction under all coinsurance arrangements.

The projected NPR and DR net of reinsurance are shown in Figure 2 for these arrangements.

FIGURE 2: NET RESERVES WITH 50% COINSURANCE



Because the reserves above reflect 50 percent coinsurance, all values are decreased significantly relative to the gross reserves from Figure 1.

The net NPR is shown as the black dotted line and is the same under all three agreements. It is calculated using a proportionate reduction to the gross NPR based on the 50 percent of the business coinsured and therefore follows the exact same pattern as the gross NPR from Figure 1.

In contrast, Figure 2 shows that the three DR curves visibly vary in the first 10 years. Table 2 below illustrates this by expressing the net reserve as a proportion of the gross reserve:

TABLE 2: NET/GROSS RESERVE BY COINSURANCE AGREEMENT

Year 1	Year 5	Year 10	Year 20
50% (DR)	50% (DR)	50% (DR)	50% (NPR)
67% (DR)	55% (DR)	53% (DR)	50% (NPR)
47% (DR)	50% (DR)	51% (DR)	50% (NPR)

Under Agreement 1, the DR is reduced proportionately because the agreement terms were set to reimburse prudent estimate expenses, which is uncommon in coinsurance transactions.

Under Agreement 2, the DR is higher than Agreement 1 because it is only set to reimburse best estimate expenses. Under this arrangement, the ceding company will not realize a proportionate reduction in the DR.

Under Agreement 3, the DR starts off slightly lower than under Agreement 1 but ends up slightly higher. The slight variation relative to Agreement 1 is due to a higher expense allowance in Agreement 3 in the early years and a lower expense allowance in the later years.

Once the reserve reaches the NPR floor in year 20, the ceding company will see a proportionate reserve reduction under all coinsurance arrangements.

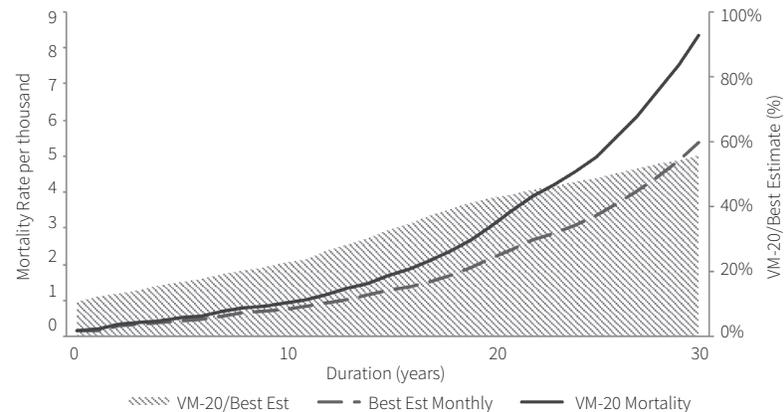
YRT Reinsurance

A 50 percent first dollar YRT reinsurance arrangement with the current premium scale set equal to 100 percent of the best estimate mortality assumption was modeled.

VM-20 mortality is based on a prudent company-specific mortality assumption grading to a prudent industry table when sufficient data no longer exists. The margin applied to set the company-specific prudent assumption is a function of the credibility of the underlying experience.

A comparison of the VM-20 mortality and best estimate mortality is shown in Figure 3 for a 35-year-old male, preferred non-tobacco:

FIGURE 3: BEST ESTIMATE VS. VM-20 MORTALITY



The shaded area shows that the total effective margin starts at 10 percent and grades to 54 percent over 30 years due to the absence of mortality improvement and the grading to the prudent industry table.

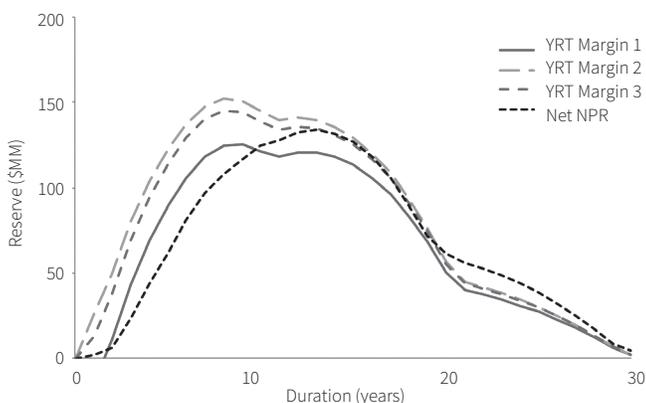
Under this adverse mortality scenario relative to best estimate, we examined the YRT rate change scenarios shown in Table 3.

TABLE 3: VM-20 YRT RATE CHANGE

Scenario	Description
1	No change in rates
2	Increase rates to remove reinsurance gain
3	Increase rates by 15%

The projected net NPR and DR for the cohort of new business under the three scenarios are shown in Figure 4.

FIGURE 4: VM-20 YRT RATE CHANGE SCENARIOS



The net NPR is shown as the black dotted line and is calculated by reducing the gross NPR by the unearned cost of insurance for the 50 percent of the business reinsured. This NPR is only slightly lower than the NPR from Figure 1.

Under Scenario 1, it is assumed that no change is made to the scale of YRT rates and that the reinsurer absorbs losses due to mortality emerging adversely as compared to the current YRT scale. The net DR is significantly reduced as compared to the gross DR and becomes lower than the net NPR in years nine and beyond.

Scenarios 2 and 3 assume that the reinsurer will exercise their option to raise YRT rates to make up for the adverse mortality variance.

In Scenario 2, it is assumed that YRT rates will be reset for the reinsurance treaty to break even at all times (i.e., no gains or loss from reinsurance). In this situation, the only reduction in the PBR reserve realized by the ceding insurer will be due to a difference in cash flow timing (return of unearned premium). The difference between the gross and net DR is similar to the difference in gross and net NPR under this scenario.

Scenario 3 with a 15 percent across-the-board increase in YRT premium is intended to represent a situation where the direct writer and the reinsurer are ultimately sharing losses due to mortality emerging adversely relative to expected. The Scenario 3 DR falls somewhere between the Scenario 1 DR and the Scenario 2 DR, as shown in the table below.

TABLE 4: NET/GROSS RESERVES BY YEAR AND YRT SCENARIO

Scenario	Year 1	Year 5	Year 10	Year 20
1	20% (DR)	74% (DR)	89% (NPR)	99% (NPR)
2	91% (DR)	97% (DR)	98% (DR)	99% (NPR)
3	68% (DR)	91% (DR)	94% (DR)	99% (NPR)

CONCLUSION

Life writers with AG 48 experience may have a head start with PBR calculations, but the inclusion of reinsurance in the calculations is a new aspect of PBR methodology for everyone.

1. From a pricing perspective, it will become important to not only understand the impact of reinsurance on pricing cash flows, but to also understand the impact on projected reserves and the emergence of distributable earnings.
2. From a valuation and forecasting perspective, financial models will require a sufficient level of granularity to reflect the nuances of the reinsurance structures, which was not a significant consideration in the past.
3. Finally, understanding the implications of reinsurance treaty design and related prudent estimate assumptions under PBR is a critical undertaking for carriers and may drive a need to refine both pricing models and reinsurance strategy. ■

The views expressed in the article are their own and not representative of Oliver Wyman's.



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2017 Canadian Reinsurance Conference—Talkin’ ‘Bout Our REvolution ...

By Alka Gautam

The 2017 Canadian Reinsurance Conference (CRC) will be held on March 29, 2017. This conference, considered one of the top in our field worldwide, provides a forum for insurers and reinsurers to learn about developments affecting our industry as well as first-rate opportunities to network with peers and top industry thinkers.

This year’s theme is *REvolution*. One constant about the work we do is change. We work closely with our clients to evolve our paradigms in order to offer the products and services needed in a world that is changing rapidly on a variety of fronts. The pace of change has zoomed in the past 10 years and continues to accelerate, with no signs of slowing anytime soon. Today, insurance and reinsurance is a highly competitive and fast-moving

global business. In essence, this means we must keep pace and revolutionize our industry.

IT’S A BRAVE NEW WORLD

New technologies have given birth to the social media platforms that have and continue to vastly increase human networking and the spread of knowledge. These new technologies are increasing demands for new products and services, facilitating new ways to sell, and enabling far greater connectivity among clients and customers.

The internet today is no longer something to approach with caution, as it was 20 years ago. It is an integral part of our lives and has become the commerce platform of choice, especially for the younger generation—our future customers. Correspondingly, there is an increasing emphasis on direct-to-customer solutions. The fundamental expectation of an overall experience for major purchases, from research to the actual buy, in terms of service as well as communication, has changed remarkably. Today’s consumers and businesses want and expect the same user experience in the purchase of financial and insurance products and services as they currently enjoy from online retailers. Transactions need to be simple, fast and accurate.

The heightened focus on data is also important. Data and data mining to predict consumer behaviors, coupled with the emerging science of behavioral economics, are all increasingly important and relevant, particularly as companies strive to simplify and shorten the underwriting process.



On top of all of this, capital, accounting and regulatory frameworks around the world are also evolving rapidly, and enterprise risk management is assuming an ever more prominent presence as we seek to understand better the risks we face and their impact upon our business. Insurers and reinsurers are at the forefront of developing new and creative ways for companies to strengthen capital and solvency to meet these new requirements, but our principal challenge today is not only integrating all the new rules and regulations, but also developing the new products and solutions required to meet these new changes.

THE LANDSCAPE: CHALLENGES AND OPPORTUNITIES

This evolving environment is, of course, challenging, but it is also sparking opportunities.

Much of the industry is already revolutionizing how we approach current and emerging business needs, becoming proactive futurists and embracing innovation in our corporate cultures. We are increasingly utilizing existing technologies and exploring new technologies such as blockchain and telematics to facilitate user-based insurance sales.

Our industry will also require a change in mindset and a release of some of our industry's traditional postures. How can new approaches be added that don't just adapt to change, but also add value and capitalize on change? Are we as an industry moving fast enough, and in the right ways, to address fast-evolving customer needs? Are we addressing today's (or even yesterday's) needs and issues instead of anticipating tomorrow's?

This, in essence, is what is meant by our theme this year of REvolution.

Working around this theme, we will be focusing on several concepts and ideas, including innovation, underwriting, predictive analytics and financial technologies. The conference will also host an extraordinary panel on innovation, which will feature Tim Ramza, chief innovation officer of Manulife and Tim Rozar, chief executive officer of RGAX. This year's conference will also have more breakout sessions than in the past. Four sessions are

scheduled in the agenda this year (up from three in prior years), and attendees will be able to choose from a range of topics.

Finding ways to move nimbly through the rapid and complex changes now afoot in the global economy and in our business is and must remain one of our highest imperatives.

On behalf of the organizing committee, I am looking forward to greeting everyone at what should prove to be a thought-provoking and timely conference.

ABOUT THE CRC

The CRC, which today is one of the premier reinsurance industry conferences in the world, is dedicated to providing a forum for industry participants to learn about developments affecting our business and providing an opportunity to network with peers.

The CRC was first held in 1956, when representatives from several Toronto insurance companies met for a half-day meeting to discuss reinsurance matters in their mutual interest. At that time, companies were involved in reciprocal risk-sharing arrangements in order to facilitate placement of large face amount policies. The purpose of their meeting was to discuss how to expedite these transactions.

From this simple beginning, the CRC has evolved to a full-day conference format which now regularly attracts more than 500 insurers, reinsurers, and retrocessionaires throughout North America and abroad. This continued strong attendance can be interpreted as a clear indicator that this conference continues to succeed in meeting its goal of delivering value to the industry. ■

Alka Gautam is president and chief executive officer, RGA Life Reinsurance Company of Canada. She can be contacted at agautam@rgare.ca.

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2016 Bermuda International Life & Annuity Conference

By Scott Selkirk

Bermuda is one of the top three reinsurance centers in the world, and is most well-known for its leading market position in the property catastrophe reinsurance sector. However, a lot has changed on this tiny island over the last few years. For example, in January 2015, Bermuda was recognized by the NAIC as a Qualified Jurisdiction under the NAIC's Credit for Reinsurance Model Law, and in 2016, Bermuda became the second non-EU jurisdiction (Switzerland being the other) to be recognized by the European Parliament as fully equivalent under Solvency II.

In addition, the island has also seen substantial growth of its long-term (re)insurance sector in recent years, which encompasses insurers and reinsurers covering liabilities such as life, annuity, disability, and long-term care. On Sept. 27, 2016, the industry celebrated its exciting evolution during its third annual Bermuda International Life & Annuity Conference, which took place at the Fairmont Southampton hotel. The conference had more than 200 attendees and was organized by the Bermuda International Long Term Insurers and Reinsurers (BILTIR), an association of companies that serves as an advocate for the long-term insurance industry in Bermuda.

The conference is an important event that has sought to highlight Bermuda's enhanced capital and solvency framework, and showcase some of the innovative risk solutions that have spurred the growing interest in the long-term (re)insurance sector on the island. The timing of the conference was also well suited for attendees to network with senior executives of the island's



reinsurers for some important strategic planning heading into the fourth quarter and year-end.

For actuaries and other credentialed professionals, the conference provided cutting-edge content that offered more than six hours of continuing professional development (CPD) credits, including this year's keynote address on Behavioral Economics, a field of research that can help risk practitioners better understand human behavior and financial decision-making. Other sessions covered the use of predictive analytics in modeling policyholder behavior, preparing for interest rate volatility, and cyber-security.

This year's conference sponsors included the SOA Reinsurance Section.

Next year's conference is already scheduled for Sept. 19, 2017—mark your calendars now! ■



Scott Selkirk, FSA, MAAA, is the head pricing actuary for Weisshorn Re. Ltd., and also serves as the chairs of BILTIR's Strategy Committee. He can be contacted at sselkirk@somersetre.com.

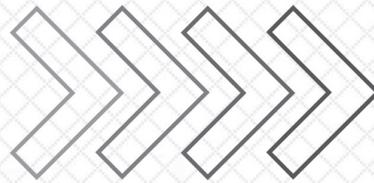
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The Economic Value of Reinsurance

By Kai Kaufhold

Why buy reinsurance? To members of the Reinsurance Section that will sound like a rhetorical question. However, as sellers or buyers of reinsurance coverage, it makes sense to ask ourselves the “why?” question from time to time. What do life companies really need reinsurance for and how do they measure the value-for-money that they get from their reinsurance premium dollars?

REINSURANCE VALUE-ADDED

Reinsurers add value to the business of their clients in a number of ways, ranging from underwriting manuals, underwriting support and training, to actuarial support in product development and other areas. However, the original and most important purpose of reinsurance is risk management. Life companies buy reinsurance to limit their exposure to insurance risks. Therefore, the question of how much reinsurance to purchase is usually centered on a company’s risk appetite: “What is the maximum loss per life that we are willing to sustain?”, or more generally, “How does reinsurance help to reduce the volatility of our company’s earnings?”

Ideally, a life company will be able to answer these questions within its enterprise risk management framework by defining its risk appetite in terms of economic capital and explicitly reflecting the impact of reinsurance in its economic capital model. In a research project¹ sponsored by the SOA’s Reinsurance Section, the Financial Reporting Section and the Committee on Life Insurance Research, we set out to design a framework within which the risk-reduction impact of reinsurance can be quantified and expressed in terms of changes to a company’s reserves and its economic capital. The key challenge was that we needed to develop a method by which we could ensure that the reserve margins and capital buffers reflected the riskiness of the business accurately, so that we could measure the impact of reinsurance. To accomplish that, we used a statistical tool called Parametric Survival Models to create portfolio-specific assumptions to calculate best-estimate reserves and carried out Monte-Carlo simulations to model the uncertainty associated with those reserves.

SURVIVAL MODELS

This statistical technique has been applied successfully by engineers and statisticians for decades. It is also widely used in the U.K. longevity market to assess the longevity risk associated with pension buy-ins, pension buy-outs and longevity swaps which are the different forms of longevity reinsurance by which pension plans and insurers in the U.K. transfer longevity risk to reinsurers. The beauty of using a statistical model is that it can be used to create portfolio-specific mortality (and lapse) assumptions and one can also measure the estimation error associated with the results. Importing this method to the life insurance practice area, our case study demonstrates how useful it is for life insurance valuation and capital management. Life insurers and reinsurers can use the framework outlined here to quantify the value of reinsurance in terms of the reduction in cost of capital which it achieves.

MULTI-DECREMENT CASE STUDY

We analyzed the mortality and lapse experience of a U.S. life insurer’s term life business and created a survival model for the mortality behavior and lapses within this portfolio from experience data at the level of the individual. The study contained roughly 1.5 million records, of which around 15,000 related to deaths and 500,000 related to lapses and surrenders. The total face amount for all policies was around \$600 billion and the study covered more than 10 million life-years of exposure. You will be thinking that this is actually a massive experience base to which not every company has access, and you would be correct. In order to test the sensitivity of results, we also applied the framework to random subsets of 25 percent, 50 percent and 75 percent of the total data and were able to fit models and run the simulations just as effectively on the smaller samples as on the entire block.

The process for building a set of survival models for the decrements death and lapse is simple:

1. First, pick parametric laws² in continuous time which match the general shape of the mortality and lapse experience in aggregate. These will be different for the two decrements.
2. Then, estimate the parameters of the hazard rate functions by maximum likelihood method.
3. Next, use the baseline survival model to identify different risk factors and quantify their impact.

As can be seen in Figure 1, the crude mortality hazard rates largely follow a log-linear pattern between the ages of 35 years and 75 years. This corresponds to the well-known Gompertz law for the force of mortality:

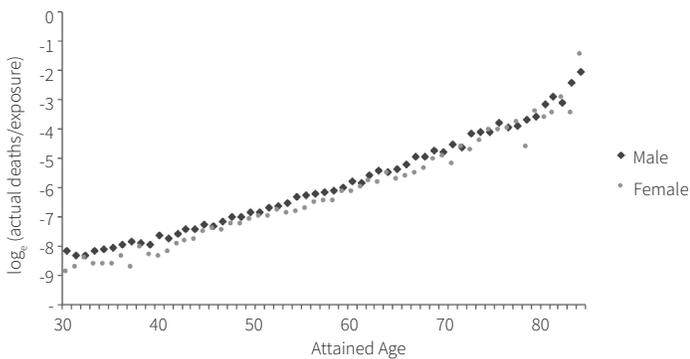
$$\mu_x = e^{\alpha + \beta x} \Leftrightarrow \ln(\mu_x) = \alpha + \beta x$$

with intercept α and slope β . In step 2 we estimate the parameters α and β and then define risk classes which have different adjustments to the intercept and slope of the baseline mortality law.

IDENTIFYING RISK FACTORS

For both the force of mortality and the lapse hazard model, we include a number of different risk factors which influence the mortality or lapse outcomes. It is important that we include as many statistically significant risk factors as possible to ensure that we do not underestimate the estimation error. Take sex as an example for a risk factor: fitting a model for aggregate unisex mortality likely gives a smoother fit and smaller estimation error than if we fit curves for males and females separately. The apparent better fit in aggregate, however, is useless, because it introduces distribution risk. While the unisex table might work for the exact business mix of policies within the experience data, the sex distribution may shift due to changing new business sales or simply because the men lapse and die at higher rates than the insured women. The same problem arises with any set of risk factors which have a significant impact on mortality. For our case study, we found that we had to differentiate by sex, duration, smoking status, underwriting class, product type (10-year term, 20-year term, etc.), face amount band, and whether a policy was rated at issue or was accepted as standard.

FIGURE 1: FORCE OF MORTALITY—CRUDE MORTALITY HAZARD RATES



Source: Kaufhold and Lennartz (2016), aggregate count of deaths over entire study period within each one-year age bracket divided by the time for which the lives in each age bracket were exposed to risk.

MEASURING UNCERTAINTY

We capture the variability of results by applying a stochastic Monte-Carlo simulation in two steps. First, we take the parametric model that describes the best-estimate mortality and lapse behavior of the portfolio and give the parameters a little shake. In other words, we randomly perturb the parameter set in a way that is consistent with the experience data. The perturbed parameters then describe a mortality and lapse behavior that is



a little different from the best-estimate, but that also could have happened this way. So, we have created an alternative scenario consistent with the experience data.

Within this perturbed scenario, we can calculate the survival curves and stochastically determine whether an insured life survived until the end of the level term period, whether they died or whether their policy lapsed. To do so, we simply draw a random number between 0 and 1, and then use the survival curve to check which remaining life-time this randomly drawn probability corresponds to. Since it is a two-decrement model, we need two random probabilities to get the corresponding random times until death and until lapse. If both are longer than the remaining time until the end of the level term period, we have a survivor. Otherwise, we count the event as a lapse or a death, whichever happened first. By going through the entire list of lives, and letting them randomly survive, lapse or die, we can add up what the total present value of claims would have been in our first perturbed scenario.

These steps are repeated many times to get a probabilistic distribution of total claims that reflects the uncertainty associated with mortality and lapse. To this distribution, we can then apply different reinsurance structures and study their impact.

First dollar quota share reinsurance has no impact on the riskiness of the retained business, which has the same profile as the gross business before reinsurance. Excess of retention reinsur-

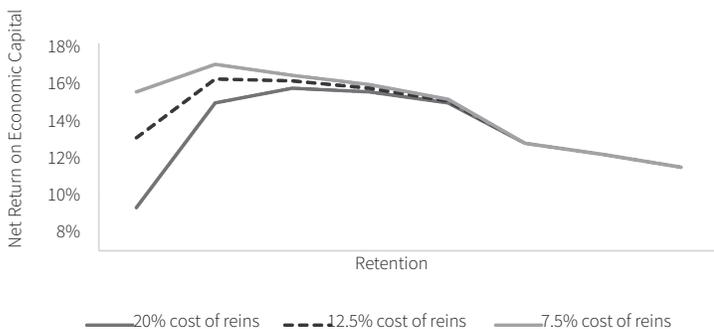
ance, however, changes the risk profile of the claims occurring in any given period.

OVERALL RESULTS

Applying the method described above to our term life portfolio in the case study, we found a number of interesting things:

1. The margin required for reserves at a certain confidence level depended on the business mix. It was different for the different products, with 10-year term requiring the greatest mark-up and longer-term products requiring a lower mark-up.
2. Different portfolio sizes required different levels of prudential provisions with smaller blocks needing a greater reserve buffer. This is totally unsurprising, but a good check to show that the method makes sense.
3. What did surprise us at first was that reserve margins were hardly affected by reinsurance. We expected to see that reinsuring large policies and thereby reducing the risk would change the risk profile of the business so much that the reserves on the retained portion would be a lot lower, relatively speaking, than the reserves without reinsurance. However, it turns out that reserves that reflect the present value of claims and premiums over an extended period of time are a lot less sensitive to the life insurer’s level of retention, because volatile annual results are smoothed over time.
4. Excess reinsurance has a strong impact on the volatility of annual earnings, and therefore affects solvency capital requirements that serve the purpose of ensuring that the life company has enough capital to withstand short-term volatility. If the company has a large portion of short-term business, the reserve margins will be greater and will also be more sensitive to reinsurance.

FIGURE 2: OPTIMIZING RISK RETENTION—OPTIMAL RETENTION



Source: Kaufhold and Lennartz (2016): Gross return on economic capital 12%, reinsurance increases return on EC, offset by increasing cost of reinsurance. Three scenarios show that optimal retention depends on the cost of reinsurance.

The purpose of the research project was to investigate the impact of reinsurance under modern reserving and solvency capital regimes.

CONCLUSION

The purpose of the research project was to investigate the impact of reinsurance under modern reserving and solvency capital regimes. In this respect, the key result was that reinsurance has a greater influence on capital levels than on reserve levels, and that reinsurance can be used to optimize the return on economic capital that properly reflects the riskiness of the business. An important byproduct of this project is that we had to develop a method for setting reserves that truly reflect the uncertainty associated with setting the mortality and lapse assumptions (estimation error), and the volatility of the business itself (adverse deviation). Our results showed that reserve levels will vary depending on the business mix of the company, and that it is therefore important for life insurers to carry out their own analysis to derive company-specific mortality and lapse assumptions and quantify explicit margins for uncertainty. The method is applicable for small- to medium-sized life companies, just as it is to large life insurers, and can be applied to any kind of insurance risk.

To find out more, please check out the SOA research report “Optimizing Risk Retention, Quantitative Retention Management for Life Insurers” available at www.soa.org/Files/Research/Projects/research-2016-quantitative-retention.pdf. The authors will be more than happy to answer any questions you may have regarding the case study and its results. Just drop us an email at kai.kaufhold@adreservices.com. ■



Kai Kaufhold, managing director, Ad Res, actuarial consulting firm in Cologne, Germany, is a member of the organizing committee of the Living to 100 Symposium and has studied longevity and mortality risk for more than two decades.

ENDNOTES

- 1 The SOA Research Report “Optimizing Risk Retention” can be accessed at <https://www.soa.org/Files/Research/Projects/research-2016-quantitative-retention.pdf>
- 2 The method is called Survival Model, because we estimate the parameters of the mortality law by maximizing the likelihood of future lifetimes $({}_t i^a)p_{(x_i)}$ ($\mu_{(x_{i+t_i})}^{(d_i)}$) for each individual i , where $({}_t i^a)p_{(x_i)}$ is the probability of an individual aged x_i surviving t_i years, $\mu_{(x_i)}$ is the individual’s force of mortality (a.k.a. mortality hazard rate) and d_i is a status variable which equals 1 if the individual has experienced death (or whichever decrement is being analysed) and 0 otherwise.

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Knowledge + Data is Power

By Dalia Khoury and Greg LaRochelle



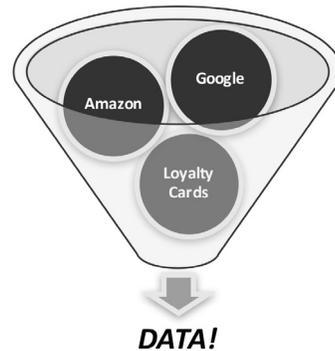
“Data really powers everything that we do.” — Jeff Weiner, chief executive of LinkedIn.

It’s apparent that companies are rapidly becoming more innovative with their investments in technology not only for their company to survive the immediate term but to thrive over the long term. In doing so many companies are willing to invest in and give away “free” products and services to its customers. Take Google for example, it has a number of “free” products such as email, maps, and apps that we can access at no cost. Many more retail stores are now offering loyalty points at no cost where you simply obtain points on your purchases and subsequently turn those around to access their products at no cost.

The one thing these companies all have in common is the aspiration to know their customer better by obtaining the crown jewel ... Data! Every customer is different but once connected

to that individual, a company can strategically market directly to them versus applying a strategy on a large cohort of the population. Another example is Amazon, they are one of the early innovators to cross sell their products “Thanks for purchasing the book *The 40-Year-Old Actuary*, customers who bought this also bought these other books and movies you may enjoy.” Data is essential—obtaining, mining, and strategically utilizing it will be the difference between industry laggards and leaders no matter what the product is.

FIGURE 1



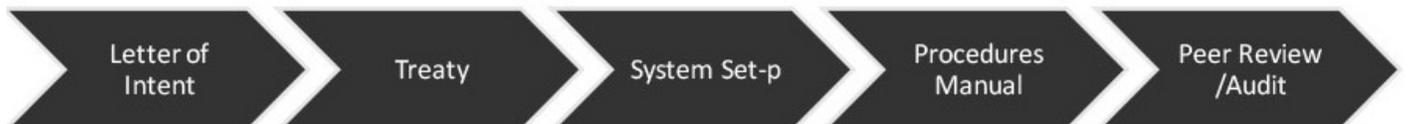
When it comes to data, (re)insurance has an abundance of it, and, if we can unlock its potential, the possibilities are endless.

While data might hold the key to our success, the accuracy, timeliness, and reliability is of paramount importance. In some instances contracts can include warranties on the quality and accuracy of data where if material errors are found in the data, the company/reinsurer may have the right to retroactively adjust the price, up to and including the termination of a contract if certain thresholds are breached. Essentially, data is to be relied on and therefore must be airtight.

Achieving data integrity in (re)insurance requires in-depth knowledge of products, treaties, concepts, and systems as well as unwavering dedication to the timeliness of administration. There are many challenges which can make it difficult not only to achieve but maintain data quality. Evolving products such as Post-Level Term, policy conversions/exchanges, retention management, and system upgrades (to name a few) increase the complexity of the administration which is further amplified as the data flows from cedant to reinsurer to retrocessionaire.

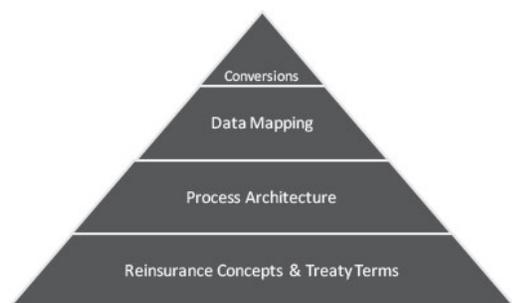
When it comes to (re)insurance data, the Reinsurance Administration Professionals Association (RAPA) has developed ro-

FIGURE 3



but training material from terminology to process, controls, and audits to assist with and ultimately improve the integrity of company's data. At a high-level here are some of the main areas (additional detailed documentation can be found online at RAPA's website):

FIGURE 2

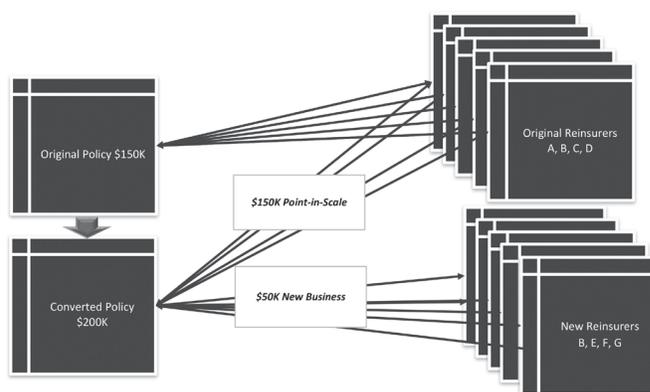


- Reinsurance Treaty Fundamentals:** For those new to reinsurance, building up your base knowledge and understanding the key terms and concepts is of the utmost importance. Differentiating between first dollar quota share and excess agreements, Coinsurance & YRT, Auto & Jumbo Limits, etc., are critical to know upfront before data handling/set-up.
- Process Architecture:** Implementing treaties from “cradle to grave” can be a daunting task. However, mapping the process out by breaking down the various steps helps to ensure completeness and accuracy. A simplified process is mapped out below with a much more detailed version, including details on key touch points, available on-line.
- Data Mapping:** There is a plethora of data gathered from insurers when a policy is issued. The amount of data needed for reinsurers and retrocessionaires can differ materially. The demand for additional information has increased over time as the underlying value within the data is being discovered. On-going communication between the cedant, reinsurers, and retrocessionaire plays a vital role. RAPA has developed a best practices document on “Communicating System, Data, or Administration Changes to Business Partners” which helps to understand the impacts and key changes to expect and plan for. Additionally, there is a “Reinsurance Reporting Guidelines and Best Practices” document. Primary focus includes:

TREATY IMPLEMENTATION	INFORCE & TRANSACTIONS
NEW SYSTEMS	CONVERSIONS
CHANGES TO SYSTEMS	REPORTING ISSUES
DATA QUALITY	<ul style="list-style-type: none"> • Late Report Transactions • Missing Fields • Partial Reporting • Policy Number Changes
JOINT LIFE CLAIM PROCESSING	
FLAT EXTRAS	
ZERO RISK AMOUNTS	

- Conversions:** This category could also be referred to as exceptions or special. But for all the administrators out there who have had to follow these through the years, conversions are extremely complex and will label it as such given the time/process involved. Essentially, once you think you have it all figured out, then conversions/exceptions come along and all the logic that you meticulously programmed for and mapped goes out the window. Is it a partial conversion, policy split, increased face amount with underwriting, originally facultative, etc.? RAPA developed “Conversion Guideline Matrix” to help with the 88 (yes, that many!) different scenarios that can exist and the process in which they are typically handled.

FIGURE 4



As companies are working to quickly innovate and implement new products, automate processes, and manage very large reinsurance portfolios, the need for up-to-date and accurate data has never been greater. Organizations should never lose sight of the fact that data quality and management can directly impact the bottom line. RAPA can assist by providing tools and techniques that reduce the learning curve, streamline the process and build controls through quality check points and audits. ■



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Four Steps to Accountability

By Olavo J. Q. de Linhares

In the book *Alice’s Adventures in Wonderland*, Alice, upon arriving at a crossroads, asks the Cheshire Cat for assistance in choosing which path to take. The Cat replies, “It depends on where it is you want to go.” Alice answers, “I don’t know really,” whereupon he says, “Then it doesn’t really matter which path you take.”

When it comes to business, however, knowing the path you wish to take can and does matter. If you don’t know where you want to go, any path can seem fine. Unfortunately, many of us have also learned that following just any path easily leads to chaos and a culture in sore need of repair.

One of the most effective ways for a business, company or even a person to obtain stronger and better results is to choose to be accountable.

What does accountable mean? Essentially, to develop objectives, commit to them, and accept responsibility for their consequences. The Merriam-Webster dictionary defines accountability as: “the quality or state of being accountable; an obligation or willingness to accept responsibility or to account for one’s actions.” Meanwhile, Roger Connors, Tom Smith and Craig Hickman, authors of *The Oz Principle*—a 1994 business book which has gained a worldwide reputation as “the bible of accountability”—see accountability as a personal choice by individuals to rise above their circumstances, take ownership, and achieve their goals.

This concept, if implemented well, can transform spectators into protagonists, responsible for their attitudes, their actions, and the consequences of their actions.

How can such a concept be implemented by a person or company to maximize results? First, according to *The Oz Principle*, by identifying the very behaviors that reflect accountability as well as those that do not, and measuring them. Such behaviors can be classified as either “above-the-line” or “below-the-line.”

Below-the-line thoughts, attitudes and behaviors are generally negative, and the very antithesis of accountability. They sort into six basic categories: ignore/deny, “not my job,” deflection

(finger-pointing), confusion (tell me what to do), self-protection (cover your tail), and wait and see.

The table below, derived from a study by accountability training firm Partners in Leadership, cites many of the most typical and common below-the-line phrases in each of the six categories that are heard most by managers:

TABLE 1: BELOW-THE-LINE PHRASES

IGNORE/DENY	NOT MY JOB:
What number did you think we were trying to achieve?	I delegated that to my people.
From where we sit, we don't see a problem.	That's not what I'm paid to do.
That's not what my reports are telling me.	I'm not concerned about things outside my realm of responsibility.
DEFLECTION (FINGER-POINTING)	CONFUSION (TELL ME WHAT TO DO)
It's the (fill in the blank) department's fault.	Did you want us to focus on quality or quantity?
Marketing gave us bad forecasts.	I thought you said customer satisfaction is how we would be measured.
Don't blame me. That's what the boss told us to do.	Tell me exactly what to do and I'll do it.
If you had told us it was that important, I would have done it.	
SELF-PROTECTION (COVER YOUR TAIL)	WAIT AND SEE
We hired the best in the business and they recommended that we do this. Look, it's right here in the report I sent you.	We've got everything in place to have an outstanding year next year.
I warned you that this would happen. Here's a copy of the email I sent you.	Time will tell.
	We're just waiting for a decision.

We have all heard at least some of these phrases. Indeed, some of us may even have used them! These are great examples of behaviors that must not be adopted if a culture of accountability is desired.

“Above-the-line” thoughts, attitudes and behaviors, on the other hand, communicate positive attitudes when facing challenging situations. These are the ones that engender accountability.

If you wish to shape your personal and workplace environments, speed and augment growth within yourself and your company



and maximize achievements for both, look to the Four Steps to Accountability, as described in *The Oz Principle*, which I paraphrase below.

TABLE 2: THE FOUR STEPS TO ACCOUNTABILITY

STEP 1: SEE IT	Visualize and acknowledge the situation—the problems, difficulties or barriers that can prevent growth and good results.
STEP 2: OWN IT	Include yourself as part of the situation instead of seeking to make others responsible. Assume responsibility as well for the results of any actions you take to mitigate the situation.
STEP 3: SOLVE IT	Seek ways to solve the situation by investigating creative and workable solutions.
STEP 4: DO IT	Become the protagonist of the situation. Take action, apply solutions, and generate results.

In essence, becoming an accountability professional requires a journey from claim to action. What does this mean? Fundamentally, it means taking responsibility. With any situation we claim in our lives, be it personal or professional, each of us must choose to take the steps and actions that will result in its resolution.

Unfortunately, many individuals stop taking such actions exactly when a situation becomes too uncomfortable or difficult to handle. Instead of facing the difficulty, dealing with the discomfort it elicits and trying to come up with solutions, many prefer to turn away—to, in essence, bury their heads in the sand.

Becoming accountable, however, requires the exact opposite. One fundamental step toward accountability is taking the risk of “touching the wounds”—that is, approaching and actually handling that which might seem too difficult or even painful to confront. My mother used to quote the popular saying, “what cures,

burns.” To achieve accountability, whether personally or in our careers, we must risk touching the wounds that are hurting our success and harming our ability to maximize results.

The first small action, even before the Four Steps, however, is determining where to start or which actions to take. This is frequently where people get stuck. Defining the intended goals, objectives, or results, whether personal or corporate, is the best way to achieve total clarity and avoid the dreaded “any path will suffice” thinking.

Once the problems are identified and goals are set, you can then use the four steps outlined in Table 2 to respond to whatever challenges might arise. All of them can be faced in this manner—seeing and owning the problems, searching ways to solve them, implementing the solutions, and owning the results.

The same steps can also be applied to challenges within a business or corporate environment—goals and objectives must be clearly set and then fine-tuned so that they can be fully reached. This will be the subject of the next article, which will cover the main elements a company can use to apply and achieve an accountability culture.

To sum up: each of us must know where we want to go. This must be the starting point for the Four Steps. To paraphrase Danton Velloso, chief executive officer of the business training company DOOR International Brasil Consultoria Empresarial Ltda.: “Between wanting and can, there is a distance. The path that unites this distance is accountability.” ■



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