SCORviews

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MESSAGE FROM THE LIFE AMERICAS CEO

Actuaries Moving Our Industry into the Future

By **J.C. Brueckner**
CEO, SCOR Global Life Americas
jcbrueckner@scor.com

Signs of transformation are evident across all aspects of life insurance. At SCOR, we are deeply invested in endeavors involving accelerated underwriting, point-of-sale distribution and, more recently, health and wellness platforms.

Innovation – around the industry and at SCOR – is equally evident in actuarial research underway to better understand mortality. New ways of using data and technology to model mortality experience make it possible to go beyond descriptions of the past and provide actionable insights about the future. Our pricing and R&D actuaries are working on various fronts to further our understanding.

In this issue of *SCORviews*...

- Tim Roy, R&D Actuary, shares the challenges and advantages of predictive modeling and the evolving role of actuaries involved in this work. He also shares findings from a recent cross-collaboration with our R&D centers in the US and Paris on mortality improvement by cause of death.
- R&D Actuary Aisling Bradfield and Statistician Sheenu Abraham give an update on policyholder behavior in a post level term (PLT) environment. The SCOR R&D team, under the direction of Mary Bahna-Nolan, is using advanced statistical and machine learning techniques to derive new insights on lapse and mortality experience on alternative PLT product structures.
- Pricing Actuary Stephen Cameron looks at the role of protective value studies in forecasting the degree of mortality cost savings from changes in underwriting evidence. Stephen looks specifically at a protective value study we conducted recently on the use of criminal history data sources in accelerated underwriting programs.

These are some of the things that SCOR actuaries are doing to better understand mortality experience and incorporate new tools and techniques to do so. We'll be hearing much more from actuaries across the industry at this year's Annual Meeting of the Society of Actuaries. Their work is vital to moving our industry into the future.

SCOR representatives are participating in several sessions at the Annual Meeting (see the back cover for details). We are especially pleased to sponsor the Women's Leadership Session and Luncheon, our 12th year as sponsor and an especially good session!

INSIDE THIS ISSUE

- EVOLUTION OF THE ROLE OF THE PREDICTIVE MODELER P2
- POST-LEVEL TERM MODELING P6
- PROTECTIVE VALUE STUDIES AT THE SPEED OF LOGIC P12
- SCOR PRESENTS AT SOA ANNUAL MEETING P16

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The Art & Science of Risk

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Evolution of the Role of the Predictive Modeler

Statisticians, like artists, have the bad habit of falling in love with their models. — George Box

An unsophisticated forecaster uses statistics as a drunken man uses lamp posts — for support rather than for illumination. — Andrew Lang

By **Tim Roy**
Actuary, Strategic Research, R&D
TRoy@scor.com

All predictive modelers are familiar with these quotes and similar anecdotes. A personal favorite still makes me feel clever even after I have uttered it for the thousandth time: *All models are wrong, but some are useful.* — George Box.

These tidbits serve a purpose to remind ourselves that models and statistical tests are tools that complement domain knowledge and common sense but cannot serve as a substitute for either. Despite reminding myself of the pitfalls of over-confidence, I have been guilty of hypocrisy.

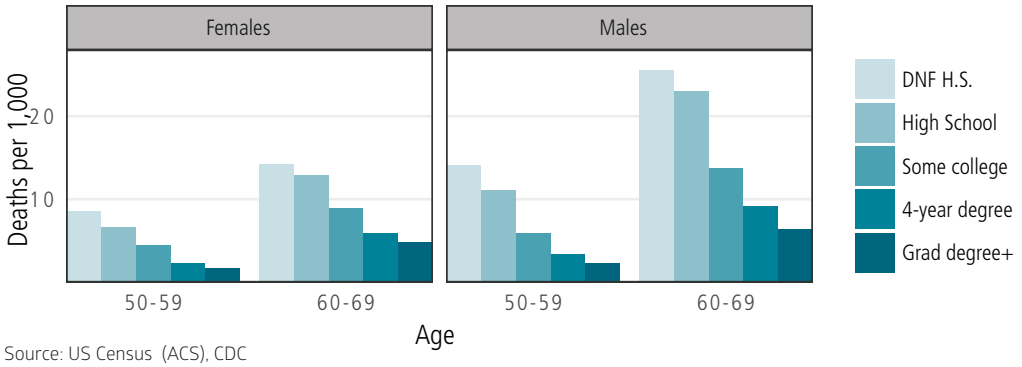
As data mushrooms, models become more complex, roles become more specialized, and terminology becomes more confusing (and over-hyped) – we need to be honest with ourselves, honest with stakeholders and not allow hubris in our models to displace common sense.

Easier said than done, but following some guidelines can help.

Some steps are outlined below, but this is by no means an exhaustive list:

- Understand the assumptions of the model and its limitations.
- Consider exogenous forces that may (not) be measurable.
- How was the data collected and reported? Could noise or bias be introduced through the process?
- Test early and often. Question surprising results. Consider an agile approach allowing yourself to fail fast. A lot can be learned from failures, and the longer it takes to admit failure, the more attached we become.
- Understand the model purpose and focus on that aspect (not every goal is point estimates!).
- Understand the variables: Are any variables proxies? Is data leakage a risk?
- Consider relationships when designing and interpreting the model. Are confounding or colliding effects accurately being captured? Are the relationships causal, correlative or spurious?

FIGURE 1: 2016 MORTALITY BY HIGHEST LEVEL OF EDUCATIONAL ATTAINMENT



Source: US Census (ACS), CDC

The final point is often the most overlooked, since traditional statistics and machine learning do not provide sufficient tools to address the nature of the relationships among variables. Methods aimed at teasing out variable relationships are mostly focused on other aspects such as reducing over-fitting (regularization, controlled randomized trials, etc.). However, a causal revolution is underway!

To learn more, I highly recommend Judea Pearl's new book, *The Book of Why: The New Science of Cause and Effect,* where he demonstrates the unbelievable effectiveness of causal modeling and its simplicity. Basic statistics is all that's required to understand the powerful concepts that can be deployed through diagrams (graphs).

Mortality Modeling in an Uncertain Environment

Mortality modeling in life insurance went through a renaissance from the early 1990s through the 2000s as models now often referred to as the "M" models were published, refined, and libraries became available. Variations, extensions and surveys such as "A Quantitative Comparison of Stochastic Mortality Models Using Data From England and Wales and the United States"[1] go into detail on the differences and applications of each.

Recent declines in US mortality, particularly among specific demographics[2] have caused concern for insurers over the impacts to their balance sheets. Opiate crisis has unfortunately become a part of our vocabulary and insurers want to know: How much does the epidemic, along with other growing concerns including obesity and diabetes, impact the mortality of their insured portfolios?

One area receiving attention is the usage of population mortality data used to supplement insured mortality data, whether used for setting base mortality assumptions due to low credibility or mortality improvement and trend assumptions due to a narrow time window on most homogeneous insured populations. Do we need to update our models, update our data or a combination?

Continued

Evolution of the Role of the Predictive Modeler

Cont.

Government data is slowly becoming a more reliable tool. In the US, the CDC[3] and Census Bureau[4] have recently provided an API (Application Programming Interface) which makes it easier to access and download larger datasets that can include additional demographic data, which may help segment the general population. This gives an additional data source over the Human Mortality Database, where the only demographic data provided is sex and age. Chart 1 illustrates the usage of incorporating the educational attainment factor.

Mortality Modeling with Cause-of-Death

Modeling mortality using a multi-decrement approach, typically cause-of-death (COD), has been a challenge that many have attempted with varying degrees of success. Segmenting mortality into separate causes, (often) independently forecasting then aggregating is proving to be very challenging. A few reasons are:

- Highest cause-specific improvement → decreased market share (and vice versa) → underestimating aggregate mortality improvement[5]
- Often ignores interaction among causes; for example, a cure or medical breakthrough in one cause implies "saved" individuals will die from another cause
- Too few COD groups results in grouping causes that may have dissimilar health and mortality dynamics together
- Too many COD groups increase noise and exposure to reporting volatility

COD reporting is very complicated and elevates process variance. Standardized COD codes (International Classification of Diseases) evolve over time, and reporting guidelines and forms can vary from state to state. Furthermore, a variety of professionals can be responsible for reporting the COD including coroners, medical examiners, physicians, nurses or forensic pathologists. To add to the complication, primary cause-of-death is often not very clear.

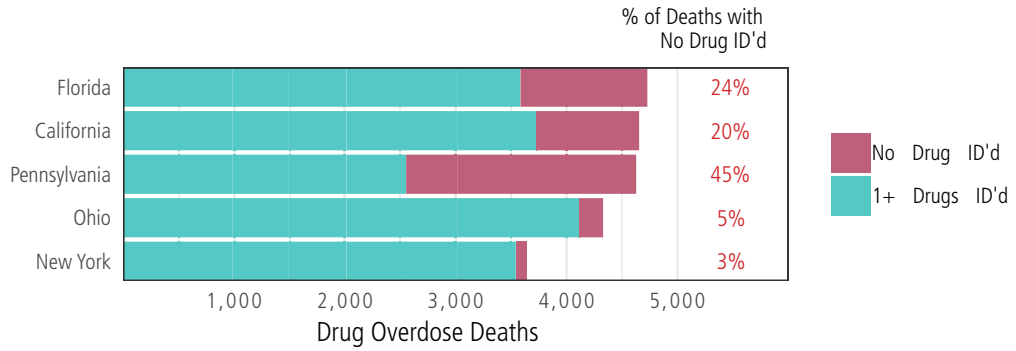
Consider the scenario of Herbert. Herbert is 65 years old, and a life of heavy drinking contributed to early-onset Alzheimer's. Now he relies on a nurse to visit him daily. One snowy day a nurse forgets to visit him, he fails to take his medication and subsequently dies due to hypothermia when he gets lost going for a walk outside.

What is his primary COD — alcoholism, Alzheimer's, negligence or hypothermia? Should only the primary causes be considered, or should the secondary causes listed on death certificates be given weight? These are not easy questions and often depend on the goal of the forecasting model, the allowable tolerance and other factors.

An example of the complications relying on cause-of-death reporting has been highlighted in recent articles on NPR[6], fivethirtyeight[7] and in the academic publication *Addiction*[8]. The main theme being reported is that, despite the alarming statistics on recent spikes, the number of opioid-related deaths are being underreported.

Government data is slowly becoming a more reliable tool. New Application Programming Interfaces make it easier to access and download larger datasets with additional demographic data that may help segment the general population.

FIGURE 2: 2016 HIGHEST DRUG OVERDOSE DEATHS BY STATE



Source: https://fivethirtyeight.com/features/there-is-more-than-one-opioid-crisis/

Another surprising result emerges comparing the top five states with drug overdose deaths in 2016, each with at least 3,500 total deaths, shown in Chart 2. On one end of the spectrum, death certificates identified at least one drug attributed to the overdose for 95% and 97% of deaths, respectively, in Ohio and New York. On the other end, Pennsylvania only identified at least one drug on 55% of drug overdose deaths.

The lack of standardization in cause-of-death reporting across states, countries and professions adds another complication in modeling cause-of-death. Despite the data and modeling challenges, progress is being made.

A recent cross-collaboration with our R&D centers from the US and Paris worked on producing a mortality model using cause-of-death. From this work, we have learned some valuable insights. a few of which are listed below:

- Mortality improvements by cause change over time. For example, statins were a huge benefit in the 1990s to 2000s and a lot of research was focused on those areas. Eventually returns diminish and research money and time gets focused on other areas. Hence, a two-step approach should lead to better results: all-cause mortality followed by cause-specific mortality on the residuals.
- We found it easier to work with the age-at-death COD-conditional distributions over the mortality rates to incorporate dynamics among CODs.[5]
- Adjustments, which may need to be subjective, may be necessary. For example, we have learned that recent increases in mortality from Alzheimer's and dementia across ages are an artifact in improved COD reporting guidelines and not indicative of an actual trend.

If you would like to learn more, please contact me, Tim Roy, at TRoy@SCOR.com.

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SCOR LIFE R&D

Analyzing Post Level Term

Analysis of post level term (PLT) behavior is important for all life insurers with term business, because policyholder retention and the extent of anti-selective behavior influences the balance of premium and claims in PLT and directly impacts the profitability of the product as a whole. PLT lapse and mortality assumptions impact pricing, product design, inforce management, capital modeling and reserving for US term products.

In 2017, SCOR R&D undertook a significant exercise to analyze experience on the Jump to ART structure and through statistical analysis developed a model to determine lapse and mortality assumptions.

By **Aisling Bradfield**
Head of Policyholder Behavior, R&D
abradfield@scor.com

By **Sheenu Abraham**
Sr. Associate, Statistician, R&D
sabraham@scor.com

Jump to ART is the most common PLT structure, in which the premium significantly increases and continues increasing annually after the level rate during the initial term period. Though this is the most common structure historically in the US market, different structures are becoming increasingly important as companies seek to optimize their PLT experience. SCOR R&D expanded PLT analysis in 2018 to increase understanding of other structures.

PLT Structures

Decreasing Term is a PLT structure which allows the premium to remain level after the end of term (Figure 1). Instead of a premium increase, policyholders face a reduction in Face Amount. In one way this is meeting a customer need, which continues cover at an affordable price.

Jump to New Level is the predominant structure in the Canadian market. At the end of the initial term period, the premium increases but then remains level for a new term period (Figure 2).

Premium increase is still a key driver of behavior at the end of term. In the Canadian market, average premium jumps are increasing over time as level term rates are reduced in a competitive market, and PLT rates have been maintained. SCOR has found that analysis including premium increase is indispensable when using historic experience to predict lapse and mortality assumption for business that may have different premium increase levels.

FIGURE 1: DECREASING FACE AMOUNT STRUCTURE

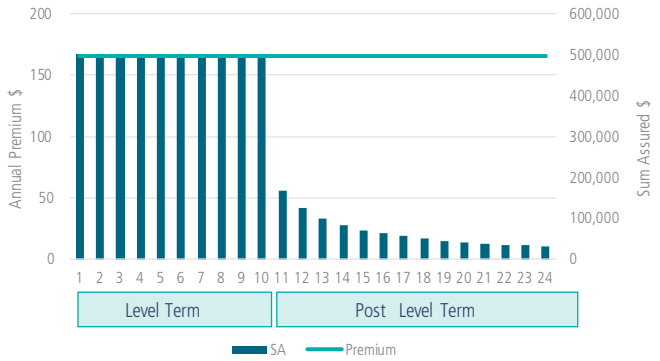
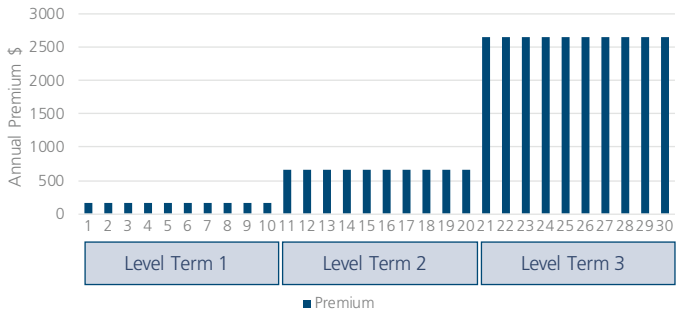


FIGURE 2: JUMP TO NEW LEVEL TERM STRUCTURE



Graded PLT is a structure that has stepped increases over a five- to 10-year period before reaching an ART scale. Lower initial premium increases with significant steps up in subsequent years are features of this structure.

Some companies have adopted this Graded PLT structure for a long time, and their policyholders will have Graded PLT rates as standard. In the past five years, many companies have considered pilot programs to test the impact of applying a Graded structure rather than a Jump to ART structure. Common practice involves communicating with policyholders at the end of term and offering Graded PLT premiums with lower end of term premium jumps and stepped premiums for a period before reaching an ART scale.

When changing to a Graded PLT structure, the PLT rates may reach the same level as the original Jump to ART structure at some point (Figure 3).

Alternatively, under the new structure PLT premiums may grade to ultimate rates that are set as a multiple of an industry table (Figure 4). Often the approach will depend on the original PLT structure where grading to original PLT rates is less sensible when original jumps were particularly high.

FIGURE 3: 20-YEAR TERM GRADED TO CURRENT PLT RATES

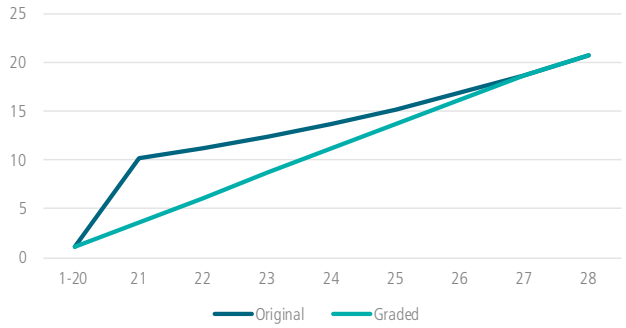
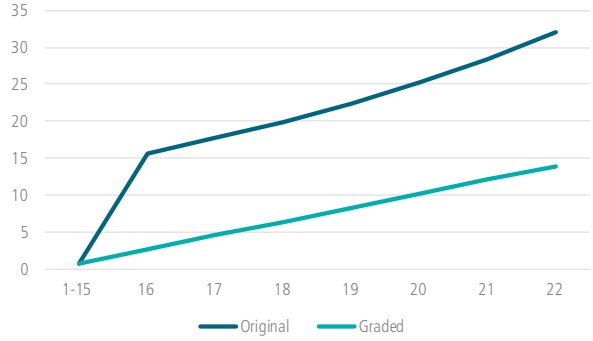


FIGURE 4: 15-YEAR TERM GRADED TO MULTIPLES OF INDUSTRY TABLE



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Analyzing Post Level Term

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Optimizing Post Level Term Results

The aim when changing PLT structures is to improve persistency by presenting a lower premium jump at the end of term. A key take-away from SCOR R&D analysis on PLT has been that the relationship between premium jump, lapse rate and mortality deterioration is clear in experience analysis. For the Graded PLT structure we also need to consider the subsequent premium increases in PLT which are significant annual increases relative to the ART scale of the Jump to ART structure.

As well as considering the annual premium increase at the end of the term and into PLT, it has been interesting to compare the PLT premium to new business premiums available in the market. In particular for the longer-term products, when premium jumps are in the range of two to four times that of the level premium, we have identified cases where the PLT premium represents good value compared to the rates the policyholder could expect for current age.

A feature of the Graded PLT structure is that PLT premiums vary by risk class, compared to the smoker/non-smoker rates that were more usual under the Jump to ART structure. A policyholder who qualified for a preferred rate based on underwriting 20 years ago is eligible for a PLT preferred premium. This policyholder may not qualify for a preferred rate now and may be comparing the Preferred PLT rate to new business rates for residual classes.

Comparison to available rates in the market is becoming easier for customers, and the emergence of accelerated underwriting makes newly underwritten rates more accessible. New business rate comparisons will have increased influence on consumer behavior.

The search is for that perfect balance, where the premium increase will drive behavior that leads to persistency of the appropriate mortality group for which that premium can cover all claims. SCOR R&D seeks that sweet spot and wants to identfy how it might vary between structures.

Any changes in the PLT structures for business about to reach PLT have the advantage that experience is emerging in the coming years. Communication of the change is something that will also affect policyholder behavior, and SCOR has therefore been separately analyzing experience where policyholders had a Graded PLT structure in the original policy and those where policyholders were offered a Switch to Graded PLT structure just as their policies reached PLT.

As other premium structures gain prevalence in the market, SCOR R&D extends research to study differences in lapse and mortality as premium structure varies.

The search is for that perfect balance, where the premium increase will drive behavior that leads to persistency of the appropriate mortality group for which that premium can cover all claims.

Analyzing the Data

Research indicates that policyholder behavior can be empirically distinguished into three broad categories

- Macroeconomic factors
- Company-specific factors
- Policy-specific factors

However, our data is mostly comprised of the latter two categories.

Regression-based models (GLMs) are by far the most used tools to fit and predict probabilities, to capture empirical dependencies among factors and to understand the best factors to calibrate the lapse risk as accurately as possible. GLMs provide a powerful statistical analytics tool to investigate the underlying reality of the parameters available in the data to show how previously ignored parameters may have affected observed policyholder behavior.

Similar to our 2017 research on the Jump to ART structure, lapse experience for Graded PLT and Switch to Graded PLT structures was modeled using a GLM assuming a Poisson probability distribution and a logarithmic function that linked the explanatory variables to the expected value of the variable modeled (lapse rate). The GLM output consists of an intercept, and for each factor, a series of multiplicative coefficients showing the relative effect at the levels for each factor.

Some of the explanatory power came not only from the premium jumps but also from other policy-specific variables (e.g., Face Amount, Age). Interaction between these explanatory variables needed to be assessed carefully. Variability in shock lapse behavior introduced by company-specific factors was observed as well.

Shown on right are surface plots that demonstrate the modeled relationship between lapse rates and relevant factors like Face Amount and Age. The interactive impact of increasing face amounts and higher ages on shock lapses is demonstrated in the top plot at the right. Similarly, the jump-age effects are shown in the bottom plot at right.

With GLM as the benchmark, SCOR R&D also evaluated the usefulness of decision tree algorithms such as CART (Classification And Regression Trees), a machine learning algorithm that falls under the category of supervised learning. Since our goal was to predict lapse rates, we utilized the regression tree's version of the algorithm.

FIGURE 5: FACE AMOUNT - AGE IMPACT ON LAPSE RATES

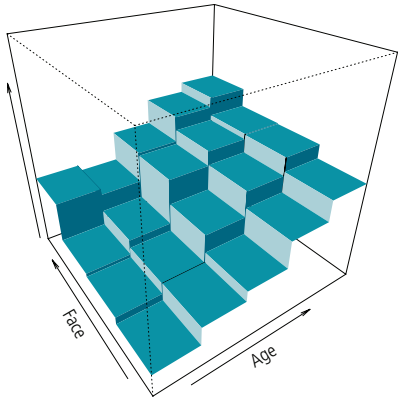
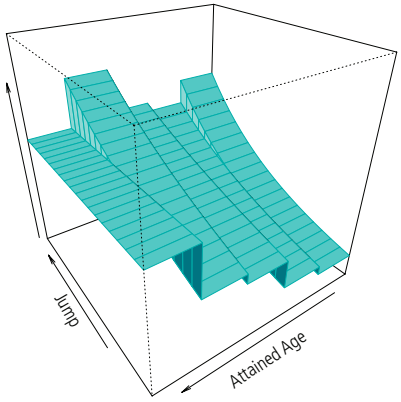


FIGURE 6: JUMP - AGE IMPACT ON LAPSE RATES



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Analyzing Post Level Term

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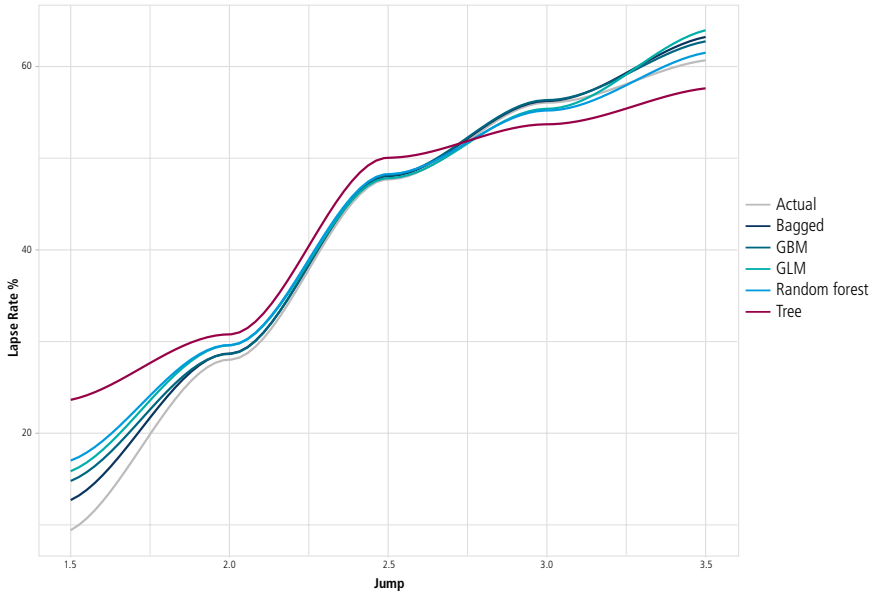
FIGURE 7: MODEL PERFORMANCE COMPARISONS



The decision tree algorithm is based on recursive partitioning, which involves dividing up the multidimensional space of explanatory variables into non-overlapping multidimensional spaces. A random 80/20 split was used, training the model on 80% of the data and making the prediction on the remaining 20%. The goal is to match the predicted lapse to the actual as closely as possible in the test data.

The flow chart like structure of decision trees provided clarity to the logic used in partitioning the data into segments of the shock lapse ranges that were predicted from the combinations of the features used to construct the tree. While the main advantage of using decision trees are its interpretability, they are often susceptible to the risk of overfitting/overlearning. We deal with this disadvantage of being sensitive to local optima by using model aggregation/ensemble methods as solutions.

Tree-based ensemble methods like bagging (Bootstrap AGGregatING), random forests and GBM (Gradient Boosting Machine algorithm) were utilized to optimize model performance and for comparison. Interpretability however is lost after utilizing these ensemble techniques, since representing the prediction path on a single tree is no longer possible. However, an overall summary of the importance of each predictor can be obtained via relative influence plots.

Our research indicates that the GLM and tree-based models seem to work comparably well on this study data that predicted shock lapses. Quantitative measures (such as the predictive performance and the computational time) and qualitative measures (like interpretability and implementation) were pivotal factors in the final choice of methodology.

FIGURE 8: ASSOCIATION OF LAPSE TO INITIAL AND SUBSEQUENT JUMP (ALL SUCCESSIVE DURATIONS)

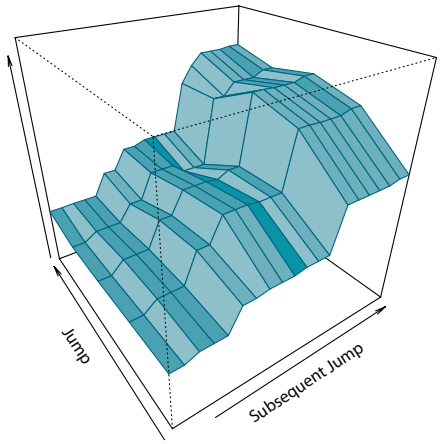
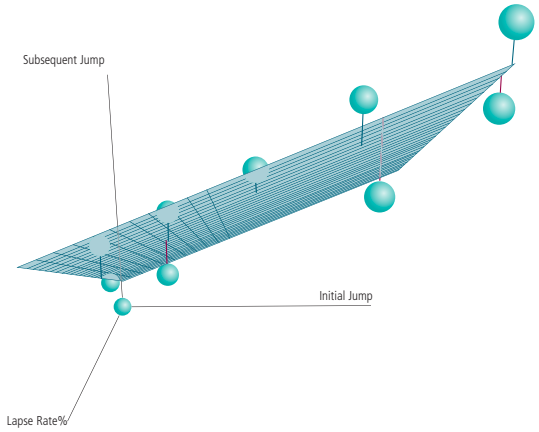


FIGURE 9: LAPSES IN N+1 DURATION SHOWING VARIATION BY INITIAL AND SUBSEQUENT JUMPS



Similarly, post shock lapses were modeled with a combination of factors that were used in the shock lapse model. A key component, however, that needed to be taken into consideration specifically for Graded structures was the annual subsequent premium increases after the end of term.

Again, usage of decision trees was pivotal as the algorithm itself is non-parametric and works without imposing a complicated parametric structure (e.g., linear relationship for regression). As mentioned before, this methodology, which helps in developing prediction algorithms for a target variable based on multiple features, helps us to hone in on the most relevant ones (aka the variable selection process).

The ability to do this with little to no data preparation is an added benefit. The relationships of the lapses with the initial and subsequent jumps and their possible interaction, while controlling for additional factors, were carefully considered to build a robust model. The surface plot in Figure 8 shows the association of the lapse to the initial and subsequent jump observed across all successive durations.

When considering a Graded structure, the subsequent duration lapses are significant – often the lapse in the first duration in PLT (N+1) can be almost as substantial as the end of term shock lapse. The significant subsequent premium increase is a factor but the initial premium increase remains an important aspect.

Figure 9 is a snapshot of lapses in N+1 duration and how this varies by initial and subsequent jumps.

Mortality

While we still need more data to model post level mortality at a more granular level, the association between shock lapse and mortality deterioration continues to be pivotal under other PLT structures. Though initial PLT mortality deterioration can be studied, mortality experience under the Switch to Graded structure is still only available for initial PLT durations.

As we have seen, the premium increase pattern and post shock lapse pattern in PLT are different under the Graded structure, so attention needs to be focused on the mortality deterioration pattern in PLT. Increased persistency will only improve the PLT value if it is successful in achieving reduced anti-selection and lower claims throughout the PLT period. As mortality experience develops into later durations in PLT, SCOR will continue to study the pattern of claims to complete the picture for this increasingly popular Graded structure.

Conclusion

As lapse and mortality experience emerges for these alternative product structures and as we garner more data, SCOR's R&D is committed to integrate data and analytics and to derive new insights on policyholder behavior through advanced statistical and machine learning techniques. Should you have any questions on this analysis, SCOR R&D would be happy to discuss further.

SETTING NEW ASSUMPTIONS

Protective Value Studies at the Speed of Logic

As a Life Reinsurance Pricing Actuary, I am charged with setting assumptions for reinsurance programs for our US clients. With programs today, there is a paradigm shift occurring in the industry with the new norm consisting of adding new data sources and/or the introduction of a new underwriting program, such as accelerated underwriting.

Stephen Cameron
AVP, Actuary - Pricing
scameron@scor.com

The primary challenge posed with the introduction of new data and new processes is to forecast the degree of mortality savings (or cost) from the changes being made. At SCOR our Research and Development (R&D) team does most of the research, benchmarking and analytics associated with the new norms, from designing programs that meet client objectives to measuring their impact.

I recently had the opportunity to co-lead a protective value study with our R&D team that focused on adding instant electronic criminal history data to one of our client's Simplified Issue programs using Velogica® (SCOR's automated underwriting solution). A simultaneous study was done by our R&D team on the value of instant electronic clinical lab data for the same client. This triggered a reflection on the value of doing protective value studies, the success factors and their limitations.

What Is a Protective Value Study?

To start, what is a "protective value study" anyway? In its simplest form it is a determination of whether a test or tool provides (mortality) benefit in the underwriting process. The output of the study can range from a qualitative "yes" to a detailed quantitative breakdown of mortality impact by age, gender or other relevant variables. From a direct writer perspective, the complete picture has additional considerations that may include cost of the new tool and implementation, time and cost savings from replacing other tests and potentially freeing up underwriter time.

Why Do One?

So why do a protective value study before adopting a new data source?

- The benefits of various underwriting tools can be heavily correlated to the population to which they are being applied and to the existence of other underwriting tools. One size does not fit all in the protective value world.
- Proper stratification of risk. A study may allow you to better assign savings/costs to the correct subpopulations (age groups, gender, face amount bands, etc.)
- Personalization of use. A protective value study can be used to establish how a new data source will be used in the underwriting process based on the client's objectives. For example, underwriting action (declination, referral, rating, approval) can be modified to hit pre-determined targets as measured by the study.
- Support discussions with your reinsurance partners when it is time to implement. Best practice is to involve your reinsurance partners early and/or collaborate with one partner for analysis and implementation.

What Is the Value?

Now that we understand why there is value in a personalized protective value study, how do we ensure the study produces meaningful output and direction?

- A protective value study usually has a question attached to it that drives the focus of the study.
- Data, data, data. It goes without saying that the more data that is available the better the inferences that can be made.

  Equally important is understanding the limitations of the new data source. For example, the criminal history data source reviewed in the study did not have coverage across all 50 states. Being aware of this fact, the SCOR Velogica® team reviewed the hit rates by issue state with the context of knowing which states may have lower or no hits due to lack of coverage. The initial effort to scrub and integrate a new data source should not be underestimated. For example, the mapping process for electronic clinical labs data that can contain a plethora of medical codes. SCOR's Velogica® team was well prepared to handle both sets of data preparation.

ELECTRONIC DATA SOURCES ALLOW INSTANT VERIFICATION OF APPLICATION RESPONSES, BUT HOW IMPACTFUL IS IT TO YOUR BUSINESS?

- Next, underwriting expertise! Sorry, actuaries, but before you can start crunching those numbers, underwriting expertise is needed to confirm how the data source will be incorporated in the underwriting process. For example, can this source produce immediate declines or table ratings, or will it trigger referrals in a triage process?
- The "retro-study" – the core of most protective value studies at least for actuaries – quantifies the underwriting impact on a block of business if the proposed data source was used. Usually this is accomplished by re-underwriting a block of previously submitted applications – a task that is substantially easier with an automated platform. Once the rules are established, several thousand cases can be re-underwritten within an hour.
- And yes, actuarial expertise is required to opine on assumption inputs or analyze mortality experience to quantify the impact of the re-underwriting.

Continued

Protective Value Studies at the Speed of Logic

Cont.

MORTALITY IMPACT IS JUST PART OF THE EQUATION WHEN EVALUATING A NEW DATA SOURCE OR UNDERWRITING TOOL

There are generally two broad approaches to quantification – a relative mortality impact or a full mortality study including the new data source. The latter requires a substantial amount of claims experience and the ability to reflect the new data source for the entire mortality study population. As such, the latter approach, while more insightful, is less common.

- Finally, a good protective value study does not just provide numerical output but also contains meaningful insights:
  - With a parallel clinical lab study led by R&D, the latent value in electronic clinical lab hits containing clean records—and not just the instant identification of undisclosed medical history—became apparent.
  - The clinical lab study also quantified expected savings from a possible reduction in APS orders.
  - In the criminal history study the low hit rate but relatively large protective value to the client from this data source was eye-opening.

Congratulations! You've completed your protective value study, you've analyzed the cost/benefit and you're ready to go … or are you?

Yes, you probably are, but there are a few considerations to keep on the radar. The key consideration is how long are the results valid and what adjustments should be made along the way. Post-implementation monitoring is therefore critical. Consider the following situations:

- Does the addition of another data source later change the initial estimated savings? Inadvertently assuming that all changes are additive does not account for overlap and correlation. A new protective value study incorporating all the changes should mitigate this overestimation risk.
- Does a change in the hit rate of a data source indicate a change in the protective value?
  - If criminal history data is implemented and as part of the post-implementation monitoring we observe a drop in criminal history hits, does that mean we lost value or could there now be a sentinel effect that deters certain applicants?

- What if we saw the opposite, an increase in hit rate after implementation? An interesting observation in this criminal history study was that the age group with the largest hit rate was not the age group with the largest expected savings. Changes in hit rates for this client will need to be reviewed in terms of demographic shifts and changes in the underlying types of hits such as felony versus non-felony hits.

- Finally, there are aspects of new data sources that are not easily quantified in advance such as how actual placement rates will materialize.

After co-leading this protective value study, I have a renewed appreciation for how the use of an automated underwriting platform can streamline the process of analysing and implementing a new data source and how it will become easier to tackle post-implementation considerations. The other affirmation is the level of expertise and collaboration with the client that goes into the proper analysis of a new data source. Data, automation, analytics, expert judgement and partnership are all key ingredients in a process that aims to extract value at the speed of logic.

Special thanks to Cindy Mitchell for her underwriting input on this article and to Alex Kendrew for his actuarial modelling support in these studies.

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SCOR Presents at SOA Annual Meeting

J.C. Brueckner

Mary Bahna-Nolan

Tim Roy

Tammy Kapeller

Richard de Sousa

Rick Pretty

SCOR Global Life in the Americas is proud to be a sponsor of the Society of Actuaries Annual Meeting. Sessions featuring SCOR actuaries are shown below.

- CEO **J.C. Brueckner** will be a panelist at the Reinsurance Section Luncheon on Monday.
- **Mary Bahna-Nolan**, EVP and Head of SCOR's Life R&D Center, and **Tim Roy**, featured in this publication (page 2), will be addressing considerations for modeling mortality trend (improvement) on Tuesday.
- **Tammy Kapeller,** EVP and Head of US Market, and **Richard de Sousa**, Managing Director for ReMark, are discussing opportunities for growth given changing consumer behavior on Wednesday.
- **Rick Pretty**, VP and Deputy Head of SCOR's Life R&D Center, moderates the impact of new underwriting data sources and tools, also on Wednesday.

In addition, SCOR is proud to present the Women's Leadership Forum and Lunch on Monday, where **Mary Bahna-Nolan** will be moderating the panel discussion.

SCOR
The Art & Science of Risk

Editor
Pam Granzin
704.344.2725
pgranzin@scor.com
www.scor.com/SGLA

SCOR Global Life
Americas Reinsurance Company,
a division of SCOR.

CHARLOTTE
101 South Tryon Street
Suite 3200
Charlotte, NC 28280

KANSAS CITY
11625 Rosewood Street
Suite 300
Leawood, KS 66211

MINNEAPOLIS
650 Third Avenue South
Suite 1600
Minneapolis, MN 55402

MONTREAL
1 Place Ville Marie
Suite 2010
Montreal, Quebec
H3B 2C4
Canada

TORONTO
199 Bay Street, Suite
2800 Toronto,
ON M5L 1G1 Canada

MEXICO
Oficina de
Representación
en México
Edificio Torre Reforma
Paseo de la Reforma
483, floor 36
Col. Cuauhtemoc,
06500, Mexico City

SANTIAGO
Edificio Isidora
Magdalena Norte
Magdalena 181, Piso 12,
Oficina 1201 Norte
7550055 Las Condes
Santiago - Chile

SAO PAULO
SCOR Global Life
U.S. Re Escritorio de
Representação no
Brasil Ltda
R.Luigi Galvani 70, suite
121 04575-020
São Paulo - SP Brazil