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Research Paper

Lapse Experience under Universal Life Level Cost of Insurance Policies

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Seeing Beyond Risk

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Voir au-delà du risque

Research Paper

Lapse Experience under Universal Life Level Cost of Insurance Policies

Research Committee
Individual Life Experience Subcommittee

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Lapse Experience under Universal Life Level Cost of Insurance Policies

1 Introduction

1.1 Overview

This is the third lapse experience study covering universal life level cost of insurance policies (referred to as "LCOI"; "UL" is used to refer to all types of universal life policies). Lapses have a significant impact on the financial results of this product. The previous studies have been useful to establish a benchmark for the possible level of the ultimate lapse rates.

Overall, compared to the prior study, lapse rates are slightly lower than those observed before at most durations.

1.2 Data in Study

The previous study was limited to the first 15 policy years because there were negligible data for higher durations. This study includes all durations of data received, but there are very little data for policy years higher than 30. It is doubtful that policies shown as having exposure to duration 30 began as LCOI at policy issue. It is more likely that the plan of insurance was converted from some other form to LCOI subsequent to issue. However, this study reports on duration from issue as submitted by the contributing companies; no later date is provided on the records.

Companies were asked to contribute data for the eight calendar years 2005–2012. Not all were able to contribute data for all years nor for all requested fields. For example, some lacked information on fund and premium. For most, fund information was missing or poor in quality. Accordingly, this report contains no reporting by fund values.

Duration is measured from the issue date reported. Some companies were not able to distinguish between the start date of the LCOI coverage and the start date of the policy, particularly in the case of conversion from UL-YRT to UL-LCOI. The impact cannot be quantified, but it is unlikely that duration is misinterpreted on enough records to invalidate any results.

Some records were rejected for reasons such as being outside the study period and missing essential information like date of birth. A pivot table summarizes all valid data and various subsets of the data. It is possible to verify most of the tables shown in this report with the pivot table.

1.3 Table of Lapse Rates (LapseLCOI)

Unlike the previous studies, this one begins with constructing tables of lapse rates from the submitted data. The tables were based on submitted data for single life policies, guaranteed premium and benefits, standard issues, and not converted. There are separate tables by sex and smoking status. Each table includes rates for issue ages 0–70 and durations 1–40, although rates above duration 30 are not supported by the data because there was insufficient exposure. The tables are referred to, for the sake of brevity and clarity, as *LapseLCOI.* LapseLCOI is used to calculate actual-to-expected

ratios that appear throughout the report. The actual-to-expected ratios are helpful in quantifying the variation in lapse rates between various subsets of the data.

Note that LapseLCOI reflects the experience contributed. LapseLCOI is not a table officially endorsed by the CIA. It may not be appropriate as a best estimate assumption for any particular company. It may be unwise for a company to adopt LapseLCOI, as is, for its own use. It is likely to be more appropriate for a company to develop its own lapse table or to modify LapseLCOI to fit its own business and experience.

The rates for LapseLCOI are available in Excel format here. The method of construction is described in the appendix to this report.

1.4 Data by Subset

Table 1 shows a summary of all valid data for guaranteed policies and various subsets of it. Records that did not conform to the specifications for the study are excluded. Records for adjustable policies are also excluded because too few companies submitted data for this category.

The row called All Guaranteed Policies is the subset of data comparable to what was used in the prior report, for 2002–2004.

In most cases in this report, the subset used is a smaller subset, referred to as the "standard subset of data". It excludes adjustable policies, as in the prior report. It also excludes joint policies, policies rated other than standard, policies arising from a conversion or a guaranteed insurability election, and riders or increases to a base coverage. However, conversions from CVYRT to UL LCOI are included in the standard subset. Although the standard subset is only about 70% of all guaranteed policies, it is more useful to consider because it is more homogeneous. Additional comparisons in section 5 of this report extend beyond the standard subset.

Table 1 includes columns of aggregate lapse rates; however, these columns should be used with care. The distribution by age and duration may differ substantially between the various subsets.

Table 1. Summary of valid records submitted by category. Volume in thousands.

	Exposure		Lapses		Agg Lapse Rate	
	Count	Vol (000)	Count	Vol (000)	Count	Vol (000)
All Guaranteed Policies	8,601,464	1,415,025,856	296,800	37,264,548	3.5%	2.6%
less Riders	527,950	51,043,265	16,901	1,570,694	3.2%	3.1%
Guaranteed, Base records	8,073,514	1,363,982,591	279,899	35,693,854	3.5%	2.6%
less Joint	502,355	211,201,140	12,686	3,225,822	2.5%	1.5%
Single, Gtd, Base records	7,571,160	1,152,781,451	267,213	32,468,032	3.5%	2.8%
less Substd, Conv, GIE	1,001,454	161,646,860	28,879	4,320,969	2.9%	2.7%
Standard subset of data	6,569,705	991,134,591	238,334	28,147,063	3.6%	2.8%

1.5 Contributing Companies

There were 12 contributing companies—see table 2. Ten submitted data for all eight years of the study, one for seven, and one for five. The distribution of data by company differs from that of the prior study, as is to be expected with an eight year gap between. In order to protect the confidentiality of company-specific experience, no comments will be made on the impact of the change.

The overall ratio of actual to expected lapses varies considerably by company. After dropping the three highest and lowest ratios, the remaining ones are 85%, 85%, 89%, 104%, 109%, and 110%. The standard deviations in the actual-to-expected ratios for most companies are near 2%, but some are lower and some much higher. (Further information is not provided in order to keep company-specific information confidential.)

Companies were given the option of submitting records for each calendar year or one record for all years. If the latter, they were requested to provide current sum assured and cash value and those values five years earlier. Values for other years were obtained by linear interpolation or extrapolation. Company practices varied on how "five years earlier" was implemented. Given the large volume of data, it is reasonable to conclude that the reliability of the study was not hampered by the variation in reporting of amounts.

Table 2. Distribution of exposure by volume by contributing company within the standard subset of data.

Company	Distribution
Canada Life	12.0%
The Co-operators	1.5%
Desjardins	3.3%
Empire Life	3.4%
Great-West Life	0.5%
Industrial Alliance	19.2%
London Life	1.2%
Manulife	26.9%
RBC Insurance	0.1%
Standard Life	9.9%
Sun Life	9.4%
Transamerica Life	12.6%
All	100.0%

1.6 Standard Deviation

Standard deviations are important in experience studies because they indicate how much fluctuation one might expect in the mean. Very approximately one might expect the "true" actual-to-expected ratio to be within one standard deviation either side of the observed mean two-thirds of the time, and within two standard deviations 95% of

the time. If two ratios differ by more than the sum of their standard deviations, it is very likely that the difference is statistically significant. If the difference is more than double the sum of the standard deviations, the difference is highly significant.

It is important to note that the standard deviations calculated for this report are accurate if the underlying true lapse rates are those of LapseLCOI and if policies are independent of each other with respect to their risk of lapsing. The formula for standard deviation is the one for the binomial distribution. To the extent that factors are at play other than age, duration, gender, and smoking, the actual standard deviation could be different from that calculated. For example, the variation in the overall actual-to-expected ratio by calendar year is greater than can be accounted for solely by statistical fluctuation; the volatility needs to be explained by some additional factors such as changes in the economic environment. Nonetheless, the standard deviation is useful in assessing how much credibility to attach to a particular observation.

1.7 Calculating Exposure and Standard Deviation

Exposure commences when a policy enters the study, either on January 1, 2005, or at issue if later and continues until December 31, 2012, or the date of termination if earlier. The exception is that for a lapse, under the Balducci hypothesis, exposure continues to the next policy anniversary even if it is after December 31, 2012. Exposure by volume of insurance or premium is obtained by multiplying the exposure by policy by the relevant amount.

Standard deviations in the actual-to-expected ratios are calculated by the following formula, where K represents the relevant amount (volume of insurance or simply 1 if used for policy count) for a policy and n is the exposure by policy for that duration. The amounts are summed over all the policies included in the calculation. The formula assumes that the lapse amount is a linear combination of binomial distributions within each sex-smoking-age-duration cell.

$$\text{Standard deviation of A/E by relevant amount} = \frac{\left(\sum_i K_i^{\,2} n_i p_i q_i\right)^{0.5}}{\sum_i K_i n_i q_i}$$

2 Overall Results and Comparison with 2002–2004

Table 3 shows the overall exposure and lapse rates for guaranteed policies by policy count and by volume of insurance (in thousands of dollars). This subset of data is the same as used for the 2007 study of calendar years 2002–2004. The numbers for the current study are shown on the left and the prior study on the right of table 3. Note that the quantity of data is substantially higher for the current study at all durations, and particularly at the higher durations.

Table 3. Ungraduated lapse rates by duration for the current and prior studies. Includes guaranteed policies only. Volume is sum assured in thousands of dollars.

Study of 2005-2012				Duration	Study of 2002-2004			
Exposure		Lapse Rates			Exposure		Lapse Rates	
Count	Vol (000)	Count	Volume		Count	Vol (000)	Count	Volume
857,833	147,831,782	7.0%	4.7%	1	249,784	33,633,245	8.3%	5.2%
789,580	137,891,439	5.4%	4.1%	2	240,122	34,096,114	7.1%	5.4%
722,542	122,690,994	5.0%	4.1%	3	230,595	34,386,293	6.5%	5.1%
657,952	111,116,983	4.1%	3.2%	4	223,591	33,565,847	5.4%	4.0%
605,828	103,363,400	3.4%	2.6%	5	219,515	31,392,073	4.6%	3.6%
560,482	95,881,569	3.1%	2.3%	6	212,409	29,271,220	3.9%	3.1%
525,398	88,781,160	2.8%	2.1%	7	197,089	27,096,232	3.1%	2.4%
502,071	82,608,491	2.6%	2.0%	8	166,166	23,511,584	2.6%	2.1%
481,551	78,191,914	2.4%	2.0%	9	132,00[illegible]	1[illegible]275,591	2.6%	2.2%
458,495	74,024,492	2.3%	1.8%	10	102,2[illegible]	15,[illegible]29,085	2.3%	2.0%
424,165	68,643,787	2.5%	1.9%	11	[illegible]74,519	11,103,139	2.4%	1.9%
384,153	62,017,742	2.0%	1.6%	12	47,[illegible]17	7,087,414	2.1%	1.7%
342,239	54,112,278	1.7%	1.3%	13	[illegible]8,564	3,612,130	2.2%	1.8%
298,305	45,875,786	1.5%	1.2%	14	8,[illegible]76	1,367,351	2.0%	1.5%
249,615	37,674,022	1.5%	1.1%	15	2,815	458,092	1.7%	1.4%
199,376	30,270,529	1.4%	1.0%	[illegible]6				
155,783	23,417,556	1.3%	0.9%	17				
115,016	16,974,585	1.3%	[illegible]%	18				
86,188	12,338,375	1.[illegible]%	0.9%	19				
63,304	8,490,384	1.[illegible]%	[illegible]0%	20				
43,558	5,351,951	[illegible].5%	[illegible].1%	21				
28,366	3,151,16[illegible]	[illegible].4%	1.2%	22				
18,335	1,831,616	1.2%	1.0%	23				
11,730	9[illegible]9,[illegible]56	[illegible].2%	1.1%	24				
7,924	62[illegible],4[illegible]8	1.4%	0.9%	25				
4,949	387,[illegible]33	2.0%	1.6%	26				
2,873	231,580	1.6%	1.2%	27				
1,976	144,187	1.6%	2.1%	28				
1,129	65,525	2.0%	1.9%	29				
582	30,318	1.7%	0.9%	30				
171	7,948	0.6%	0.3%	31+				
8,601,464	1,415,025,856	3.5%	2.6%	All	2,130,860	304,885,411	4.8%	3.6%

Lapse rates are generally lower in this study vs. the prior study. Lapse rates at durations 16–30, which were not included in the prior study, are fairly flat but lower than those observed at earlier durations. The lapse rates by policy count are generally higher than those by volume of insurance.

Table 4 shows exposure and lapse rates by duration for the standard subset of data (similar to the above subset but also excludes substandard policies and those issued as a conversion or guaranteed insurability election) for ages 18 and up, for non-smokers only, separately for males and females, and table 5 similarly for smokers only. Policies classified as aggregate (not smoker-distinct) or issued under age 18 are excluded from both tables.

Table 4. Ungraduated lapse rates by duration for the standard subset of data, for non-smokers only, issue ages 18+. Volume is sum assured in thousands of dollars.

Adult male non-smokers				Duration	Adult female non-smokers			
Exposure		Lapse Rates			Exposure		Lapse Rates	
Count	Vol (000)	Count	Volume		Count	Vol (000)	Count	Volume
210,027	45,286,041	5.9%	4.0%	1	251,082	38,163,776	7.1%	5.5%
199,229	43,547,997	5.0%	3.9%	2	230,503	35,292,858	5.4%	4.5%
186,143	39,927,321	4.6%	3.9%	3	209,985	31,2[illegible]3,618	4.8%	4.1%
173,233	36,919,200	3.8%	3.0%	4	190,061	27,92[illegible],720	3.9%	3.2%
163,723	35,026,068	3.2%	2.5%	5	17[illegible],413	25,[illegible]71,349	3.2%	2.6%
155,319	33,182,096	2.9%	2.3%	6	1[illegible],5[illegible]3	22,841,033	2.9%	2.2%
148,642	31,254,101	2.6%	2.1%	7	149,[illegible]20	20,609,735	2.5%	2.0%
144,170	29,570,271	2.5%	1.9%	8	[illegible]41,018	18,916,985	2.3%	1.9%
140,333	28,566,522	2.2%	2.0%	9	[illegible]3,776	17,627,197	2.0%	1.9%
136,255	27,644,962	2.1%	1.7%	10	126,033	16,442,787	2.0%	1.7%
129,607	26,413,925	2.3%	1.9%	11	115,720	15,022,344	2.2%	1.8%
120,995	24,642,598	1.8%	1.[illegible]%	12	103,921	13,405,581	1.7%	1.5%
111,056	22,446,911	1.5%	1.4%	13	91,095	11,613,505	1.4%	1.2%
99,176	19,785,854	1.3%	1.0%	14	77,955	9,736,917	1.3%	1.2%
85,353	17,041,540	1.[illegible]%	1.0%	15	64,492	7,924,161	1.2%	1.0%
70,368	14,203,579	1.[illegible]%	0.8%	16	51,150	6,256,524	1.1%	0.9%
56,218	11,278,896	1.1%	0.8%	17	39,702	4,824,226	1.1%	0.9%
42,545	8,421,[illegible]41	1.0%	0.9%	18	29,239	3,495,886	0.9%	0.8%
32,342	6,151,[illegible]89	1.0%	0.7%	19	21,967	2,551,070	1.0%	0.8%
23,679	4,242,99[illegible]	1.1%	0.8%	20	16,010	1,742,212	1.0%	0.8%
16,248	2,689,378	1.2%	0.9%	21	10,876	1,066,124	1.0%	0.9%
10,655	1,559,253	1.3%	1.2%	22	7,236	647,481	1.2%	1.0%
7,256	942,379	1.1%	1.0%	23	4,730	371,363	0.9%	0.6%
4,926	542,360	1.1%	0.9%	24	2,988	197,889	0.9%	1.1%
3,546	361,917	0.9%	0.6%	25	1,986	116,962	1.0%	0.9%
2,380	232,543	1.6%	1.6%	26	1,212	68,533	1.7%	1.3%
1,503	146,609	1.5%	1.1%	27	665	36,859	2.1%	1.1%
1,030	91,967	1.3%	1.3%	28	491	24,538	1.2%	1.4%
540	39,231	0.9%	1.1%	29	321	14,105	2.8%	3.5%
274	18,033	1.5%	0.9%	30	164	6,407	1.2%	0.4%
75	4,632	1.3%	0.4%	31+	48	1,853	0.0%	0.0%
2,476,846	512,181,841	2.9%	2.4%	All	2,408,650	333,600,599	3.3%	2.8%

Table 5. Ungraduated lapse rates by duration for the standard subset of data, for smokers only, issue ages 18+. Volume is sum assured in thousands of dollars.

Adult male smokers				Duration	Adult female smokers			
Exposure		Lapse Rates			Exposure		Lapse Rates	
Count	Vol (000)	Count	Volume		Count	Vol (000)	Count	Volume
45,406	5,252,285	14.2%	11.5%	1	35,566	3,225,973	14.0%	11.3%
39,867	4,672,078	10.4%	9.2%	2	32,095	2,881,159	9.5%	8.4%
36,351	4,205,539	9.3%	9.4%	3	30,167	2,583,078	8.7%	8.3%
33,476	3,772,007	7.1%	6.3%	4	28,545	2,372,842	6.6%	5.8%
31,607	3,512,756	5.9%	5.5%	5	27,754	2,245,806	5.4%	5.1%
30,304	3,315,058	5.1%	4.6%	6	27,218	2,152,998	4.7%	4.2%
29,907	3,219,169	4.5%	3.9%	7	27,066	2,068,933	4.2%	4.5%
29,679	3,106,033	4.0%	3.5%	8	27,227	1,982,701	3.4%	3.1%
29,008	2,983,430	3.6%	3.3%	9	26,710	1,9[illegible]2,572	3.2%	3.1%
27,881	2,861,480	3.2%	3.3%	10	25,582	1,83[illegible],896	2.9%	3.2%
25,916	2,659,515	3.5%	3.0%	11	[illegible]3,591	1,[illegible]12,128	3.1%	3.0%
23,445	2,462,565	2.9%	3.1%	12	[illegible]1,946	1,560,668	2.2%	2.2%
21,000	2,236,976	2.5%	2.1%	13	18,[illegible]80	1,387,806	2.0%	2.2%
18,220	1,948,684	2.1%	2.3%	[illegible]	15,671	1,179,567	1.6%	1.7%
15,138	1,628,645	2.0%	2.0%	[illegible]5	[illegible]2,755	982,492	1.7%	1.5%
11,924	1,317,756	1.7%	1.5%	16	9,748	778,640	1.5%	1.5%
9,241	1,032,409	1.6%	[illegible].4%	[illegible]7	7,442	601,480	1.5%	1.9%
6,821	753,981	1.4%	1.[illegible]%	18	5,445	433,031	1.6%	1.5%
5,239	562,243	1.7%	1.5%	19	4,069	311,543	2.0%	1.3%
3,966	387,266	2.0%	1.[illegible]%	20	3,035	208,409	1.4%	1.4%
2,720	235,816	1.[illegible]%	[illegible].5%	21	2,156	127,951	1.9%	1.5%
1,866	142,274	[illegible]%	2.7%	22	1,490	81,193	1.7%	1.6%
1,311	91,083	1.6%	1.5%	23	1,036	50,654	1.4%	1.1%
927	57,[illegible]96	1.9%	1.9%	24	713	30,805	1.3%	1.1%
649	38,6[illegible]	2.5%	2.5%	25	509	20,462	1.6%	1.0%
410	26,45[illegible]	2.4%	1.7%	26	274	11,137	2.9%	3.2%
213	16,155	0.5%	0.1%	27	116	4,841	0.9%	2.3%
145	10,202	2.8%	9.7%	28	78	2,755	0.0%	0.0%
94	3,433	5.3%	5.0%	29	56	1,859	1.8%	1.9%
53	1,896	5.7%	3.9%	30	32	961	0.0%	0.0%
16	541	0.0%	0.0%	31+	10	248	0.0%	0.0%
482,799	52,513,630	5.8%	5.3%	All	415,680	32,754,585	5.2%	5.0%

Tables 6 and 7 are based on the same data as tables 4 and 5, but by volume of insurance only. The columns are exposure, lapse rates, the ratio of actual to expected lapses, and the standard deviation in the actual-to-expected ratios. The volume of expected lapses and the standard deviations are calculated on LapseLCOI.

Table 6. Ungraduated lapse rates by duration for the standard subset of data, for non-smokers only, issue ages 18+. Expected on LapseLCOI. Volume is sum assured in thousands of dollars.

Adult male non-smokers				Duration	Adult female non-smokers			
Vol (000)	Lapse rate	A/E	Std Dev		Vol (000)	Lapse rate	A/E	Std Dev
45,286,041	4.0%	97%	3%	1	38,163,776	5.5%	101%	2%
43,547,997	3.9%	101%	4%	2	35,292,858	4.5%	98%	3%
39,927,321	3.9%	111%	4%	3	31,283,618	4.1%	104%	3%
36,919,200	3.0%	97%	4%	4	27,926,720	3.2%	100%	3%
35,026,068	2.5%	93%	4%	5	25,371,349	2.6%	95%	4%
33,182,096	2.3%	98%	4%	6	22,841,033	2.2%	98%	4%
31,254,101	2.1%	98%	5%	7	20,609,735	2.0%	97%	4%
29,570,271	1.9%	95%	5%	8	18,916,985	1.9%	100%	5%
28,566,522	2.0%	107%	5%	9	17,627,197	1.9%	103%	5%
27,644,962	1.7%	96%	5%	10	16,442,7[illegible]	[illegible].7%	100%	5%
26,413,925	1.9%	113%	5%	11	15,032,3[illegible]	[illegible]8%	111%	5%
24,642,598	1.5%	100%	5%	12	[illegible],405,581	1.5%	99%	6%
22,446,911	1.4%	101%	6%	13	[illegible],505	1.2%	89%	7%
19,785,854	1.0%	82%	7%	14	9,[illegible]	1.2%	93%	7%
17,041,540	1.0%	94%	7%	[illegible]	7,924,161	1.0%	93%	8%
14,203,579	0.8%	85%	9%	16	6,256,524	0.9%	88%	10%
11,278,896	0.8%	89%	10%	17	4,824,226	0.9%	93%	11%
8,421,421	0.9%	102%	11%	[illegible]	3,495,886	0.8%	86%	15%
6,151,239	0.7%	85%	[illegible]	19	2,551,070	0.8%	90%	18%
4,242,997	0.8%	99%	15%	20	1,742,212	0.8%	104%	22%
2,689,378	0.9%	103%	[illegible]%	21	1,066,124	0.9%	121%	27%
1,559,253	1.2%	[illegible]%	22%	22	647,481	1.0%	141%	40%
942,379	1.0%	[illegible]%	27%	23	371,363	0.6%	79%	46%
542,360	[illegible]%	112%	31%	24	197,889	1.1%	134%	40%
361,917	[illegible]%	69%	36%	25	116,962	0.9%	113%	44%
232,543	[illegible]%	201%	41%	26	68,533	1.3%	160%	46%
146,609	1.1%	140%	50%	27	36,859	1.1%	139%	61%
91,967	1.3%	161%	63%	28	24,538	1.4%	174%	74%
39,231	1.1%	142%	87%	29	14,105	3.5%	440%	96%
18,033	0.9%	111%	107%	30	6,407	0.4%	49%	117%
4,632	0.4%	54%	170%	31+	1,853	0.0%	0%	216%
512,181,841	2.4%	99%	1%	All	333,600,599	2.8%	100%	1%

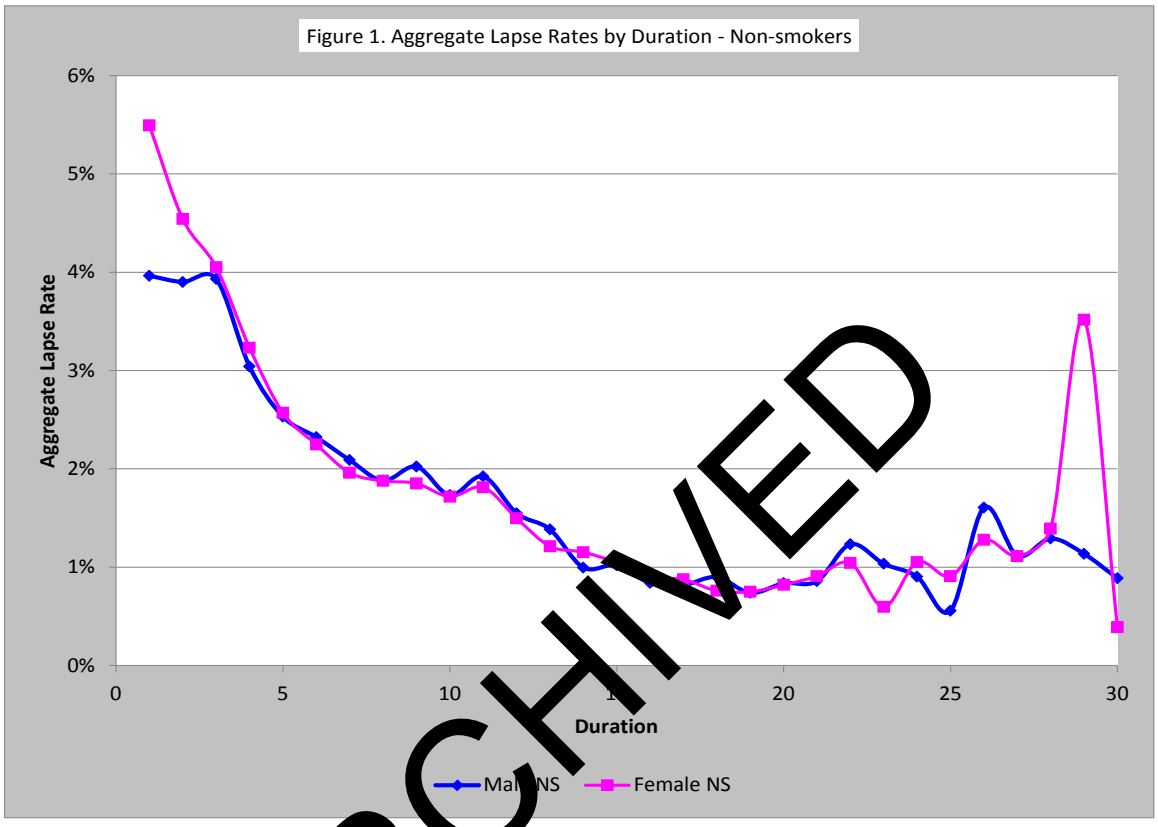
Table 7. Ungraduated lapse rates by duration for the standard subset of data, for smokers only, issue ages 18+. Expected on LapseLCOI. Volume is sum assured in thousands of dollars.

Adult male smokers				Duration	Adult female smokers			
Vol (000)	Lapse rate	A/E	Std Dev		Vol (000)	Lapse rate	A/E	Std Dev
5,252,285	11.5%	100%	3%	1	3,225,973	11.3%	102%	7%
4,672,078	9.2%	94%	4%	2	2,881,159	8.4%	93%	8%
4,205,539	9.4%	114%	4%	3	2,583,078	8.3%	111%	8%
3,772,007	6.3%	92%	5%	4	2,372,842	5.8%	94%	9%
3,512,756	5.5%	98%	6%	5	2,245,806	5.1%	98%	9%
3,315,058	4.6%	99%	6%	6	2,152,998	4.2%	95%	10%
3,219,169	3.9%	97%	7%	7	2,068,933	4.5%	114%	10%
3,106,033	3.5%	99%	8%	8	1,982,701	3.1%	89%	9%
2,983,430	3.3%	101%	8%	9	1,912,572	3.1%	94%	8%
2,861,480	3.3%	105%	8%	10	1,839,896	3.2%	106%	8%
2,659,515	3.0%	100%	8%	11	1,712,148	3.0%	111%	9%
2,462,565	3.1%	112%	9%	12	1,560,668	2.2%	92%	10%
2,236,976	2.1%	82%	10%	13	1,397,806	2.2%	102%	10%
1,948,684	2.3%	98%	10%	14	1,189,587	1.7%	88%	10%
1,628,645	2.0%	97%	12%	15	982,492	1.5%	87%	12%
1,317,756	1.5%	83%	14%	16	778,640	1.5%	92%	14%
1,032,409	1.4%	79%	17%	17	601,480	1.9%	121%	16%
753,981	1.0%	65%	20%	18	433,031	1.5%	99%	19%
562,243	1.5%	101%	24%	19	311,543	1.3%	89%	23%
387,266	1.7%	112%	26%	20	208,409	1.4%	95%	24%
235,816	1.5%	104%	31%	21	127,951	1.5%	105%	29%
142,274	2.7%	190%	35%	22	81,193	1.6%	114%	36%
91,083	1.5%	107%	46%	23	50,654	1.1%	76%	38%
57,296	1.9%	129%	59%	24	30,805	1.1%	72%	39%
38,607	2.5%	165%	78%	25	20,462	1.0%	67%	46%
26,454	1.7%	112%	107%	26	11,137	3.2%	216%	61%
16,155	0.1%	6%	168%	27	4,841	2.3%	153%	94%
10,202	9.7%	647%	232%	28	2,755	0.0%	0%	116%
3,433	5.0%	333%	100%	29	1,859	1.9%	128%	134%
1,896	3.9%	258%	129%	30	961	0.0%	0%	173%
541	0.0%	0%	227%	31+	248	0.0%	0%	283%
52,513,630	5.3%	100%	1%	All	32,754,585	5.0%	100%	3%

The relatively narrow range of A/E ratios shows that the fit between the actual data and LapseLCOI by duration is reasonably good to duration 20. At higher durations, the fit is not as good, but there are so little data that the standard deviations are very high.

It is worth noting that the overall actual-to-expected ratios are 100% for each of males and females, smokers and non-smokers.

Figures 1 and 2 show the raw aggregate lapse rates for non-smokers and smokers, respectively. The information is taken from tables 6 and 7. The blue lines are for males and the pink for females.



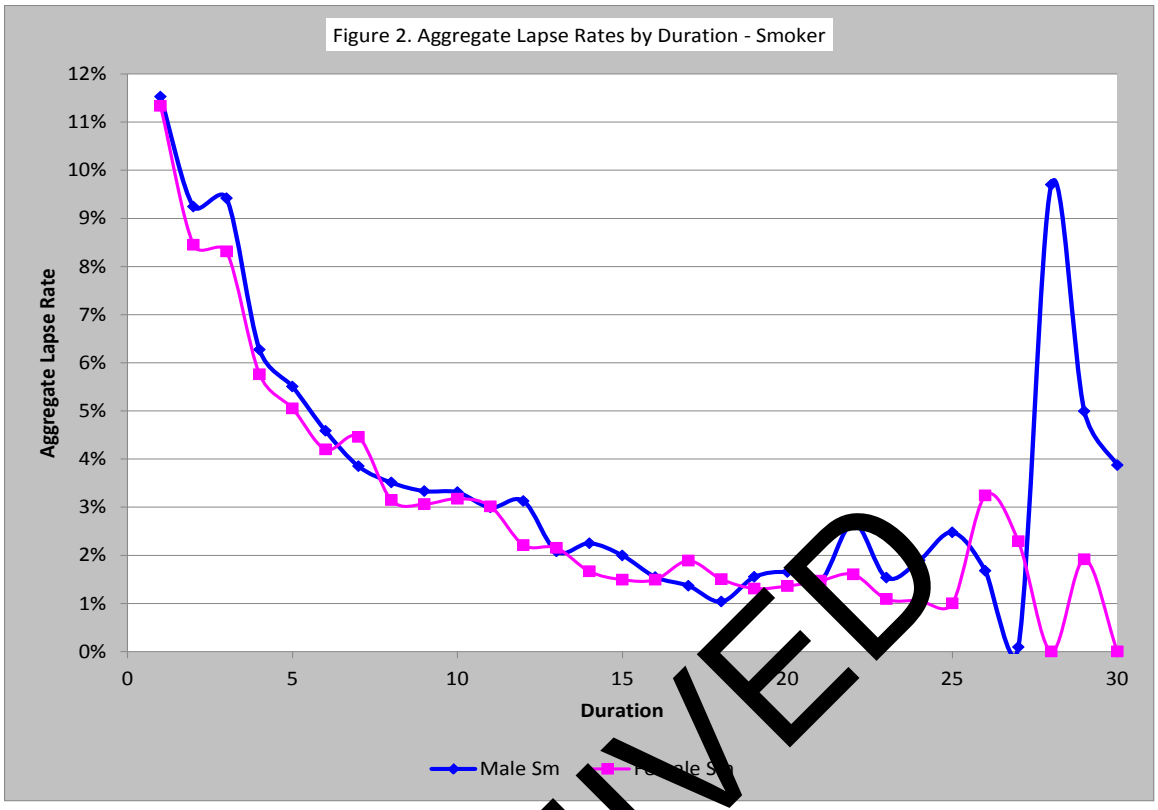


Table 8 shows the ratio of actual lapses to tabular lapses on male non-smoker LapseLCOI; that is, the male non-smoker table is used to calculate the tabular lapses for all four subsets. (The word "tabular" is used rather than "expected" because one does not expect lapses to be consistent with rates for male non-smokers in the other three cases.) The same tabular is used for all to emphasize the variation in lapse rates across sex and smoking status.

Table 8. Ratio of actual to tabular lapses for issue ages 18+. Tabular on LapseLCOI male non-smoker.

Duration	M NS	M Sm	F NS	F Sm
1-5	100%	232%	114%	216%
6-10	99%	173%	94%	168%
11-15	100%	172%	98%	147%
16-20	90%	152%	91%	167%
21-25	118%	231%	110%	167%
16+	94%	163%	93%	168%
All	99%	208%	107%	194%

The differentials between male and female are relatively small. The differentials between smoker and non-smokers are consistently large.

For those who relate better to lapse rates than actual-to-tabular ratios, table 9 presents the same data as table 8 but with the aggregate lapse rates for each cell.

Table 9. Aggregate lapse rates for issue ages 18+, measured by volume.

Duration	M NS	M Sm	F NS	F Sm
1-5	3.5%	8.7%	4.1%	8.1%
6-10	2.0%	3.7%	2.0%	3.6%
11-15	1.4%	2.6%	1.4%	2.2%
16-20	0.8%	1.4%	0.8%	1.6%
21-25	1.0%	1.9%	0.9%	1.4%
16+	0.9%	1.5%	0.9%	1.5%
All	2.4%	5.3%	2.8%	5.0%

3 Experience by Calendar Year

Table 10 shows ratios of actual to expected lapses by volume of insurance for each calendar year included in the study. The last column shows the standard deviation in the actual-to-expected ratio for 2012 only; the standard deviations for other years are fairly similar.

Table 10. Actual to Expected ratios for the standard subset of data by calendar year of experience. Expected is calculated on LapseLCOI.

Duration	Calendar Year of Experience									Std Dev
	2005	2006	2007	2008	2009	2010	2011	2012	2005-12	2012
1-5	109%	114%	97%	101%	108%	97%	93%	82%	100%	3%
6-10	113%	105%	101%	115%	110%	98%	83%	75%	99%	4%
11-15	101%	98%	98%	105%	106%	104%	98%	93%	100%	4%
16-20	146%	105%	109%	114%	103%	94%	76%	77%	91%	6%
21-25	176%	172%	173%	202%	100%	133%	112%	91%	115%	12%
16+	148%	110%	113%	121%	105%	97%	81%	80%	94%	6%
All	110%	110%	108%	105%	111%	98%	91%	82%	100%	2%

Table 11 is based on the same data as table 10, but it shows the aggregate lapse rate each year for the range in durations shown. The variation in lapse rate is not as reliable as the variation in actual-to-expected ratios because the distribution by duration, age, gender, and smoking can vary between cells. The actual-to-expected ratios are better able to compensate for changes in distribution.

Table 11. Aggregate lapse rates for the standard subset of data by calendar year of experience.

Duration	Calendar Year of Experience									Std Dev
	2005	2006	2007	2008	2009	2010	2011	2012	2005-12	2012
1-5	4.6%	4.9%	4.2%	4.4%	4.8%	4.1%	3.8%	3.3%	4.2%	0.1%
6-10	2.5%	2.3%	2.2%	2.5%	2.4%	2.1%	1.8%	1.7%	2.2%	0.1%
11-15	1.7%	1.6%	1.6%	1.7%	1.7%	1.6%	1.5%	1.4%	1.6%	0.1%
16-20	1.6%	1.2%	1.2%	1.2%	1.1%	1.0%	0.8%	0.8%	1.0%	0.1%
21-25	1.7%	1.7%	1.7%	1.9%	1.0%	1.3%	1.1%	0.9%	1.1%	0.1%
16+	1.6%	1.2%	1.2%	1.3%	1.1%	1.0%	0.9%	0.8%	1.0%	0.1%
All	3.4%	3.3%	2.9%	3.1%	3.2%	2.7%	2.5%	2.1%	2.8%	0.1%

4 Experience by Age and Duration

Tables 12–15 show actual-to-expected ratios of lapses by volume for quinquennial groups of durations and decennial groups of adult issue ages. There is a separate table for each of male non-smoker, female non-smoker, male smoker, and female smoker. To provide a wider range of information each table also includes a section with standard deviations of the actual-to-expected ratios and the aggregate lapse rates.

Table 12. Actual to Expected ratios for the standard subset of data by groups of issue ages and durations. Expected is calculated on LapseLCOI.

	Duration	Male Non-smoker by issue age group						
		18-29	30-39	40-49	50-59	60-69	70+	18+
Actual to Expected	1-5	100%	99%	101%	100%	104%	99%	100%
	6-10	100%	100%	98%	97%	91%	63%	99%
	11-15	98%	101%	102%	98%	91%	50%	100%
	16-20	111%	82%	101%	68%	48%	26%	90%
	21-25	124%	122%	124%	68%	42%	1107%	118%
	16+	114%	87%	104%	70%	47%	39%	94%
	All	100%	99%	101%	98%	98%	90%	99%
Standard Deviation	1-5	3%	3%	4%	5%	8%	24%	2%
	6-10	4%	3%	4%	7%	14%	44%	2%
	11-15	5%	4%	5%	9%	20%	60%	3%
	16-20	11%	7%	9%	18%	38%	106%	5%
	21-25	19%	16%	21%	49%	109%	473%	11%
	16+	10%	7%	8%	17%	36%	105%	4%
	All	2%	2%	3%	3%	6%	20%	1%
Aggregate Lapse Rate	1-5	4.6%	3.4%	3.3%	3.1%	2.9%	2.7%	3.5%
	6-10	2.7%	2.0%	1.9%	1.8%	1.3%	0.6%	2.0%
	11-15	1.7%	1.5%	1.4%	1.3%	0.7%	0.3%	1.4%
	16-20	1.1%	0.8%	0.9%	0.6%	0.4%	0.2%	0.8%
	21-25	1.1%	1.0%	1.0%	0.6%	0.3%	9.2%	1.0%
	16+	1.1%	0.8%	0.9%	0.6%	0.4%	0.3%	0.9%
	All	3.2%	2.3%	2.2%	2.1%	1.9%	1.6%	2.4%

Table 13. Actual to Expected ratios for the standard subset of data by groups of issue ages and durations. Expected is calculated on LapseLCOI.

	Duration	Female Non-smoker by issue age group						
		18-29	30-39	40-49	50-59	60-69	70+	18+
Actual to Expected	1-5	100%	100%	100%	99%	101%	106%	100%
	6-10	100%	100%	99%	97%	102%	73%	99%
	11-15	100%	99%	100%	99%	87%	84%	99%
	16-20	111%	91%	87%	60%	25%	76%	90%
	21-25	146%	128%	117%	38%	7%	0%	121%
	16+	115%	95%	90%	58%	24%	75%	94%
	All	100%	100%	100%	98%	98%	96%	100%
Standard Deviation	1-5	2%	2%	3%	7%	10%	21%	1%
	6-10	3%	3%	5%	9%	15%	32%	2%
	11-15	5%	5%	6%	13%	16%	34%	3%
	16-20	9%	9%	14%	23%	3[illegible]%	104%	6%
	21-25	20%	20%	54%	84%	147%	316%	18%
	16+	8%	9%	13%	22%	34%	102%	6%
	All	2%	2%	3%	[illegible]%	[illegible]%	17%	1%
Aggregate Lapse Rate	1-5	5.2%	4.4%	3.7%	3.1%	2.2%	1.5%	4.1%
	6-10	2.8%	2.1%	1.7%	1.4%	0.8%	0.4%	2.0%
	11-15	1.8%	1.4%	1.1%	1.0%	0.6%	0.5%	1.4%
	16-20	1.1%	0.8%	0.6%	0.5%	0.2%	0.6%	0.8%
	21-25	1.1%	1.0%	0.9%	0.3%	0.1%	0.0%	0.9%
	16+	1.1%	0.9%	0.7%	0.5%	0.2%	0.6%	0.9%
	All	3.8%	3.0%	2.5%	2.1%	1.4%	1.0%	2.8%

Table 14. Actual to Expected ratios for the standard subset of data by groups of issue ages and durations. Expected is calculated on LapseLCOI.

	Duration	Male Smoker by issue age group						
		18-29	30-39	40-49	50-59	60-69	70+	18+
Actual to Expected	1-5	100%	100%	100%	99%	98%	129%	100%
	6-10	99%	99%	101%	108%	98%	67%	100%
	11-15	102%	96%	100%	96%	97%	63%	99%
	16-20	103%	76%	85%	68%	26%	0%	83%
	21-25	119%	111%	165%	240%	0%	100%	133%
	16+	105%	82%	93%	87%	24%	0%	90%
	All	100%	99%	100%	100%	97%	106%	100%
Standard Deviation	1-5	2%	3%	4%	8%	14%	40%	2%
	6-10	6%	5%	7%	13%	25%	98%	3%
	11-15	8%	7%	9%	19%	[illegible]3%	184%	4%
	16-20	12%	13%	19%	42%	10[illegible]%	549%	8%
	21-25	45%	25%	35%	76%	172%	100%	19%
	16+	13%	12%	17%	[illegible]8%	99%	549%	8%
	All	2%	3%	3%	[illegible]%	[illegible]2%	40%	1%
Aggregate Lapse Rate	1-5	10.3%	8.7%	7.8%	6.3%	5.1%	3.7%	8.7%
	6-10	4.4%	3.4%	3.5%	4.2%	2.6%	0.8%	3.7%
	11-15	3.1%	2.4%	2.[illegible]%	2.3%	1.1%	0.6%	2.6%
	16-20	1.8%	1.3%	1.[illegible]%	1.1%	0.4%	0.0%	1.4%
	21-25	1.7%	1.[illegible]%	2.4%	3.4%	0.0%	100.0%	1.9%
	16+	1.8%	[illegible].4%	1.[illegible]%	1.4%	0.4%	0.0%	1.5%
	All	6.7%	[illegible]9%	4.7%	4.7%	3.7%	2.0%	5.3%

Table 15. Actual to Expected ratios for the standard subset of data by groups of issue ages and durations. Expected is calculated on LapseLCOI.

	Duration	Female Smoker by issue age group						
		18-29	30-39	40-49	50-59	60-69	70+	18+
Actual to Expected	1-5	100%	100%	95%	111%	94%	90%	100%
	6-10	102%	98%	102%	102%	57%	59%	100%
	11-15	98%	102%	95%	99%	69%	98%	99%
	16-20	108%	115%	81%	57%	6%	0%	101%
	21-25	113%	96%	62%	128%	16%	0%	96%
	16+	110%	114%	79%	65%	6%	0%	101%
	All	100%	100%	97%	107%	80%	78%	100%
Standard Deviation	1-5	2%	7%	13%	14%	24%	81%	4%
	6-10	5%	6%	14%	18%	40%	98%	4%
	11-15	7%	7%	10%	25%	[illegible]7%	92%	4%
	16-20	11%	12%	17%	42%	11[illegible]%	[illegible]58%	8%
	21-25	22%	27%	47%	119%	277%	1258%	17%
	16+	10%	11%	16%	[illegible]9%	112%	157%	7%
	All	2%	5%	9%	1[illegible]%	[illegible]%	56%	3%
Aggregate Lapse Rate	1-5	10.9%	8.4%	6.2%	5.2%	2.8%	1.2%	8.1%
	6-10	4.9%	3.7%	3.2%	2.1%	0.6%	0.6%	3.6%
	11-15	2.9%	2.2%	2.[illegible]%	1.2%	0.7%	1.0%	2.2%
	16-20	1.8%	1.8%	1.[illegible]%	0.8%	0.1%	0.0%	1.6%
	21-25	1.6%	1.4%	0.9%	1.8%	0.2%	0.0%	1.4%
	16+	1.8%	1.7%	1.[illegible]%	0.9%	0.1%	0.0%	1.5%
	All	6.9%	[illegible]8%	4.1%	3.4%	1.5%	0.9%	5.0%

Table 16 completes the picture of tables 12–15 by showing quinquennial issue age groups for juveniles. Neither gender nor smoking status is distinguished.

Table 16. Actual to Expected ratios for the standard subset of data by groups of issue ages and durations. Expected is calculated on LapseLCOI.

	Duration	Male and Female, All smoking types			
		0-4	5-9	10-17	0-17
Actual to Expected	1-5	101%	98%	99%	99%
	6-10	98%	100%	99%	99%
	11-15	103%	114%	109%	108%
	16-20	107%	104%	78%	95%
	21-25	130%	75%	73%	93%
	16+	111%	100%	77%	94%
	All	101%	100%	99%	100%
Standard Deviation	1-5	2%	3%	6%	3%
	6-10	4%	8%	11%	5%
	11-15	4%	8%	7%	4%
	16-20	7%	8%	7%	4%
	21-25	16%	19%	15%	10%
	16+	6%	7%	7%	4%
	All	2%	3%	5%	2%
Aggregate Lapse Rate	1-5	4.1%	5.2%	4.4%	4.4%
	6-10	3.2%	2.1%	2.5%	2.8%
	11-15	3.3%	3.3%	2.9%	3.1%
	16-20	3.1%	3.1%	2.2%	2.7%
	21-25	3.7%	2.1%	2.1%	2.6%
	16+	3.2%	3.0%	2.2%	2.7%
	All	3.7%	4.1%	3.5%	3.7%

5 Experience for Other Subsets

5.1 Joint Type

Records submitted distinguish between single life policies, joint first-to-die, joint last-to-die, and other or unknown joint policies. (Because not many companies classified records as other or unknown, and because the experience could vary considerably by the actual joint type, these records are excluded from this report and from the pivot table.) The lapse experience varies markedly between these joint types. Note that LapseLCOI was constructed on single life policies only.

Table 17 shows the actual-to-expected ratios for the various joint types for issue ages 18 and higher. The table is based on the standard subset of data expanded to include joint policies. There is one caution for the expected lapses for joint policies. The expected lapses are calculated on LapseLCOI for sex and smoking status of the older life in the case of joint policies. The reason is that the records for joint policies show only the older life. Nothing is known of the other life.

Table 17. Experience by joint type for ages 18+ for standard subset expanded for joint. Expected lapses are calculated on LapseLCOI. Volume in thousands.

Duration	Joint type	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	Single	5,798,227	933,200,363	119%	100%
	First to die	173,063	23,021,795	170%	148%
	Last to die	257,531	152,232,965	75%	57%
	All	6,228,821	1,108,455,122	119%	96%
1-15	Single	5,250,044	853,200,363	119%	100%
	First to die	158,295	21,056,708	172%	150%
	Last to die	245,845	145,522,377	76%	57%
	All	5,654,184	1,019,779,448	119%	96%
16+	Single	548,183	80,000,000	125%	94%
	First to die	14,767	1,965,087	100%	111%
	Last to die	11,686	6,710,587	91%	49%
	All	574,637	88,675,675	114%	91%

The actual-to-expected ratios for joint first-to-die are markedly higher than for single life, for durations 1–15. The ratios for joint last-to-die are markedly lower than for single life.

5.2 Base/Rider/Increase

Records distinguish between base coverages, riders, and increases to the policy. The riders and increases must also have LCOI. LapseLCOI was constructed using records for base coverages only. Table 18 shows summaries for base coverages compared to riders. The table is based on the standard subset expanded to include riders and increases.

Table 18. Experience by base, rider or increase for standard subset expanded for coverage type. Expected lapses are calculated on LapseLCOI. Volume is sum assured in thousands.

Duration	Coverage type	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	Base	6,569,705	991,134,591	121%	100%
	Rider/Incr	459,835	45,004,299	110%	105%
	All	7,029,540	1,036,138,890	120%	100%
1-15	Base	5,962,517	907,743,035	121%	100%
	Rider/Incr	416,347	41,351,632	110%	104%
	All	6,378,865	949,094,668	120%	100%
16+	Base	607,188	83,391,556	118%	94%
	Rider/Incr	43,488	3,652,666	1[illegible]%	117%
	All	650,676	87,044,222	117%	95%

There is no clear pattern. Riders experience higher termination rates than base plans by volume, but lower by count. Experience for increases is clearly lower than for base plans, but the difference at higher durations does not appear to be significant.

5.3 Rating

Most companies indicated the mortality rating on each record. Some were able to distinguish only between standard and substandard (which were artificially set at 199%). Some could not distinguish, and all records were marked as standard. LapseLCOI was constructed from records marked as standard only.

Table 19 compares the lapse experience of standard policies and two bands of substandard ratings. The table is based on the standard subset expanded to include all ratings.

Table 19. Experience by mortality rating for standard subset expanded for all ratings. Expected lapses are calculated on LapseLCOI. Volume is sum assured in thousands.

Duration	Rating	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	Standard	6,569,705	991,134,591	121%	100%
	101-200%	157,336	31,926,229	143%	120%
	>200%	32,733	3,553,036	182%	192%
	All	6,759,774	1,026,613,856	122%	101%
1-15	Standard	5,962,517	907,743,035	121%	100%
	101-200%	139,430	30,096,988	143%	119%
	>200%	31,689	3,442,325	180%	191%
	All	6,133,636	941,282,348	12[illegible]%	101%
16+	Standard	607,188	83,391,556	118%	94%
	101-200%	17,906	1,829,24[illegible]	1[illegible]%	136%
	>200%	1,044	11[illegible]710	281%	292%
	All	626,138	85,[illegible]31,[illegible]	11[illegible]%	95%

The actual-to-expected ratios for substandard business are generally higher than for standard business.

5.4 Preferred Class

The specifications for data provided distinct codes for not preferred (that is, no preferred underwriting for that plan), residual of preferred classes (that is, preferred underwriting was available, but the policy was issued in the residual class), and various preferred classes as defined by the company (that is, preferred underwriting was available, and the policy was in a preferred class). There was also a code in this field for policies issued by guaranteed insurability elections (GIE). Not all companies were able to distinguish GIE, and there is no consistency in the use of preferred classes between companies, and not necessarily even within companies. Accordingly all preferred classes beyond the residual class are combined for this report. Because few companies have business with preferred underwriting beyond duration 15, table 20 shows only durations 1–15. Smokers and non-smokers are distinguished. LapseLCOI was constructed on data that did not distinguish the preferred class but excluded GIE. The table is based on the standard subset. GIE is not shown because too few companies distinguished it.

Table 20. Experience by preferred class for the standard subset of data, for ages 18+ and durations 1-15 only. Expected lapses are calculated on LapseLCOI. Volume in thousands.

Smoking	Preferred Class	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
No	Not pref	2,581,649	436,269,003	112%	98%
	Residual	1,109,874	119,730,068	159%	141%
	Preferred	731,603	217,434,900	92%	79%
	All	4,423,127	773,433,971	123%	100%
Yes	Not pref	464,630	43,242,087	99%	95%
	Residual	281,661	19,016,632	129%	120%
	Preferred	70,383	15,666,117	90%	82%
	All	816,674	77,924,836	111%	100%

Actual-to-expected ratios in durations 1–15 are lower for preferred than for non-preferred, and higher for the residual class compared to non-preferred products.

5.5 Premium Payment Frequency

The data specifications allow the premium frequency to be specified as annual, semi-annual, quarterly, monthly, or not specified. Frequency would not be specified if premiums were paid on an ad hoc basis, there was no billing of premium, or the frequency was unknown. Table 21 summarizes the experience for each. LapseLCOI was constructed on data that did not distinguish frequency.

Table 21. Experience by premium frequency for the standard subset of data. Expected lapses are calculated on LapseLCOI. Volume is sum assured in thousands.

Duration	Frequency	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	N/A	7,859	3,532,817	125%	70%
	Annual	785,715	235,709,013	250%	131%
	Semi-annual	31,876	6,492,023	353%	221%
	Quarterly	84,013	16,329,309	637%	460%
	Monthly	5,660,242	729,071,429	99%	84%
	All	6,569,705	991,134,591	121%	100%
1-15	N/A	7,822	3,494,532	125%	71%
	Annual	683,705	212,005,145	254%	131%
	Semi-annual	25,390	5,388,416	367%	226%
	Quarterly	66,965	13,129,502	6[illegible]8%	465%
	Monthly	5,178,635	673,725,[illegible]41	99%	85%
	All	5,962,517	907,743,[illegible]35	121%	100%
16+	N/A	37	[illegible],285	[illegible]%	0%
	Annual	102,010	23,703,868	194%	120%
	Semi-annual	6,486	1,103,607	220%	166%
	Quarterly	17,048	[illegible],199,807	725%	400%
	Monthly	[illegible]1,607	55,345,989	78%	65%
	All	607,[illegible]88	83,391,556	118%	94%

At least one company reported changing the premium frequency (to semi-annual in its case) if a monthly debit is returned NSF. If some other companies follow a similar practice, the high lapse rates become explainable. Because the frequency is not constant for a policy, there may be nothing useful that can be inferred from this table.

5.6 Conversion type

Some companies were able identify conversion type. The allowed types were “group”, “term”, “UL YRT”, and “Other”. Because few companies reported conversions, all conversion types are reported here combined. Table 22 shows the experience for not converted, converted, and both. For this purpose, a conversion from UL YRT is considered “not converted”; “converted” then means group, term, and other conversions. The table is based on the standard subset expanded to include conversions. Note that “no” may include unidentified conversions. The data underlying LapseLCOI included policies that were not converted and those that were converted from UL YRT; other conversion types were excluded.

Table 22. Experience by conversion type for standard subset expanded for conversion from another type of policy. Expected lapses are calculated on LapseLCOI. Volume is sum assured in thousands.

Duration	Converted	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	No	6,569,705	991,134,591	121%	100%
	Yes	757,026	118,043,700	77%	77%
	All	7,326,732	1,109,178,291	116%	97%
1-15	No	5,962,517	907,743,035	121%	100%
	Yes	722,862	113,019,815	77%	76%
	All	6,685,379	1,020,762,850	116%	97%
16+	No	607,188	83,391,556	118%	94%
	Yes	34,165	5,023,886	74%	92%
	All	641,353	88,415,441	116%	94%

Converted policies show markedly lower actual-to-expected ratios than normal issues for durations 1–15.

5.7 Volume of Insurance

Table 23 summarizes experience into several ranges of volume of insurance. The table is based on the standard subset of data.

Table 23. Experience by ranges of volume of insurance for the standard subset of data. Expected lapses are calculated on LapseLCOI. Volume is sum assured in thousands.

Duration	Range of Volume	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	0-49k	1,335,964	29,991,458	144%	141%
	50-99k	1,426,164	76,321,070	132%	133%
	100-249k	2,887,525	347,336,053	113%	113%
	250-499k	528,092	149,680,973	96%	97%
	500k+	391,960	387,805,037	84%	77%
	All	6,569,705	991,134,591	121%	100%
1-15	0-49k	1,207,159	26,481,830	142%	140%
	50-99k	1,298,122	69,105,606	133%	133%
	100-249k	2,606,925	313,716,708	114%	114%
	250-499k	487,657	137,910,855	96%	97%
	500k+	362,653	360,528,007	84%	77%
	All	5,962,517	907,743,825	121%	100%
16+	0-49k	128,804	3,50 628	168%	165%
	50-99k	128,042	7,215,464	114%	117%
	100-249k	280,600	33,619,346	93%	94%
	250-499k	40,43	1 770,118	103%	102%
	500k+	29,30	27,277,000	82%	69%
	All	607,188	83,391,556	118%	94%

There is a strong downward trend in actual-to-expected ratios with increasing volume, interrupted slightly for durations 2-5.

5.8 Premium Amount

The premium amount is unknown for the vast majority of records. Given that UL can allow consider flexibility in premiums, it may be unwise to infer too much from the relationship between lapse rates and premium. Table 24 shows the experience for ranges of annualized premium and for "unknown". The table is based on the standard subset of data.

Table 24. Experience by ranges of annualized premium for the standard subset of data. Expected lapses are calculated on LapseLCOI. Volume is sum assured in thousands.

	Annualized Premium	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	Unknown	5,033,850	717,314,262	127%	105%
	None	400,084	70,227,510	115%	99%
	1-249	201,370	12,980,062	110%	95%
	250-499	323,453	26,301,987	92%	91%
	500-999	302,188	36,224,344	93%	90%
	1000-1999	163,880	30,858,479	97%	89%
	2000+	144,881	97,227,947	95%	72%
	All	6,569,705	991,134,591	121%	100%
1-15	Unknown	4,493,065	641,420,725	127%	105%
	None	396,722	69,819,595	115%	99%
	1-249	194,520	12,480,698	110%	95%
	250-499	303,718	24,951,823	93%	92%
	500-999	282,333	34,492,836	93%	90%
	1000-1999	153,706	29,588,389	98%	89%
	2000+	138,453	94,982,459	95%	72%
	All	5,962,51	967,743,035	121%	100%
16+	Unknown	540,78	75,893,538	121%	96%
	None	3,362	407,915	342%	218%
	1-249	6,84	499,364	108%	88%
	250-499	19,735	1,350,354	61%	62%
	500-99	19,855	1,724,508	70%	69%
	1000-1	10,175	1,270,090	70%	84%
	2000+	6,428	2,245,788	71%	66%
	All	607,188	83,391,556	118%	94%

For those records with premium specified, there is a general downward trend in lapse rates as premium increases.

5.9 Policy Fund

Eight of the 12 companies provided some information on the amount of the fund in the LCOI policies. It seemed reasonable to study the impact of the size of fund on lapse, not by the absolute amount of the fund, but by the ratio of the fund to the volume of insurance. Since it has already been observed that lapse rates decrease with increasing volume, a study of lapse by fund amount done in the same manner may simply reflect the difference by volume because the larger funds would tend to be with the larger policies. Table 25 shows lapse experience for various ranges in the ratio of the current fund to the current volume of insurance. *Current* means the effective date chosen for the record; typically that would be the end of 2012 for policies in force and the prior

year-end value for those that terminated during the study period. The first category is "0/unknown" because a record may show a zero fund either because the fund is zero or because the fund is not provided. The table is based on the standard subset of data.

Table 25. Experience by ranges of fund to sum assured for the standard subset of data. Expected lapses are calculated on LapseLCOI. Volume is sum assured in thousands.

	Ratio of	Exposure		Actual/Expected	
	Fund to Ins	Count	Vol (000)	Count	Volume
All	0/unknown	3,147,660	427,741,556	174%	157%
	0-1%	1,942,387	305,205,070	76%	62%
	1-2%	397,838	61,057,342	46%	34%
	2-5%	491,888	79,757,446	38%	25%
	5-10%	281,790	51,946,001	37%	27%
	10%+	308,142	65,427,177	36%	24%
	All	6,569,705	991,134,59[illegible]	12[illegible]%	100%
1-15	0/unknown	2,875,795	388,162,359	173%	157%
	0-1%	1,873,324	295,3[illegible]6,6[illegible]	76%	62%
	1-2%	351,518	55,06[illegible],236	46%	35%
	2-5%	417,617	[illegible],318,161	38%	26%
	5-10%	222,187	44,744,189	37%	27%
	10%+	222,077	[illegible],146,470	33%	22%
	All	5,9[illegible]	07,743,035	121%	100%
16+	0/unknown	271,[illegible]5	39,579,197	198%	155%
	0-1%	69,063	9,898,449	100%	78%
	1-2%	46,320	5,992,107	38%	29%
	2-5%	74,272	9,439,285	37%	24%
	5-10%	59,602	7,201,812	36%	26%
	10%+	86,066	11,280,707	46%	36%
	All	607,188	83,391,556	118%	94%

Clearly the actual-to-expected ratios are substantially lower when the fund is positive, even if quite small compared to the volume of insurance. However, it is possible that the "0/unknown" category is artificially high and others artificially low because some contributing companies may have been unable to access the fund just prior to lapse and therefore show zero.

5.10 Adjustability

The record specifications distinguished between guaranteed policies, those for which premiums are adjustable, those for which benefits are adjustable, and those for which both are adjustable. No records were submitted for the last two categories. However, too few companies submitted data for adjustable policies to justify displaying results in this report.

6 Main Observations

The most significant observations from the study are:

1. Lapse rates continue to decrease as duration increases but appear to flatten out around duration 20;
2. Lapse rates are slightly lower than those reported in the prior studies;
3. Smoking status is much more important than gender for lapse rates;
4. Joint type is an important factor; and
5. Lapse rates decrease markedly with increasing volume of insurance, but less strongly so for durations 16+.

Appendix: Construction of LapseLCOI

This appendix may be of interest to some readers, but it does not deal directly with the observed experience.

Constructing a decrement table is fairly simple when there is an abundance of data over all ages and durations required, but typically there will be ages and durations needed for which there are not enough data. LapseLCOI is no exception. There is not enough exposure at high durations and at high ages. There is relatively little exposure for juvenile ages compared to adult ages. As a result, the tables must be constructed in pieces, making appropriate use of the available data, and stitching the pieces together smoothly. In these cases, there are many arbitrary decisions that need to be made; there may be no clearly right choice, but rather a fairly wide range of acceptable choices. What follows documents the method used, but it does not attempt to justify the many arbitrary choices made.

The tables were constructed from the standard subset of data by volume of insurance. For issue ages 18–70 the records are separated into male and female, non-smoker, smoker, and aggregate. For issue ages 0–17, only male and female are distinguished. The raw lapse rates are calculated on the volume of insurance. The graduation is done by Whittaker-Henderson in either one or two dimensions, as required by the data. The measure of goodness of fit is weighted by the volume of insurance exposed. In all cases, the weights are scaled so that they sum to the number of numbers being graduated.

Adult Ultimate

Testing indicated that there was more similarity by duration across all ages than by attained age across all durations. Therefore, the ultimate is based on the combined experience by durations for issue ages 18–70. The raw rates of durations 16–23 are graduated using order of difference 2 and smoothness factor 200. The two numbers for the lowest and highest durations are then discarded to avoid the edge effects of graduation.

There is very little exposure over duration 23. However, the few data there are at the highest few durations available suggest that the lapse rate may be fairly flat. The high-duration lapse rate is set at the weighted aggregate lapse rate for durations 16–30. The rates used for male non-smoker, male smoker, female non-smoker, and female smoker are 0.8%, 1.5%, 0.8%, and 1.5%, respectively. The standard deviations for these same rates are approximately 0.04%, 0.15%, 0.06%, and 0.11%, respectively. This high-duration lapse rate is used for durations 25 and higher. The rates for durations 22–24 are obtained by fitting a cubic equation to the rates already obtained for durations 20, 21, 25, and 26.

Adult Select

The graduation encompassed issue ages 18–73 and durations 1–18. The order of difference was 3 in all cases. The smoothness factor was 10 in the direction of durations and 100 in the direction of ages. Because there were some obvious peaks in the raw

lapse rates at high ages likely due to statistical fluctuation, a ceiling was applied for raw rates for issue ages 69–73; the ceiling was 5% for non-smokers and 6% for smokers. To avoid edge effects, the rates for ages over 70 were discarded and so were the rates for durations over 13.

The adult section was completed by fitting a cubic equation for each issue age to the values for select durations 12 and 13 and ultimate durations 18 and 19, to determine rates for durations 14–17.

The rates for issue age 70 are intended to be used for all older issue ages, because there are not sufficient data to infer more appropriate rates at those high ages, particularly for smokers.

Juvenile

The graduation used data for issue ages 0–17 and durations 1–17. The order of difference was 3 and the smoothness factor was 300. The rates for durations 18 and higher were set to the weighted aggregate of the aggregate lapse rate for ages 0–17 and durations 18–40 combined. The rates for durations 15–17 were calculated as a blend of the graduated rates and that aggregate rate.

There was no attempt to remove discontinuities between the juvenile and adult rates. The differences between the rates at age 17 and 18 for the same duration can be large.

Aggregate

There were not sufficient data for aggregate (not smoker-distinct) policies to allow constructing a table from the data. The aggregate exposure is less than 2% of the total and less than 0.2% of the total for adult ages. The overall experience for aggregate at adult ages was only slightly higher than non-smoker for males and very close to non-smoker for females. Therefore, the non-smoker rates were used for adult aggregate.

Completed Tables

The tables are available in Excel format here.