UNDERWRITING METHODOLOGIES

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Longevity risk is probably the most significant risk associated with life settlement investments. An investor purchases a portfolio of life insurance policies and pays the required premiums on those policies until the insureds comprising the portfolio die. If they live longer than expected, the investor will realize a lower than anticipated return or possibly sustain an investment loss, in the same way that he would if he purchased a bond that defaulted and for which he received no return of principal or a reduced return of principal.

Strictly speaking, longevity risk is the risk that someone will live longer than reasonably expected due to future, currently unknown developments - as could be the case if a new life saving drug is developed, such as when HAART (highly active anti-retroviral therapy) was developed to treat people with acquired immune deficiency syndrome (AIDS). However, as a practical matter and as the term is commonly used, longevity risk is simply the risk that someone will live longer than expected; and to the extent that we have experienced this in the market, it has more often been the result of poor underwriting by the firms that estimate life expectancy than due to new developments on the medical front.

Thus, it is critically important that investors have a way to evaluate the accuracy of the underwriters they consider using to estimate life expectancies for the life insurance policies they invest in. This paper will discuss some of the different methods of measuring the accuracy of life expectancy underwriters, along with the associated pros and cons. Three general methodologies will be discussed:

1. Point Estimate Methodologies;
2. Mortality Distribution Methodologies; and
3. Difference in Curtate Life Expectancy (DCLE)

Point Estimate Measurement of Accuracy

A Point Estimate Methodology for measuring accuracy entails calculating the difference for each life in a portfolio between the actual date of death and the predicted date of death. In many respects, this methodology is the most precise measure of performance. It is an ideal methodology to use after everyone in a portfolio has died. However, the problem with this methodology is that we typically need to measure our performance before everyone has died; and when we use this methodology prematurely, it makes the underwriter appear more conservative (conservative meaning estimating that people will live longer than actual) than is the case.

The reason for this has to do with mortality distributions and the fact that some people always will die sooner than expected and a roughly equal amount will die later. If we predict a 10 year life expectancy for a thousand people, some will die in the first year, more will die in the second year, more yet in the third – until we reach the 10th year, when most likely the most people will die. After the 10th year, we normally would expect less people to die every year – by virtue of the simple fact that the majority of the people in the portfolio would already have died. The average survival of everyone in the portfolio would be 10 years – but roughly half would have died before the average and roughly half after. That is the nature of averages.

Thus, in the above example, if we should use a point estimate methodology for measuring our accuracy any time in the first nine years of that portfolio, we would only see the deaths that happened before the 10 year average; and it would appear that we had estimated life expectancy too long.

Mortality Distribution Methodology of Measuring Accuracy

With a Mortality Distribution Methodology of measuring accuracy, we do not look at the difference between actual and estimated *date of death* for the individual lives in the portfolio, but rather we look at the difference between actual and expected *number of deaths* for the entire portfolio; and we do this based on the projected mortality distributions of the lives in the portfolio.

Referring to the earlier example, if we have given each of a thousand people a life expectancy estimate of 10 years, and if the projected pattern of deaths – or mortality distribution – of the lives in that portfolio is such that we expect 1% (10) to die by the end of the first year, 2% (20) to die during the second year, and 3% (30) to die in the third year; then we would expect a total of 60 people to have died by the end of the third year.

If we were to do an Actual to Expected analysis at the end of the third year, we would divide the number of people who had actually died by the cumulative total number we had estimated. If, for example, only 45 people had actually died, our Actual to Expected accuracy would be 45 divided by 60, or 75% - which would not be considered a good result.

Thus the Mortality Distribution Methodology is a good methodology to use in the early and middle years of a portfolio. The problem it presents, however, is that the older the portfolio gets, the more this methodology makes everyone (potentially wrongly) look good. For example, if we waited 40 years to use a Mortality Distribution Methodology of our performance for a portfolio of 1,000 people with life expectancies of 10 years each, most likely everyone would have died – so Actual deaths would be 1,000, as would Estimated deaths – which would generate an Actual to Expected (A to E) ratio of 100%. But we would generate a 100% A to E ratio even if we predicted that everyone would die in the first year, which common sense tells us would be pretty bad performance.

Difference in Curtate Life Expectancy (DCLE) Methodology

The DCLE Methodology was developed by Dr. Jochen Russ, who is Managing Partner of the Institute for Finance and Actuarial Science, an actuarial consulting firm in Ulm, Germany, and Dr. Daniel Bauer, who is Assistant Professor in the Department of Risk Management and Insurance at Georgia State University. It was developed to provide a less biased measure of accuracy during the intermediate and later years of a portfolio's life than the Mortality Distribution Methodology.

Rather than divide the total number of Actual deaths by the total number of Estimated deaths, the DCLE methodology measures the average difference between the total Actual number of months lived until a point in time and the total number of months Expected to have been lived up to that point in time. With this methodology, if you score zero, i.e., if the total average Actual months of survival equals the total average Expected months of survival, you are perfect. You could not do better. However if the totals are not the same, the larger the difference in average months of Actual versus Expected survival, the worse you have done.

To illustrate how this methodology works, let's take a simple example of a 9 life portfolio, where one underwriter estimated a life expectancy of 1 year for everyone in the portfolio, while another estimated an "average" life expectancy of 3 years, with a mortality distribution that assumed that 1 person (11.1%) would die in each the first and fifth years, 2 (22.2%) in the second and fourth years, and 3 (33.3%) in the third year; and let's assume the people died exactly as had been predicted by the second underwriter.

If we did an evaluation at the end of the 5th year using a Mortality Distribution Methodology, each underwriter would have estimated that a total of 9 people would have died and, in fact, a total of 9 people would have died – so that both underwriters would have an Actual to Expected ratio of 100% - misleadingly making the first underwriter look as accurate as the second.

However, if we used the DCLE methodology, the results would look much different. The first underwriter would have predicted an average of 12 months of life – i.e., 9 people times 12 months each, divided by 9; while the second underwriter would have predicted the exact same death pattern as actually happened – 1 person lived 12 months, 2 lived 24 months, 3 lived 36 months, 2 lived 48 months and 1 lived 60 months. This translates into a total of 324 months of life, which when we divide by the 9 lives in the portfolio, gives us an average of 36 months (3 years). The difference between the average Actual total months of life and Estimated total will be 36 minus 36, or zero, for the second underwriter – correctly reflecting his perfect performance. However, the results for the first underwriter would be much worse. He estimated an average total of 12 months of survival versus an actual average total of 36 months. Thus the difference in average total months of survival for him is 24 months, which obviously is much worse than the perfect score of 0 achieved by the second underwriter. The difference also correctly identifies that the first underwriter's estimate was on average 24 months too short.

Summary and Conclusion

There are different ways to measure an underwriter's accuracy in estimating life expectancy. The method you use may depend on how long the underwriter has been in business or how long the portfolio that is being evaluated has been in existence. A Point Estimate Methodology is a good methodology to use after everyone in a portfolio has died, while a Mortality Distribution Methodology is more appropriate for the early and intermediate years of a portfolio. The Difference in Curtate Life Expectancy (DCLE) works well in the intermediate and later years of a portfolio, but is also good in the early years.

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