When I started my actuarial career in 1992, what struck me was 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 kilometers. I heard a tour guide noting that 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.”
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.

**Example 1: Setting 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 conversations with underwriters at that time, I understood that the table shave idea essentially stems from the belief that insurance companies often do not place business with mild substandard ratings (such as table two, three, or four), 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, is a table four 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 for the reinsurance rates. The mortality assumptions for these programs are often not shared by the direct writing company. Thus, the reinsurer has to develop their own assumptions. One direct company indicated that the loading for their table four to standard shaving program should be x%, which means the proposed reinsurance rate would be (100+x)% of the rate applied to the standard class. At this point, there wasn’t any credible industry experience on table shaved business, making it challenging to substitute facts for impressions.

The first piece of information that I obtain is the distribution of table two, three and four risks prior to the launch of the table shave program. In this example, there is no distribution for table one policies, as it is not common for companies to issue at that table (i.e., the underwriter would assign debits for various impairments and either reach the threshold for table two or issue the policy as standard). Next, I 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 two is anticipated to have 50 percent higher mortality than the baseline and a policy rated table four is anticipated to have double the mortality as compared to the baseline. You may notice that I use the term “baseline” as opposed to “standard”. That was done purposely, as the final component in this process 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 (two, three and four) applied to the loading for that table (50, 75 and 100 percent) to develop a weighted average load. That would work if real-life applicants 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 is implemented. For example, say Company A has a table four to
standard shaving program and Company B does not. All else equal (which is rarely the case), the table three and table four 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 two may find that they get the best deal when purchasing the policy with Company B, as they don’t want to subsidize the table four risks that will be placed in Company A’s table shave program.

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 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.

Example 2: Setting the lapse assumption for level term business.
For shorter duration products (five-year and 10-year) and for the first dozen or so durations of 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 is what I typically 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 it has 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 challenge now is setting the lapse assumption for the remaining 16 durations of this product.

One may look at industry lapse experience and determine that it appears to level off at 5 percent by duration 12 when the experience loses credibility. Assume 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 or not the results are sensitive to that lapse assumption. I have seen that sensitivity testing 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 assume 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 test would be to hold the lapse assumption constant for the first 12 to 14 durations (where credible experience exists and where the policyholders’ 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

It may not be clear whether the table ratings are relative to the standard class or to the entire non-rated population, including preferred risks.

Credible, company-specific lapse information is desirable, but none exists for longer duration products.
lower 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 for appearance where none seem to exist in their marketplace. That is when they may need to turn to experience on similar lapse-supported 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 1990s. At that time, LTC pricing actuaries saw the higher early duration lapse experience on their LTC business and decided to keep a relatively high later duration lapse rate (approximately 5 percent) as their baseline pricing assumption. A decade later, newer 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 five to 10 durations tended to keep their policy thereafter. That policyholder behavior resulted in an ultimate lapse rate of approximately 1 percent per year. While this data point is not on the same product as the focus for our hypothetical term pricing actuary, it should cause him/her to pause to see if other sources of data could be relevant.

The next step is 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 (there is no non-forfeiture regulation in Canada), it would also fall in the category of being “lapse supported” from a pricing perspective. The U.S. 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, which showed that the actual lapse assumption came down to just under 1 percent. Once the 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 might determine that the baseline lapse assumptions on their 20-year and 30-year term products should be modified to account for the lapse-supported risk.

In conclusion, there are often non-traditional sources of information that can help “...substitute facts for appearances and demonstrations for impressions.”

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