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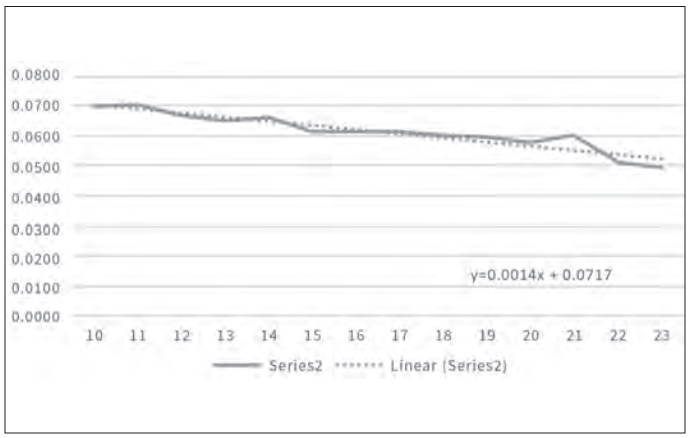
Searching for Morbidity Improvement in the SOA Experience Database

By David Benz

The topic of morbidity improvement in long-term care (LTC) insurance has been discussed for more than twenty years. *The Long-Term Care Morbidity Improvement Study* (Eric Stallard and Anatoliy Yashin) was published in July 2016 and represents the most pertinent (for long-term care insurance actuaries) analysis of activity of daily living (ADL) and cognitive impairment (CI) prevalence rates over a period for a non-insured population. However, an open question in the LTC insurance industry is to what extent morbidity improvement is present in the insured population. In this article, I will investigate an approach using the Long-Term Care Intercompany Experience Study – Aggregate Database (Database) to explore the issue of insured population incidence rate improvement.

The Database was released in January 2015 and is a great industry resource for insured experience. Plus, its pivot table format makes it readily accessible. However, the Database does not include a calendar year variable,[1] requiring some decisions on how to work around this. The approach I have pursued is to study incurred age buckets across durations. This approach will produce a mixture of calendar years within a duration but should produce a set of exposures where the average calendar year increases with duration.

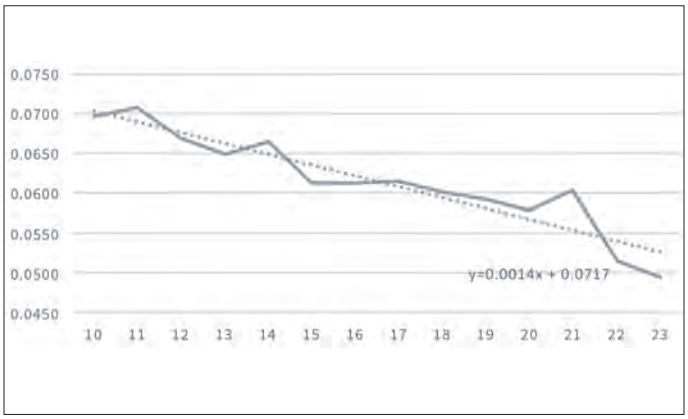
Figure 1
Female, Age 85–89



From the Database, I determined the resulting set of incidence rates for a given gender-incurred age grouping. Female, incurred ages 85–89 is shown in Figure 1. Note, the figure shows all durations 10 or higher with at least 50 claims. Duration 10 was chosen to alleviate some issues underwriting might introduce—more on underwriting will be discussed later.

One will notice the generally downward slope of the incidence rates as duration increases. This may indicate the presence of improvement as the average calendar year increases as duration increases. Using Microsoft Excel, I added a linear trend line to the chart as shown in Figure 2 (note the y-axis scale was compressed for this graph to emphasize the line slope).

Figure 2
Female, Age 85–89



The use of a linear trend line means the percentage durational change increases each year since the rate of change is constant but the beginning of duration value is decreasing. For purposes of my analysis I took the first and last points on the line and calculated the constant durational change between the two points.

For this example, the first point is 0.0703 and the last is 0.0521. There are 14 observations, making 13 time periods. The resulting calculation is:

$$[0.0521/0.0703)^{(1/13)}] - 1 = -0.0228$$

This change (-2.28%) is a measure of the observed annual incidence improvement in the data, where a positive value would indicate dis-improvement.

Repeating this exercise for other incurred age/gender groups produces the following values as seen in Table 1. I have included

Table 1
Durational Change by Issue Age

Incurred Age Group	Calculated Durational Change	Durations Used in Analysis
Female 80–84	−1.4%	13
Male 80–84	−0.7%	12
Female 85–89	−2.3%	14
Male 85–89	−1.4%	13
Female 90+	−1.6%	14
Male 90+	−0.9%	13

only ages 80 and older. The process can be followed for other ages, though the smaller number of claims for younger ages will reduce the usable data points. I have included the number of durations with at least 50 claims included in the calculation.

The good news for the industry is the analysis shows incidence rate improvement by duration for a constant incurred age group. There is certainly hesitancy on my part to call this definitive evidence of morbidity improvement for several reasons discussed below.

CAVEATS

Use of an Industry Database

The report accompanying the Database lists 22 participating companies. Most of these companies stopped writing new business during the 2000–11 observation period. At least one started writing during the period. Sales volumes certainly changed for individual companies year to year. This means the mix of business by company will change by duration for a constant incurred age grouping. Variations in experience by company could be contributing to the observed results.

Underwriting effects

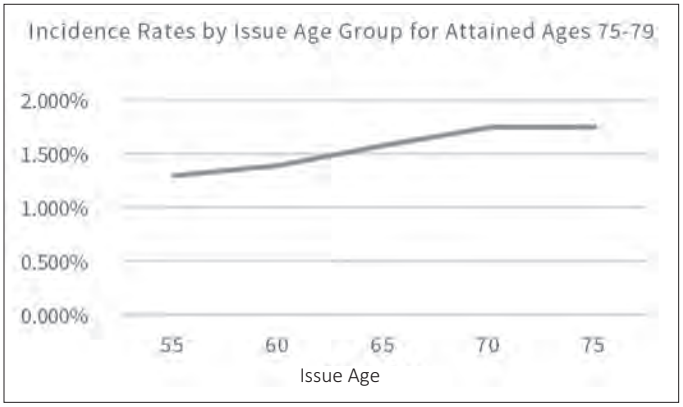
Any study of morbidity improvement using industry data needs to grapple with the general direction toward tighter underwriting through time on the results. Because the Database does not include a calendar year variable, there is even less clarity as to how industry underwriting changes may be affecting the results. The example used earlier (female, incurred age 85–89) will include business issued to applicants aged 75–79 over calendar years 1990 to 2001 in duration 10. Duration 15 will include business issued to applicants aged 70–74 in calendar years 1985 to 1996.

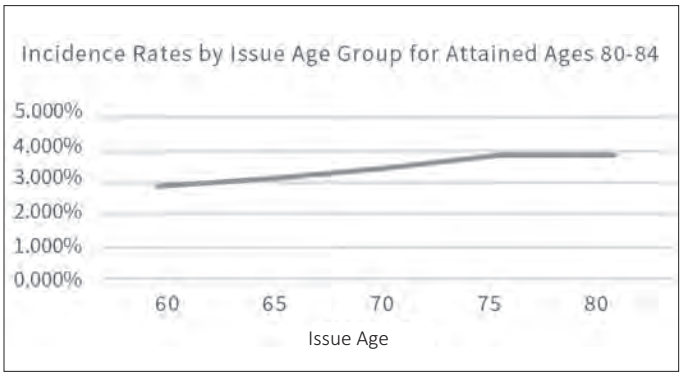
Two items of note may be mentioned at this point. First, the calendar issue years covered in the experience will move farther into the past as duration increases. This means higher durations were underwritten in earlier calendar years, typically with less underwriting scrutiny. Second, there is some uncertainty in the industry as to when selection completely wears off, if it ever does. Both items work against the observed incidence rate improvement seen leading to some thought the results shown may lessen the true underlying changes.

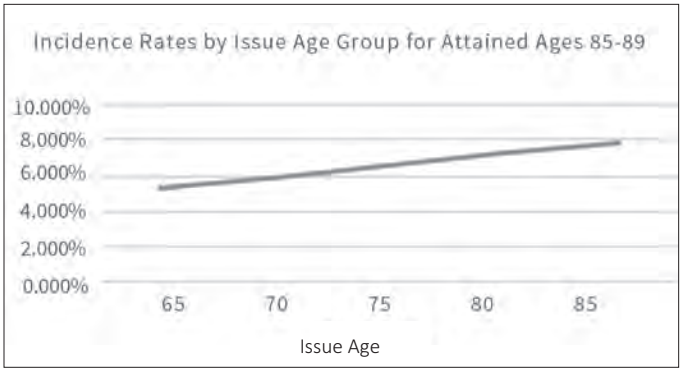
In a related thought, some in the industry have observed and project issue age differences lasting for the life of the business. Several explanations for the effect have been put forward including less ability on the part of applicants to project future LTC needs and lower anti-selection among younger applicants. Whatever the reason, each successive duration in my analysis will contain a younger average issue age. The Database does show evidence of issue age incidence differentiation by attained age as shown in Figure 3.

One will need to consider the interplay of issue age factors and morbidity improvement in drawing conclusions from this data and the need for consistency between inter-related factors when setting assumptions for projections. In my analysis of the results from the Database, the highest issue ages generally have incidence rates about 50 percent higher than issue ages 20 years

Figure 3







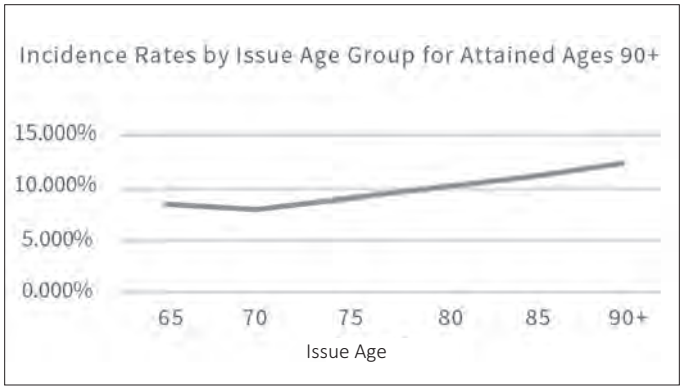


Table 2
Durational Change by Issue Age and Underwriting

Incurred Age Group	Calculated Durational Change—all u/w types (# claims)	Calculated Durational Change—full u/w (# claims)	Calculated Durational Change—other u/w (# claims)
Female 80–84	−1.4% (17,451)	−1.0% (6638)	−1.5% (10,753)
Male 80–84	−0.7% (9089)	+0.8% (3472)	−1.5% (5563)
Female 85–89	−2.3% (17,182)	−2.5% (5735)	−1.6% (11,335)
Male 85–89	−1.4% (8593)	−2.6% (2907)	−0.5% (5577)
Female 90+	−1.6% (9454)	−2.7% (2636)	−0.9% (6727)
Male 90+	−0.9% (3827)	−1.6% (1070)	−0.8% (2673)

younger. One actuary might see this as strong evidence of an issue age effect on incidence while another might see it as evidence of morbidity improvement at a rate of 2 percent per year.

Finally, just to see what impact underwriting has on the calculated change factors, I repeated the exercise splitting the experience by underwriting type, as found in the Database. From these results, it seems underwriting has more of an impact at the older attained ages, though this could be tied to a greater effect at the oldest issue ages or just due to random fluctuation as less data is available for study at the oldest attained ages. Table 2 does show the total number of claims included in the analysis. The total for all underwriting types will not always equal the full plus other groups as only durations with at least 50 claims were included so the durations included in the categories are not always identical.

There is some uncertainty in the industry as to when selection completely wears off, if it ever does.

Severity

Finally, the analysis looked solely at incidence rates and made no attempt to consider any aspects of severity—claim continuance and utilization. Changes through time in severity could offset or enhance the observed changes in incidence rates.

CONCLUSION

This analysis is not intended to drive definitive conclusions on the issue of morbidity improvement but to be a stepping stone on the path of further investigation and discussion. The Database is the largest source of publicly available insured long-term care experience. As such, it is a great source for the trend analysis performed for this paper, but also comes with caveats as outlined above. As a large LTC reinsurer, my company has access to data from a variety of direct writers. I have performed similar analysis (though we do have access to calendar year splits) and found the results to generally be consistent with those I found using the Database (though more variable and with instances of dis-improvement). ■

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David Benz, FSA, MAAA, is managing actuary—A&H at GE Capital. He can be reached at *david.benz@ge.com.*

ENDNOTE

1 Per the Society of Actuaries, calendar year was collected but not included in the final data prepared for publication. Perhaps a future experience study update will include calendar year in the final data.