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# Practical Aspects of Long-Term Care Continuance Table Construction

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This article addresses the complexities and practicalities of constructing a continuance curve from long-term care (LTC) claims data. The process discussed herein is one that makes use of the maximum amount of actual data available. The methods and formulas presented describe one way to create tables; different methods or approaches could be equally possible.

## What is a Continuance Curve?

The “continuance curve” and its construction are topics that most actuaries study as part of their exam curriculum. Continuance tables provide the probabilities that someone who begins a claim (such as for disability, long-term care or hospitalization) will still be on that claim at the end of a given time period. The time intervals can be measured in days, months or years, depending on what is being measured and how long it’s expected to last. The tables usually start with a radix (beginning value) of 1.0, and then give factors that show what proportion of the original claimant population is expected to remain on claim at various points in time.

A hypothetical example of what a LTC continuance curve could look like is shown in Table 1. This table says that, for example, out of a given group of starting claimants, we would expect 34.1 percent of them to still be on claim at the end of 12 months, 24.5 percent at the end of 24 months, 16.1 percent at the end of 36 months, etc..

## Getting Started

Most companies who are selling LTC will eventually find themselves in the position of wanting to create continuance curves that reflect their own claim experience. These continuance curves might be used to help create claim costs, to develop claim liabilities, and/or to compare to other available “industry” tables.

Developing continuance curves from a company’s own experience can be a complicated and difficult process, requiring a significant amount of data for credibility. The “tail” of a LTC continuance curve can be quite long, requiring many years of experience to get the “full picture.” Continuance can vary substantially by site of care (nursing home versus assisted living facility versus home care), by claimant age, and by diagnosis. Large portions of the continuance curve could be unknown, due to elimination periods and benefit period maximums. Changing care

management practices or benefit triggers over time could affect the pattern and length of the continuance curve.

In order to create continuance curves, a company must first create a database that contains its historic claim payments by as many data variables as possible. At a minimum these variables should include elimination period, benefit period/pool of money, site of care, sex and claimant age. Some basic decisions must be made as to the level of detail at which tables will be constructed (this may depend on credibility) and whether the continuance curve will begin at the date of disability (which may be difficult to determine) or the first date of service that is either paid or applied to the elimination period. These decisions should be made to be consistent with product definitions.

A company must also decide whether a “disability” type of table will be created, which tracks the entire clinical care pathway of a person (regardless of the site of care) or whether separate tables will be created for each site of care (at least nursing home versus home care). This decision may be driven by how the continuance tables will be used and on how frequency rates are constructed for claim cost calculations. A disability-type of table may not be appropriate for a company who has home care or assisted living facility (ALF) benefits that are paid at a different amounts than nursing home benefits, since it would be important to know the point at which the benefit amount changes (when a person transfers from one level of care to another). A disability-type table may also be less than optimal for use in developing claim liabilities on reimbursement style policies, since the pattern of continuance for nursing home care could be significantly different than for home care (i.e., the continuance could be much longer), and all that is known of a claimant at valuation time is the current site of care. Any possible transference to a future site cannot be predicted.

However, having separate continuance curves by site of care also has its problems. For pricing, further assumptions would be needed about the proportion of people who transfer from one site to another so that integrated pools of money could be priced.

For reserving, having composite home care and composite nursing home tables (with time zero (0) being the point at which the person enters that site of care) may mean that, upon

Table 1

Claim Duration (in months)	Total
0	1.00
1	.790
2	.698
3	.628
4	.569
5	.519
6	.477
7	.442
8	.413
9	.389
10	.370
11	.354
12	.341
...	...
24	.245
...	...
36	.161
Etc.	Etc.

transference from one site to another, a person is not really in the “right” duration for his actual clinical length on claim, and expected lengths of stay could thus be affected. However, this latter concern is alleviated if the continuance curves are constructed in a manner in which they are to be used for reserving, i.e., by treating the duration of the claim as the transfer duration in both the continuance table construction and in valuation. Another possibility is to create two sets of tables: the first for claims before site transfer (which ultimately includes those who stay in one site of care throughout the claim), and the second for use after transfer. Finally, the database needs to include whether a claim is open or closed at the time of the study. And, if the claim is closed, the database should include whether the claim closed due to maximum benefits being paid.

### Basic Formulas

For most companies, it will be important to get as much credibility as possible out of the data it possesses. This implies that data for all elimination periods and benefit periods should probably be combined. Claim persistency rates (i.e., the number of claims still active at the end of the duration divided by the number active at the beginning of the duration) would then be created for each claim duration, using all available claims that had the opportunity to be exposed at *both* the beginning *and* the ending of the claim duration. If monthly durations are used, the incurral date is defined as  $t = 0$ , and the end of 30.42 calendar days (or other acceptable definition) is defined as the monthly duration  $t = 1$ .

We then define  $BOP_x$  to be the number of claims at the beginning of the month  $x$ . Likewise,  $EOP_x$  is the number at the end of month  $x$ .

$$\text{Persistency at each claim duration } t = \frac{EOP_t}{BOP_t}$$

In this formula, a claim that terminates in month  $t$  due to recovery or death will be included in  $BOP_t$ , but excluded from  $EOP_t$ , thus contributing to the termination rate (1 minus persistency) for the month. The persistency for each duration reflects the probability that a claim that is open at the beginning of that duration will still be open at the end of the duration.

The  $BOP_t$  will not necessarily equal  $EOP_{t-1}$  at each duration, since we only want to include, for each duration, those claims that have the potential to end in the duration. Likewise,  $EOP_t$  does not equal  $BOP_{t+1}$ . This is discussed further in the next section on exposure guidelines.

Once claim persistency rates have been calculated for each possible duration, the continuance table can be constructed by calculating the number of lives on claim at each time  $t$  ( $l_t$ ), as follows:

$$l_1 = l_0 * \frac{EOP_1}{BOP_1}$$

$$l_2 = l_0 * \frac{EOP_1}{BOP_1} * \frac{EOP_2}{BOP_2}$$

$$l_3 = l_0 * \frac{EOP_1}{BOP_1} * \frac{EOP_2}{BOP_2} * \frac{EOP_3}{BOP_3}; \text{ etc.}$$

Using the above approach, many companies will be faced with the problem of how to extrapolate at the end of their credible data. Choices of approach include choosing an endpoint of the continuance (such as 15 or 20 years) and interpolating from the last available point to the end of the table, artificially creating a set of termination rates from a mortality table at the tail, or extrapolating using the most recently measured persistency rate until  $l_x$  approaches zero.

### Exposure Guidelines

As mentioned above, the claims included in the exposure at the end of one duration are not necessarily the same number of claims included in the exposure at the beginning of the next duration. The exposures to include in each period  $t$  must be adjusted considering the following:

- Claims that end due to the maximum benefit being paid,
- Claims that are still open at the end of the study period, and
- Claims that do not have a zero-day elimination period.

Each of these situations is discussed in further detail below.

#### *a) Claims that Close Due to the Maximum Benefit Period Being Reached*

These claims should be included in BOP and EOP up until the time that the policy benefits have been completely used up; they should then be excluded from the BOP exposure for the next duration after the end of the benefit period (and for all subsequent durations, since nothing is known about the claimant after that point).

In order to do this:

- The maximum benefit period is calculated for each claim. This may be expressed either in dollars or as a calendar period.
- The ending service date is compared to the end date of the maximum benefit period if it is a “calendar” policy. If it is a “pool of money” policy, the comparison is to the sum of paid-to-date.

For all claims with the last duration equals  $x$  due to reaching the maximum benefit period:

- The exposures are included in EOP and BOP for  $t = x$

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- The exposures are not included in EOP and BOP for  $t = x+1$  or greater. Even though the exposure is included in  $EOP_x$ , it is not included in  $BOP_{x+1}$ .
- Exposures are included in BOP and EOP for durations  $x+1$ .

Even though claims may theoretically be included in the study up to the last duration of their benefit, it may be prudent to examine data for a behavioral bias. For example, behavior caused by a restoration of benefits provision in a LTC contract may be important to examine. Claimants having such a contract may choose to end their services a month or two before their benefits are exhausted in an attempt to be eligible to restore benefits in the future. If a company observes this in their data, the exposure rules may be modified to define the last period  $x$  for inclusion in the study to be several months before the actual expiration of benefits.

*b) Claims that are Open at the End of the Study Period*

These claims should be handled similarly to claims that reach the end of the benefit period, as described above. Exposures for claims that are open at the end of the study period are calculated in the following manner:

- The duration at the end of the study period is noted. This duration =  $x$ .
- The exposures for these claims are included for EOP and BOP where  $t = x$ .
- The exposures are not included in EOP and BOP for  $t = x+1$  or greater.

*c) Claims that have Elimination Periods other than zero*

It is important that the claims incurral date be set by the claims department in a consistent manner—to either be the first date the claimant begins services, the first date that the claimant meets the qualification criteria or the first date that the deductible is met.

Since there are many claims that will have terminated prior to satisfying the elimination period, and detail about these claims may not be captured in the database, information during the elimination period will be lost. Thus, in order to avoid a bias of having too many claims with early duration persistencies of 100 percent, claims with elimination periods greater than zero should not be included in the exposures until the elimination period has been met. That is:

- Claims that have an elimination period of zero days are included in all exposures.
- Claims with an elimination period equal to  $x$  are not included as an exposure count for any EOP or BOP of duration up to and including duration  $x$ .

It should be noted that claim persistency rates that are calculated using the above guidelines may end up containing some biases at the beginning and the end of the continuance curve. This is because the beginning duration persistency rates will be driven by the zero-day elimination period claims and the end will be driven by the lifetime benefit period claims. These claims have typically been somewhat more anti-selective, thus perhaps resulting in higher claims persistency rates.

### Conclusion

The methodology described above should provide optimal results, since the most of data possible will be incorporated into the tables. It should be noted that a significant amount of data is still necessary. Also, claim persistency rates derived from that data could be constantly changing (due to changes in mix of comprehensive versus stand-alone business, claim payment and management procedures, etc.). Thus, the tables should be updated regularly or continually validated against actual experience. \*



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