Long-Term Care Insurance Mortality and Lapse Study

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Developed by the Long-Term Care Valuation Work Group
of the American Academy of Actuaries
and the Society of Actuaries Research Institute

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I. INTRODUCTION

On May 5, 2016, the Long-Term Care Valuation (B) Work Group of National Association of Insurance Commissioners' (NAIC's) Health Actuarial (B) Task Force's Long-Term Care Actuarial Working Group (LTCAWG) requested recommendations from the American Academy of Actuaries (Academy)[1] and the Society of Actuaries Research Institute (SOA)[2] to replace the mortality and lapse bases for statutory minimum reserves. A copy of the request is included in Appendix 1 to this report.

The Academy and SOA created a Long-Term Care Valuation Work Group (Work Group) to address the request. The Work Group is chaired by Warren Jones, the Mortality Subgroup is led by Bruce Stahl, and the Lapse Subgroup is led by Bob Yee. The Work Group has provided regular updates to the LTCAWG at national meetings and provided opportunities for the LTCAWG members to ask questions regarding the work in progress.

This report presents the recommended lapse tables in Appendix 3, and recommended mortality tables in Appendix 4, and describes the methodology and process in developing these tables.

[1] The American Academy of Actuaries is a 19,500-member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

[2] Serving as the research arm of the Society of Actuaries, the SOA Research Institute provides objective, data-driven research bringing together tried and true practices and future-focused approaches to address societal challenges and business needs. The Institute provides trusted knowledge, extensive experience and new technologies to actuaries, employers, regulators, research funders and the public, to help them effectively identify, predict and manage risks.

II. BACKGROUND

The minimum statutory reserve basis for long-term care (LTC) insurance is documented in the NAIC Valuation Manual VM-25: Health Insurance Reserves Minimum Reserve Requirements. The mortality table specified for currently new issues is the 1994 Group Annuity Mortality (GAM) Table. The lapse rate specified is the lesser of x% of the voluntary lapse rate used in the calculation of gross premiums and y%, where x and y vary by policy year:

> For policy year one (1), x is 80% and y is 6%.
>
> For policy years two (2) through four (4), x is 80% and y is 4%.
>
> For policy years five (5) and later, x is 100% and y is 2%, except for group insurance, for which y is 3%.

Both the mortality and lapse bases for the minimum reserve requirements have been revised over the years with the changes to apply to new issues only. The mortality basis has been that for whole life insurance or payout annuities.

General Approach

Our charge is to develop recommended mortality and lapse tables for valuation on both a total-lives basis and an active-lives basis. This charge dictates the approach we have chosen to develop such tables.

Valuation tables are conservative in nature. A logical method is to develop basic tables based on experience first and then consider the margins to be added. Because the mortality and lapse tables would be used in combination, it is desirable for both tables to be as consistent as possible with respect to the data source and the factors that the tables vary by. The Work Group recognizes the likelihood of the under-reporting of death for healthy policyholders. Thus, the delineation between death and lapse is not always clear. Consistency in both data source and factors can facilitate the assessment of combined deaths and lapses for reasonableness checks.

Source of Data

The Work Group defined the base mortality table to be the 2012 Individual Annuity Mortality Table. Further, development of mortality margins and the lapse assumption is to be based on the recent SOA/LIMRA LTC Voluntary Lapse and Mortality Experience Study (the Study). It is comprised of experience data from 2000 through 2011 for 22 companies. From the aggregate data, we observed trends during the study period, especially for lapse. Accordingly, we selected the observation period 2008-2011 to reflect more recent trends. Furthermore, the Study identified certain participating companies with relatively more accurate data submitted. Data from 10 companies (Definition 2 [DEFN 2] companies) satisfied the following conditions:

1. Deaths are separately identified from lapses,
2. Unknown terminations are less than 25% of total terminations, and
3. Performed matching with Social Security death records within the previous three years from the date of submission.

Apart from some preliminary comparisons between DEFN 2 data and the full dataset, we further restricted our data to these DEFN 2 companies. We compared our tabulated lapse counts and exposures with the published summary data from the SOA. We concluded that our data is reasonably representative of corresponding summary data from the Study. The DEFN 2 companies represent approximately 70% of the industry experience for the exposure period used.

The following table shows the summary statistics of the DEFN 2 subset of data:

Table 1. DEFN 2 Exposures

	Total Lives[3]		Active Lives	
	Counts	Exposure Years	Counts	Exposure Years
Mortality—Individual	142,647	9.4MM	95,474	9.0MM
Lapse—Individual[4]	197,000	9.4MM	197,000	9.0MM
Lapse—Group[5]	302,000	4.9MM	302,000	4.8MM

[3] The mortality was derived using individual mortality and tested using both individual and group data. Also, the figures in this line include 19,599 deaths from "Substandard" and "Unknown" risk classes that do not appear in the "Death Count Totals" table later in this report.

[4] The lapse count is the same for Total Lives and Active Lives as the immaterial number of disabled life lapses that were ignored.

[5] Ibid.

III. MORTALITY

Purpose and Scope

The Mortality Subgroup worked to identify reasonable mortality tables to be used in setting statutory reserves for individual LTCI policies, either as a particular set of tables or as guidance that the NAIC could expect from insurers.

The Work Group further recognized that the NAIC allows principle-based reserving for life insurance and that, therefore, the NAIC may be interested in guidance for a similar approach with LTCI mortality. Guidance for principle-based reserving may be of particular interest when considering marital status and underwriting risk classes.

When setting mortality assumptions in accordance with actuarial standards of practice (ASOPs) for LTC (e.g., ASOP 18[6]), it is appropriate to consider the effects of both selection and class of applicants on expected mortality experience (section 3.2.2). Consequently, in addition to other potential mortality rate differentiators, the analysis considered risk class and marital status, representing both selection and class of applicants.

Data Quality

Addressing data quality under ASOP 23, *Data Quality*,[7] the Work Group relied upon the Society of Actuaries' Intercompany Study from 2015 to make sure the data was "clean" and as uniform as possible for complex and diverse data that came from 10 insurance companies.

The Work Group sought to follow the ASOP on credibility procedures (ASOP 25[8]) in its work. Industry data is more relevant than general population data for two reasons. First, the selection process when issuing LTCI, from both the applicants' and the insurers' perspectives, may result in the insured population being a low mortality subset of the general population. Second, a mortality study of this nature requires consideration of numerous cells of data. The number of deaths in a given cell may or may not be credible. Looking at data from multiple insurers increases the number of cells that are credible.

[6] Actuarial Standards Board; Actuarial Standard of Practice No. 18*, Long-Term Care Insurance*; May 2011.
[7] Actuarial Standards Board; Actuarial Standard of Practice No. 23, *Data Quality*; December 2016.
[8] Actuarial Standards Board; Actuarial Standard of Practice No. 25, *Credibility Procedures*; December 2013.

To assess data credibility with respect to rate development, it is a common practice to consider 1,082 or more counts in a particular cell in Tables 2 and 3 below to be fully credible.[9] It is also typical to assign a lower count number to annotate partial credibility for a cell. For example, a minimum count of 271 can be considered as partially credible.[10] Using 271 deaths as a measure, the majority of the cells in Table 2 below can be considered as partially credible.

Table 2. Death Counts (Total Lives) By Sex, Risk Class, Attained Age, and Marital Status

	Female: Preferred Risk				Female: Standard Risk				Male: Preferred Risk				Male: Standard Risk		
Attained Age	Married	Single	Total		Married	Single	Total		Married	Single	Total		Married	Single	Total
Under 60	217	113	330		373	184	557		180	69	249		384	113	497
60-64	393	194	587		708	357	1,065		407	106	513		887	192	1,079
65-69	670	346	1,016		1,329	839	2,168		795	177	972		1,720	425	2,145
70-74	1,022	716	1,738		2,402	1,670	4,072		1,375	370	1,745		3,331	934	4,265
75	270	252	522		650	520	1,170		414	115	529		938	293	1,231
76	266	288	554		717	562	1,279		454	148	602		1,112	332	1,444
77	272	296	568		786	675	1,461		515	132	647		1,167	342	1,509
78	243	304	547		868	779	1,647		485	190	675		1,261	460	1,721
79	330	415	745		937	904	1,841		527	163	690		1,436	520	1,956
80	304	442	746		951	999	1,950		527	186	713		1,426	594	2,020
81	313	459	772		984	1,129	2,113		542	169	711		1,541	652	2,193
82	338	509	847		999	1,224	2,223		527	218	745		1,534	666	2,200
83	337	591	928		1,008	1,290	2,298		546	228	774		1,557	748	2,305
84	307	602	909		925	1,345	2,270		526	208	734		1,549	762	2,311
85	344	694	1,038		954	1,395	2,349		515	241	756		1,451	735	2,186
86	316	757	1,073		868	1,506	2,374		487	276	763		1,460	756	2,216
87	308	727	1,035		791	1,520	2,311		434	254	688		1,302	799	2,101
88	258	803	1,061		725	1,452	2,177		397	208	605		1,184	733	1,917
89	248	745	993		624	1,362	1,986		356	198	554		964	589	1,553
90-94	590	2,605	3,195		1,543	4,483	6,026		943	625	1,568		2,467	1,911	4,378
95 and over	112	914	1,026		266	1,542	1,808		199	171	370		360	463	823
Total	**7,458**	**12,772**	**20,230**		**19,408**	**25,737**	**45,145**		**11,151**	**4,452**	**15,603**		**29,031**	**13,019**	**42,050**

[9] Full credibility means that there is a 90% probability that the observed rate is within 5% of the true underlying result. Some practitioners would accept as low as 200 data points as minimally credible (approximately 40% partial credibility).

[10] Corresponding to 1,082 as full credibility, 271 counts means that there is a 90% probability that the observed rate is within 10% of the true underlying rate.

Table 3. Active Life Death Counts

	Death Counts (Active Lives)		
Attained Age	Female	Male	Total
Under 60	1,029	978	2,007
60-64	1,829	1,890	3,719
65-69	3,325	3,460	6,785
70-74	5,367	6,001	11,368
75	1,425	1,631	3,056
76	1,502	1,859	3,361
77	1,607	1,916	3,523
78	1,765	2,082	3,847
79	2,032	2,324	4,356
80	2,077	2,277	4,354
81	2,079	2,388	4,467
82	2,173	2,400	4,573
83	2,219	2,465	4,684
84	2,133	2,399	4,532
85	2,163	2,273	4,436
86	2,162	2,204	4,366
87	2,061	2,036	4,097
88	1,932	1,848	3,780
89	1,720	1,402	3,122
90-94	5,052	3,946	8,998
95 and over	1,336	707	2,043
Total	46,988	48,486	95,474

As important as using multiple contributors is to enhance credibility, using multiple contributors also compromises the uniformity of the data and, in that sense, reduces the credibility. For example, the study identified marital status based in part on the presence of a spouse discount,[11] and some insurers apply a spouse discount based on the legal status of being married alone, while others require both spouses to apply for coverage, and still others require both spouses to be issued policies. Similarly, the data recorded whether policies were preferred, standard, or substandard risks,[12] but each insurer defines the health

[11] The study variable "marital status" is based on a combination of the data fields "marital status at issue" and "marital discount." In the case where marital status at issue was provided, that field was used. For approximately 43% of the policies submitted for the study, marital status at issue was not provided. For 37% of the policies, the martial status at issue was not provided but the marital discount was provided (and was used to define the study marital status variable for those policies). For the remaining policies (approximately 20%), neither marital status at issue nor marital discount were provided; these cases were coded as marital status = "unknown."

[12] The SOA study defined the risk class using "Premium Class" as "The class in which the policy was issued relative to the base policy." If an underwriting discount or load was given, then preferred or substandard was provided by the company. The data provided did not permit aligning across companies.

status of the risk in different ways following its own particular underwriting guidelines. The NAIC may want to address this lack of homogeneity when determining what mortality table standards to set for statutory reserves.

The Work Group also chose to rely on statistical metrics to identify the significance of the variables associated with each policy. The statistical metrics help to identify interactions among the variables, allowing the Work Group to minimize the number of parameters needed for setting mortality tables. They also help to identify which variables the NAIC may want each insurer to consider more closely when setting reserves for LTCI, using the information as guidance.

When setting tables using the statistically identified variables, the Work Group employed smoothing techniques that generated reasonable outcomes. Part of the analysis involved an iterative smoothing process. At younger and older ages where data was sparse, we used the slope of the 2012 Individual Annuity Mortality Basic tables (2012 IAM) as a guide.

Before converting the smoothed tables as guidance for deriving the valuation tables, the Work Group decided to apply mortality improvement to recognize that LTC insured mortality has likely improved since the time of the experience period 2008–2011. A separate section on mortality improvement is provided below.

A valuation table is expected to be conservative; for longevity risks such as with LTCI, "conservative" means using lower mortality than expected. Past annuity tables have essentially used mortality rates that are 90% of the experience, with modifications for very old ages beyond 100. The Work Group recommended using the 90% factor once again and capping the mortality of the valuation table at 0.400, which generally limits the mortality at very old ages. A large majority of insurers' actual mortality experience exceeded this proposed mortality factor.

The Work Group does not think the NAIC should ignore marital status and risk class because, despite the lack of homogeneity in the definitions, these variables still proved to be influential in the prediction of the actual mortality.

The Work Group does not necessarily think the NAIC should use marital status and risk class without any consideration for specific insurer definitions and practices. As stated previously, insurers treat these differently, and, while these items had a high statistical significance, the effect of these items will likely vary according to the definition followed or practices used by each insurer.

The Work Group did not have the data necessary to identify the specific values for each marital status definition or risk class identification. Therefore, adjusting for these variables may not be practical without the NAIC granting individual companies the ability to justify how their mortality might appropriately vary from the findings identified in this report. If the NAIC allowed individual insurers to justify such differences, each insurer could easily add margin by applying a similar conservative factor of 90% to the mortality rates that it identifies.

Methods

Issue Ages

The data was consistent with measuring age as age last birthday (ALB). No tables are offered to convert the findings to age nearest birthday (ANB).

Exposures

For policyholders who died within a particular period, the Work Group chose to use the full exposure, meaning the count of lives at the beginning of the period being measured; for everyone else, the Work Group chose to use the exact (daily) exposure (for example, a policy that lapsed three months into its policy year was treated as having one-fourth of an exposure year for that particular year). This method of calculating exposure is consistent with the Balducci Hypothesis, which essentially assumes mortality rates decrease during the exposure period. As a reminder, the Balducci assumption may have distortions when the mortality rates are relatively high and credibility is low. Please see "Experience Study Calculations" written by David Atkinson and John McGarry on behalf of the SOA. Please also note that the manner used to derive mortality rates in this study relied heavily on the 2012 IAM slope at very old ages where the lack of credibility is of greatest concern (the method is described later). The 2012 IAM study also used the Balducci method and smoothing.

Predictive Variables

LIMRA developed a statistical Generalized Linear Model and other statistical methods to identify variables that had the greatest significance in explaining the mortality experience and might be most appropriate for use in projecting future experience.

Initially, the analysis recognized nine variables: sex, attained age, policy year, coverage type (whether nursing home only, home health care only, comprehensive, or other), an indicator for the presence of an automatic increasing benefit, an indicator that the policy has had a rate increase, the underwriting risk class (Preferred, Standard, or Substandard), marital status, and an indicator for whether the policy had an unlimited maximum benefit period.

Some factors were represented by multiple indicator variables. For example, Premium Risk Class was represented by three indicators. (For Table 4, we identified the highest Wald Chi-Square value from the group of indicators.)

Table 4 shows a measure of the significance of the variables under a Poisson distribution and is generally representative of other measures. Under other distributions, the factor "Gender" had greater statistical significance yet, even here, we deemed the significance to be strong.

Table 4. Significant Covariates Using Poisson Distribution

Significant Covariates	
Factor	Wald Chi-Square
Age	7,838
Premium Risk Class	5,508
Lifetime Maximum (Limited or Unlimited)	3,851
Coverage Type	2,336
Marital Status (presence of spouse discount)	1,605
Premium Rate Increase	276
Policy Year	110
Gender	6
Automatic Increasing Benefit Maximums	0

For example, using the standard Chi-squared test in the Poisson distribution, most of the factors had a probability of being statistically significant at over 0.9999. Gender had a probability of being statistically significant at 0.9884, compared to the Automatic Increasing Benefit Maximum at only 0.2639.

The factors (variables) were selected based on (1) those that had a high rate of responses (some variables had a relatively high number of missing values), (2) those that had a material influence on the mortality (sometimes a variable appeared to be statistically significant but only trivially altered the mortality rate), and (3) those that were not redundant (not statistically correlated with other factors). Such analysis reduced the initial nine to five: sex, age, policy year, underwriting risk class, and marital status. (Age can be identified either at issue age or attained age because the presence of policy year correlates the two age measurements.).

The findings, therefore, provide tables that include the five predictive variables. For two of the variables—underwriting class and marital status—the underlying data is not homogeneous by contributing company because contributing insurers derive or define these differently, and presumably the differences for some insurers could be larger for some than others. The findings provide a set of tables that offer the option to exclude underwriting risk class and marital status. The NAIC may want to consider the optionality of these two variables.

Development of Tables

The Work Group noticed that the selection period in the data appeared to be about 20 years, and that the number of deaths in policy years 21 and over was not very credible. The Work Group, consisting primarily of LTCI actuaries, then relied heavily upon Susan Willeat, an actuary from RGA with many years of experience in deriving mortality tables. She initially identified a set of ultimate tables prior to identifying selection factors. She increased the number of deaths from policy years 15 to 20 to estimate the ultimate mortality, and she did so iteratively in order to find a good fit. Starting with an increase of anywhere between 2% and 4%, she narrowed the annualized increases to an average of 3%. Therefore, the death counts from policy year 15 were increased by a factor of 1.03^6 in order to identify the number of deaths expected without any value from initial underwriting. She adjusted the death counts for policy years 16 through 20 in a similar manner. For example, she increased death counts from policy year 19 by a factor of 1.03^2, and from policy year 20 by a factor of 1.03.

Willeat used the ultimate rates for quinquennial age bands to improve credibility. This result required a 1.02 overall "true-up" factor to match the actual experience. The Work Group then identified a trend line by applying Gompertz's law (mortality increases exponentially) through the Excel GROWTH function. This resulted in a pattern for ages 60 to 89 (in five-year age bands) that the Work Group considered to be materially inconsistent with the actual data, so the Work Group modified the approach to find two suitable trend lines. Then, the Work Group followed through with applying selection factors and calculated final actual to expected factors. The female actual data had only a small departure from ages 75 to 79, while the male actual data had a major departure that the Work Group deemed unusable. The Work Group decided to apply the female ratios to the male data in order to get a better fit.

Next, the Work Group graduated the curves for ages 60 to 89 using the Karup-King six-point graduation technique and then extended the table to younger and older ages using the slope of the 2012 IAM as a guide. Initially, the Work Group tried to set the expected mortality rates at younger ages using 90% of the 2012 IAM, but iteratively found that 100% for males and 120% for females appeared to be a better fit to the actual data. For older ages, the Work Group floored the Karup-King results at 107% of the 2012 IAM for males and 101% for females. See Figures 1 and 2 below.

Figure 1. Male Ultimate Mortality Rates, Age Last Birthday

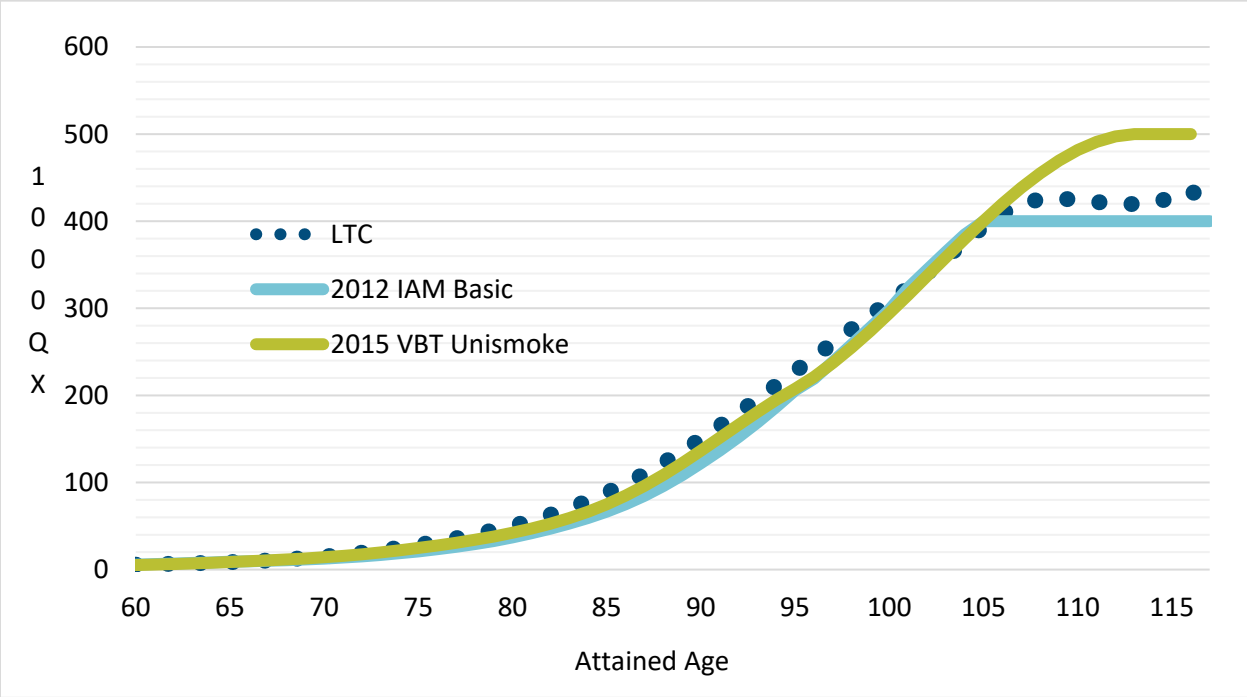
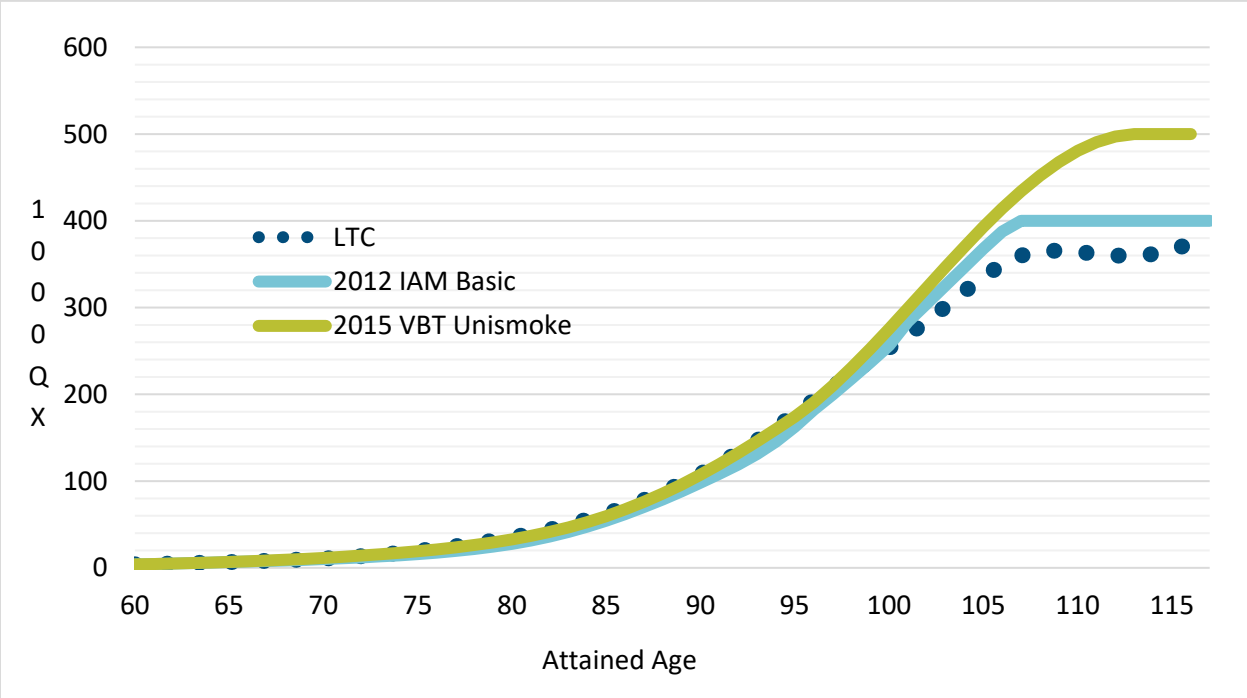


Figure 2. Female Ultimate Mortality Rates, Age Last Birthday



Applying the Excel "add trendline" options to the issue-age adjusted data, the Work Group found a best fit selection pattern with an R-square value of 0.9967. It was a POWER function in the form $y = 0.1736*x^{.5775}$. The Work Group modified this slightly to allow policy year 21 to be exactly at 100%, so the equation became $y = 0.175*x^{0.5775}$.

Further review suggested that there was less value from selection at younger issue ages than at older but longer selection periods at younger issue ages than older. For issue ages below 65, the Work Group extended the selection period to 30 years and, for issue ages above 70, reduced the selection period to 10 years. The Work Group graded the selection period between these issue ages.

Then, the Work Group returned to validate the results by determining the actual-to-expected ratios, as shown in Tables 5 and 6.

Table 5. Males—Actual-to-Expected Ratio

	Issue Age Range								
Policy Year	**<50**	**50-54**	**55-59**	**60-64**	**65-69**	**70-74**	**75-79**	**80+**	**Total**
1		119.8%	108.3%	113.0%	97.0%	68.6%	136.1%	138.7%	104.9%
2	37.7%	99.4%	104.9%	109.7%	97.7%	130.0%	79.3%	82.4%	104.7%
3	128.9%	81.0%	96.1%	107.4%	123.1%	94.2%	95.1%	93.8%	104.5%
4	103.1%	107.5%	106.2%	112.5%	116.0%	82.0%	97.4%	102.7%	105.4%
5	83.1%	103.2%	110.4%	99.1%	110.2%	98.9%	89.0%	97.8%	102.2%
6	73.3%	106.7%	107.9%	102.5%	103.2%	96.7%	95.1%	113.4%	101.7%
7	116.1%	96.9%	106.3%	103.1%	89.8%	96.1%	94.2%	113.2%	98.0%
8	90.0%	92.5%	110.4%	89.1%	100.1%	99.2%	111.6%	104.8%	100.7%
9	66.8%	93.3%	102.6%	97.5%	96.1%	108.0%	102.6%	105.6%	101.0%
10	101.3%	77.9%	96.8%	93.1%	104.6%	104.4%	106.2%	110.5%	102.0%
11	98.3%	83.6%	107.3%	93.2%	104.0%	101.2%	103.3%		101.2%
12	87.9%	91.6%	103.3%	96.0%	101.8%	109.2%	104.2%		103.4%
13	113.9%	128.5%	111.1%	98.8%	99.8%	100.7%	98.8%		100.8%
14	116.5%	89.6%	95.0%	93.2%	104.1%	101.3%	95.0%		99.9%
15	104.3%	127.3%	103.9%	98.9%	101.5%	103.8%	98.0%		102.1%
16	96.5%	106.1%	85.3%	97.4%	98.8%	97.8%			97.7%
17	146.6%	99.4%	93.2%	101.9%	103.7%	97.5%			101.0%
18	86.2%	119.2%	135.3%	98.8%	97.2%	99.0%			100.0%
19	78.8%	123.2%	89.7%	95.7%	93.8%	96.0%			94.8%
20	172.5%	95.6%	89.3%	90.4%	99.2%	105.1%			97.0%
Total	**97.1%**	**98.0%**	**103.8%**	**97.0%**	**101.0%**	**101.9%**	**102.0%**	**107.4%**	**100.9%**

Table 6. Females—Actual-to-Expected Ratio

	Issue Age Range								
Policy Year	**<50**	**50-54**	**55-59**	**60-64**	**65-69**	**70-74**	**75-79**	**80+**	**Total**
1		115.6%	81.3%	65.0%	98.8%	85.6%	91.6%	17.6%	83.3%
2	291.9%	85.7%	93.3%	103.1%	90.7%	102.7%	116.9%	63.4%	98.1%
3	139.3%	106.6%	89.6%	107.5%	106.2%	111.9%	102.9%	58.9%	102.6%
4	104.6%	128.9%	111.4%	103.5%	72.7%	99.0%	90.5%	84.9%	97.0%
5	144.8%	85.4%	103.2%	110.8%	103.6%	100.6%	101.8%	106.1%	104.1%
6	77.4%	97.7%	91.5%	86.7%	94.0%	99.6%	85.8%	101.9%	92.5%
7	108.0%	102.3%	94.5%	105.8%	96.4%	83.2%	99.2%	102.7%	96.7%
8	96.6%	100.0%	93.5%	102.6%	95.6%	100.2%	100.8%	99.3%	99.0%
9	78.0%	93.5%	96.7%	102.7%	102.3%	102.7%	99.6%	91.6%	100.1%
10	76.4%	91.6%	105.2%	105.5%	101.5%	107.6%	100.1%	98.4%	102.9%
11	106.2%	98.8%	98.9%	102.1%	105.2%	106.8%	98.2%		102.9%
12	81.1%	96.7%	94.2%	105.1%	95.5%	101.0%	101.9%		99.8%
13	76.0%	87.5%	93.8%	102.0%	99.3%	103.9%	96.8%		100.0%
14	113.1%	90.7%	102.0%	97.6%	98.9%	97.8%	88.7%		97.0%
15	130.7%	126.8%	104.7%	98.6%	95.0%	95.0%	99.1%		97.2%
16	80.0%	101.5%	101.7%	96.9%	98.0%	98.5%			98.1%
17	95.1%	125.1%	104.8%	104.9%	100.4%	101.6%			102.2%
18	99.2%	120.9%	116.1%	104.0%	98.1%	100.6%			101.3%
19	34.8%	97.4%	111.6%	102.3%	95.2%	102.7%			99.2%
20	67.3%	104.3%	99.2%	101.9%	101.3%	101.7%			101.3%
Total	95.7%	99.5%	99.1%	101.7%	98.6%	100.9%	98.2%	96.5%	99.7%

The Work Group followed similar methods for deriving tables by adding underwriting risk classes and marital status, both separately and together, and for deriving tables for Active Lives.

Being healthier than the disabled lives, the mortality rates for the Active Lives are smaller than for Total Lives. At very old ages, the mortality of Active Lives is as high as that for Total Lives. Beginning around attained age 90, the ultimate Active Lives mortality begins to converge to that of the Total Lives to the point they are equal at ages above 100.

Procedures

The Work Group initially worked in coordination with the Lapse Subgroup to make sure that the findings of the two Subgroups (1) would be consistent and (2) could be used in conjunction with each other. Insurers of LTCI typically know when a policy terminates, but they do not necessarily know the reason. Often deaths and lapses can be misreported or not be identified at all. Comparing the data to the Social Security Database is one way to clarify which of the terminated policies were due to death. This database is not without error, yet the Subgroups believed that using it to adjust the data was more credible than otherwise. Therefore, the two Subgroups agreed to use a restricted number of contributors identified as "Definition 2" (DEFN 2).

Early in the process, the Work Group recognized that few of its members had experience in deriving mortality tables. Therefore, the group relied heavily upon guidance provided by Marianne Purushotham of LIMRA, as well as previous studies performed by the SOA, in order to identify how to calculate the actual mortality rates and how to identify the predictive variables (please see Methods above, particularly "Exposure" and "Predictive Variables"). When the Work Group reached the point of developing mortality tables, it relied heavily upon Susan Willeat.

The study period is the four-year period 2008 to 2011. The central year of the study's exposure was 2010; to adjust the study to 2020, the Work Group applied the G2 mortality improvement assumptions for 11 years. If subsequent issue years are to have improvement, the same annual improvement figures can be applied. The Work Group applied G2 mortality improvement during the study but did not measure the actual mortality improvement.

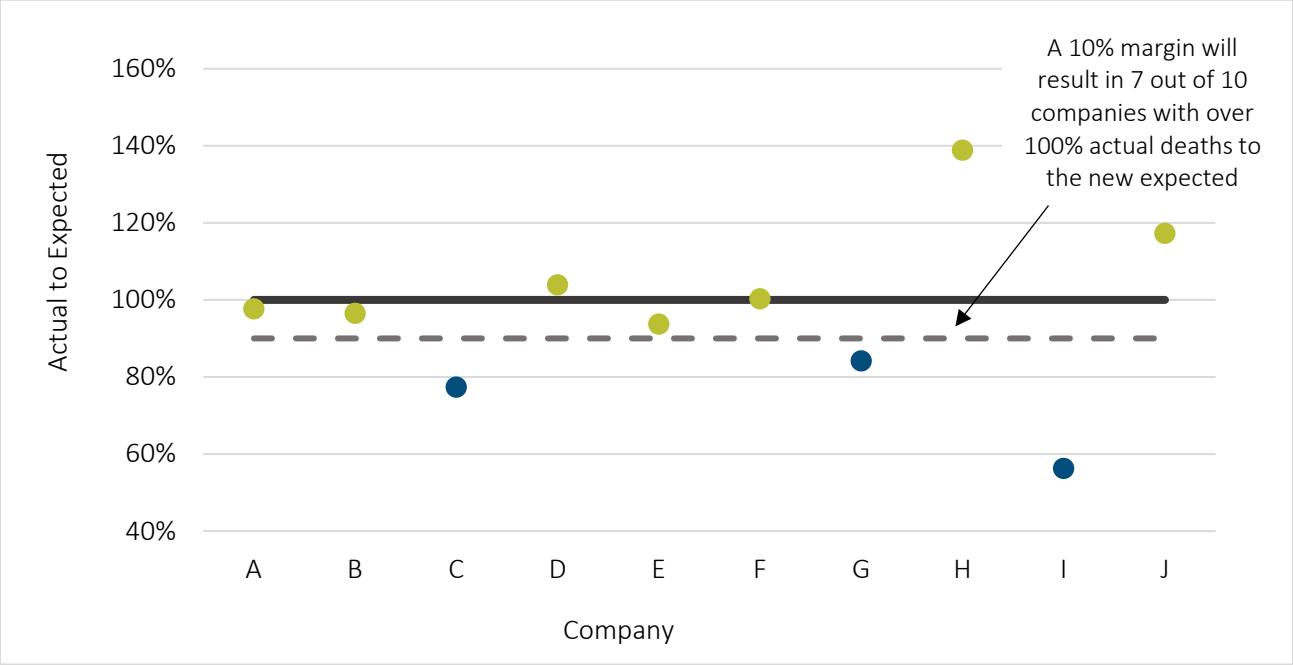
Finally, the Work Group chose to follow similar Provisions for Adverse Deviation (PAD) as used by those who had derived mortality tables for annuity valuation tables in the past.

Table 7. Summary of Valuation or Period Table Ratio to the Basic Table

Annuity Table	Omega Age	General Adjustment to Age 100	Adjustment Age 100+
1983 GAM	110	90% at all ages	90% at all ages
1994 GAM	120	93% at all ages	Beginning after age 102, graded up from 93% to 100% when mortality was .5000 or greater.
1996 IAM	115	90% at all ages	Graded from 90% to 100%
2000 Annuity	115	90% at all ages	Graded from 90% to 100%
2012 IAM	120	90% at all ages	Minor grading around age 103 that ends due to a capping of the rate at 0.400000

The Work Group tested the number of contributors of data whose mortality would have been higher than the mortality using a similar PAD as used for the 2012 IAM. The grading was performed over the same ages as the 2012 IAM but with slightly different and rounded factors. As shown in Figure 3, seven of the 10 had mortality that was higher overall than identified by the recommended table with this PAD.

Figure 3. Actual-to-Expected Mortality, Total Lives by Company, Without Margins, Policy Years 11 & Over



Six out of 10 companies had less than or equal to 100% actual deaths to expected deaths based on the fitted table before the application of the margin. (Less than 100% A/E implies that the recommended table is inadequate in reflecting their experience.) The number of companies to have actual-to-expected ratios below 100% may reasonably be expected to be about half of the total unless a small number have an inordinate amount of weight. Six is about half. By lowering the expected deaths by 10%, only three companies remain under 100% A/E. The 70% coverage is adequate as a valuation table provided that the sample of 10 companies is a fair representation of the industry. If the margin were to cover 80% or 90% of the companies, the expected deaths would need to be reduced by 16% or 22%, figures which seem extreme considering that one company's experience is less credible than the whole, and that other mortality table provisions for adverse deviation are not that high. However, with more data or a more precise explanation of the existing data, an actuary may sufficiently demonstrate that a company has different mortality than the industry. For example, if hypothetically a particular company had a spouse discount only when the married applicant also had a healthy spouse apply for coverage, while most other companies required only that the applicant be married regardless of the status of the spouse, the particular company's actual-to-expected ratio could be low. Similarly, the reverse could be true. If hypothetically, a particular company had a relatively weak requirement for spouse discounts, then the actual-to-expected ratio could be high.

Disclosures

1. The Work Group relied upon the following reports and parties to perform its work.
    a. SOA Long Term Care Experience Study Committee for the collection of the data.
    b. LIMRA, MIB, and Willis Towers Watson for "cleaning" the data (part of the SOA Long-Term Care Experience Study Committee work).
    c. The SOA report titled "Experience Study Calculations" by David Atkinson and John McGarry.[13]
    d. Marianne Purushotham and LIMRA for calculating the exposure and identifying the statistical significance of predictive variables.
    e. Susan Willeat of RGA Reinsurance Company for developing the mortality tables.

2. The findings of this study have important limitations as follows.
    a. The data was for traditional, stand-alone LTCI. Mortality for combination or hybrid products may differ. Also, what represents provision for adverse experience on combination products will likely differ. Similarly, the mortality may differ for other products that have some features in common with LTCI (i.e., short-term care products).
    b. The Social Security Database may not be as accurate as expected and, therefore, the mortality assignments for terminations may be misleading.
    c. The predictive variables may not be defined consistently among the contributors. This is particularly true for marital status and underwriting risk class.
    d. The data for later policy durations and extremely old ages may not be fully credible.
    e. The trend or mortality improvement from 2010 to 2020 based on the 2012 IAM may not have represented the LTCI insured population.

3. Recommendations for further study
    a. Update this study when mortality at extremely old ages and later policy durations becomes more credible.
    b. While individual insurance companies are not the intended users of the findings from this study, they may find value in identifying mortality within their own definitions of marital status and underwriting risk class, particularly if they have maintained their definitions over the entire population within the data being analyzed. Insurance companies may want to compare their own mortality to this study.

[13] https://www.soa.org/globalassets/assets/Files/Research/2016-10-experience-study-calculations.pdf

Mortality Tables

The mortality tables presented in this report should be used with the full understanding of how they were derived and the purpose for which they were intended.

Basic tables are without margin (they are smoothed and extrapolated actual experience with the ability to apply G2 mortality improvement for a specified period of improvement).

Total or Active Lives may be selected, as well as the following parameters:

- Sex, Issue age, and Policy year
- Sex, Marital status, Issue age, and Policy year
- Sex, Underwriting risk class, Issue age, and Policy year
- Sex, Marital status, Underwriting risk class, Issue age, and Policy year

Valuation tables are derived by multiplying the "Expected" mortality rates by a factor of 0.90 with the margin factor grading to 1.00 at very old ages.

Mortality Improvement

Mortality improvement is observed in the general population and all insured lines of business. Mortality improvement scales are almost always based on Social Security Administration general population data over decades of time.

The Work Group is recommending the G2 Scale developed by the American Academy of Actuaries/Society of Actuaries Payout Annuity Table Team in the development of the 2012 Individual Annuity Reserving Table (2012 IAR). The recommended improvement starts from the midpoint of the observation period for the mortality data, 2008 to 2011 inclusive to the end of 2020 (i.e., 11 years of improvement).

ASOP No. 18, *Long-Term Care Insurance*,[14] section 3.2.8 "Change-over-Time Assumptions" requires the actuary to consider assumptions that change over time. Mortality improvement from the period observed to the period for which the assumption is to be used should be considered. The LTCAWG may consider alternative projection scale(s) to that recommended by the Work Group. The impact of improvement to the ultimate basic (without margin) mortality is illustrated in Table 8 below.

The G2 scale is recommended for improvement from the observation period to the end of 2020 for both total life mortality and active life mortality. The Work Group chose the G2 scale as it is a contemporary mortality improvement scale developed from Social Security Administration's mortality data. The G2 scale was developed by the 2012 IAR Work Group. We note that the ultimate LTC mortality table developed by the Work Group has a substantially similar shape and level as the 2012 IAM table. The Work Group is not making any recommendations for disabled life mortality as that is outside of the scope of the request from the LTCAWG.

[14] Actuarial Standards Board; Actuarial Standard of Practice No. 18, *Long-Term Care Insurance*, May 2011.

Additionally, an alternative the LTCAWG may consider is improvement of total life mortality and active life mortality beyond 2020, either for all policies for which the recommended mortality would apply (i.e., calendar year), or by issue year with no improvement beyond the issue year.

We used the Actuarial Guideline 51 (AG51) sample cells to show the sensitivity of applying the mortality improvement to 2020 and applying it indefinitely beyond 2020 for policies issued in 2020.

The following reserve amounts in Table 8 are for illustrative purposes only to provide an indication of how the mortality improvement might affect them. The interest rate used for discounting was 3.50%. The decrements are based on the recommendations in this report, assuming a Preferred premium rate class. The underlying incidence rates were based on the SOA 2015 LTC Experience Study's GLM model #2, without diagnosis. They were increased to account for the impact of the elimination period on the incidence. The claim terminations were calculated using the SOA 2015 LTC Experience Study's GLM model #2, applying the same continuance assumption during the elimination period as used to adjust the incidence. The recoveries were set at the difference between the total terminations and assumed disabled lives mortality. Mortality could not be higher than total terminations. The utilization was set at 100%.

Table 8. Sample Active Life Reserves

Sample Active Life Reserves						
Sample 1 =	Female, Issue Age 55, Unlimited Benefits with Automatic 5% Compound Increases in Maximums					
Sample 2 =	Female, Issue Age 55, Three Year Lifetime Benefit Maximum, with no increases in Maximums					
		Policy Year Fifteen (15)			**Policy Year Thirty (30)**	
		Reserve	**Ratio relative to no improvement**		**Reserve**	**Ratio relative to no improvement**
Sample 1	**No Improvement Scenario**	198,960			380,135	
	No Disabled Lives Mortality Improvement					
	Active Lives Improvement to 2020 Scenario	199,866	100%		393,799	104%
	Active Lives Indefinite Improvement Scenario	200,563	101%		417,195	110%
	Disabled Lives Mortality Improvement					
	Active Lives Improvement to 2020 Scenario	202,219	102%		399,149	105%
	Active Lives Indefinite Improvement Scenario	210,963	106%		437,879	115%
Sample 2	**No Improvement Scenario**	16,008			24,111	
	No Disabled Lives Mortality Improvement					
	Active Lives Improvement to 2020 Scenario	16,081	100%		24,999	104%
	Active Lives Indefinite Improvement Scenario	16,138	101%		26,524	110%
	Disabled Lives Mortality Improvement					
	Active Lives Improvement to 2020 Scenario	16,084	100%		25,186	104%
	Active Lives Indefinite Improvement Scenario	16,142	101%		27,086	112%

The Work Group offers the following additional observations with respect to mortality improvement for valuation:

1. There is currently no known industry study on LTC mortality trends. There is evidence of mortality improvement trends in both general and annuitant populations. Because mortality experience for Individual Annuitants and LTC policyholders appear to have similar shapes (see figures 4 and 5, below), it is reasonable to assume that mortality improvement exists in LTC as well.

Figure 4. Female Ultimate Mortality Rates, Age Last Birthday

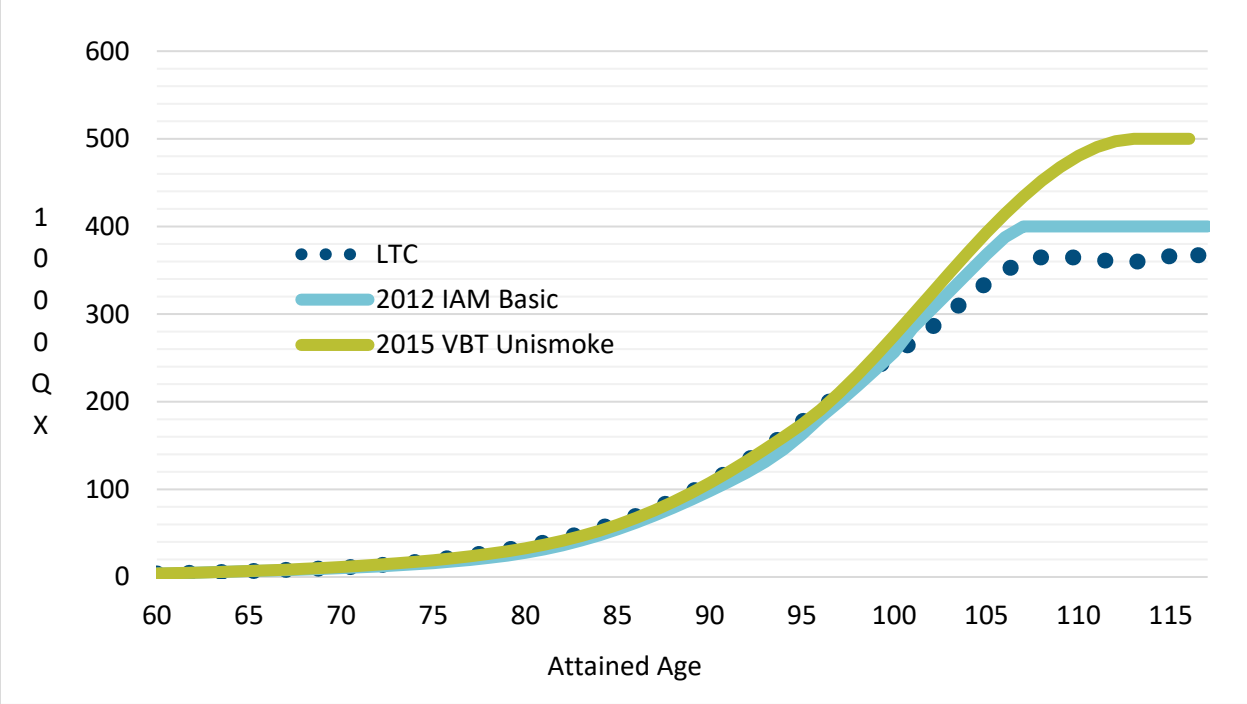
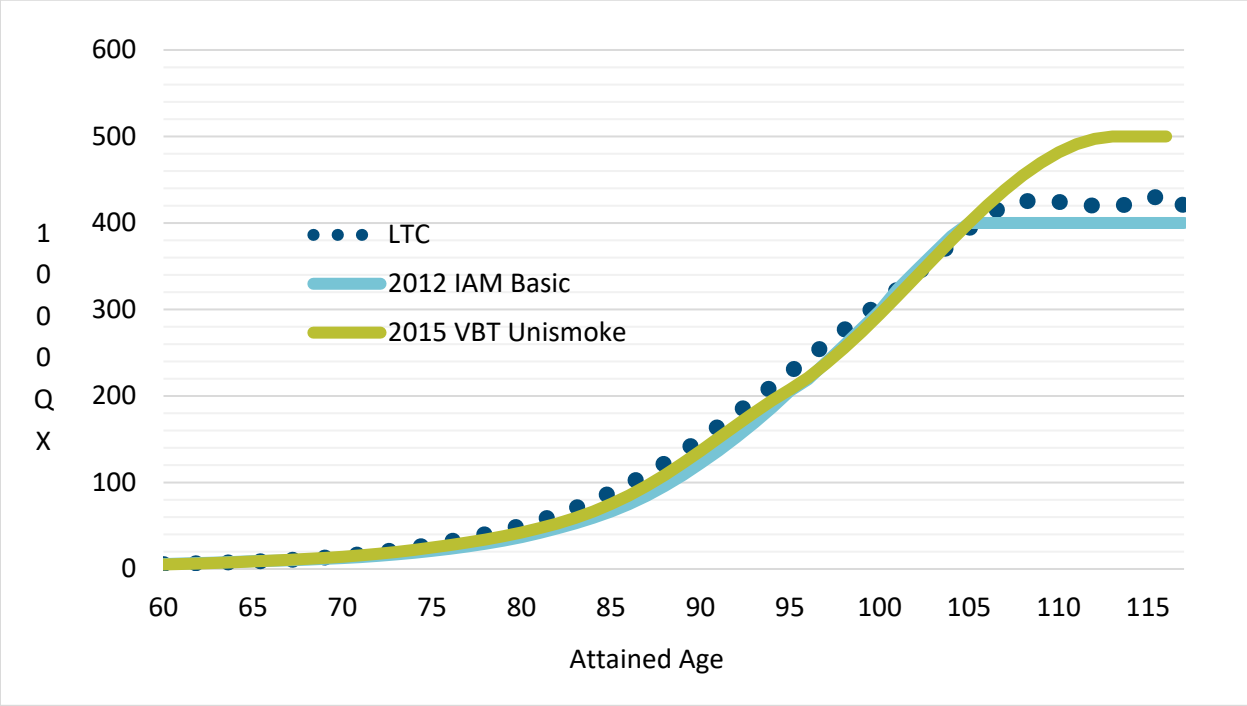


Figure 5. Male Ultimate Mortality Rates, Age Last Birthday



2. If no future mortality improvements are assumed in the valuation of liabilities, the valuation tables may be inadequate in the future if there is indeed future improvement and the built-in margin for conservatism is eroded. This may be an acceptable position if industry experience can be monitored in a timely manner.

3. With respect to the choice of G2 scale for LTC, there is a possibility that LTC policyholders have greater improvement than annuitants because they tend to have a higher socioeconomic status. Again, timely industry experience monitoring is necessary.

4. In a first-principle valuation method, active and disabled policyholders are modeled separately (disabled policyholders tend to have materially higher mortality than active policyholders). A decision needs to be made on whether mortality improvement applies to both active and disabled policyholders or to actives only.

    a. There is evidence of disabled lives mortality improvement in Social Security disabled beneficiaries' data. There is also evidence of improvement in disabled retired persons' data (RP-2000 and RP-2014 tables). However, the definition of disability varies considerably among disabled populations.

    b. From a comparison of five-year survival rates of disabled samples in the National Long-Term Care Surveys, there is no evidence of mortality improvement.[15] Comparison of

[15] "Disabled Mortality and the Impact on Life Expectancy: An LTC Perspective," 2017 SOA Annual Meeting, Session 83.

disabled mortality rates by calendar year using the 2000–2011 SOA LTC Inter-Company Study is inconclusive with respect to mortality improvement trends.

c. Requiring mortality improvement on total lives may be inconsistent with not requiring improvement on disabled lives.

d. For financial projections and valuation under generally accepted accounting principles (GAAP), industry practice has been to assume mortality improvement on active policyholders only.

e. Disabled mortality improvement is an unresolved issue in LTC. A reasonable approach is to allow companies to choose disabled mortality improvement or not. AG51 may consider requiring sensitivity analysis with respect to this assumption.

5. Currently, there is no conclusive indication whether COVID-19 will have a permanent impact on future LTC mortality experience. The coronavirus may subside, and vaccines may be effective so that the impact on mortality is only temporary. On the other hand, herd immunity may be difficult to develop, so the impact may linger. Early data suggests that COVID-19 has a relatively flat excess percentage of mortality across ages above 60. It is, therefore, unclear how COVID-19 may affect future mortality improvement trends. If COVID-19's impact is permanent, then the recommended tables will likely have additional margins.

IV. LAPSE

Developmental Process

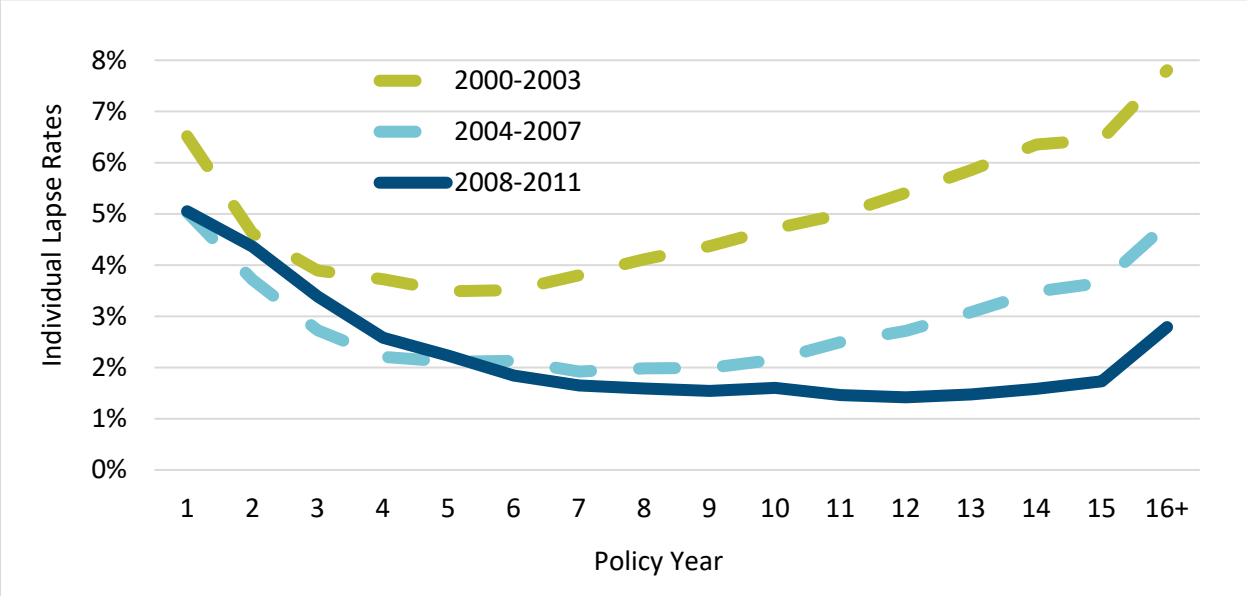
Similar to the mortality tables, the following general steps were taken to derive the recommended lapse tables:

- Check reasonableness of provided data using published SOA summary data.
- Determine predictive factors for lapse tables.
- Develop raw rates.
- Smooth rates.
- Develop factors.
- Calculate expected lapses based on preliminary proposed rates with factors.
- Compare actual lapses to expected lapses.

Study Period

As noted previously, lapse data from the DEFN 2 participating companies for the most recent four-year period (2008–2011) of the 2000–2011 SOA LTC Intercompany Study was used for the lapse tables. As suggested by Figure 6 below, there appears to be a declining trend in lapses, perhaps impacted by improved death coding over the SOA study period from 2000 to 2011, especially at the later policy durations beyond year 13.

Figure 6. Lapse Rates by Policy Duration and Study Period, All Issue Ages, DEFN 2 Companies



Lapse and Exposure Definitions

The recommended lapse tables to be developed pertain to voluntary lapses. Voluntary lapses are defined as policy terminations due to nonpayment of premium, group termination, policy conversion, and other terminations with unknown causes. Terminations due to benefit exhaustion were excluded. However, it is possible that certain companies might have classified benefit exhaustions as other terminations with unknown causes.

Annual lapse rates for the recommended tables are ratios of counts over exposures. Both counts and exposures are tabulated on a policy year basis. During any policy year, a policy contributed to a lapse count if the policy lapsed during the policy year. Because almost all LTC policies waive premiums during claim, we assumed that the lapse counts are the same on both total-lives and active-lives bases.

Exposures are also determined on a policy year basis. A full year of total-lives exposure for lapse (consistency with mortality) is assigned if a policy is in force at the beginning of the policy year and still in force at the end of the policy year or if the policyholder lapsed during the policy year. If the policy terminated for any other reasons, a partial year of exposure is assigned based on the month during which the policy terminated.

For active lives lapse exposures, the policy must not be on claim at the beginning of the policy year. If a policy becomes active during a policy year, partial exposure is assigned from the first month of being active.

Data Credibility

Based on the selected data, Figures 7 and 8 below summarize the lapse counts by issue age group and policy duration with respect to credibility, using 1,082 counts or more as a measure of full credibility.

Figure 7. Minimum of Number of Individual Lapses and 1,082 (Full Credibility) by Issue Age Group and Policy Duration

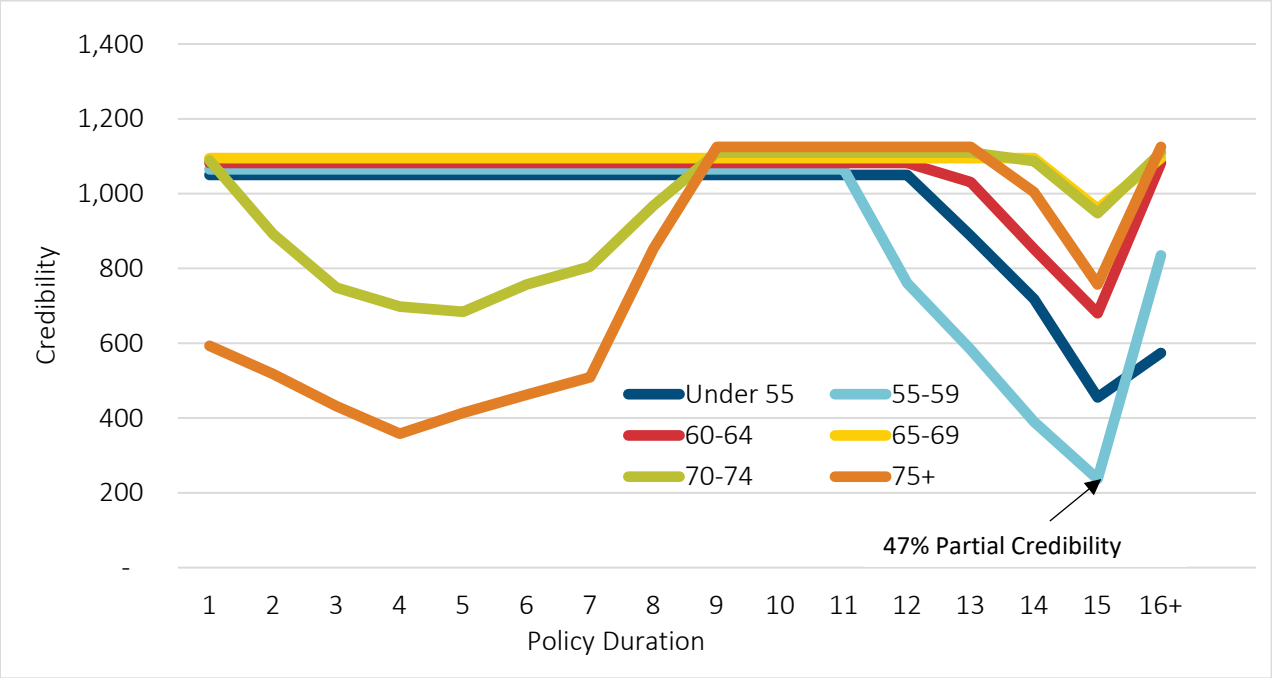
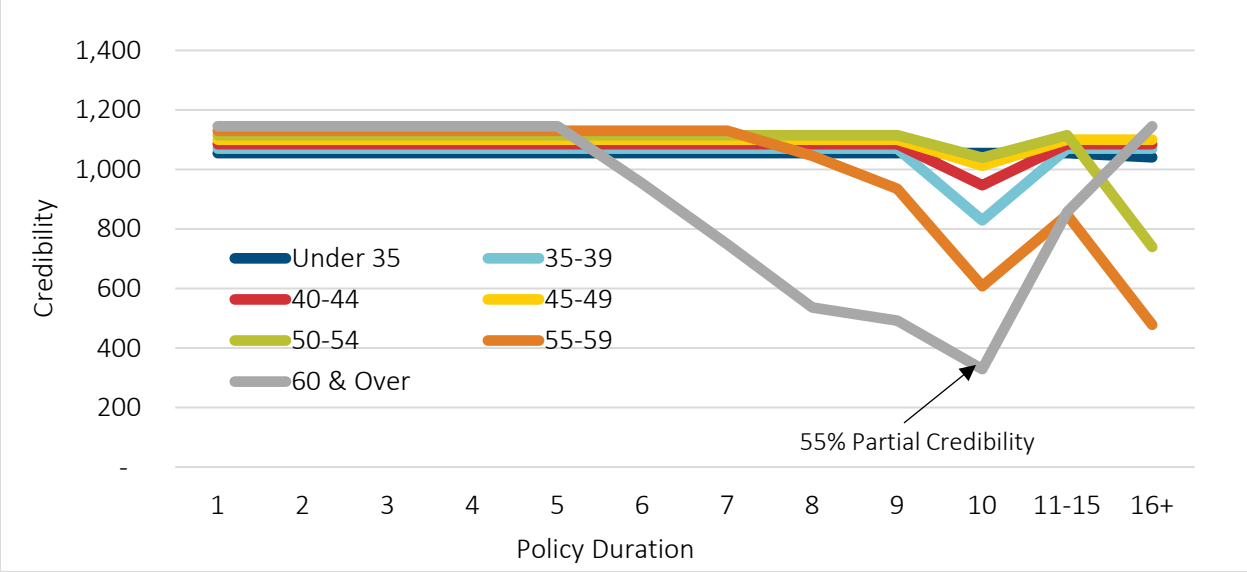


Figure 8. Minimum of Number of Group Lapses and 1,082 (Full Credibility) by Issue Age Group and Policy Duration



The graphs indicate that the majority of the developed rates in issue age and duration cells are fully credible, except for certain cells in the later policy durations.

As shown in the graph for individual lapses (Figure 7), lapse counts for policy duration 11 and over for the issue age group Under 55 are only partially credible. Thus, it is inadvisable to split the Under 55 issue age group further. This also holds for group lapses (Figure 8) in the issue age group 60 and over for policy duration beyond the sixth year. Any further subdivision would render the results not credible.

Predictive Variables

LIMRA, the statistical agent for the Study, performed a multivariate analysis of the tabulated lapse data. A logistic regression model with forward selection produced the following ranked results of factor significance based on Wald Chi-Square:

Table 9. Ranked Results of Significant Covariates (Wald Chi-Square)

Significant Covariates	
Factor	Wald Chi-Square
Policy Year	37,460
Premium Status	24,051
Attained Age	22,168
Underwriting Type	20,696
Periodic Premium Level	15,548
Marital Status	3,004
Premium Mode	2,348
Physician Statement	1,570
Marital Discount	917
Rate Increase Indicator	572

Policy year, attained age, underwriting type, premium level, and marital status appeared to be key factors for table development.

These findings are consistent with the results from the corresponding model for mortality. Accordingly, the Work Group decided that the factors for both mortality and lapse should be as identical as possible. That is, the lapse table will utilize policy year, attained age (in the form of issue age and policy duration), underwriting type, and marital status as factors.

For group LTC business, the vast majority of certificates are guaranteed issue and marital status is typically not known. Therefore, these factors would not apply to group business.

Development of Tables

As shown in Figures 9 and 10, raw individual and group lapse rates for total lives by issue age group and policy duration were determined as ratios of lapse counts over exposures.

Figure 9. Raw Lapse Rates by Issue Age, Group and Policy Duration, Individual, Total Lives

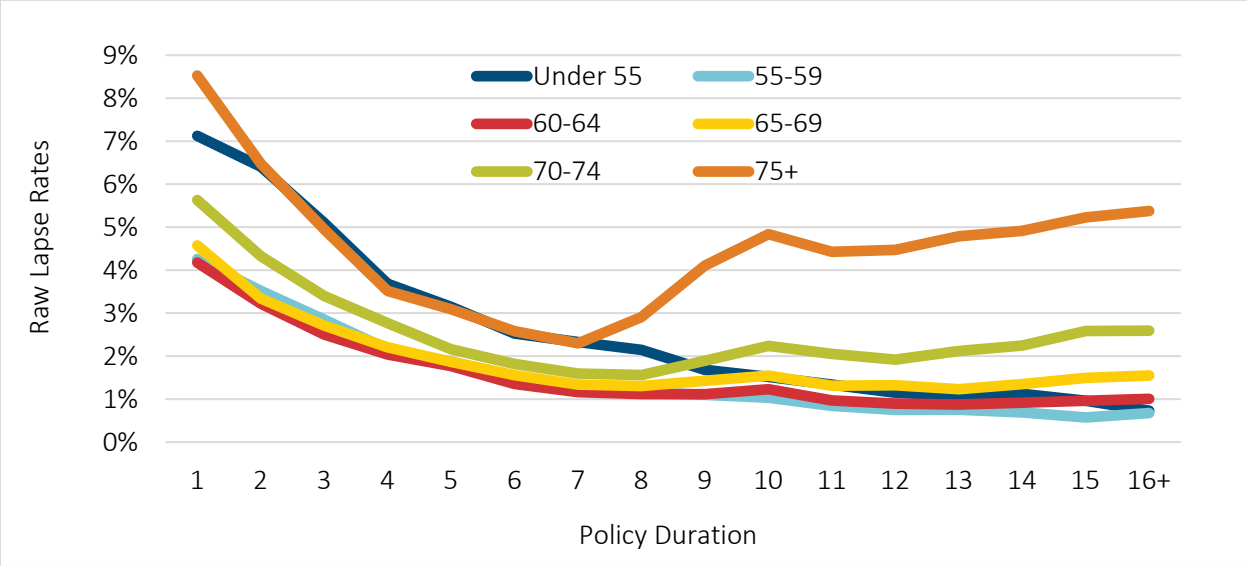
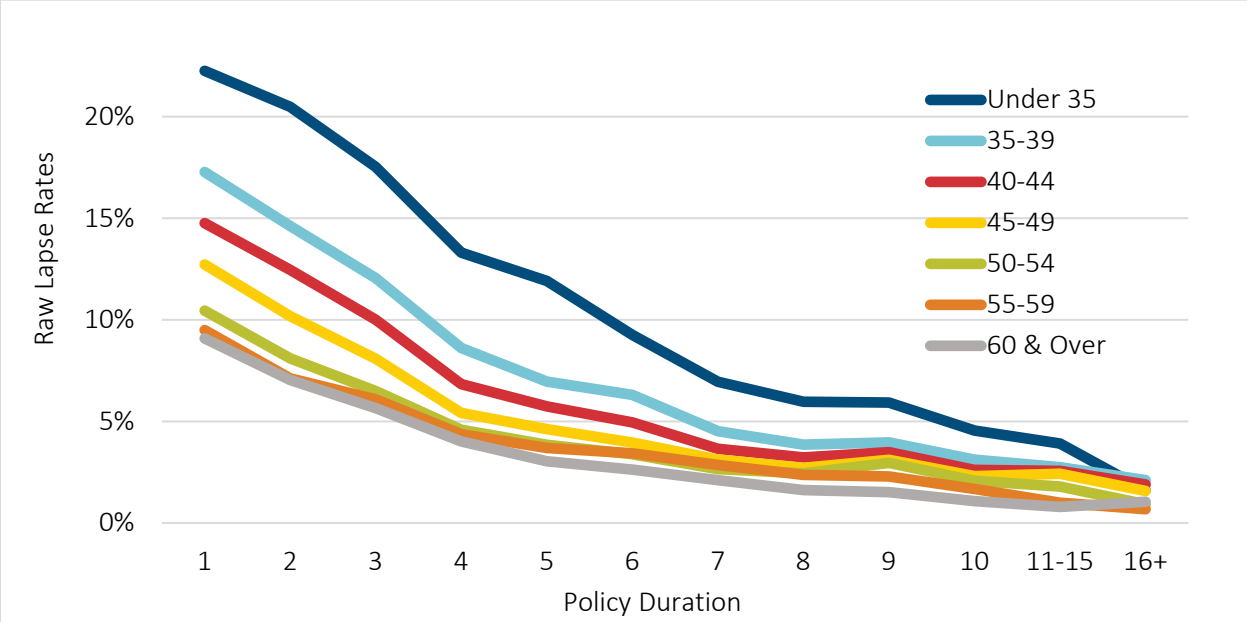


Figure 10. Raw Lapse Rates by Issue Age, Group and Policy Duration, Group, Total Lives



With respect to the raw individual lapse rates, we noted that later policy duration lapse rates tended to be increasing, especially at the older issue age groups. This phenomenon can at least be partially attributed to the under-reporting of deaths upon policy termination, which occurs more frequently at

later policy durations and older attained ages. Due to the declining trend by calendar year, the Work Group believes it is prudent to be conservative at the later policy durations. Accordingly, the raw lapse rates were adjusted to be non-increasing by policy duration.

Note that, for group lapse rates, policy durations from year 11 through 15 were aggregated in order to improve data credibility at these durations.

To derive the recommended lapse rates for total lives by issue age group and policy duration, the raw rates were smoothed by fitting them to either a 2-degree polynomial or a power function. A polynomial or power equation was chosen by visualizing the fit in an Excel graph. Figures 11 and 12 below display the recommended lapse rates.

Figure 11. Smoothed Lapse Rates by Issue Age Group and Policy Duration

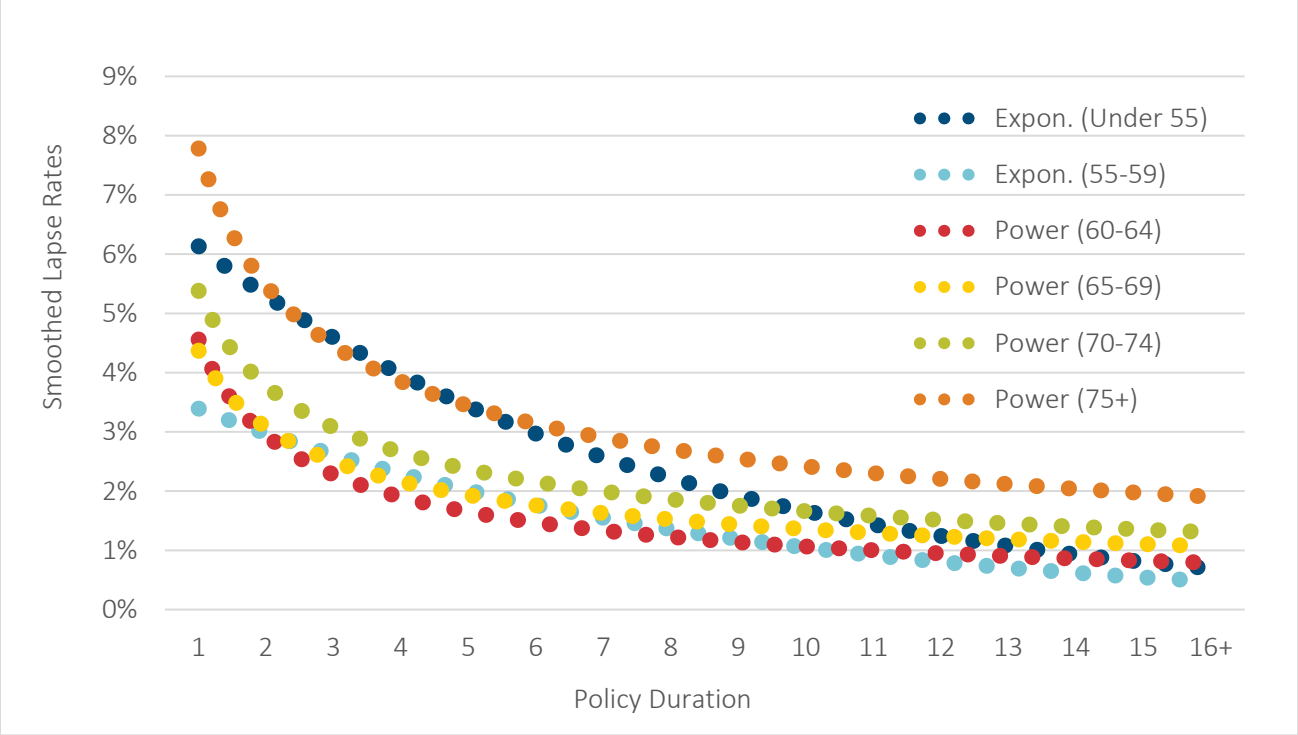
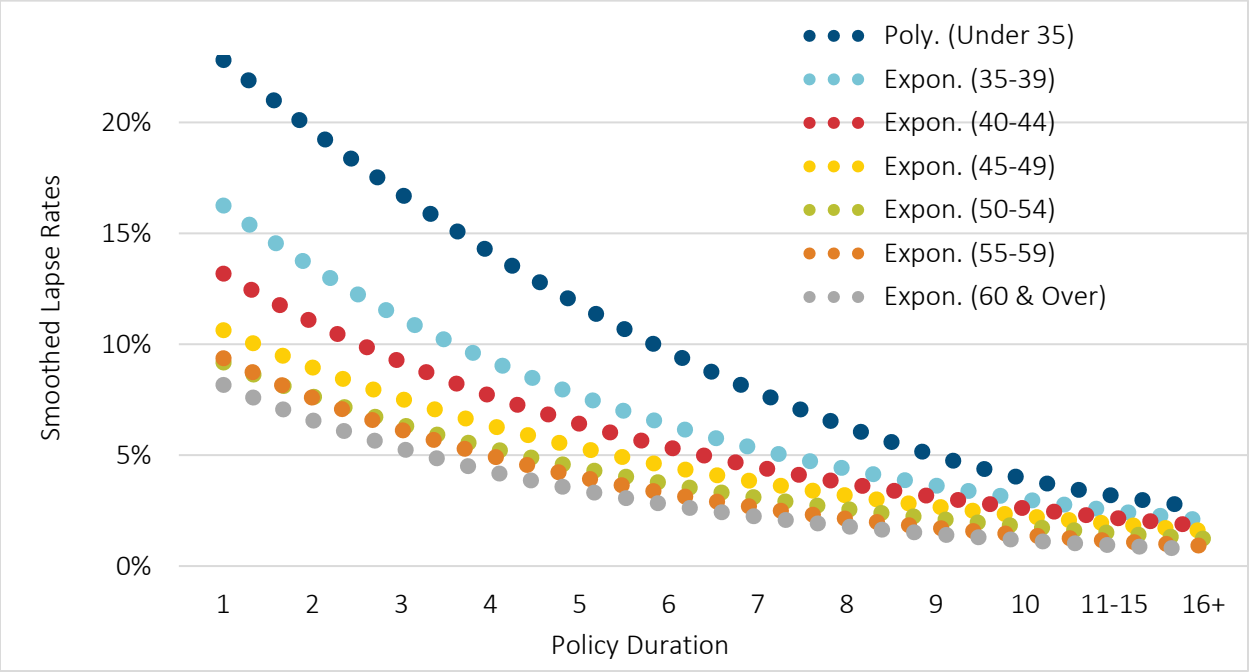


Figure 12. Smoothed Lapse Rates by Issue Age Group and Policy Duration Group, Total Lives



The recommended lapse tables for active lives were developed in a similar fashion by substituting active lives exposures for total lives exposures. The numerators of the ratios, the numbers of active lives lapses, are assumed to be the same as for total lives lapse rates. Because almost all long-term care policies have waiver of premium benefits, very few policies lapsed while the policyholders were on claim.

Underwriting Risk Class and Marital Status Factors for Individual Business

The underwriting risk class and marital factors for total lives individual lapses were determined by policy duration only with the same factors applying to all issue age groups. Lapse rates by policy duration for the three underwriting classes—preferred, standard, and substandard—were first calculated. The factors are the ratios of these lapse rates to the overall durational lapse rates without underwriting distinction. These factors for the three classes were smoothed to arrive at the final proposed factors. A similar process was also performed for marital status. Figures 13 and 14 below show the raw and the smoothed factors.

Figure 13. Raw and Smoothed Factors for Underwriting Class

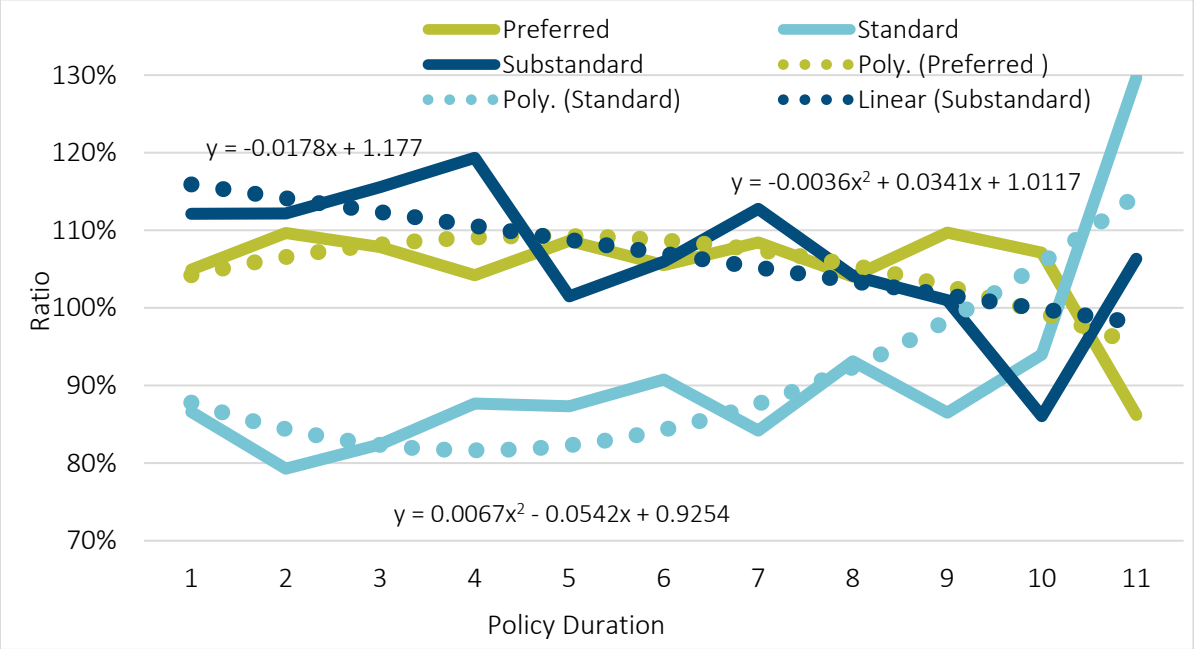
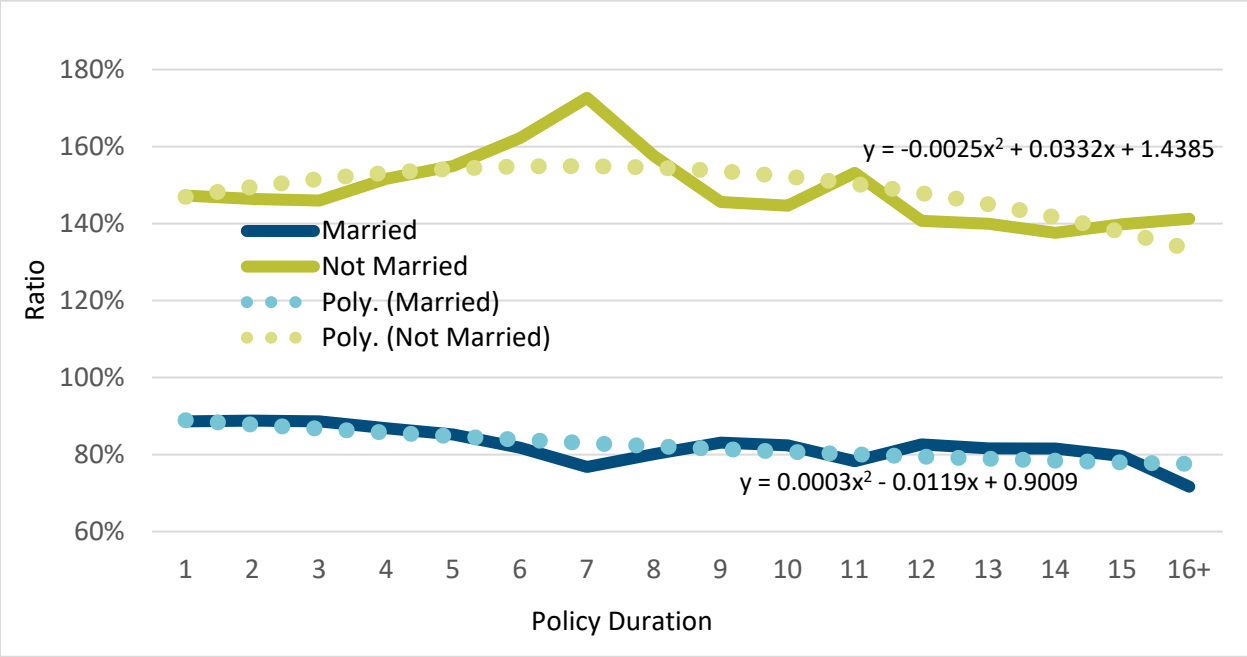


Figure 14. Raw and Smoothed Factors for Marital Status



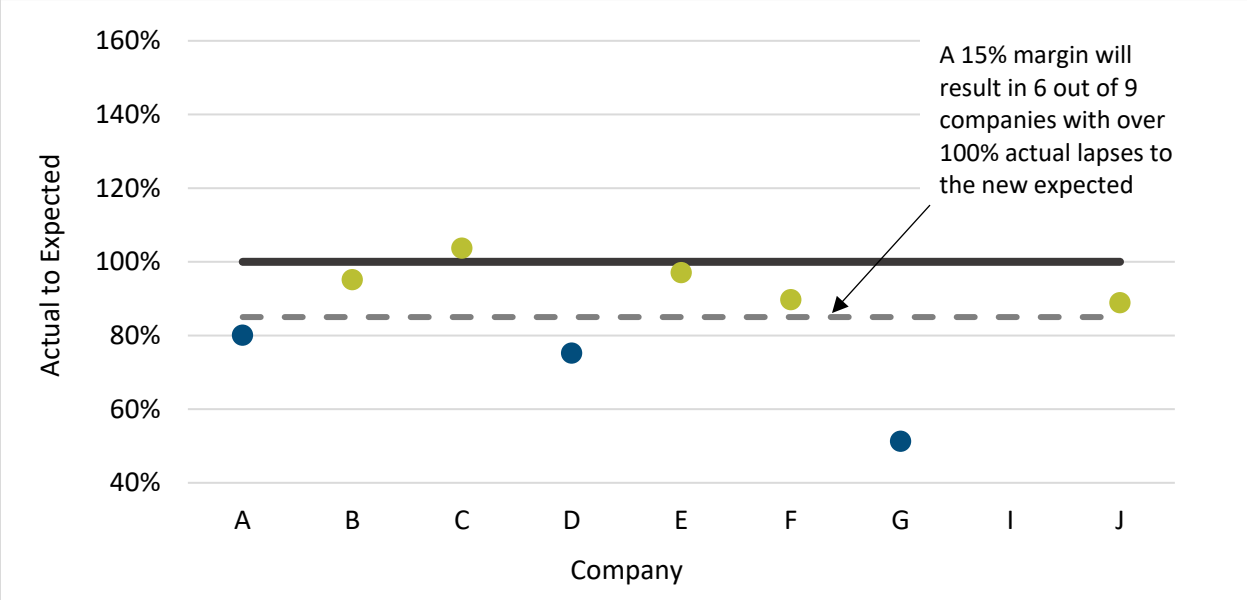
Because the lapse rates for active lives are not materially different than those of total lives, the recommended factors derived from total lives lapses can equally apply to active lives lapse rates.

The underwriting risk class and marital status factors are not applicable to the recommended group lapse rates because most of the group business was guaranteed issue and marital status is generally unknown.

Development of Margin Recommendation

The recommended lapse tables and factors represent best estimates of future long-term care lapse events based on past experience. In order to use these tables for valuation purposes, a margin of conservatism should be added to cover a company's variation from industry experience. The Work Group was able to obtain lapse data from individual participating companies that made up the aggregate data for the recommended lapse table construction. A ratio of actual lapses to expected lapses based on the recommended lapse tables was calculated for each company. The results are shown in Figure 15:

Figure 15. Actual-to-Expected Lapses, Individual Total Lives, by Company, Without Margins, Policy Years 11 & Over



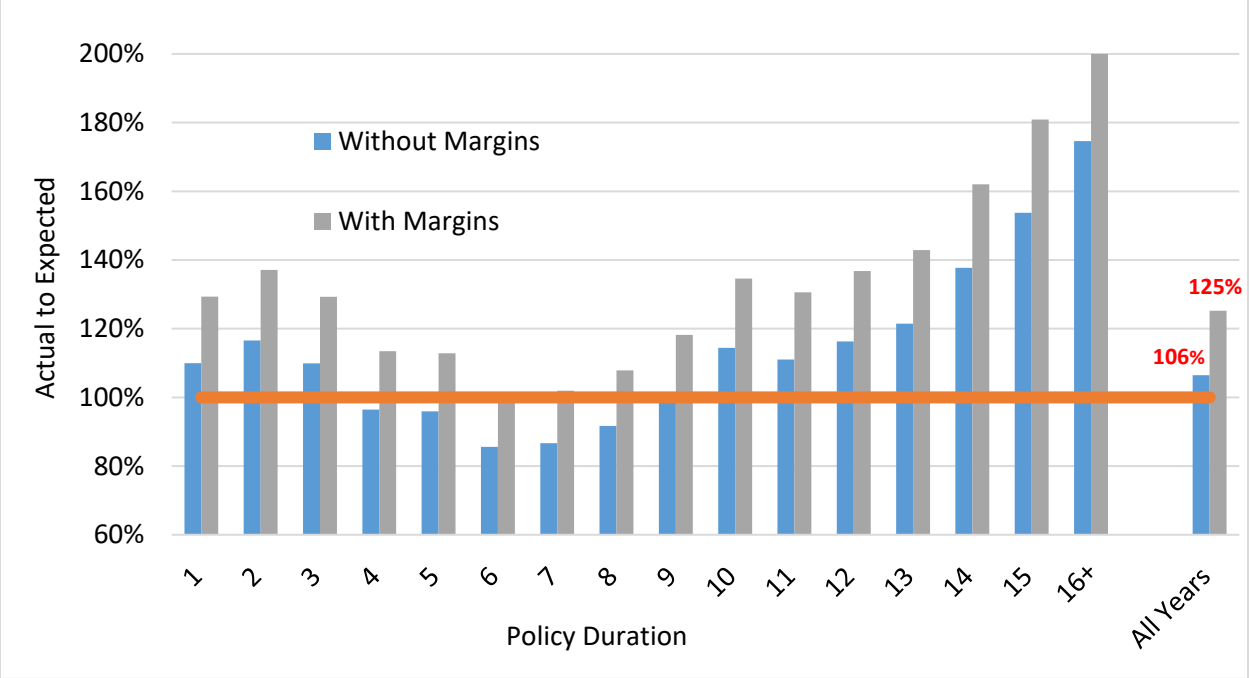
One company with an abnormally high actual-to-expected ratio was excluded in the comparison. The actual-to-expected ratio for two out of nine companies was above 100%. However, a 15% margin on the recommended lapse tables would result in six out of nine companies' actual lapses exceeding the newly expected number of lapses based on the more conservative lapse tables. Accordingly, the Work Group recommends a 15% margin.

Comparison of Recommended Lapse Tables With Actual Experience

In order to assess the reasonableness of the recommended lapse tables relative to past experience, the Work Group performed a series of comparisons.

Figure 16 compares the actual total lives Individual lapses by policy duration to the expected number of lapses based on the recommended lapse tables.

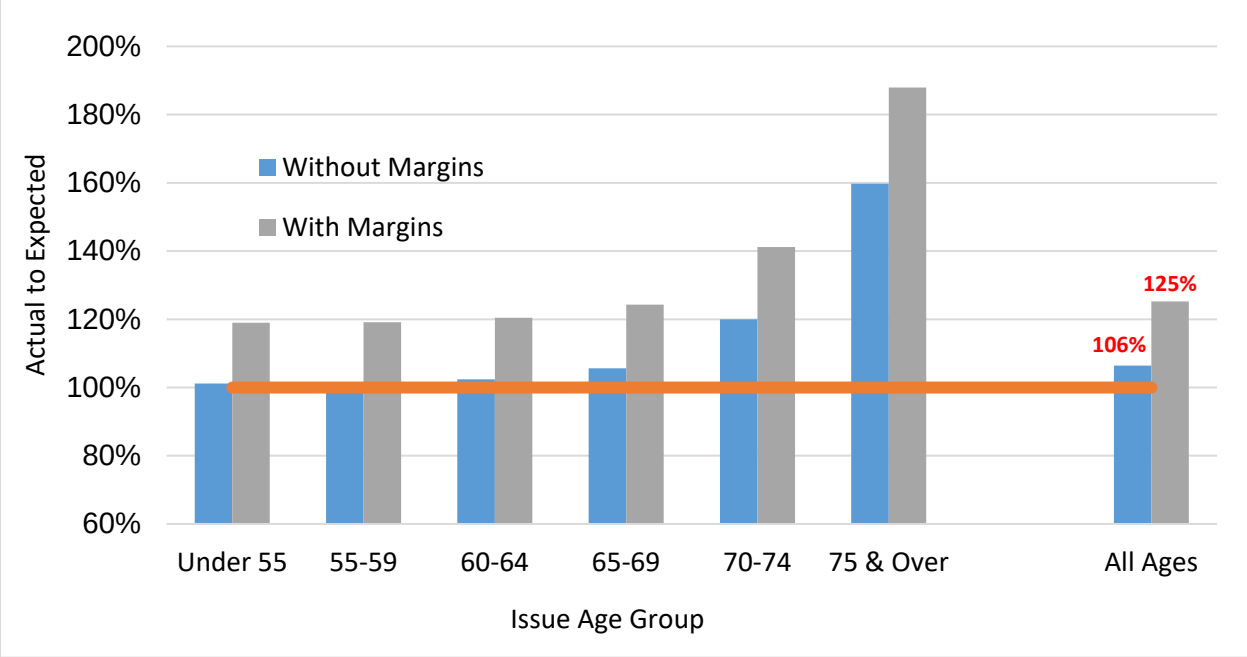
Figure 16. Actual-to-Expected Lapses, Individual Total Lives, by Policy Duration, With and Without Margins



The greater-than-100% actual-to-expected ratio beyond the ninth duration is due to the restriction of non-increasing lapse rates by policy duration. The overall actual-to-expected is 106%. With the margin, the overall actual-to-expected is 125%. The Work Group believes the recommended lapse rates by policy durations relative to actual experience are reasonable in light of the declining trends in recent experience years.

The Individual total lives actual lapses to expected by issue age group are shown in Figure 17.

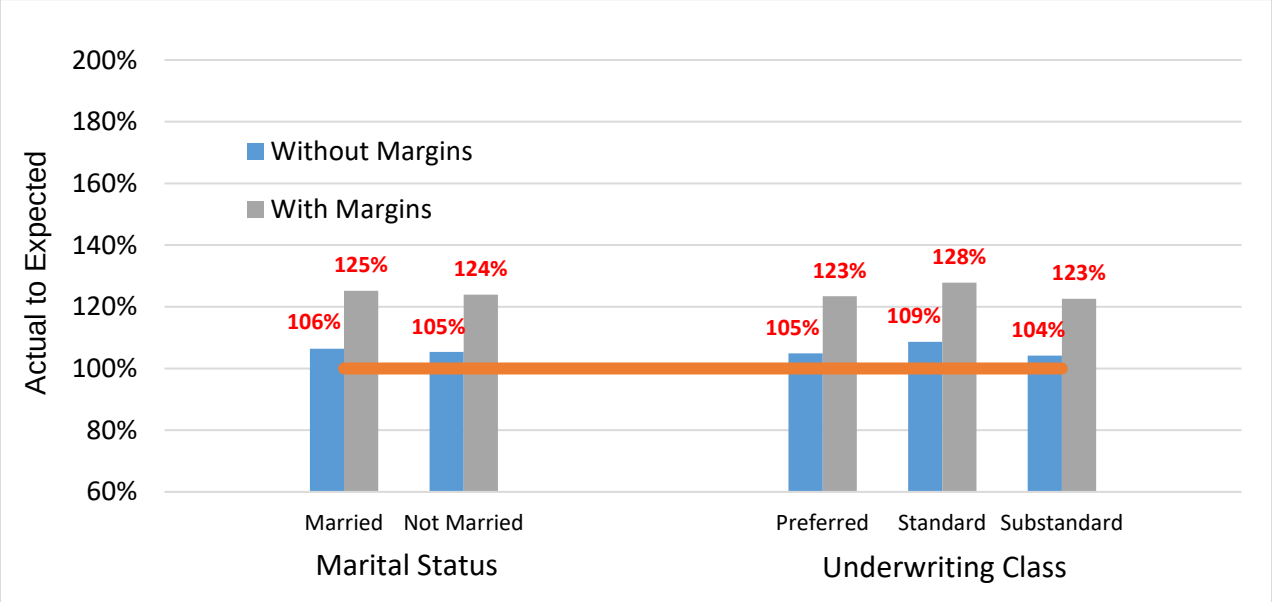
Figure 17. Actual-to-Expected Lapses, Individual Total Lives, by Issue Age Group, With and Without Margins



The non-increasing limitation by policy duration has the greatest impact on issue ages 70 and over.

Figure 18 shows the total lives individual actual-to-expected ratios by marital status and underwriting risk class.

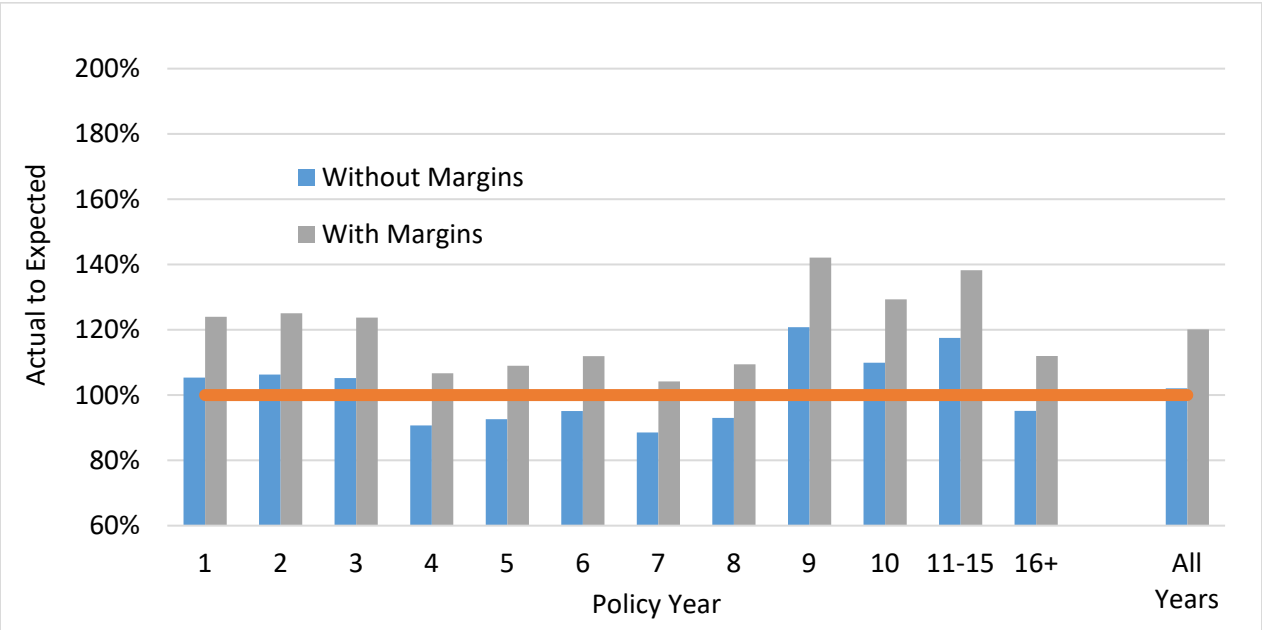
Figure 18. Actual-to-Expected Lapses, Individual Total Lives, by Martial Status and Underwriting Class, With and Without Margins



The actual-to-expected ratios are relatively close to the overall actual-to-expected without the margin.

The total lives group actual lapses to expected by policy duration are provided in Figure 19:

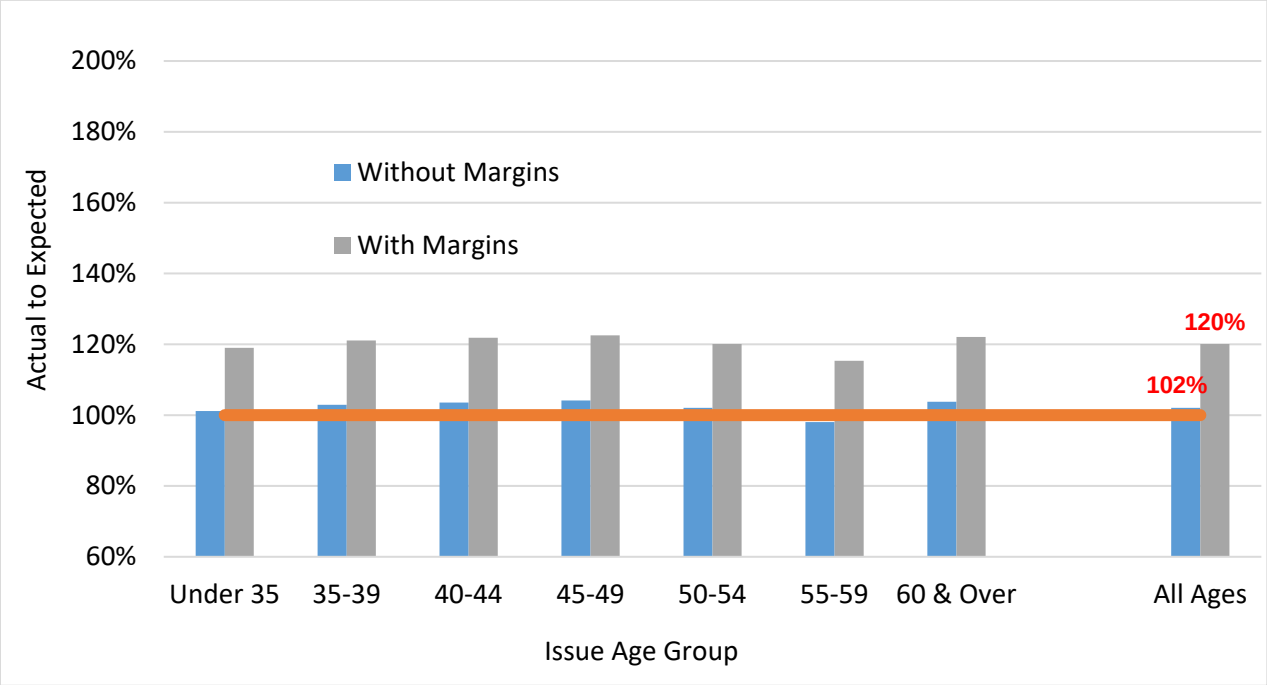
Figure 19. Actual-to-Expected Lapses, Group Total Lives, by Policy Year, With and Without Margins



Without margin, the actual-to-expected ratios are relatively stable during the first eight policy durations but slightly exceed 100% thereafter. The Work Group believes the slight conservatism is justified due to the significance of the lapse rates at higher durations for valuation purposes.

The total lives group actual lapses to expected by issue age group are shown in Figure 20:

Figure 20. Actual-to-Expected Lapses, Group Total Lives, by Issue Age Group, With and Without Margins



The corresponding comparisons for actives lives lapses produced similar results as for total lives lapses. These comparisons are presented in Appendix 2.

Recommended Lapse Tables

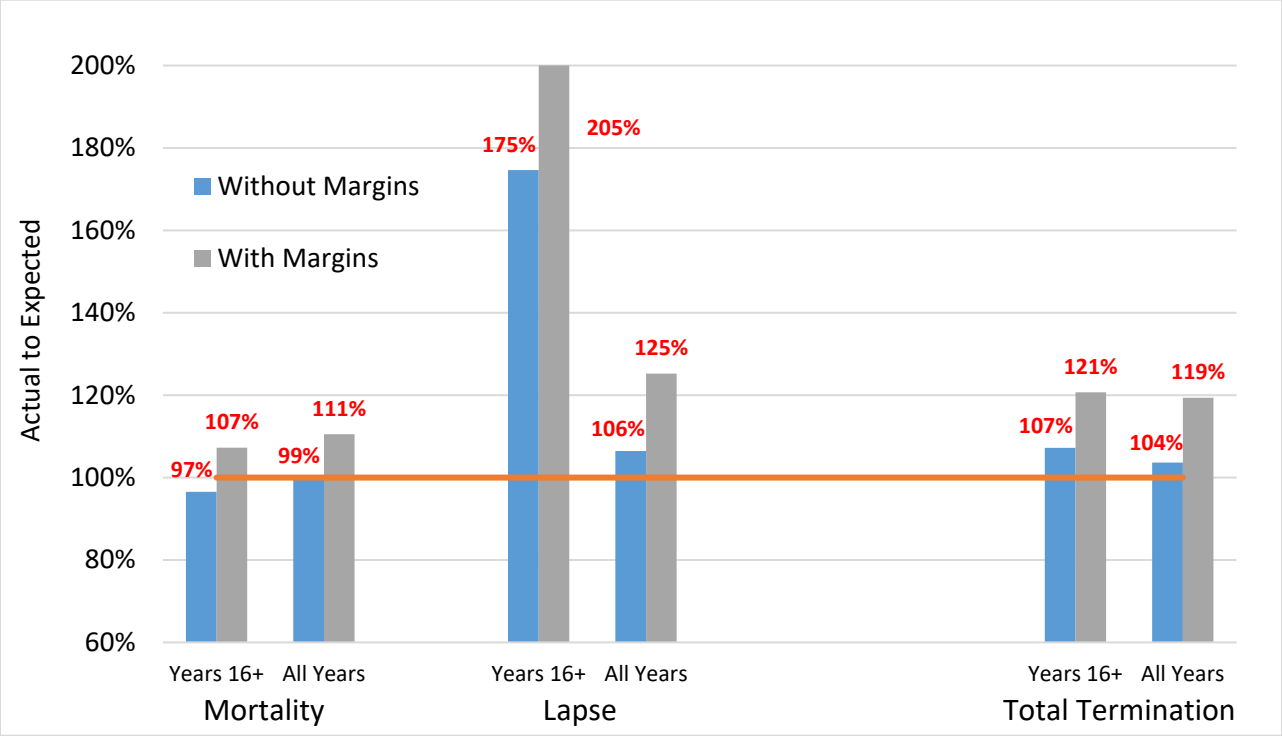
The recommended lapse tables for total lives and active lives are shown in Appendix 3. The individual lapse rates vary by issue age group, policy duration, marital status and underwriting class. The group lapses rates vary by issue age group and policy duration.

V. TOTAL TERMINATION

A policy may lapse because the policyholder died. Verification of death is not always possible, and results vary from company to company. Accordingly, the delineation between voluntary lapse and death is not precise for long-term care insurance. The Work Group performed a check on total terminations (i.e., combining lapses and deaths) to ensure that the recommended lapse and mortality tables reasonably represent actual combined experience.

The lapse and death components that made up the total lives individual actual-to-expected are shown in Figure 21:

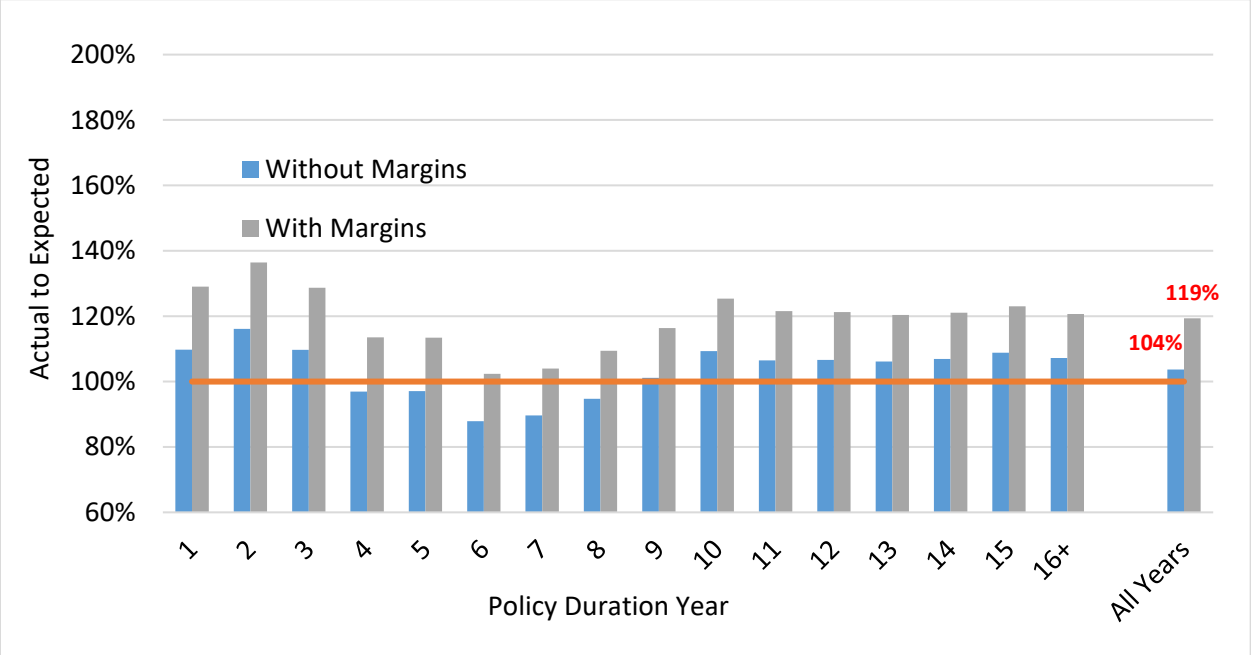
Figure 21. Actual-to-Expected Mortality and Lapse, Individual Total Lives, With and Without Margins



During the study period 2008–2011, there were approximately 79,000 deaths and 200,000 lapses. The slightly aggressive actual-to-expected deaths are more than offset by the conservatism from that for lapses. For terminations that occurred beyond policy year 15, there were 11,000 deaths and only 8,800 lapses.

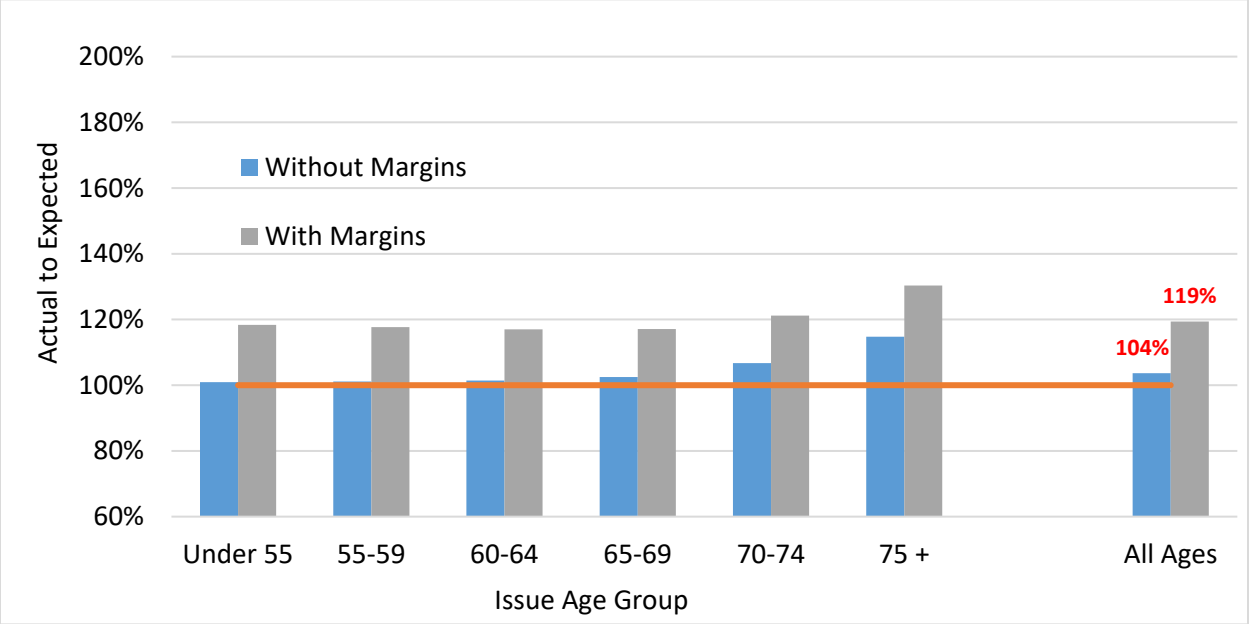
The individual total lives actual total terminations are slightly greater than the expected with and without margins beyond the 10th policy duration, as seen in Figure 22:

Figure 22. Actual-to-Expected Total Terminations, Individual Total Lives, by Policy Year, With and Without Margins



As shown in Figure 23 below, the actual-to-expected is slightly increasing by issue age group:

Figure 23. Actual-to-Expected Total Terminations, Individual Total Lives, by Issue Age Group, With and Without Margins



For group business, the actual total terminations are slightly less than the expected without margins beyond the 15th policy year, as shown in Figures 24 and 25 below:

Figure 24. Actual-to-Expected Mortality and Lapse, Group Total Lives, With and Without Margins

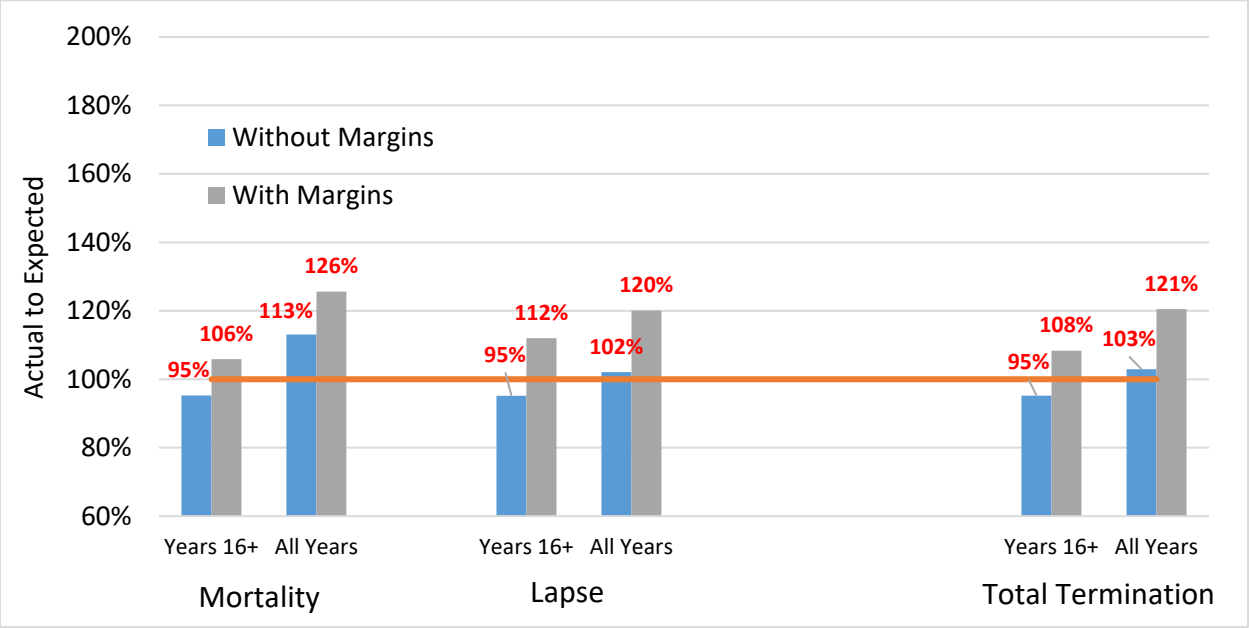
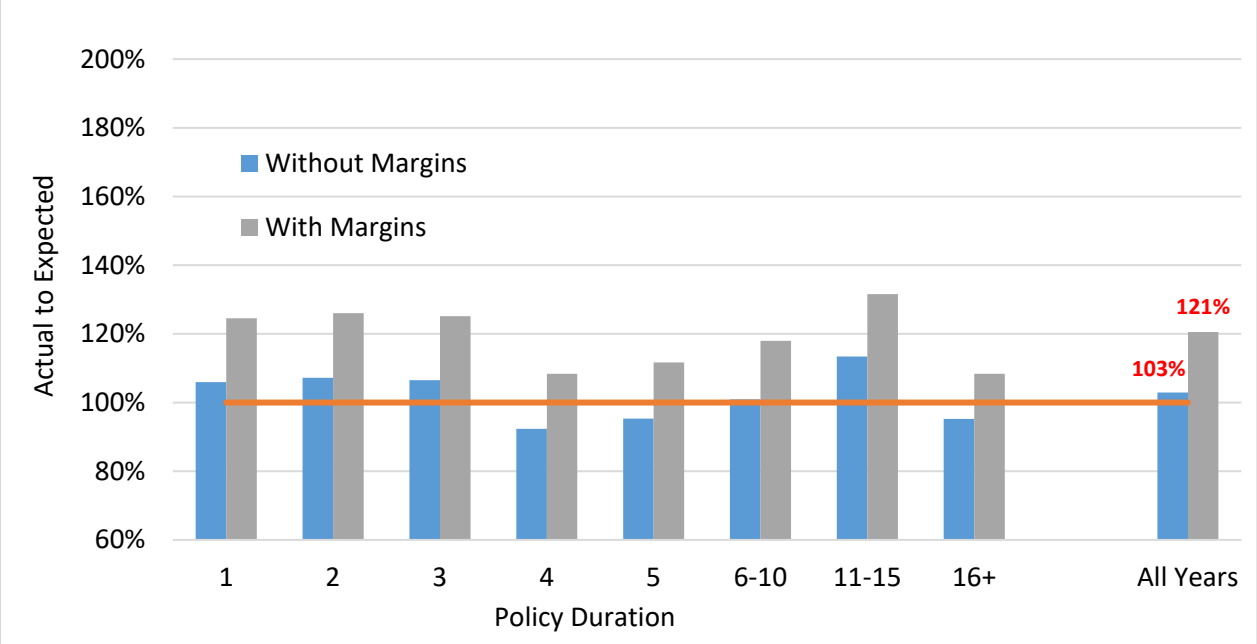


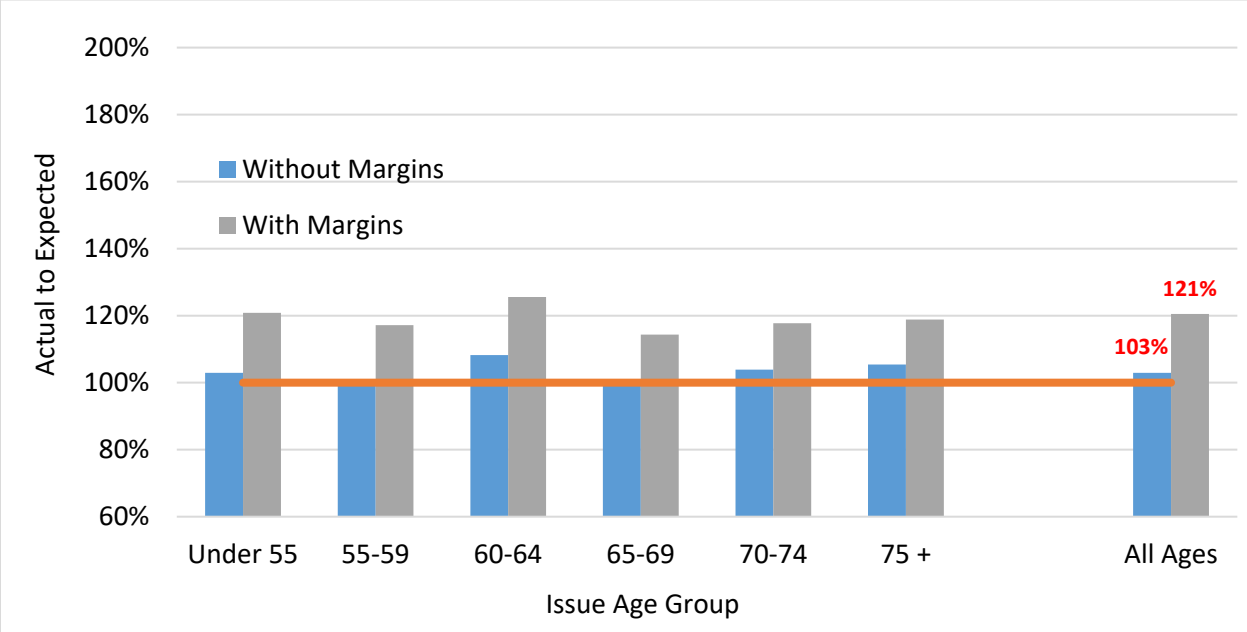
Figure 25. Actual-to-Expected Total Terminations, Group Total Lives, by Policy Duration, With and Without Margins



The actual total terminations are greater than the expected with margins for all policy durations.

By issue age group, the group total lives actual total terminations are equal to or slightly greater than the expected without margins for all issue age groups. As seen in Figure 26, actual total terminations are greater than the expected with margins for all issue age groups.

Figure 26. Actual-to-Expected Total Terminations, Group Total Lives, by Issue Age Group, With and Without Margins



The relationship of actual-to-expected total terminations for actives lives is very similar to that for total lives.

In conclusion, the Work Group is satisfied with the recommended tables in that the implied total terminations are consistent with actual experience.

VI. APPENDICES

Appendix 1—LTCAWG Request

5/5/16

The Long-Term Care Valuation (B) Work Group of the NAIC Health Actuarial (B) Task Force's Long-Term Care Actuarial (B) Working Group requests assistance from the American Academy of Actuaries (Academy) and the Society of Actuaries (SOA) with the following:

1) Develop a replacement mortality table for the current statutorily prescribed long-term care (LTC) mortality basis for active life reserves (ALR), the 1994 Group Annuity Mortality Static Table. The replacement mortality table is to be based on the 2012 Individual Annuity Mortality Table, and should vary, where appropriate, by issue age, gender, and individual versus group policy. Consider whether it would be prudent to develop a margin for conservatism to be applied to the table for ALR. Such a margin may be in the form of select and ultimate factors reflective of data studied in the recent SOA/Life Insurance Research Marketing Association (LIMRA) LTC Voluntary Lapse and Mortality Experience Study.

2) Develop a proposal to replace the current statutorily prescribed LTC voluntary lapse parameters. The proposal is to be developed using data from the recent SOA/Life Insurance Research Marketing Association (LIMRA) LTC Voluntary Lapse and Mortality Experience Study, and should vary, where appropriate, by issue age, gender, policy duration, individual versus group policy as well as by the presence of specific benefits features that show evidence of producing different lapse experience historically than others.

3) For both items above, consider whether the required assumptions used for determining ALR should be modified depending upon whether the morbidity tables used in determining ALR are based on an active lives only or an all lives approach.

Please provide updates on progress as, available, and provide final results for mortality and lapses separately if they are completed at different times.

Thank You,

Perry Kupferman, Chair, Long-Term Care Actuarial (B) Working Group

Appendix 2—Active Lives Actual Lapses to Expected Comparisons

Figure 27. Actual-to-Expected Lapses, Individual Active Lives, by Policy Duration, With and Without Margins

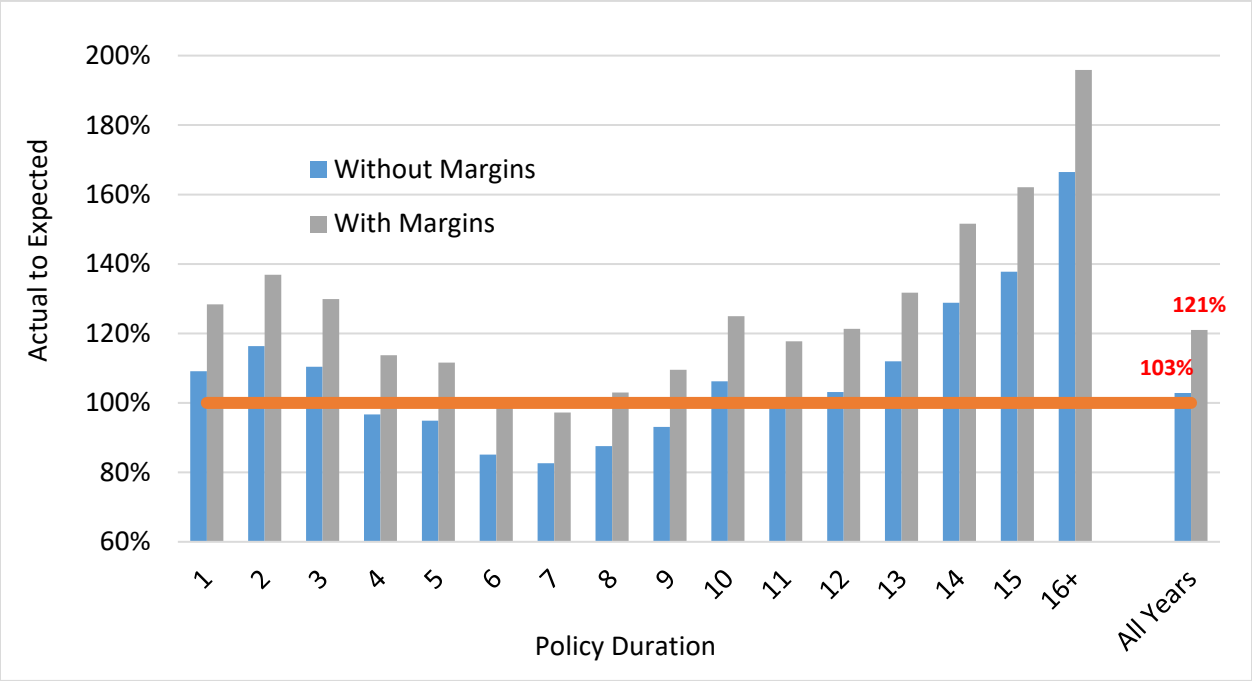


Figure 28. Actual-to-Expected Lapses, Individual Active Lives, by Issue Age Group, With and Without Margins

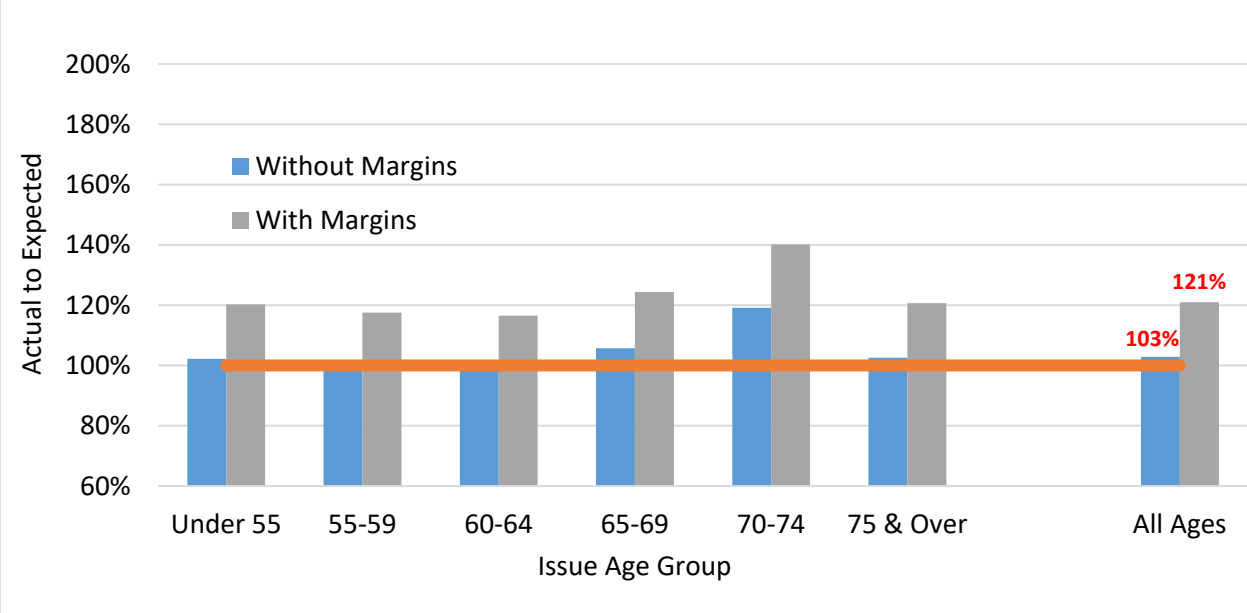


Figure 29. Actual-to-Expected Lapses, Individual Active Lives, by Martial Status and Underwriting Class, With and Without Margins

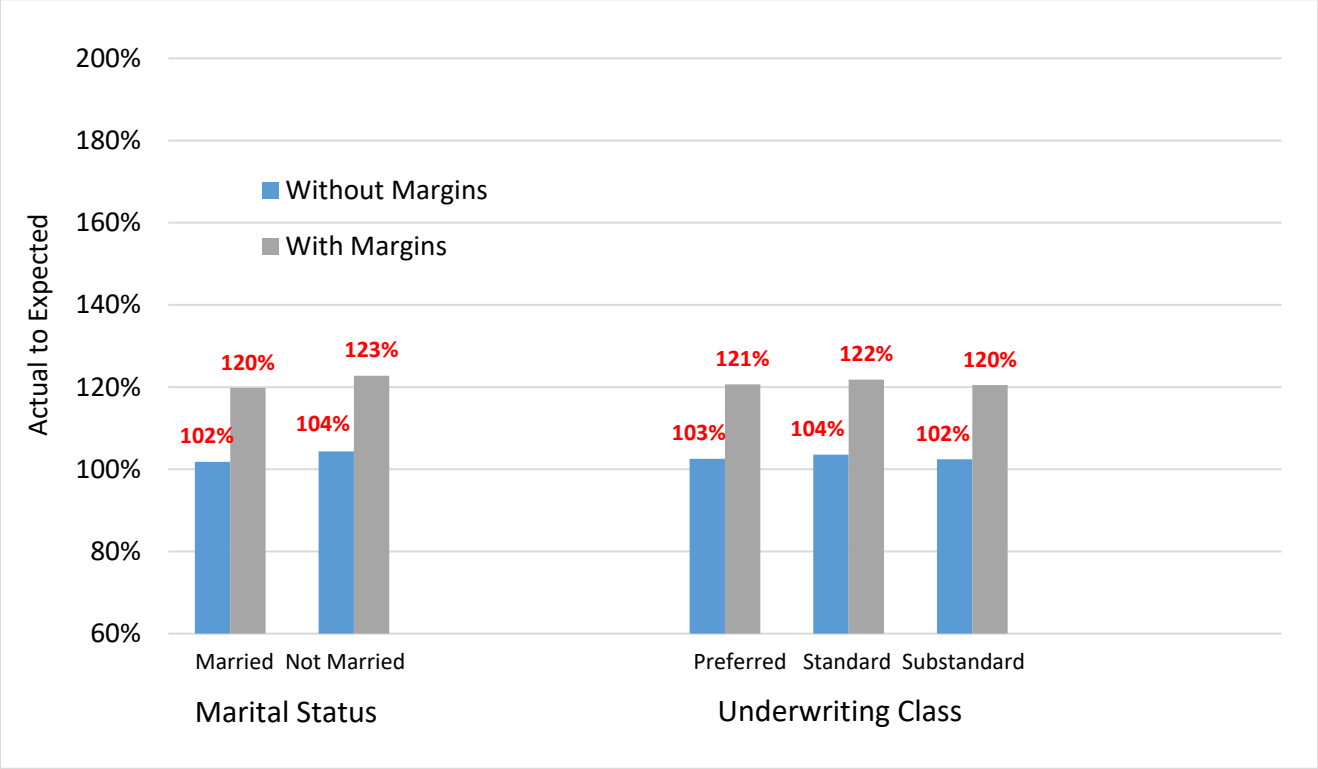


Figure 30. Actual-to-Expected Lapses, Group Active Lives, by Policy Duration, With and Without Margins

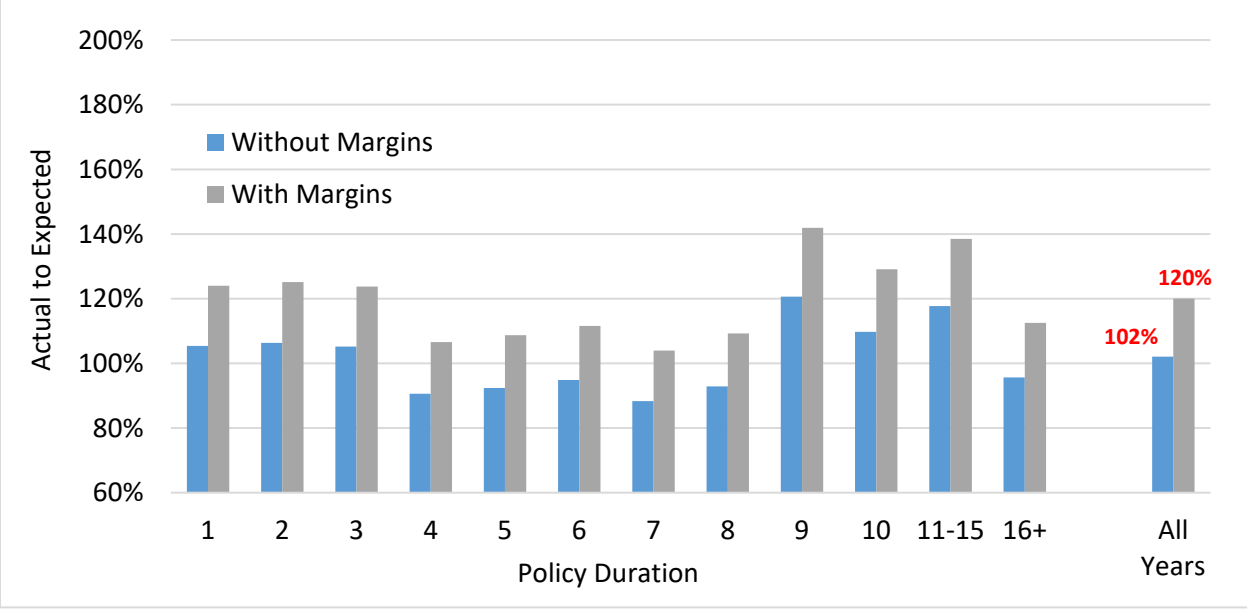
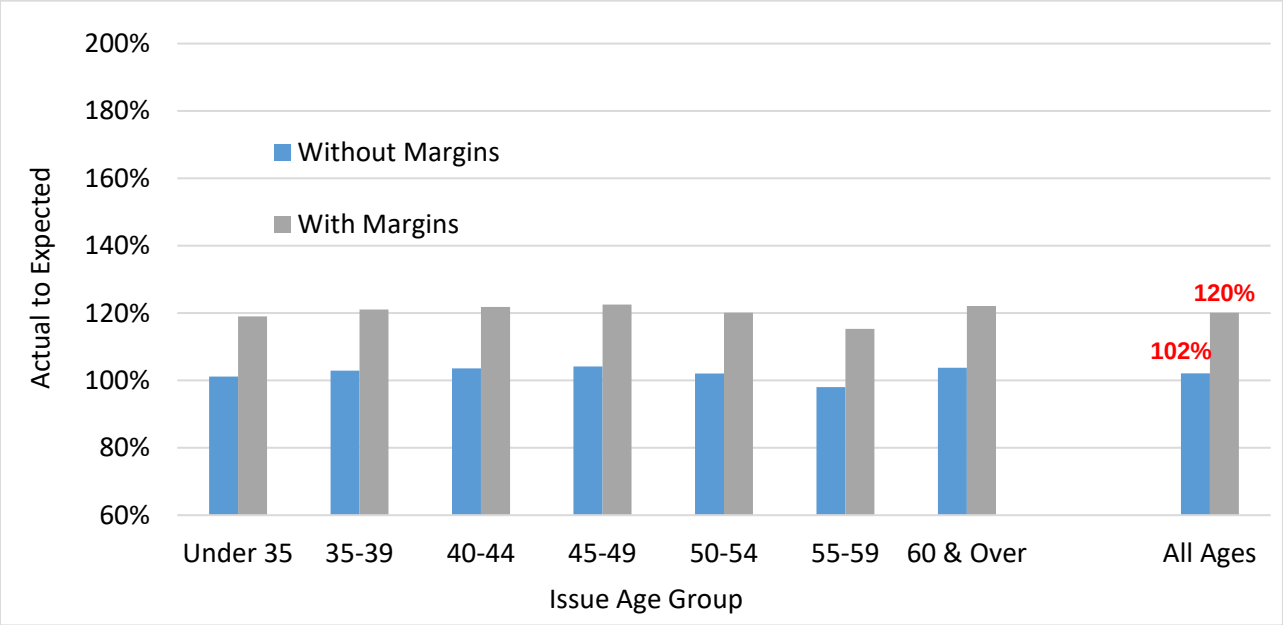


Figure 31. Actual-to-Expected, Group Active Lives, by Issue Age Group, With and Without Margins



Appendix 3—Recommended Lapse Tables

Double-click this icon to download an Excel version of these recommended individual and group lapse tables:

LTC Lapse Tables.xlsx

Table 10. Recommended Individual Lapse Rates—Total Lives (With Margins)

		Issue Age Group						Marital Status Adjustment Factor			Underwriting Class Adjustment Factor		
Policy Year		Under 55	55-59	60-64	65-69	70-74	75 & Over	Married	Single	Unknown	Preferred	Standard	Sub-standard
1		5.2%	2.9%	3.9%	3.7%	4.6%	6.6%	0.89	1.47	1.00	1.04	0.88	1.16
2		4.5%	2.6%	2.5%	2.6%	3.2%	4.8%	0.88	1.49	1.00	1.07	0.84	1.14
3		3.9%	2.2%	2.0%	2.1%	2.6%	4.1%	0.87	1.52	1.00	1.08	0.82	1.12
4		3.4%	2.0%	1.6%	1.9%	2.3%	3.6%	0.86	1.53	1.00	1.09	0.82	1.11
5		2.9%	1.7%	1.4%	1.7%	2.1%	3.2%	0.85	1.54	1.00	1.09	0.82	1.09
6		2.6%	1.5%	1.3%	1.5%	2.0%	3.0%	0.84	1.55	1.00	1.09	0.84	1.07
7		2.2%	1.4%	1.2%	1.4%	1.8%	2.8%	0.83	1.55	1.00	1.07	0.88	1.05
8		1.9%	1.2%	1.1%	1.4%	1.7%	2.6%	0.82	1.54	1.00	1.05	0.92	1.03
9		1.6%	1.0%	1.0%	1.3%	1.6%	2.6%	0.82	1.53	1.00	1.03	0.98	1.02
10		1.4%	0.9%	0.9%	1.2%	1.5%	2.4%	0.81	1.52	1.00	0.99	1.06	1.00
11		1.3%	0.8%	0.9%	1.2%	1.4%	2.3%	0.81	1.50	1.00	0.95	1.14	0.98
12		1.1%	0.7%	0.9%	1.1%	1.4%	2.2%	0.80	1.48	1.00	0.95	1.14	0.98
13		0.9%	0.6%	0.8%	1.1%	1.4%	2.1%	0.80	1.45	1.00	0.95	1.14	0.98
14		0.8%	0.5%	0.8%	1.0%	1.3%	2.0%	0.79	1.41	1.00	0.95	1.14	0.98
15		0.7%	0.5%	0.8%	1.0%	1.3%	2.0%	0.79	1.37	1.00	0.95	1.14	0.98
16 & Over		0.6%	0.4%	0.7%	0.9%	1.2%	2.0%	0.79	1.33	1.00	0.95	1.14	0.98

Table 11. Recommended Group Lapse Rates—Total Lives (With Margins)

		Issue Age Group						
Policy Year		Under 35	35-39	40-44	45-49	50-54	55-59	60 & Over
1		19.4%	13.8%	11.2%	9.0%	7.8%	8.0%	6.9%
2		16.7%	11.4%	9.4%	7.6%	6.5%	6.5%	5.6%
3		14.2%	9.5%	7.8%	6.4%	5.4%	5.2%	4.5%
4		12.0%	7.9%	6.5%	5.4%	4.5%	4.2%	3.6%
5		9.9%	6.5%	5.5%	4.5%	3.8%	3.4%	2.9%
6		8.1%	5.4%	4.6%	3.8%	3.1%	2.8%	2.3%
7		6.5%	4.5%	3.8%	3.2%	2.6%	2.2%	1.9%
8		5.2%	3.7%	3.2%	2.7%	2.2%	1.8%	1.5%
9		4.0%	3.1%	2.7%	2.3%	1.8%	1.5%	1.2%
10		3.1%	2.5%	2.2%	1.9%	1.5%	1.2%	1.0%
11		2.4%	2.1%	1.9%	1.6%	1.3%	1.0%	0.8%
12		2.4%	2.1%	1.9%	1.6%	1.3%	1.0%	0.8%
13		2.4%	2.1%	1.9%	1.6%	1.3%	1.0%	0.8%
14		2.4%	2.1%	1.9%	1.6%	1.3%	1.0%	0.8%
15		2.4%	2.1%	1.9%	1.6%	1.3%	1.0%	0.8%
16 & Over		1.9%	1.7%	1.5%	1.4%	1.1%	0.8%	0.6%

Table 12. Proposed Individual Lapse Rates—Active Lives (No Margins)

		Issue Age Group						Marital Status Adjustment Factor			Underwriting Class Adjustment Factor		
Policy Year		**Under 55**	**55-59**	**60-64**	**65-69**	**70-74**	**75 & Over**	**Married**	**Single**	**Unknown**	**Preferred**	**Standard**	**Sub-standard**
1		6.1%	3.4%	4.6%	4.4%	5.4%	7.8%	0.89	1.47	1.00	1.04	0.88	1.16
2		5.3%	3.0%	2.9%	3.1%	3.8%	5.7%	0.88	1.49	1.00	1.07	0.84	1.14
3		4.6%	2.6%	2.3%	2.5%	3.1%	4.8%	0.87	1.52	1.00	1.08	0.82	1.12
4		4.0%	2.3%	1.9%	2.2%	2.7%	4.2%	0.86	1.53	1.00	1.09	0.82	1.11
5		3.4%	2.0%	1.7%	2.0%	2.5%	3.8%	0.85	1.54	1.00	1.09	0.82	1.09
6		3.0%	1.8%	1.5%	1.8%	2.3%	3.5%	0.84	1.55	1.00	1.09	0.84	1.07
7		2.6%	1.6%	1.4%	1.7%	2.1%	3.3%	0.83	1.55	1.00	1.07	0.88	1.05
8		2.2%	1.4%	1.3%	1.6%	2.0%	3.1%	0.82	1.54	1.00	1.05	0.92	1.03
9		1.9%	1.2%	1.2%	1.5%	1.9%	3.0%	0.82	1.53	1.00	1.03	0.98	1.02
10		1.7%	1.1%	1.1%	1.4%	1.8%	2.8%	0.81	1.52	1.00	0.99	1.06	1.00
11		1.5%	0.9%	1.0%	1.4%	1.7%	2.7%	0.81	1.50	1.00	0.95	1.14	0.98
12		1.3%	0.8%	1.0%	1.3%	1.6%	2.6%	0.80	1.48	1.00	0.95	1.14	0.98
13		1.1%	0.7%	0.9%	1.3%	1.6%	2.5%	0.80	1.45	1.00	0.95	1.14	0.98
14		0.9%	0.6%	0.9%	1.2%	1.5%	2.4%	0.79	1.41	1.00	0.95	1.14	0.98
15		0.8%	0.6%	0.9%	1.2%	1.5%	2.4%	0.79	1.37	1.00	0.95	1.14	0.98
16 & Over		0.7%	0.5%	0.8%	1.1%	1.4%	2.3%	0.79	1.33	1.00	0.95	1.14	0.98

Table 13. Recommended Group Lapse Rates—Active Lives (With Margins)

	Issue Age Group						
Policy Year	**Under 35**	**35-39**	**40-44**	**45-49**	**50-54**	**55-59**	**60 & Over**
1	19.4%	13.8%	11.2%	9.0%	7.8%	8.0%	6.9%
2	16.7%	11.5%	9.4%	7.6%	6.5%	6.5%	5.6%
3	14.2%	9.5%	7.8%	6.4%	5.4%	5.2%	4.5%
4	12.0%	7.9%	6.5%	5.4%	4.5%	4.3%	3.7%
5	9.9%	6.5%	5.5%	4.5%	3.8%	3.5%	3.0%
6	8.1%	5.4%	4.6%	3.8%	3.2%	2.8%	2.5%
7	6.5%	4.5%	3.8%	3.2%	2.6%	2.3%	2.0%
8	5.2%	3.7%	3.2%	2.7%	2.2%	1.9%	1.7%
9	4.0%	3.1%	2.7%	2.3%	1.8%	1.5%	1.4%
10	3.1%	2.6%	2.2%	1.9%	1.5%	1.3%	1.1%
11	2.4%	2.1%	1.9%	1.6%	1.3%	1.0%	0.9%
12	2.4%	2.1%	1.9%	1.6%	1.3%	1.0%	0.9%
13	2.4%	2.1%	1.9%	1.6%	1.3%	1.0%	0.9%
14	2.4%	2.1%	1.9%	1.6%	1.3%	1.0%	0.9%
15	2.4%	2.1%	1.9%	1.6%	1.3%	1.0%	0.9%
16 & Over	1.9%	1.8%	1.5%	1.4%	1.1%	0.8%	0.7%

Appendix 4—Recommended Mortality Tables

Please double-click this icon to download an Excel version of the recommended mortality tables:

LTC Mortality Tables.xlsx