



# Product Matters!

ISSUE 87 | OCTOBER 2013

- 1 **Substitute Facts for Appearances and Demonstrations for Impressions**  
by Jim Filmore
- 3 **Chairperson's Corner  
The Glass is Half Full!**  
By Paula Hodges
- 7 **Current Dynamics of Universal Life and Indexed UL**  
By Susan J. Saip
- 11 **Around The World – United Kingdom Drive Like a Girl: Development of Gender Neutral Pricing**  
By Jason Hurley
- 13 **Risk-adjusted pricing: Risk-neutral, real-world, or does it matter?**  
By Seng Goh and David Wang
- 16 **SOA Assumption Development and Governance Discussion Second Quarter 2013 Calls**  
By Liz Olson
- 18 **Highlights of the May 2013 SOA Life & Annuity Symposium**  
By Jim Filmore and Kurt Guske  
with various contributors
- 23 **Product Development and Pricing: Beginning to End**  
By Donna Megregian and Josephine Marks
- 26 **Life insurance: Bought not sold?**  
by JJ Carroll
- 30 **Danger in Predictive Models for Underwriting**  
by Chris Davis

## Substitute Facts for Appearances and Demonstrations for Impressions

by Jim Filmore

**W**hen I started my actuarial career in 1992, what struck me is the motto of the Society of Actuaries which is “The work of science is to substitute facts for appearances and demonstrations for impressions.”

It is amazing how often that motto has come to mind when engaged in conversations outside of work where appearances and impressions are often mistaken for facts. Perhaps it is natural curiosity, but I found myself researching some items in those day to day conversations to see how often those impressions did not coincide with the facts. The most recent example of this is during a recent business trip to Asia where I visited the Great Wall of China on the weekend. It was an impressive sight especially considering that the wall runs for thousands of kilometres. I heard a tour guide noting how the Great Wall of China is the only man-made object on earth that can be seen by the naked eye from outer space. My ears perked up when I heard that statement (which appeared to be readily accepted by the group of tourists) as the wall wasn't particularly wide despite the fact that it was very long. Thus, I decided to do some research on the internet to see if the statement made by the tour guide was true (as everybody knows that only factual information can be put on the World Wide Web). That search revealed a variety of websites that all determined that the statement was in fact a myth. While this by itself is not clear cut factual proof, there does appear to be enough data in the form of pictures taken with digital lenses from the International Space Station where one struggles to observe the Great Wall of China while the pyramids of Giza are readily apparent. The conclusion published by Scientific American is: “Though it stretches for some 4,500 miles, the ancient Chinese fortification is not as visible from orbit as modern desert roads.”

CONTINUED ON PAGE 4



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To join the section, SOA members and non-members can locate a membership form on the Product Development Section Web page at [www.soa.org/product-development](http://www.soa.org/product-development).

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## Articles Needed for the Next Issue of *Product Matters!*

While all articles are welcome, we would especially like to receive articles on topics that would be of interest to Product Development Section members based outside of the United States.

Please email your articles to Jim Filmore, Kurt Guske or Stephen Peeples by November 13, 2013.

## Chairperson's Corner

# The Glass is Half Full!

By Paula Hodges

Those who know me best, realize that I am a hopeless optimist. Even when we're constantly bombarded with the negative news: the low interest rates, high unemployment, and massive challenges in implementing the Affordable Care Act, I like to think about the bright side. This spring, at the Life and Annuity Symposium, I heard that if interest rates stay at their current low level for another 5-10 years, it will be the end of the life insurance industry as we know it! I look at this as a time of opportunity.

History has shown that some of the toughest times bring out the best in people, so I believe that times like these bring about great innovations. In Product Development, we have always been challenged to find ways to meet the competing demands of competitive rates, profitable products, while fitting into the boundaries of increasingly complex regulatory constraints. In my opinion, today's version of these challenges will bring about a new era of protection products to meet the needs of our customers. As an industry, I am hopeful that we take this opportunity to start fresh: by reviewing our customers' core needs and then find solutions that might look different than products that we're offering today. If this means the "end of the life insurance industry as we know it"—then so be it. I am anxiously awaiting the revolutionary ideas that will come about from the current financial environment. Our companies and products may look different in the future, due to today's challenges—but that can be a good thing!

In that spirit, I'd like to share two of my favorite quotes:

- "Optimists are right. So are pessimists. It's up to you to choose which you will be." - Harvey Mackay
- "Whether you believe you can do a thing or not, you are right." – Henry Ford

Finally, as we have just elected new council members, I'd like to use this space to thank the council members who are completing their current elected terms:

- Rhonda Elming has served for three years on the council and most recently served as Secretary / Treasurer for the section.
- Stephen Peeples is also completing his three year term, currently serving as co-editor of our *Product Matters!* newsletter.
- Dave Moran accepted a 1 year appointment to the council when a vacancy opened up. He has helped with various section activities including serving on the committee for the Annual Meeting this fall.

I will be handing over the section chair responsibilities to Tim Rozar, who will be a most capable leader of the section council. With this new leadership, we are in good hands. Our glass is definitely half full! □



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So, how does all of this apply to actuaries? From my perspective, it means that an appropriate use of diligence should be applied when setting assumptions used in pricing and valuation of our business. Even when there isn't indisputable factual information for a particular item, we can often determine an appropriate assumption by testing ranges of results and also by looking outside of our markets for similar experience. I will go through two examples of how this can be done from the perspective of pricing individual life products.

**My first example involves setting of mortality assumptions for table shaved business.** I was first exposed to this topic when moving from a direct writing company to the world of individual life reinsurance back in 2002. From my conversation with underwriters at that time, the table shave idea essentially stems from the concept that insurance companies often did not place business with mild substandard ratings (such as Table 2, 3, or 4) as either a reinsurer or another writing company would issue that same policy at a Standard rating. To save facultative time and resources on the underwriting side and to place these "mild" substandard cases, some companies started programs where any policies within a certain level of table rating would be issued as Standard. The most common form based upon my experience was a Table 4 to Standard Shaving Program and that is what I will use for my example.

Once the underwriting parameters of the table shave program are set, the next question is what mortality should be assigned both for the pricing of the direct writing company and also for the reinsurance rates. The mortality assumptions for these programs were often not shared by the direct writing company. Thus, the reinsurer had to develop their own assumptions. One direct company

indicated that the loading for their Table 4 to Standard Shaving program should be  $x$  percent which means the proposed reinsurance rate was  $(100+x)$  percent of the rate applied to the Standard class. At this point, there wasn't any credible industry experience on Table Shaved business. Thus, it would be challenging to substitute facts for impressions.

The first piece of information that I obtained was the distribution of Table 2, 3, and 4 risks prior to the launch of the Table Shave program. In this example, there was no distribution for Table 1 policies as it is common for companies to not issue at that table (i.e., the underwriter would assign debits for various impairments and it would either reach the threshold for Table 2 or would be issued as Standard). Next, I had to confirm how the table rating translates into a mortality load. The usual situation is that each table corresponds to 25 percent higher mortality. That means a policy rated Table 2 is anticipated to have 50 percent higher mortality than the baseline and a policy rated Table 4 is anticipated to have double the mortality as compared to the baseline. You may notice that I used the term "baseline" as opposed to "Standard." That was done purposely as the last component is determining the basis to which the Table loading should apply. If the underwriting ratings are debits relative to a Standard rating, then it seems appropriate to use the Standard mortality as the basis to which the mortality load is applied. In that situation, one can take the distribution of Net Amount at Risk in each table rating (2, 3, and 4) applied to the loading for that table (50 percent, 75 percent, and 100 percent) to develop a weighted average load. That would work if applicants in real life were as accommodating as numbers in an actuarial spreadsheet. However, in reality there could be a shift in the distribution of cases after the Table Shaving program was implemented. For example, say Company A has a Table 4 to Standard Shaving program and Company B does not. All else equal (which is rarely the case), the Table 3 and Table 4 risks should gravitate towards Company A as they are getting a relatively good deal while the true Standard risks and those rated up to Table 2 may find that they get the best deal when purchasing the policy with Company B (as they don't want to subsidize the Table 4 risks that will be placed in Company A's Table Shave program).

“An appropriate level of diligence should be applied when setting assumptions.”

The second complicating factor is that it may not be clear whether the table ratings are relative to the Standard Class or if they are relative to the entire non-rated population. Essentially, the question there is whether the Standard class already includes some loading as the Preferred risks are already stripped out into their own class. If one believes that is the case and if one believes that the Standard rates already include a 20 percent load over the average of the non-rated risks (i.e., the expected mortality of the combined Preferred and Standard risks), then our Table Shave load derived by the weighted average approach should be divided by 1.2 when applied to the Standard class rates. Over time, one can monitor the program (assuming that the underwriters track the pre-shaved class rating) to determine if the mix of business by class changes after the implementation of the Table Shave Program. One can also monitor the mortality experience of the Table Shave Program although it will take longer for credible mortality experience to emerge as compared to the emergence of the distribution.

**My second example involves setting the lapse assumption for level term business.** For the shorter duration products (5-year and 10-year) and for the first dozen or so durations of the longer duration level term business (20-year and 30-year), there would be either company specific or industry level lapse experience. When credible company specific lapse information exists, then that typically is what I consider to be the best source of information. However, company specific lapse experience would not be available for a similarly structured 30-year level term product since Actuarial Guideline XXX was not enacted until 1999 and that had a material impact on the design of level term products in the United States. That means there is credible industry level lapse experience for approximately the first 14 durations of a 30-year level term product. The question now is how to set the lapse assumption for the remaining 16 durations of this product.

One may look at the industry lapse experience and determine that it appears to level off at 5 percent by duration 12 when the experience loses credibility. Say that 5 percent lapse assumption is used for the remaining durations and the retail premiums are developed on that basis. A prudent actuary should then perform some testing to determine whether the results are sensitive to that lapse



Clearly, I'm very excited to arrive at the Great Wall of China (June 2013)

assumption. I have seen that sensitivity test performed by applying a multiple to the baseline lapse assumption (such as 125 percent lapse sensitivity and 75 percent lapse sensitivity). In my opinion, such sensitivity tests would not adequately highlight the risk in this lapse supported 30-year level term product. If our baseline lapse assumption for durations 12+ was 5 percent, then this 75 percent lapse sensitivity would be assuming a 3.75 percent lapse assumption in those years (as well as lower lapses in the earlier durations). Both of those assumptions could be far off from reality. I believe that a better sensitivity would be to hold the lapse assumption constant for the first 12 to 14 durations (where credible experience exists and where the policyholder's level premium is still overpaying to build the reserve) and to decrease the later duration lapse assumption to a much lower amount such as 1 or 2 percent. In that scenario, you will likely see profits are materially lower as compared to the baseline scenario. That lets the pricing actuary know that the choice of lapse assumption for the middle and later durations on this lapse supported product (where little experience exists) is a key pricing assumption. The pricing actuary may initially struggle to determine how they can substitute facts where none appear to exist in their marketplace.

CONTINUED ON PAGE 6

That is when they may need to turn to experience on that similar lapse support risk from other products or from other jurisdictions.

After a call to their living benefits department, this hypothetical pricing actuary finds out that their Long-Term Care (LTC) pricing area faced a similar dilemma back in the 1990's. The LTC pricing actuaries at that time saw the higher early duration lapse experience on their LTC products and decided to keep a relatively high later duration lapse rate (approximately 5 percent) as their baseline pricing assumption. A decade later, experience emerged indicating that while it was challenging to find people willing to initially purchase the LTC policy, the ones who purchased and kept the policy beyond the first 5 to 10 durations tended to keep their policy thereafter. That policyholder behaviour resulted in an ultimate lapse rate of approximately 1 percent per year. While this data point was not on the same product as the focus for our hypothetical term pricing actuary, it did cause him/her to pause to see if he/she could find some other sources of data that could be relevant.

The next step was to call their reinsurer who happened to have an operation in Canada. The pricing actuary found out that the Canadian marketplace had been selling a Term-to-100 product for many years. Since this product

had level premiums and no cash values (since there is no non-forfeiture regulation in Canada), it would also fall in the category of being "lapse supported" from a pricing perspective. The United States term pricing actuary found out that many of the companies offering this product in Canada initially assumed a middle and later duration lapse assumption of approximately 5 percent. That assumption seemed reasonable at the time given that the early duration lapse experience was much higher (often in double digits). However, experience emerged on this Term-to-100 product in Canada which showed that the actual lapse assumption came down to just under 1 percent. Once that revised lapse assumption was put into the valuation models, there was a material drop in the profitability of those products. Armed with these two sources of information, the prudent actuary determined that they should modify their baseline lapse assumptions on their 20-year and 30-year term product to account for the lapse supported risk.

In conclusion, there often are non-traditional sources of information that can help us "substitute facts for appearances and demonstrations for impressions" as our actuarial motto suggests. Thus, don't be afraid to build relationships outside of your current area of expertise and to keep your eyes open for insights that can be applied to your primary area of responsibility. ■



# Current Dynamics of Universal Life and Indexed UL

By Susan J. Saip

It is practical for life insurance carriers to keep up with the current dynamics of the universal life (UL) market since its market share has hovered around 40 percent since 2005<sup>1</sup>. Also, UL products were the biggest driver of growth in life insurance sales during the first quarter of 2013<sup>1</sup>. Milliman Inc. recently conducted its sixth annual survey of leading UL carriers to discover the current dynamics of the market, and to provide carriers with competitive benchmarking to evaluate where they stand relative to their peers. The scope of the survey included UL with secondary guarantees (ULSG), cash accumulation UL (AccumUL), current assumption UL (CAUL), and the indexed UL (IUL) counterparts of these products. Results are based on responses from twenty-eight carriers of UL/IUL products. Here are highlights of the key findings of the survey.

## UL Sales

The mix of UL sales (excluding IUL sales) reported by survey participants for calendar years 2009 through 2011 and for 2012 as of September 30, 2012 (YTD 9/30/12) is shown in the graph in Figure 1. For purposes of the survey, sales were defined as the sum of recurring premiums plus ten percent of single premiums.

Eleven participants reported a shift of at least ten percent from or to any one UL product when looking at the YTD 9/30/12 product mix relative to that of 2009. Fourteen participants reported movement to ULSG products, at the expense of both AccumUL and CAUL products. Four participants discontinued sales of ULSG products and two discontinued CAUL products. For all survey responses combined, the product mix over the survey period looks relatively stable since many of the individual company changes offset each other.

## Indexed UL Sales

The IUL market has continued to draw considerable interest as evidenced by more companies entering the market. This product is attractive in today's environment due to its upside potential and downside protection to the policyowner.

Total IUL sales as a percentage of total UL and IUL sales combined have increased from eighteen percent in 2009 to forty percent through the first nine months of 2012. IUL sales alone showed a twenty-three percent growth during the first quarter of 2013 relative to the

prior year quarter<sup>2</sup>. The dominance of cash accumulation IUL (AccumIUL) sales within all IUL business and the decline of indexed UL with secondary guarantees (IULSG) are seen in the graph in Figure 2.

## Long-term Care and Chronic Illness Rider Sales

The popularity of UL/IUL products with chronic illness and long-term care (LTC) riders can be seen as more and more companies begin to offer and track such products. Nearly seventy-nine percent of survey participants



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Figure 1: UL Product Mix by Year

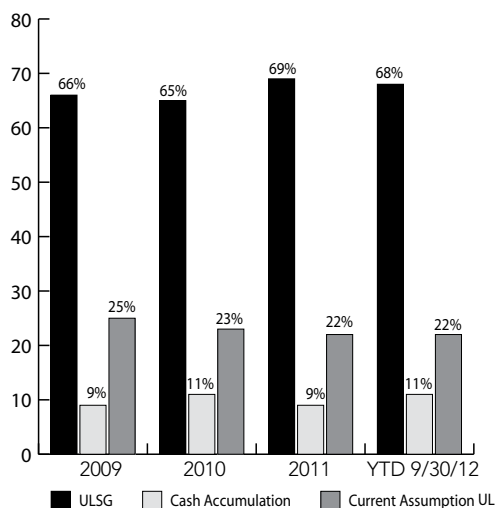
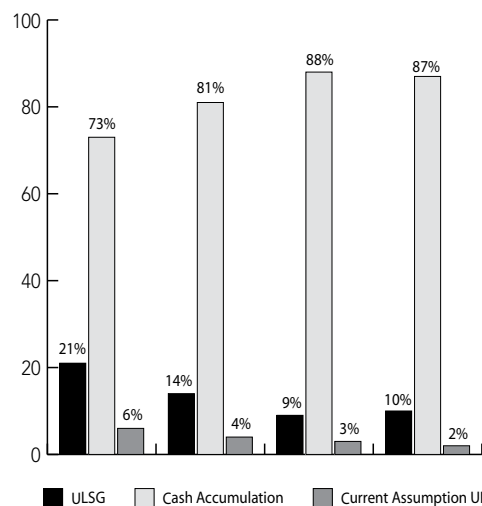


Figure 2: IUL Product Mix by Year



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expect to market either a chronic illness or LTC rider within twelve to twenty-four months. Sales of chronic illness riders and LTC riders as a percentage of total sales reported by survey participants are shown sepa-

rately for UL and IUL in Figure 3. There is little overlap between companies that offer chronic illness riders and those that offer LTC riders. In some cases, the chronic illness rider is automatically included on certain UL/IUL policies. These are no-cost riders that provide an accelerated death benefit using the discounted death benefit or lien approach.

**Figure 3:** Chronic Illness and LTC Rider Sales as a Percentage of Total Sales

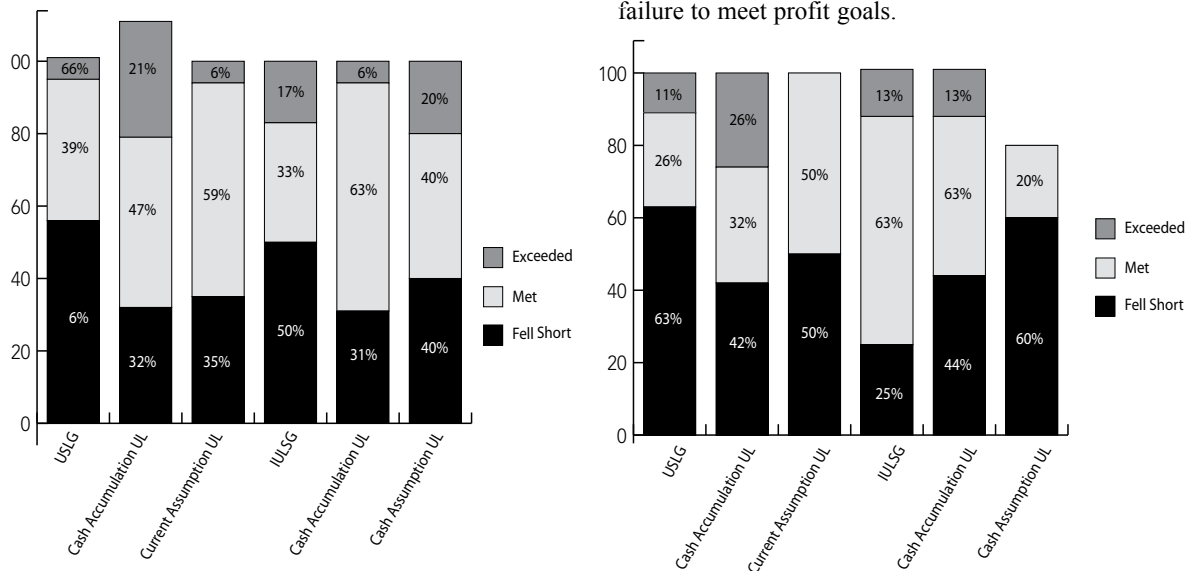
CALENDAR YEAR	UL SALES		IUL SALES	
	WITH CHRONIC ILLNESS RIDERS AS A PERCENT OF TOTAL UL SALES	WITH LTC RIDERS AS A PERCENT OF TOTAL UL SALES	WITH CHRONIC ILLNESS RIDERS AS A PERCENT OF TOTAL IUL SALES	WITH LTC RIDERS AS A PERCENT OF TOTAL IUL SALES
2011	11%	15%	18%	1%
YTD 9/30/12	14%	16%	13%	4%

### Profit Measures

The median return on investment or internal rate of return (ROI/IRR) reported by survey participants is twelve percent for all UL product types, consistent with prior survey results. With the exception of IULSG, the percentage of survey respondents that fell short of profit goals increased from 2011 through September 30, 2012. For IULSG, fifty percent met their profit goals in 2011 and this figure increased to seventy-six percent during the first three quarters of 2012.

The chart in Figure 4 shows the percentage of survey participants reporting they fell short of, met, or exceeded their profit goals by UL product type. Low interest earnings continue to be the primary reason cited for failure to meet profit goals.

**Figure 4:** Actual Results Relative to Profit Goals





## Reserves

Eleven of twenty-two participants expressed concern about the net premium reserve floor that is included in the valuation manual. The reasons for concern included the following

- the net premium reserve is too high
- there is a significant amount of work in implementing the new regulations with little reserve relief, and
- there are potential tax inefficiencies

## Product Design

Thirteen of the twenty-eight participants in the survey re-priced their ULSG design in the last twelve months. The majority of participants that re-priced also reported that premium rates increased on the new basis versus the old basis. Ten of these thirteen, plus three additional participants, intend to modify their secondary guarantee products in the next twelve months. The fact that seven of these thirteen survey respondents were short of their profit goals through the first nine months of 2012 may be driving such re-pricing and modification plans. In addition to interest earnings, recent regulatory changes to Actuarial Guideline 38 are also driving expected modifications to secondary guarantees.

## Conclusion

Keeping on top of the dynamic and ever-changing market is critical to the development of creative solutions for the issues and challenges that arise. Resources such as the UL survey provide UL insurers with competitive benchmarking to determine where they stand within the industry.

In addition to sales, profitability, reserves, and product design, the study also includes information on other product and actuarial issues, such as target surplus, risk management, underwriting, compensation, pricing, administration, and illustration testing. A complimentary copy of the executive summary of the April 2013 Universal Life and Indexed Universal Life Issues report may be found at <http://insight.milliman.com/article.php?cntid=8358>. □

# SOA 2013

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### **Perspectives on Mortality Trends**

Session 97 Panel Discussion

**Tuesday, Oct. 22**

10:15 – 11:30 a.m.

Rather than just measuring mortality, it helps to understand the drivers of the factors that are resulting in the mortality improvement we've been seeing. This session features a panel of experts from insurance, pharmaceuticals and epidemiology to share their insights regarding changes in cause of death and other trends in mortality improvement.

### **Indexed Life and Annuity Product Development Deep Dive**

Session 128 Panel Discussion

**Tuesday, Oct. 22**

3:45 – 5:00 p.m.

This session will provide attendees with valuable insights into the future of the growing market for indexed products.

[SOAAnnualMeeting.org](http://SOAAnnualMeeting.org)

# Around The World – United Kingdom

## Drive Like a Girl: Development of Gender Neutral Pricing

By Jason Hurley

This is the next article in our series on product trends around the world. Each issue we look at new market developments in a different country or region, examining interesting product developments, new distribution ideas, regulatory responses and industry initiatives. This month, we turn our focus to the United Kingdom, looking at a new way of branding and distributing insurance that could be industry changing.

It has been two years since the European Union announced gender equalization in insurance rating. In the weeks following the announcement, there was considerable media speculation considering how insurers might differentiate their treatment of one sex or the other, to encourage the right mix of business. Ideas included gender-specific commission rates, new underwriting factors, developing gender-specific critical illness products, or even “Sheila’s Wheels” style marketing aimed at one sex or the other. Speculation centered on the extent to which an insurer might adapt business practices. Gender-neutral prices could leave the insurer open to the risk of being accused of indirect discrimination, or the risk that customers might select against insurers based on differences in insurers’ response to the rule.

It is now two years later. What has happened? In the life insurance space, it doesn’t seem like much. However, in Ireland, we have seen Irish Life offering added benefits on term insurance with a face amount in excess of €25,000 (approximately \$32,000). For these policies, there is an extra benefit of €5,000 (or \$6,400) upon diagnosis of five specific conditions that might arise during pregnancy. Clearly, these benefits can only be paid to women. Would this be enough to encourage a young female to buy a life insurance policy with Irish Life, and would this skew the gender mix? Arguably, it might.

Probably not surprisingly, we have seen more innovation in the general insurance space, where young males previously typically paid double the premium of ‘identical’ young females. My favorite is a new general insurance brand: [www.drivelikeagirl.com](http://www.drivelikeagirl.com). Branded in pink with a heart over the “i” in “girl,” the company is clearly targeting young females. As one may expect, premiums will be cheaper if you drive like a girl.

Using telematics technology—a black box, provided by the company and installed behind the dashboard, monitors the insured’s driving (in particular speed of acceleration). If it falls within certain parameters—that is, if you ‘drive like a girl’—you get a discount on premium rates through quarterly premium reimbursements.

There is nothing to stop males from applying—in the same way that they could go to a women’s hairdresser or clothes shop—but the company is clearly playing on the egos of young males. I’m not sure how many 17-25 year old males would admit to driving like a girl; I doubt many would. Do the people from drive like a girl mind? No, of course not. They are marketing themselves as offering heavily discounted premiums for safe drivers, irrespective of their sex.

It’s easy to start thinking about the bigger, wider implications of having insurer-driven telematics in a car. Will the device detect if a driver is breaking the speed limit, wearing a seatbelt, running red lights, or driving in the middle of the night? Some of these factors are already reflected in auto insurance premiums in companies rating for usage-based insurance, but developments in the future are sure to come.



CONTINUED ON PAGE 12

And ... could the next life insurance brand be [www.live-likeanun.com](http://www.live-likeanun.com)?

The traditional way of developing life insurance premium rates is achieved by preferred underwriting. An insurance company sends a nurse to the customer several weeks after the policy application is submitted, to record height, weight, take the blood pressure and so on. The nurse would then report back to an insurance company underwriter, who makes a decision. The whole process is costly, inconvenient for the customer and could take several weeks if not months.

This idea to rate based on individualized data from insured behavior, rather than relying on population based rating factors is not limited to the general insurance arena. Technological advances may enable life insurers to collect basic medical information and evaluate lifestyle choices in lieu of traditional underwriting. Although data gathered from personalized devices may not be a perfect measure of risk, the data could be used in a simplified-issue underwriting process that could be quick and easy, and appropriately targeted. Individualized data, combined with an appropriately designed product, could give a more favorable financial result to a life or health insurer without relying on gender to rate the product. □

# Risk-adjusted pricing: Risk-neutral, real-world, or does it matter?

By Seng Goh and David Wang

Traditionally, U.S. actuaries have relied on real-world profit measures in product pricing. In the past few years, there has been an increasing interest in the industry to apply a more market-consistent approach to value products. There have also been debates on which approach is better. The two approaches, however, are not so fundamentally different, if used appropriately.

Below is a list of some of the commonly used real-world profit measures:

- Premium margin: Ratio of present value of pre-tax statutory profits over the present value of premiums at an assumed discount rate
- Internal rate of return (IRR): The rate at which the present value of distributable earnings is equal to zero
- Embedded value: Present value of distributable earnings discounted at an assumed discount rate
- Return on asset (ROA): Ratio of present value of pre-tax statutory profits over the present value of projected assets at an assumed discount rate

A common feature of these measures is that the assumptions typically reflect the actuaries' best estimate of what happens in reality, particularly the investment assumptions. This seems a very reasonable approach. If the company invests in equities in real life, then it makes sense for the actuary to assume an expected return that corresponds to the historical performance of the equity assets. However, investing in equity assets exposes the investor to risks. And a general belief in finance is "high risk, high return." So by assuming a higher return from equity investment, actuaries bring in extra risk to the product's risk profile. The question is then: *How is this risk quantified and reflected in pricing?*

One common place to reflect risk in pricing is through the discount rate. However, the selection of the discount rate often involves great subjectivity. Some might argue that the discount rate should be the company's weighted average cost of capital (WACC). WACC may reflect the overall investment risk of the company, but does not directly reflect the risk associated with the product itself.

Aside from the investment risk (or market risk), there are also other risks associated with the product, including uncertainties related to lapses, mortality/longevity,

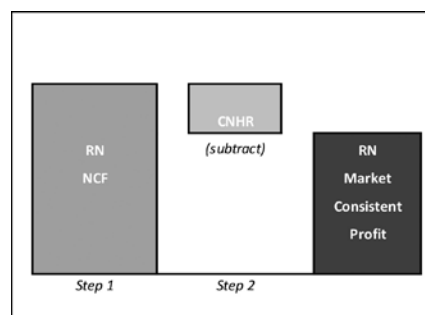
expenses, and even operational risks. These risks are not accounted for explicitly in any of the real-world profit measures that we have seen. Sensitivities can be performed to study the variability of the profitability to the risks, but the results are more of an indication rather than quantification of the risk exposure.

Therefore, we believe the biggest issue with traditional real-world pricing is a lack of explicit consideration for all the risks associated with the product and how the product is managed.

Interestingly, this issue is directly addressed in the market-consistent embedded value (MCEV) calculation recommended by the CFO Forum. The market risk is directly addressed through risk-neutral valuation, where the risks associated with investments in different assets are directly removed and all assets are expected to earn the same risk-free return. The non-market risks are required to be quantified through a component called cost of non-hedgeable risk (CNHR). Although the CFO Forum provides no explicit guidance on the calculation of CNHR, companies typically follow the cost of capital approach as recommended under the Solvency II.

MCEV and Solvency II probably sound too European for us actuaries in the United States. However, if we strip out the details, as illustrated below, essentially the Europeans try to calculate a price at which all risks are accounted for and at which the product can be traded (at least conceptually) in the market. The risk-neutral net cash flow (RN NCF) is the average present value of cash flows calculated over a set of risk-neutral scenarios, thus allowing for market risk. The CNHR is the cost of capital required for all non-market risks. The net result is therefore a market-consistent price (or profit in pricing concept).

Illustration 1: Risk-neutral pricing



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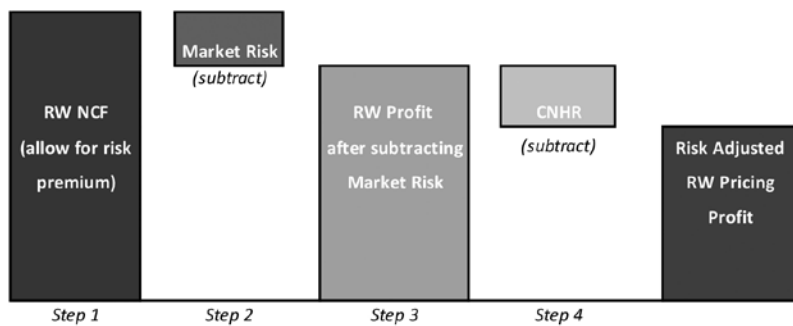


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CONTINUED ON PAGE 4

It is probably debatable whether a market-consistent price applies to insurance products, since no market exists today where investors can trade insurance products. However, we can still learn from our European peers and modify our current pricing approach to explicitly account for the risks.

Illustration 2: Risk-adjusted Real-world Pricing



As illustrated above, the real-world net cash flow (RW NCF) is the average present value of cash flows over the best-estimate real-world investment assumptions. Since we will address the market risk explicitly, the discount in this step should just be at the earned rate. The market risk is a quantification of the market risk associated with the asset investment. The CNHR is the same as in MCEV, a quantification of the non-market risks. The net result is what we call risk-adjusted real-world profit.

Illustration 3: Economic Capital



The two approaches in Illustration 1 and 2 could potentially produce the same result. When that happens, the adjustment for both market and non-market risks in real-world pricing is exactly the same as the adjustment that the market would require to achieve a market-consistent price. However, they do not have to be the same. The market risk and CNHR in real-world pricing can reflect the company's own view of the cost of these risks instead of the market's view. This is an important thing to note, and fundamentally differentiates our suggested approach from either MCEV or the traditional real-world pricing. In order to calculate the market risk and CNHR in real-world pricing, perhaps the cost of capital approach that is often adopted by our European peers can also be borrowed. For example, the variable annuity product is subject to C3 Phase II (C3P2) capital, which essentially quantifies the market risk. The C3P2 requires conditional tail expectation 90 or CTE90, which is the regulator's view on the minimum capital for market risk. The company may investigate its own view on market risk, and may decide on, say, CTE98 to be more closely reflective of the product's market risk. Then the difference between CTE98 and CTE90 is the additional economic capital the company decides to hold for the market risk. Reflecting the cost of this capital in pricing will thus provide the market risk component in Illustration 2.

The CNHR can also be calculated in a similar manner. Again, we can start from the regulatory minimum required capital and recalculate the additional capital required if the non-market risk factors (such as lapse, mortality, expense, etc.) are worse than the best-estimate assumption. This is fundamentally similar to how Solvency II determines CNHR, except that we do not calculate this in a risk-neutral framework. The degree of stress to assume in the CNHR calculation is again based on the company's own view of these risks. Solvency II provides some useful guidance on the assumptions, but companies can develop their own view and methodology. As illustrated in Illustration 3, the market risk and CNHR effectively combine to form the company's economic capital in addition to the regulatory minimum.

In summary, it is probably wrong to ask whether real-world pricing or risk-neutral pricing is better. A more important question is whether and how risks are reflected



in pricing. We have offered our view on how this can be done in a real-world pricing framework. And the risk-adjusted real-world pricing effectively does the same thing as risk-neutral pricing in MCEV. But the former allows the company to build in its own view on the risks rather than to accept the market's view. Through our illustration, we have also shown that a very important piece in risk-adjusted pricing is the quantification of the risks. Therefore, pricing is very much linked with risk management directly, and economic capital can play a significant role at the outset of product development rather than simply serve as a tool for in-force management. □

“ A very important piece in risk-adjusted pricing is quantification of the risks. ”

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# SOA Assumption Development and Governance Discussion Second Quarter 2013 Calls

By Liz Olson



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With increased scrutiny on assumptions, companies are ramping up efforts and resources to increase governance around setting assumptions. The Assumption Development and Governance Group (sponsored by the Financial Reporting and Product Development Sections) was formed in April to offer an opportunity for actuaries to participate in discussions around key topics and establish industry contacts in this field.

The first discussions of this new group were held May 8th through May 23rd, in a series of four conference calls. There were seventy-two companies represented, with additional participants from these companies listening in. The topic of discussion was “Top of Mind” for assumption management at your firm in 2013. The group discussed top initiatives and top challenges that they are dealing with this year. The format enabled company representatives to provide updates on their company assumption initiatives, with a few minutes to toss out questions to the group. Several common themes emerged.

The most frequently mentioned topic was governance. Larger U.S. companies and international companies have had infrastructure up and running for about three years. However, most are continuing to improve their processes. Governance for these companies includes formal committees, approval processes, established frequency of review of assumptions and documentation (in one case with written standards for documentation). Committee membership varies greatly by company with representation from the following areas:

- chief actuary
- appointed actuary
- valuation
- risk management
- CFOs
- pricing actuaries
- accountants and
- illustration actuaries

The frequency of meetings varied. Most other companies that talked about governance were either just starting to form formal committees and processes or were thinking about it.



The second most mentioned topic was dynamic lapse rates, with considerations for the low interest rate environment coming up frequently. Many companies are considering the impact of potential interest rate rises by sensitivity testing across plausible scenarios. With no recent data with increasing rates, it is a challenge to predict actual policyholder behavior under the various new contract options that are available. There was some discussion around difficulties in defining “base” lapses vs. “dynamic” lapses, as well as the growing complexity around these assumptions as we learn more from emerging experience and consider the efficiency to which policyholders could exercise options. One company mentioned success with predictive modeling around variable annuity living benefit behavior and anticipates using the same techniques for fixed annuities.

When discussing the storage and documentation of final assumptions, the idea of an assumption database came up frequently. Many companies are considering a comprehensive assumption database as an option, and some have started to build them. Other solutions ranged

from spreadsheet storage to SharePoint sites, and tools available within the modeling software.

Resources appeared to be a consistent constraint, especially among smaller companies. This led to questions such as:

- What is the right amount of effort to put into governance?
- What are the benefits?

Companies that have had processes in place did not seem to have used sizeable amounts of new staff behind assumptions. Although governance has added additional steps to the assumption-setting process, some noted the benefits of notable quality improvement and consistency in assumptions.

- In addition to the issues above, the following were challenges were discussed:
- Lack of credible data for smaller companies and newer product designs
- Audit-ready documentation
- Consistency across assumption uses
- Legacy assumptions with little or no documentation
- Small company considerations – few resources and lack of credible data
- Definitions around provisions for adverse deviations

Discussions are anticipated to occur quarterly. If you are interested in participating or just being in the loop, please contact Liz Olson at [olsonl@nationwide.com](mailto:olsonl@nationwide.com) or 614.249.0605 to get on the distribution list. Participation is completely optional at all times. Look for our group on LinkedIn by searching for “SOA Assumption Development.” □

# Highlights of the May 2013 SOA Life & Annuity Symposium

By Jim Filmore and Kurt Guske with various contributors



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This article contains a summary of some of the presentations given at the May 2013 SOA Life & Annuity Symposium. This article does not cover all sessions that are related to product development, but shares observations that have been made by various members of the SOA Product Development Section Council. We encourage everyone to join our LinkedIn group where you can participate in discussions on these or any other topics that are relevant to our business.

## Sessions 13 & 28 – Life Protection Product Update (by Kurt A. Guske)

- Moderator/Presenter: Robert P. Stone (Milliman)
- Presenter: Elizabeth H. MacGowan (National Life)
- Presenter: Jeremy Allen Bill (Midland National Life)

The purpose of this session was to provide an update of life insurance products serving the protection market, as well as the near-term outlook for these products. Elizabeth discussed trends in the term insurance marketplace. Rob followed with insights about the universal life market. He touched on UL with and without lapse protection and focused mostly on indexed UL. Jeremy wrapped up the session by outlining the recent changes to Actuarial Guideline 38 (AG38) which affect lapse protection UL contracts.

## Trends in the Term Insurance Marketplace

Elizabeth reviewed term sales trends, pricing and regulatory environment, and industry responses to the environment. According to LIMRA's preliminary estimates for 2012, over one-third of life insurance policies sold are term insurance. She stated term has held steady in the marketplace over the last 12 years. Term market share is twenty-one percent based on annualized premium according to the same LIMRA source.

She demonstrated average premiums per term policy have increased since 1987 according to LIMRA sales survey and compared this trend to average U.S. household income according to Bureau of Labor Statistics over the same time period. A key takeaway is that term purchasers are paying premiums at a level they can afford and not necessarily what protection they need.

The term pricing environment is driven by high reserve requirements, declining interest rates, improving longevity, and regulatory changes. She stated that due to Regulation XXX, term insurance requires a high amount of capital for an extended time period. This makes capital financing a major issue when pricing term. She admitted that, in the absence of reserve financing, pricing returns are low.

The industry response to high capital requirements is reinsurance. She stated fifty-six percent of life insurance is reinsured, according to SNL Financial's SNL Data Dispatch dated 11/26/12. Of the fifty-six percent reinsured, fifty percent of that reinsurance is ceded to affiliates of the direct companies. This means twenty-eight percent of all life insurance is ceded as captive reinsurance.

A key takeaway is that most of the top twenty life insurance carriers use reinsurance captives and have been expanding their use over the last five years. This is based on 2011 data with the same SNL data source.

## Universal Life (UL) Products

Rob demonstrated that while term growth rates from 2011-12 remained stable by production, UL annualized premium is up eight percent year to date, according to LIMRA's US Individual Life Insurance Sales Summary Report, fourth quarter 2012. UL captured forty percent of the annualized premium market in 2012 versus twenty-one percent in term. According to Milliman UL/IUL surveys, UL with secondary guarantees continues to dominate UL sales, with sixty-eight percent year-to-date 9/30/12.

He explained that Indexed UL (IUL) sales are a growing market, from \$695 million sales in 2010 to \$973 million in 2011 and \$1.3 billion in 2012 according to AnnuitySpecs' Sales & Market Report 4<sup>th</sup> Quarter 2011. Rob pointed out that companies are leaning on IUL as an alternative to Universal Life with Secondary Guarantees (ULSG), as it illustrates well in the current environment. He posed the question of whether the market is leaning too much on the IUL product.



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### **Actuarial Guideline 38 (AG38) update**

Jeremy briefly outlined the chronology of AG38, from the advent of Regulation XXX in 2000 to Actuarial Guideline 38 (“AXXX”) in 2002 to the “bifurcated” approach adopted in September, 2012. He discussed the latest approach is effective January 1, 2013 with separate rules for in-force policies (Section 8D) and new business (Section 8E).

Section 8D requires additional reserves potentially on selected in-force UL with secondary guarantee policies based on the deterministic reserve methodology outlined in the valuation manual (VM20).

Section 8E deals with how gross minimum premiums are calculated in step one of the AG38 calculations. He explained two permitted methods, “certain designs” (Method 1) and “other designs” (Method 2). He stated most companies avoid method 2, which requires demonstrations of multiple premium patterns to establish the gross minimum premium requirement. Under Method 1, there are three designs, one of which can be used. In order to use any of these designs, a special certification is required by an appointed actuary and a company officer.

Jeremy discussed potential impacts. He shared that, according to benchmarks prepared by his company, level pay premiums from March 2012 to January 2013 have increased five-point-three percent on average for the top five companies and five-point-nine percent for the top ten (the top companies changed over this time period). Single pays have increased thirteen-point-seven percent on average for the top five companies and nineteen-point-one percent for the top ten. He commented a handful of carriers have pulled out of UL with secondary guarantee products.

### **Session 29 – Risks in Products (by Donna Megregian)**

- Moderator: Jim Filmore (Munich Re)
- Presenter: Donna Megregian (Milliman)
- Presenter: Blake Hill (Manulife)

This session started with Blake Hill of Manulife discussing how return of premium on critical illness poses risk in the design. Similar to return of premium on term in the United States, there are concerns related to the lapse-supported nature of the policy and providing additional value related to the cost for the option.

Donna Megregian of Milliman took a step back from a specific product to throw out a wide range of risks within contracts, products, assumptions, regulation, and other areas. Concerns included policy form language, optionality within products, consistency and documentation of assumptions, and concerns related to keeping products compliant with the tax code.

Jim Filmore of Munich Re was also able to add perspectives on risks in products such as secondary guarantee universal life from a reinsurer’s perspective. As actuaries, we are responsible for quantifying and qualifying risks. The more we know about the risks out there, the better we can mitigate those risks during the pricing, development, and inforce management processes for all parties involved.

### **Session 36 - Illustration Compliance (by Donna Megregian)**

- Moderator & Presenter: Donna Megregian (Milliman)
- Presenter: Susan K. Bartholf (American Family)
- Presenter: Gayle L. Donato (Nationwide)

Most of the audience had some form of experience related to illustration testing, so this session was much focused on practical applications and concerns related to The Life Illustration Model Regulation and Actuarial Standard of Practice (ASOP) 24. In a fairly open panel session, Sue Bartholf of American Family, Gayle Donato of Nationwide, and Donna Megregian of Milliman discussed topics related to indexed universal life issues, in-force modeling, and one-time expense. Using polling, the audience was able to anonymously provide opinions and feedback on some of the topics as well.

This session was not endorsed by the SOA or AAA, and any recordings or takeaways from the session should be deemed the panelist opinions. The slides will be made available on the SOA website, but please be cautious when looking at these or any slides which, without proper context, may be misinterpreted or misunderstood. We recommend that you contact the panelist if you have specific questions.

If you missed this session but plan to attend the annual meeting, a session is planned to have a workshop related to illustration issues. Attendees to this session are encouraged to actively participate in subjects and bring topics for discussion. Space will be limited, so please register for the session.

### Session 86: Delphi Study in Real Time - Life & Annuity Products & Product Development (by Paula Hodges)

- Moderator & Presenter: Paula Hodges (Ameritas)
- Presenter: Albert Abalo (Oliver Wyman)
- Presenter: Ben Wolzenski (Actuarial Innovations)

This session utilized the Delphi method to develop several predictions about developments in the life and annuity market over the next seven years. For those not familiar with the Delphi method, it is a process whereby a facilitator collects information from a group of experts on a particular subject matter. After collecting a first round of opinions, the facilitators share the aggregated results with the group. At that time, the group continues to participate anonymously, but with the benefit of the opinions, and sometimes commentary, from the other experts. Another round of polling takes place, and this continues until the results are stabilized. This method has proven to be very predictive. In this session, the audience was utilized as the experts, and here are a few of the predictions made:

By the year 2020, U.S. and Canadian bond yields will be between three percent and five percent, but will remain relatively unchanged for the next three to five years. As this will challenge the spreads that insurance companies require, the burden will be passed along to consumers (higher prices), agents (lower commission),

employees (lower wages and layoffs), and the company itself (lower profits). The group felt that a reasonable IRR expectation in this environment is less than ten percent.

Life insurance products that will take off in the next few years are expected to be whole life and indexed universal life, while the indexed annuities will see the largest amount of growth in the annuity space.

With the aging of the current field force, alternative avenues will be sought by both consumers and insurance carriers. Therefore, marketing of life and annuity products is expected to shift to financial advisors for annuity sales and to the internet for life products.

Not surprisingly, the biggest issues facing insurers over the next seven years is expected to be the low interest rate environment and the shifting demographics, impacting both the distribution force and the insured population.

This was a very interesting session, showing how additional information and the anonymity of the experts influenced changes in the ultimate consensus of the group. I look forward to the year 2020 when we can validate the opinions of the experts that were in the room for this enjoyable session.

### Session 88 – Older Age Mortality (by Jim Filmore)

- Moderator: Jim Filmore (Munich Re)
- Presenter: Tim Rozar (RGA)
- Presenter: Dieter Gaubatz (Munich Re)

At this session, two industry mortality experts, Tim Rozar and Dieter Gaubatz, shared their insights regarding older age mortality.

Tim started off the session by discussing the results of the research project titled “Report on the Survey of Older Age Mortality and Other Assumptions” that RGA conducted on behalf of the SOA Product Development section. Tim’s presentation covered the following topics



- i. Product design and sales trends by age
- ii. Underwriting requirements at older ages
- iii. Actuarial assumptions at older ages including selection factors, preferred discounts, mortality improvement, and lapse assumptions.
- iv. A comparison of cognitive function and physical function tests used in older age life insurance and long-term care insurance.

Observations from Tim’s presentation include the following:

- The percentage of in-force life products on individuals with attained age greater than 65 has risen steadily since the late 1980’s and peaked in around the year 2006. Universal Life with Secondary Guarantees (ULSG) has the highest percentage of the inforce business on individuals with attained ages greater than 65 followed by accumulation universal life products.
- In general, companies increased both per life retention and capacity (retention plus reinsurance) between 2005 and 2011. However, the increases were smaller at the older issue ages.
- Availability of riders (such as WOP, ADB, terminal illness acceleration) tends to decrease at the older issue ages.
- Cognitive testing tends to start at issue age 70 with Delayed Word Recall being the most common cognitive test used for individual life and Enhanced Mental Skills Test (EMST) being the most common cognitive test used for Long-Term Care.
- Physical function tests tend to start at either issue age 70 or issue age 75 with “Timed Get Up and Go” being the most common test in life underwriting and “Gait and Chair Rise/Stand” being the most common tests in Long-Term Care underwriting.
- Enhanced Mental Skills Test (EMST) had the highest perceived predictive value when it comes to cognitive testing while 10-Word Delayed Word Recall had the highest perceived protective value.

The difference is that protective value takes into account both the usefulness and the cost of the test while predictive value only considers the usefulness of the test.

- Some tests are more liberal at issue age 80 as compared to issue age 45 (blood pressure, family history, and maximum weight) whereas other tests are more conservative (minimum cholesterol, minimum weight).
- The average select period was shorter for Long-Term Care companies as compared to Life companies (comparison made on companies that were in both markets).
- The 2008VBT has a shorter and steeper selection period at the older issue ages. This was also true for respondents of the survey. However, it was noted that there was a significant variance in the survey results especially at the older issue ages.
- Some companies limit the availability of preferred classes at the older issue ages.
- Preferred discounts are generally less at the older issue ages.
- Mortality improvement assumptions tend to be lower for females and for both genders as the issue age increases.

Dieter’s presentation covered the following topics:

- i. Importance of the senior market
- ii. SOA 2008-09 individual life intercompany study
- iii. 2014 VBT table development
- iv. Experience interpretation issues
- v. Other considerations in using experience as a guide.

Observations from Dieter’s presentation include the following:

- While the percentage by count of policies issued above age 70 may be small, they make up a greater percentage of the face amount and an even greater percentage of the first duration expected claims.

CONTINUED ON PAGE 22

- Comparisons were made between the select periods by issue age from the 2008VBT and the draft version of the 2014VBT.
- It was noted that certain sources of information regarding older age mortality have data errors. For example, Part A of Medicare is free which results in late reporting of deaths covered under that source.
- Life span is the oldest age to which someone can live whereas life expectancy is the average remaining future life time for which someone is expected to live.
- Annual population mortality improvement adjusted to remove AIDS deaths was lower on a percentage basis (and negative at the older ages) in the time period from 1992-2002 as compared to 2002-2010.
- Annual population mortality improvement adjusted to remove AIDS deaths was higher across all ages for males as compared to females in the time period from 2002-2010. ■

# Product Development and Pricing: Beginning to End

By Donna Megregian and Josephine Marks

This one-day seminar on product development and pricing was offered the day after the May 2013 Life & Annuity Symposium in Toronto. The seminar focused on issues related to pricing and developing various products including term, universal life with secondary guarantees, and indexed products. A general market overview was laid out by Rob Stone and Luc Farmer. General market trends, size and growth were discussed between US and Canadian products.

## Term Insurance

Term insurance was covered by Luc Farmer and Donna Megregian. Luc discussed how term insurance in Canada works. The basic structure of term in Canada is different from the United States in that it has multiple level term periods rather than one level term period followed by an Annually Renewable Term (ART) scale. Canada has experienced a shift in business away from the 10-year plans and toward the 20-year plans. The 20-year term plans have been the primary focus of the U.S. market for many years now. A big similarity between the markets comes from the fact that generally, a re-price of the term product only changes the first level term period. As those initial rates have decreased without change in the second level set of rates, the increase in premium has become larger and the shock lapse on Canadian term policies has increased. This shock lapse is approaching the level of shock that the United States has shown to occur when the premiums increase over ten-fold from the initial level premium period. In the U.S. market, hot topics include simplified issue and capital solutions. Many companies that are able to price with a capital solution on term products find a competitive advantage when pricing their products. Throughout the product development process, a number of issues will come up that will require iteration before completion, so anticipation and getting parties involved early will help meet deadlines that often come crashing down upon people. The table to the right shows a general comparison of how term assumptions line up between Canada and the United States:

Topic	Canada	United States
Mortality assumption:	<ul style="list-style-type: none"> <li>• Very sophisticated, varies by age, sex, amount of insurance, many preferred classes</li> <li>• Takes into account future mortality improvement</li> </ul>	<ul style="list-style-type: none"> <li>• Very sophisticated, varies by age, sex, amount of insurance, many preferred classes</li> <li>• Takes into account future mortality improvement</li> </ul>
Lapses:	<ul style="list-style-type: none"> <li>• Base lapse (each year)               <ul style="list-style-type: none"> <li>- Less sensitive</li> <li>- Between 5% and 10% per year</li> </ul> </li> <li>• Lapse at renewals               <ul style="list-style-type: none"> <li>- Very sensitive</li> <li>- As high as 80%</li> <li>- Often spread over two years</li> <li>- Very dependent on "slope" of premiums (level of premium at renewal versus the one at previous renewal)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Base lapse (each year)               <ul style="list-style-type: none"> <li>- Fairly Stable</li> <li>- Between 3% and 10% per year</li> </ul> </li> <li>• Lapse at renewals               <ul style="list-style-type: none"> <li>- Very sensitive</li> <li>- As high as 90%</li> <li>- Often spread over two years</li> <li>- Very dependent on "jump" of premiums (level of premium at ART versus level term period)</li> </ul> </li> </ul>
Interest rates:	<ul style="list-style-type: none"> <li>• Not very sensitive since under Canadian reserving method, the reserves are not as material as for permanent products</li> </ul>	<ul style="list-style-type: none"> <li>• Capital requirements, reserve solutions and more retention of reserves (less coinsurance) makes this assumptions more sensitive in the United States</li> </ul>
Expenses:	<ul style="list-style-type: none"> <li>• Acquisition               <ul style="list-style-type: none"> <li>- Differs by issue age and volume</li> <li>- Should use full expenses</li> <li>- Many companies only use marginal expenses</li> </ul> </li> <li>• Maintenance               <ul style="list-style-type: none"> <li>- Not sensitive</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Acquisition               <ul style="list-style-type: none"> <li>- Differs by issue age and volume</li> <li>- Should use full expenses</li> <li>- Many companies only use marginal expenses</li> </ul> </li> <li>• Maintenance               <ul style="list-style-type: none"> <li>- Sensitive, depending on size of policy &amp; use in gross premium reserve</li> </ul> </li> </ul>

## Universal Life Insurance

Josephine Marks and Paul Fedchak took participants into the world of universal life (UL), with Paul focusing on secondary guarantee universal life (ULSG). Josephine discussed the UL world in Canada, market size and types of products such as level COI ULs.

CONTINUED ON PAGE 24

Universal Life business in Canada experienced a fairly significant shift after the financial crisis of 2008 to 2010 and the resulting declines in long-term interest rates. The LCOI (Level Cost of Insurance) product suffered a decline in new business, with subsequent recovery to the \$ 400 million premium level whereas the YRT (yearly renewable term) product has still not recovered to its pre-crisis sales of \$ 250 million. LCOI has since been re-priced by many market participants, with rates rising 30-40%, while other companies have withdrawn from the market altogether.

Declining rates have however led to a widening in the spread between select/ultimate rates and risk-free rates for Government of Canada (GOC) bonds which is attributed to better margins for policyholders coupled with greater use of alternative investments. The asset mix for the top ten companies has evolved considerably with declines in fixed income assets offset by increased use of equity, real estate and other asset classes.

Asset Class	December 31, 2010	December 31, 2012
Fixed Income	81.6 %	74.3 %
Equity/Real Estate	17.2 %	21.6 %
Other	1.2 %	4.2 %

Some of the major trends and challenges facing UL in Canada are (i) threats to product sustainability with ten year GOC rates at historical lows, (ii) product design evolving from “fully guaranteed” to “guaranteed renewable,” (iii) anti-selection by customers and advisors, (iv) use of persistency bonuses, via increased credited rates or lower management fees, and (v) greater use of or interest in developing stochastic modeling for evaluation of rate guarantees.

Product features for the Canadian market include Critical Illness riders, inflation protection, and flexible investment options for side funds including managed accounts or specialty funds (including many mutual funds). Finally it was noted that changes to income tax rules have resulted in less room for tax-exempt growth in UL products.

Paul discussed key factors in ULSG pricing and product design. One key challenge is balancing simplicity desired for ease of modeling and administration with the versatility necessary to create a broad market appeal. Often companies commence pricing with a firm grasp of their competitive desires. ULSG raises the usual pricing challenge of meeting these competitive desires while attaining profitability targets. In addition, ULSG introduces the challenge of constructing underlying product mechanics, often unseen to the policyholder, from which such a variety of suitably competitive premiums emerge. A second key challenge discussed was understanding the impact of underlying secondary guarantee mechanics on Actuarial Guideline 38 (AG38 or AXXX) reserves.

Paul also walked through a case study of building a ULSG product and discussing sensitivities such as lower lapses and including reserve solutions. The case study represented one iteration of ULSG pricing. Following the case study, Paul discussed the questions a pricing actuary should look to address in the second pricing iteration. Paul’s session finished with brief discussion of the impact of ULSG design on GAAP SOP03-1 reserves, as well as product implementation challenges for the pricing team to keep in mind.

## Product Design Process

The first panelist sessions included Jeremy Bill of Midland, Jeff Drake of One America, Jason Jump from Nationwide, and Pete Whipple from Ohio National. The panel discussed ways their companies handled pricing concerns related to speed to market, competitive analysis, experience studies, assumption setting, and policyholder behavior. One very important item in the process is getting the right people in line to facilitate decision making. Empower people to make reasonable decisions and provide a clear path so that changes and questions related to development are not held up by scheduling conflicts.

## Indexed Universal Life and Annuities

Continuing the case study review for indexed products, Ricky Trachtman and Rob Stone discussed the nuances of index products. Indexed products are of great inter-

est in the market today due to higher illustrated rates and downside protection.

Ricky's presentation focused on Fixed Indexed Annuity (FIA) products while Rob's presentation focused on Indexed Universal Life (IUL). The FIA presentation started with a brief overview of the index market. It was demonstrated that even in the current interest rate environment the sales of index products have flourished, and that current economic factors have actually favor indexed products. Ricky moved on to state that the market has evolved and that there have been new entrants into the market. It was also mentioned that there has been plenty of product development activity for FIAs.

Next Ricky explained how FIAs are very much like fixed annuities but with a particular crediting strategy. He also walked through an example on how rate setting works for these products in contrast to other fixed annuities. A discussion of FIA's typical product features and pricing assumptions followed with an emphasis on how assumptions vary for FIA in contrast to other fixed annuities.

Modeling complexities for FIAs were discussed next. A brief discussion on option pricing models, the need to model assets to better assess interest rate risk and the use of solving algorithms to have a dynamic model rate setting within the FIA financial models, the existence of multiple crediting strategies and indices as well as the possibility of multiple buckets, were some of the modeling complexities discussed.

Ricky concluded his presentation with a focus on Guaranteed Lifetime Withdrawal Benefit (GLWB) riders on FIA. He mentioned that the GLWB rider has a very high election rate when available. As with the base FIA contract, some of the key features of this rider and a discussion on key pricing assumptions and modeling complexities followed. Within the GLWB rider presentation, the use of a holistic dynamic policyholder behavior model was discussed as well.

On the IUL side, Rob started with an overview of recent life insurance sales results. IUL has been a growing presence in the market (\$1.3 billion premium

in 2012 according to AnnuitySpecs Sales and Market report). According to Milliman UL/IUL surveys, however, IUL sales are not focused on long-term secondary guarantees as much as traditional fixed UL. This has been an underlying theme of IUL growth: as companies look for non-ULSG sales, IUL is frequently embraced as an alternative life insurance offering.

As a second part of the IUL presentation, Rob stepped through a pricing example where a traditional fixed UL product was changed to an indexed product. Through a statutory source of profits exhibit, changes in the profitability of the product were reviewed across several product changes. Finally, the indexed life pricing was switched to stochastic from deterministic, allowing for a brief discussion of the implications of stochastic pricing for indexed life products.

### Modeling Techniques and Uses

The final panel discussion included topics related to asset and liability modeling techniques, stochastic analysis, policyowner behavior, product monitoring and inforce management. The panel included prior presenters Donna Megregian, Paul Fedchak, Ricky Trachtman and Rob Stone. The purpose of the panel was to address these topics in an informal format allowing audience participation, with each panelist addressing the topics as they relate to the products each panelist addressed earlier in the day.

Some key points regarding ULSG were raised during the panel discussion. Among these points was that ULSG pricing models are usually highly customized from company to company due to the complex nature of secondary guarantees. Assets are sometimes included in a ULSG pricing model, but only necessary if stochastic analysis is desired. Stochastic analysis is sometimes used on ULSG, but not as often as with indexed products. Additionally, premium funding and lapse rates are the primary policyholder behavior concerns for ULSG pricing, particularly when the secondary guarantee is in-the-money. Inforce management related to term products should consider the optionality that policyholders have related to conversion and potential uses of reserve financing to help with term pricing. ■



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# Life insurance: Bought not sold?

by JJ Carroll



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Think back to the last major purchase you made, something you were really excited about. It was going to make a big difference in your life, and maybe you were a little bit nervous. This was a fair amount of money after all and a pretty big commitment. You spent a lot of time comparing your choices and talked to your neighbors and friends to compare what they bought. You also talked to the sales representative to get their knowledge and advice. Finally you selected the best choice. You read through the paperwork carefully, paused a moment with anticipation and then signed the paper or clicked “submit” on your screen. Okay, now be honest. Was that a life insurance policy you just bought?

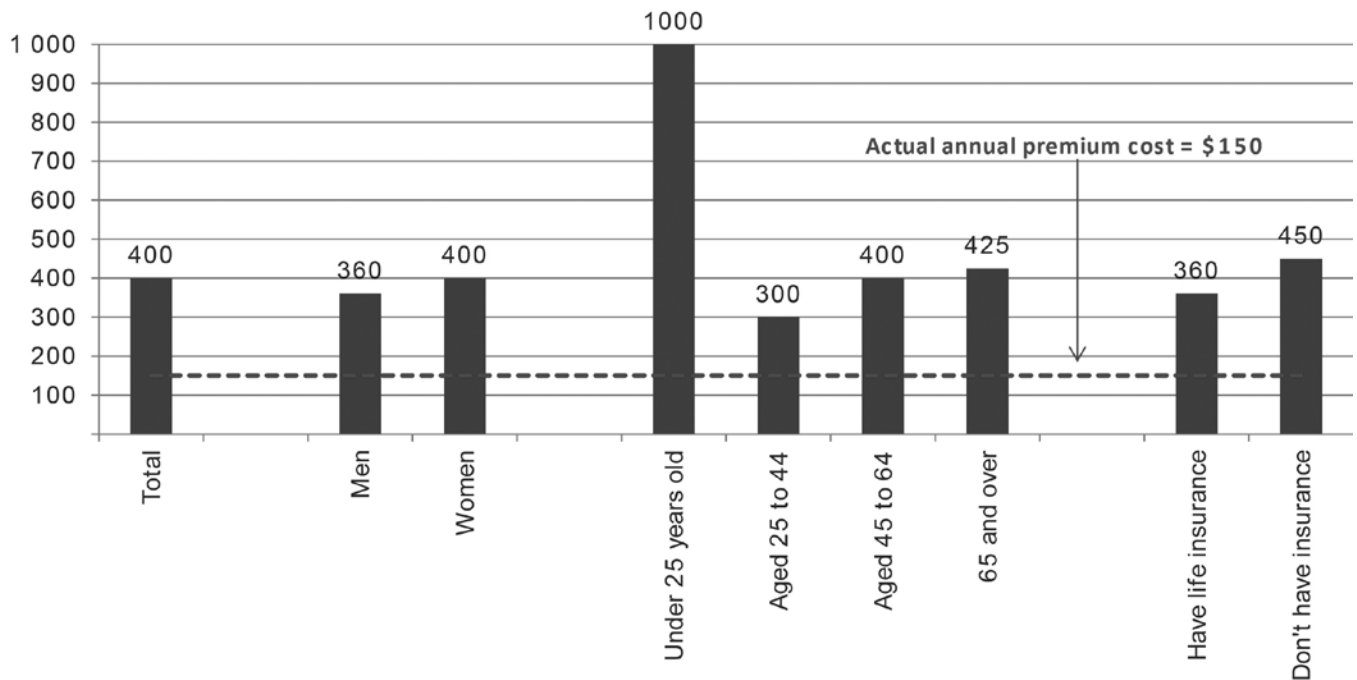
When we are very excited about a purchase and we know it will benefit us, we are willing to jump through all sorts of hoops to get what we want. This spring I drove three hours to a dealership, spent another three hours filling out paperwork and returned home after midnight with a brand-new car. And we call the life insurance purchase process onerous? Maybe with life insurance there’s something wrong with the perceived value when compared to the perceived cost.

September is Life Insurance Awareness Month (LIAM), coordinated by the nonprofit LIFE Foundation to educate Americans about the benefits of life insurance. It’s a perfect time to talk about what we as an industry can do to tackle the life insurance protection gap. Life insurers need to better understand customer perceptions, behaviors and needs in order to balance the life insurance cost-benefit equation.

## What is the protection gap?

The mortality protection gap is the difference between the resources needed and the resources available to maintain dependents’ living standards after the death of a breadwinner or caretaker.

In 2010, the global protection gap was USD 79 trillion dollars. The U.S. gap was USD 20 trillion, and the gap in Canada was USD 1 trillion. For the United States, the gap increased by almost 10 percent between 2001 and 2010, from 18 trillion to 20 trillion, or 135% of 2010 U.S. GDP. The average household in the United States had an estimated protection gap of \$378,000.<sup>1</sup> While awareness of underinsurance has improved from thirty-nine percent in 1998 to fifty percent in 2010, only





two-thirds of U.S. households would be able to cover a few months of daily living expenses if the primary earner died. And only one in ten households purchased additional life insurance each year.<sup>2</sup>

Life insurance is available at a relatively low cost, the United States being one of the cheapest places in the world to purchase this valuable protection. If life insurance really is available at a low cost, then why do consumers cite budget as one of the main obstacles to buying life insurance? Based on a study from LIMRA3, consumers drastically overestimate the cost of life insurance. Clearly there's a perception issue that needs to be overcome.

While insurers have been focused on lowering the cost of insurance, perhaps it's the perceived cost of insurance that needs to be addressed.

Another aspect of the equation is the complexity of products. Nearly half of underinsured households say it is difficult to know what type of insurance to buy, and forty-four percent report having difficulty deciding how much coverage they need. When a family buys a new car, it's pretty obvious what attributes are important to fulfill their needs. Do they need room in the back seat for kids? Do they need plenty of room in the trunk for hauling all the kids' stuff on vacation? With life insurance, it's not as clear. One way of reducing the perceived cost of insurance, thereby increasing sales, would be to simplify product design and modify the way the product fits the customers' needs.

If customers don't understand the value proposition for life insurance, the perceived benefit may actually be lower than the actual benefit. A lack of understanding of pooling and risk sharing combined with a general biased belief that bad things are more likely to happen to others will nudge customers in the direction of doing nothing. Having dedicated my career to an industry that I see offering security and peace of mind, it's disheartening to think customers view our products as a necessary evil.

Swiss Re is working with innovation agency Maddock Douglas to better understand the needs of consumers.



Consumers have listed these words in an online discussion to describe the process of buying insurance: nervous, ambiguous, tedious, personal, gauntlet, involved, consuming, frustrating, intimidated, tension, anxious, enigmatic, confused, patience, anxiety-ridden.

There has to be a better way.

Can we increase the benefit of our products by improving transparency and simplicity? What if customers can more readily see the value of products and compare prices with confidence? And what if customers can develop long-term relationships with insurers built on trust and engagement? Then doesn't this become a product that we want to buy?

Last year I was in a room of life insurance executives who are passionate about our industry. They were asked how many people owned life insurance, and only half of the room stood up. So, why do people who fully understand the benefit of insurance still fail to buy insurance?

The answers in that room mirrored those that are cited in customer surveys, including competing priorities and a cumbersome process. Behavioral economics theories

CONTINUED ON PAGE 28

will tell us that procrastination and myopia play a heavy role in customer decisions to do nothing. Framing is an equally important theory of behavioral economics that suggests peoples' decisions are influenced by the way in which the choices are presented.

As we further explore how life insurance customers think and behave, we can address their needs more effectively. Using data and predictive analytics we can better identify groups to target. By embracing technology and approaching customers with the right distribution channels based on preference, we can make life insurance more accessible. We can speak the customers' language. We can understand that they are not all created equal, and tailor products to meet individual

needs. In short, we can leverage data, research and technology to become very consumer centric.

Getting closer to the customer, can we lower the perceived cost, and raise the perceived benefit of life insurance to a point where customers get excited? Will this not then be a product to buy, not sell? **■**

#### END NOTES

- <sup>1</sup> Swiss Re, The Mortality Protection Gap in the US, August 2012
- <sup>2</sup> LIMRA, Household Trends in US Life Insurance Ownership, 2010
- <sup>3</sup> LIMRA, Insurance Barometer Study, 2012



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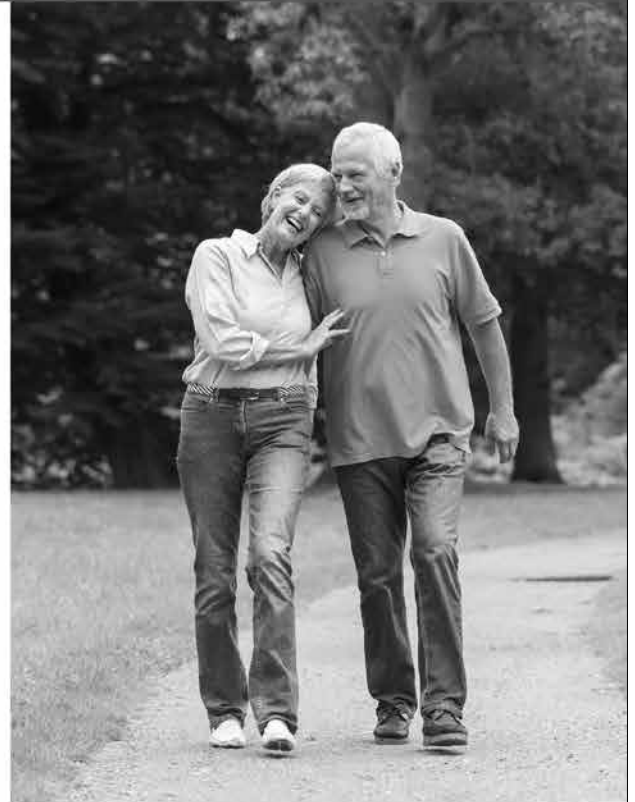
The international Living to 100 Symposium will be held Jan. 8–10, 2014 in Orlando, FL. Thought leaders from around the world will once again gather to share ideas and knowledge on aging, changes in survival rates and their impact on society, and observed and projected increases in aging populations.

With the support of more than 50 organizations from around the world, past symposia brought together thought leaders from as many as 17 countries including a diverse range of professionals, scientists, academics, and practitioners. These professionals are expected at our prestigious 2014 event to discuss the latest scientific information.

The outcome of each Living to 100 Symposium is a lasting body of research to educate and aid professionals and policymakers in identifying, analyzing and managing the potential needs and services of future advanced-age populations. Questions may be directed Ronora Stryker, SOA research actuary, at [rstryker@soa.org](mailto:rstryker@soa.org).

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# Danger in Predictive Models for Underwriting

by Chris Davis



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The purpose of this article is to alert the reader to a potential danger in using predictive models as part of the underwriting process. The danger lies in the possibility of unintentional illegal discrimination. Actuarial presentations tend to explain predictive modeling in various levels of detail based solely on the mathematics involved but fail to adequately address the concept of prohibited variables. There are other legal dangers such as privacy concerns, but this article will focus solely on the danger of illegal discrimination. It should be kept in mind that the author is not a lawyer, and the views expressed herein are solely those of the author, not necessarily those of his employer.

Most legal actions concerning illegal discrimination in the underwriting process have been associated with industrial insurance and race. Applications from decades ago contained a race question. Later applications omitted the race question but used questions about socio-economic status. In some cases, courts concluded that underwriting on the basis of socio-economic status was a proxy for race.

Predictive modeling is a process of creating a statistical model that tries to best predict the most likely outcome based on the values of predictor variables. In particular, it can be used to identify those insureds or policies that have attributes that cause life companies to take a certain action.

Some examples of possible uses of predictive models in the life insurance industry are in the areas of marketing, underwriting, fraud detection, modeling for asset adequacy analysis, and conservation of policies by identifying those likely to lapse.

Predictive modeling focuses on the statistical differences implied by certain predictor variables. Our society has laws that prohibit the use of certain variables in the underwriting of life insurance policies. Examples include race and, in some cases, sex. Predictive models can easily exclude prohibited variables. The concern is that other variables, separately or in combination, included in the model could possibly be deemed by a court to be a proxy for a prohibited variable. When there is a statistical difference among values of a prohibited variable, e.g., males have higher mortality rates than females, the model is likely to include some variables that distinguish this difference.

For example, the predictive model excludes all prohibited variables but may use variables that describe personal habits and geographic location of residence in the underwriting process. The life insurance company intends to not use a prohibited variable in the underwriting process and is unaware of the variables actually used, or at least does not realize a possibility that they are, in effect, using a proxy for a prohibited variable. Variables that describe the applicant's magazine subscriptions could be considered to be a proxy for a prohibited variable if the targeted audience of the magazines is highly correlated with a particular value of the prohibited variable.

Consider the example in which the company sets up the underwriting process and takes the position that the predictive model is used solely to classify the applicant as to whether or not more information is needed. The company claims that this results in no adverse action



for any applicant and that the model could only result in a positive action by streamlining the underwriting process. This could be debatable.

Suppose we have two values of a prohibited variable. Those characterized by a specific value will be referred to as group A, and those characterized by the other value will be referred to as group B. The statistical technique called discriminant analysis can be used to make a statistical determination as to whether one group is being charged more than another for life insurance.

Discriminant analysis distinguishes between two or more groups of data based on a set of input variables. One input variable is a classification factor that identifies which group each observation belongs to. It distinguishes by constructing discriminant functions that are linear combinations of the variables. The objective of the analysis is to be able to describe observed cases mathematically in a manner that separates them into groups as well as possible. In constructing the discriminant functions, the procedure allows inclusion of all of the variables or a stepwise selection procedure that includes only those variables that are statistically significant discriminators amongst the groups. Statistical summaries and tests of significance for the number of discriminant functions needed are performed.

Is either group A or B being charged more than the other group? Note that it is possible that the group with the lower mortality could be charged more and be able to claim illegal discrimination. It seems plausible to determine the existence of illegal discrimination based on the premiums (or mortality charges) determined rather than the input variables used. All insureds considered should be included rather than just those actually issued a policy as discrimination could have been an unintentional and unknowing factor in an applicant's decision to decline the policy.

There is a need to correct for all variables that are well-accepted for distinguishing premium rates and upon which the premiums do vary, such as age, tobacco usage, and the effects of banding and policy fees. If the variable can help in distinguishing between groups

A and B, then a separate analysis should be performed for each value of that variable; otherwise, that variable should be used as an input variable to the discriminant analysis. The other input variables are the classification factor that identifies group A or B and the premium rate.

If the discriminant analysis shows that an applicant can be correctly classified into group A or B with a very high probability, then there is a proxy to the prohibited variable being used. This can be interpreted as strong evidence of illegal discrimination based on this prohibited variable in the form of a proxy to it.

Companies should bring the concern of some of their variables possibly serving as a proxy to an illegal discriminatory variable to the attention of their legal counsel before using predictive modeling as a part of the underwriting function. ■

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