



On August 9, 2011, SCOR SE, a global reinsurer with offices in more than 31 countries, acquired substantially all of the life reinsurance business, operations and staff of Transamerica Reinsurance, the life reinsurance division of the AEGON companies. The business of Transamerica Reinsurance will now be conducted through the SCOR Global Life companies, and Transamerica Reinsurance is no longer affiliated with the AEGON companies.

While articles, treaties and some historic materials may continue to bear the name Transamerica, AEGON is no longer producing new reinsurance business

The Messenger

Transamerica Reinsurance Risk Management Newsletter

Term Price Leaders...How Do They Do It?

In looking at the term market, you have probably wondered how a handful of price leaders can offer such competitive rates and still make a profit. The short answer is – assuming they are achieving acceptable return targets – these companies price with aggressive assumptions and then manage the performance drivers effectively.

As a leader and innovator in the term market, Transamerica Reinsurance is committed to being at the forefront of the market and sharing our insight with clients. This means...

- Close monitoring of market trends
- Ongoing study of mortality and lapse risks and their impact on product returns
- Providing value-added product development services
- Investing in technology that supports risk management strategies
- Developing financing structures and tax advantages that improve capital efficiencies

Current Trends

The most recent LIMRA report on U.S. Individual Life Insurance Sales (1Q08) shows term life down slightly, but the decline is not across the board. While some companies had double digit decreases in sales, others had double digit increases.

Price leaders continue to push term rates to new lows, but the decreases are generally modest (a few cents per \$1,000 here and there) and reflect a jockeying of position among the top tier vs. the game changing rate cuts of recent years. However, middle tier and smaller term writers feel pressure to get their rates closer to the price leaders, and it is within these tiers that we see companies striving to make more dramatic changes in their rates. As we have pointed out in previous articles, term players have good reasons to strive for rates that are within 10 percent of the top tier. (See *Observations on Term Life* in the June 2006 *Messenger*.) The top tier companies experience higher growth *and* more favorable mortality experience than the rest of the market. Moreover, when term rates exceed 10-15 percent of the price leaders, it increases the risk of anti-selection.

So, how do you get to top tier price points with reasonable returns?

Scenario Testing

As part of our ongoing analysis of the term market, we periodically perform scenario tests to compare the impact that different assumptions can have on premium rate and rate of return. We calibrate the best economics that a portfolio can achieve, match this with the most competitive term rates in the market and see if the premium rates and returns are

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sustainable.

We recently performed extensive scenario testing on a base line portfolio that reflected “as good as it gets” experience. In addition to insurance assumptions (premium, mortality, lapse, end of level period shocks, future mortality) we modeled the impact that changes to capital requirements, tax jurisdictions or capital financing structures can have on premium and return rates. We tested single assumptions scenarios and a combination of assumptions.

Our findings suggest that to be a price leader, or even to get within 10 percent of the top tier players, and get six to eight percent returns, companies need to use aggressive insurance assumptions, reasonably efficient capital strategies, and then manage the portfolio closely to ensure that experience and assumptions are in alignment. In order to achieve returns in the 11-12 percent range, companies need the additional benefits of very efficient capital and tax structures.

Considerations in Setting Assumptions

Assumptions and experience need to align in order to make the math work. Miscalculations in mortality and lapse assumptions can quickly drain the profits out of a term portfolio.

Minimum Return on Investment (ROI)

While we see companies moving to other measures to gauge the profitability of their term portfolios, for this article we will use ROI. Depending on how expenses are allocated (marginally or fully), ROI expectations can vary greatly from company to company with some targeting a seven percent to eight percent return while others expect 15 percent.

Mortality

Mortality is the most potent factor in determining term life results, comprising 60-70 percent of the premium dollar. The following points deserve close attention.

Initial Mortality Level. Our data shows that early duration mortality results vary a great deal among companies that appear to execute similar underwriting and business procedures. We see ranges as wide as 28-42 percent of the 1975-80 SOA S&U Mortality Tables. Even a modest miscalculation of the initial mortality level can have a significant impact on ultimate profits. For example, a combination of underwriting exceptions and oversights on 10 percent of your business with an average impact equal to two classes would increase mortality by five percent, from an expectation of 30 to 31.5 percent of 1975-80 SOA S&U. This additional five percent of mortality would reduce ROI on our hypothetical term portfolio from 11 percent to eight percent.

Mortality Management Technology. New rules based underwriting systems are helping companies improve their mortality experience as well as business processes and policy acceptance rates. (See *New Tools for an Evolving Term Market* in the October 2007 *Forecaster*.) The value of these mortality management systems is growing as companies retain more risk, work with new financing partners, and prepare for principles-based reserves and capital – which will be more sensitive to mortality volatility.

Mortality by Band. Our research indicates that mortality experience is higher for face

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amounts of less than \$250,000; satisfactory for the \$250,000 to \$1 million band; and favorable for face amounts of more than \$1 million. (See *Observations on Mortality by Band* in the October 2007 *Messenger*.) At a minimum, companies should review mortality experience by face amount band. Once the relationship is understood, a company can opt to subsidize the low band, reflect the cost differential, or pursue a new product strategy for low band (middle market). (See *Helping Clients Tap into the Middle Market* in the March 2007 *Messenger*.)

Mortality Improvement. How much mortality improvement to factor into term pricing assumptions varies significantly, with companies using zero to 1.4 percent and higher in their models. Adding a 0.5 percent annual mortality improvement for 25 years to our hypothetical term models increased the ROI from eight percent to 11 percent. A big question, however, is whether or not long term mortality improvement will be a dependable source of profitability.

Older Age Mortality. While the impact of older age mortality is minimized for term life products, recent trends – older individuals buying larger term policies – increase the pricing and underwriting risks. Evidence is mounting that companies need to review previous speculations about the effects of underwriting at issue ages over 70. Research by Transamerica Reinsurance shows that for older age issues, the initial selection effects fade fast. (See *Older Age Issues: Initial Selection Effects Fade Fast* in the December 2007 issue of the *Messenger*.) These findings (corroborated by a recent SOA study) indicate that actual mortality may be higher than expected for this business.

Lapse Rates

For term life, lapse rates typically receive less attention than mortality in most modeling exercises. In our recent scenario testing, we looked closely at lapse rate assumptions as our data shows that level period term lapse rates are grading to lower levels at earlier durations. Pricing assumptions which do not reflect this can have a big impact on profitability down the road.

Lapse rates that previously leveled out around four to five percent by duration six or seven are now starting to dip into the two to three percent range for some companies. Incorporating a two percent annual decrease in the level period lapse rates decreases the ROI on our hypothetical term portfolio by roughly two percent, from eight to six percent.

In addition to the level premium period lapse, there is a wide range of assumptions being used for the “shock” lapse at the end of the level premium period. Experience is now emerging on the 10 year level premium products sold in the mid 90s. Our data shows the mean duration 10 lapse rate on these products is roughly 50 percent, consistent with the SOA 2007 Survey. A reduction from this survey average from 75 percent used in pricing to the mean experience of 50 percent could have a positive impact of as much as 10 percent on the 10 year term ROI.

Capital Management

Term writers that want 11 percent to 12 percent returns need to look to more effective

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The Value of New Lab Tests: NTpBNP



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This is the first of a series of articles on the laboratory and examination components of age and amount requirements. Topics will be chosen on the basis of current interest, whether new tests or simply old tests that are being reconsidered. Sidebars will introduce the mathematical tools that are commonly used to evaluate tests and testing programs. NT-proBNP (also abbreviated NTpBNP) is a relatively new blood test that has generated a lot of interest in both the clinical and insurance medicine literature – an ideal topic to kick-off this series.

A Screen For Heart Failure?

Many clinical researchers think that the US is experiencing an “epidemic” of heart failure, and they feel that NTpBNP has great promise as a clinical screen for heart failure, often in its early, more treatable stages. However, the conditions for which NTpBNP can screen now include not only systolic and diastolic heart failure but also valvular heart disease, cardiomyopathy, atrial fibrillation and several other conditions. This presents a problem. It may sound as if NTpBNP is a “fishing” test. However, these conditions are actually related by an underlying disorder, increased cardiac wall tension. They all can be thought of as precursors of heart failure.

Beyond screening for specific diagnoses, several studies have shown that NTpBNP is highly correlated with mortality.

What is NT-proBNP?

Brain-type natriuretic peptide is a member of a family of natriuretic peptide hormones. These are relatively short chains of amino acids that promote sodium and water excretion by the kidneys. Atrial natriuretic peptide (ANP) is secreted by muscle cells in the cardiac atria. Brain-type natriuretic peptide (BNP) is something of a misnomer since it is actually secreted by muscle cells in the wall of the left ventricle. In both cases, secretion is in response to increased wall tension. The resulting diuresis of sodium and water relieves the excess pressure in the heart that is common in heart failure.

During BNP biosynthesis, cleavage of the 108 amino acid precursor (proBNP) results in a 32aa active BNP molecule (the C-terminal or right end) and a residual N-terminal 76aa fragment that is inactive (NTpBNP). Either molecule can and has been measured by laboratory methods, but there are advantages to measuring NTpBNP. NTpBNP has a longer half-life in the blood, and after a blood draw it is much more stable in the collection tube. Current and in-development test kits for NTpBNP all use the same immunologic reagents developed by Roche which result in less variability between different tests. ROC and area-under-curve (AUC) concepts will be introduced later in this series, but for now accept that tests with a larger AUC do a better job of discriminating between those with and without the target disorder. AUC analysis has shown that NTpBNP performs as well as or better than BNP at detecting heart failure.

NTpBNP as an Age and Amount Requirement

As in the clinical world, NTpBNP has great promise as a screen in insurance medicine. There are a number of questions that need to be considered prior to implementing the use of NTpBNP as a requirement.

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Clearly, one should use age and sex-specific ranges for NTpBNP. Even for healthy people, NTpBNP values are higher at older ages, and women have significantly higher values than men. Typically, labs call the lower 97.5% of values for ostensibly healthy people the reference range for a test. This is often erroneously referred to as the “normal range.” However, one may choose to use a lower threshold value to “cast a wider net,” and then distinguish true positives from false positives through reflex testing.

There is not much more a lab can do on blood and urine specimens as a reflex for an elevated NTpBNP; however, minimally elevated values can be considered in the context of other age and amount requirements. This is one argument against the popular concept of substituting NTpBNP for the ECG requirement. Thorough follow-up to an elevated NTpBNP will require a resting ECG, stress test, echocardiogram, and evaluation by an attending physician.

Recommendations

No one set of recommendations regarding NTpBNP can apply to all life insurers. It cannot even be said that everyone should be using NTpBNP. However, as its acceptance and use grows in the clinical world, it is probably inevitable that insurers will need to include it as a screen for most applicants.

Given the higher prevalence of heart failure at its precursors at older ages, NTpBNP should be considered as an important tool in older age underwriting.

Transamerica Reinsurance has invested in data and expertise regarding NTpBNP. We will be glad to assist those clients who are considering the use of NTpBNP. ■

All tests report some false positives (people without the condition flagged as diseased) and false negatives (people with the condition flagged as healthy). When a higher test threshold is used (Fig. 3), there are fewer false positives but more false negatives; when a lower threshold is applied (Fig. 4), the opposite is true.

The Problem with False-Positives and False-Negatives

No test is perfect and test results are not black and white situations. An ideal test would yield results that are both bimodal and achieve complete separation between healthy (those without the condition) and unhealthy people (those with the condition). This ideal situation is depicted in Figure 1. The reality of testing is depicted in Figure 2. The distribution is still bimodal, and the average for those with the condition is clearly elevated compared to the healthy individuals, but there is considerable overlap.

Where the test is being used to screen for a condition, the choice of a threshold value is up to the screener. If the threshold is set at a higher value (to the right in Figure 3) fewer people without the condition will be categorized as positive (false-positives). On the other hand, more people with the condition are categorized as negative (false-negatives). Setting the threshold lower will have opposite effects (Figure 4).

Typically, one sets the threshold low when screening, but where exactly remains a good question. There are a number of mathematical tools that allow one to assess test performance and optimal testing strategies in different populations. These tools will be introduced in future installments in this series.

Figure - 1

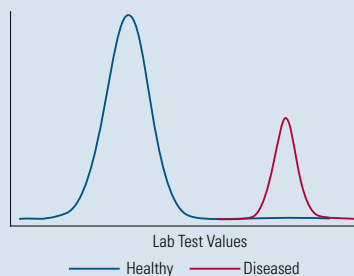


Figure - 2

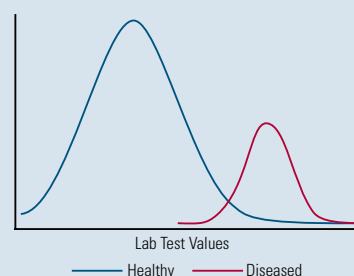


Figure - 3

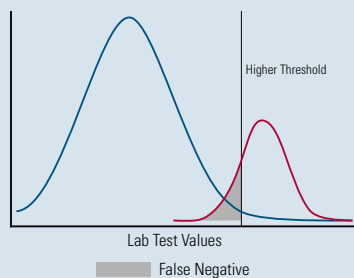
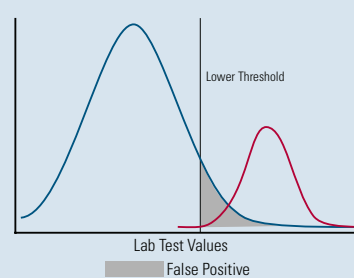


Figure - 4



Credibility Analysis for Mortality Experience Studies, Part 2



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Editor's Note: This is the second of a three-part series. Part 1, available at www.TransamericaReinsurance.com, considers the tools that actuaries use to project variability around predicted mortality.

Contrary to common misunderstanding, the credibility assigned to a mortality study has nothing to do with quality of underwriting that went into its underlying business. Certainly the overall mortality rate is correlated with the distribution of risk factors including underwriting class, age, gender, and even product type. However, it is the number of deaths in the experience study that determines the level of confidence placed in the overall study results.

Example Redux

To demonstrate the connection between confidence level and claim count, let's take another look at the example from Part 1 of this series. As you recall, we had 20,000 risks each having a mortality rate of 0.00125. Our 10,000 random trials produced an average of 25 deaths. Now let's triple our mortality rate in order to simulate a substandard risk class. Charts 1 and 2 show the results from the original example and our newly defined substandard

Chart 1 -Original Mortality Rate

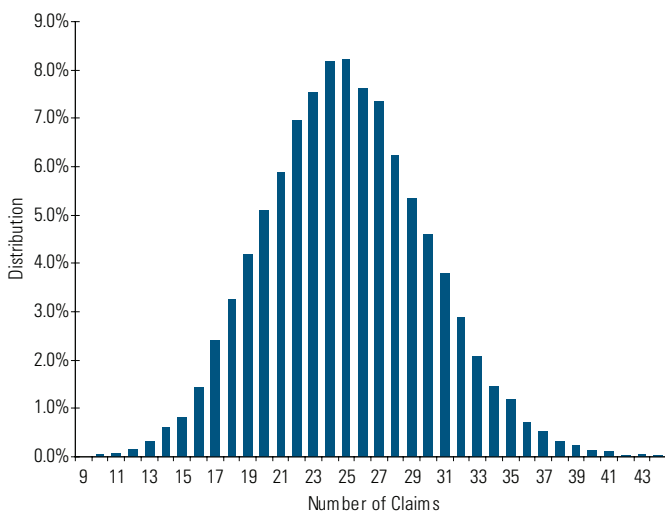
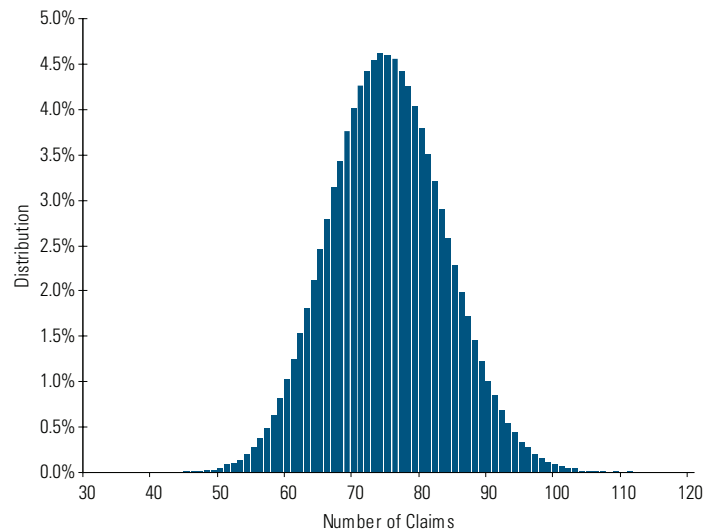


Chart 2 -Triple Mortality Rate



Tripling the mortality rate not only triples the average number of claims but, more importantly, increases confidence in predicting the outcome of any one trial as a percentage of the mean.

group.

All else being equal, the higher mortality rate has produced triple the average number of claims. More importantly, the range of outcomes as a percentage of the mean has decreased. For the original mortality rate, only 73 percent of the claim counts fall between plus or minus 20 percent of the mean. With triple the mortality, nearly 93 percent of the counts are between plus or minus 20 percent of the mean. Thus, a higher mortality rate results in higher average claim counts and increased confidence in predicting the outcome of any one trial as a percentage of the mean.

Defining Full Credibility

An experience study is the result of one random sample from a population being exposed to a process of mortality. The mortality rate from that one sample is assumed to be the best representation (our “best guess”) of the true mortality arising from the population. Credibility provides a quantitative measure of how good our guess is.

How can we make the determination that a study’s overall results are credible enough to use as the basis for a pricing assumption? There is no single correct answer to when a study’s results are deemed “fully credible.” An actuary can objectively state that future mortality is likely to be within plus or minus X percent of a current experience study’s results Y percent of the time, but someone needs to determine the X and Y percentages. In my mind, the values chosen for these critical parameters are business decisions rather than statistical decisions.

One company may decide that they will rely upon a current study as representative of future experience when the statement can be made that future mortality will be within five percent (“X”) of the current study mortality 95 percent (“Y”) of the time. Another company may require future mortality expectations to be within one percent of the study experience 99 percent of the time before using the study results as a pricing assumption.

Practical Aspects

A key consideration in choosing parameter values is the probability that the study result is not a good representation of the true population mortality. Due to random fluctuations, our study just happened to produce mortality results that are significantly different than the population trend. Analyzing this probability gets into the realm of what statisticians call *hypothesis testing*, which is beyond the scope of this series of articles. Suffice it to say that the lower the claim count, the higher the likelihood that our study is not an accurate prediction of future mortality.

Another practical aspect in the company’s parameter decision is the number of claims required for full credibility. Chart 3 shows the range of claims for various combinations of parameter values.

For example, if we wanted to be able to predict that future mortality would be within plus or minus one percent of the study results 95 percent of the time, we would want the study to have at least 38,416 claims. A company that chooses too stringent a rule may never have a study that earns full credibility status.

Chart 3 - Number of Claims Needed for Full Credibility

Prob	Range						
	10.0%	7.5%	5.0%	4.0%	3.0%	2.0%	1.0%
80%	164	292	657	1,027	1,826	4,109	16,435
85%	207	369	829	1,296	2,304	5,184	20,736
90%	271	481	1,082	1,691	3,007	6,765	27,060
95%	384	683	1,537	2,401	4,268	9,604	38,416

Choosing the critical parameters (probability of accuracy within a given percentage range) of a study is a business decision. If full credibility is required, that decision must take into account the amount of claims data that the company has available.

Partial Credibility

What happens when an experience study is deemed to be less than fully credible? The final installment in this series will show how credibility theory can be used to weight study results with other experience to determine a more appropriate mortality assumption. ■

Term Price Leaders...How Do They Do It? (cont)

Triple X reserve financing programs. Earlier this year Transamerica Reinsurance introduced a Term Notes Program (See *New Options in Reserve Financing* in the March 2008 *Messenger*) that leverages our expertise in both mortality risk management and capital markets financing. The new program compares highly favorably to other reserve financing options, and it unlocks value not available to clients in a traditional coinsurance transaction.

Once a product is designed to achieve an eight percent or higher return, adding the latest capital and tax strategies can provide a strong uplift to the ROI (i.e., eight percent leveraging up to 11 percent). However, if the product's ROI is not above a mid single-digit return, these capital and tax strategies will likely not provide any improvement in returns.

Room for Improving Performance

Marketing a term life portfolio that is both competitively priced and profitable poses a challenge for everyone in this business. But our experience in the term market shows that a number of companies can still find ways to improve performance. We look forward to sharing information on our most recent term life research and how our value added solutions can help companies grow their business and achieve target returns. ■

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