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Research Paper

Lapse Experience under Term-to-100 Insurance Policies

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Research Committee
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Lapse Experience under Term-to-100 Insurance Policies

1 Introduction

1.1 Overview

This is the sixth lapse experience study covering term-to-100 and similar insurance policies (collectively referred to as "T100"). Lapses have a significant impact on the financial results of these products. This study covers calendar years 2005–2012; the previous study covered 1999–2004. 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 lower than those observed before.

1.2 Data in Study

The scope of this study is limited to term-to-100 and similar products. The previous study was limited to the first 25 policy years because there were negligible data for higher durations. This study includes all data received, but there are very little data for policy years higher than 30.

All of the companies contributed data for all eight calendar years, 2005–2012, of the study. However, not all were able to contribute data for all requested fields. For example, some lacked information on cash values and premium. For most, cash value information was missing or poor in quality. Accordingly, this report contains no reporting by cash values.

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 (LapseT100)

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, base coverages (as opposed to riders), 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 *LapseT100.* LapseT100 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 LapseT100 reflects the experience contributed. LapseT100 is not a table officially endorsed by the CIA. It may not be appropriate as a best estimate assumption for any particular company. Because lapse rates can vary widely by company, it may be unwise for a company to adopt LapseT100, 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 LapseT100 to fit its own business and experience.

The rates for LapseT100 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 and various subsets of it. Data that did not conform to the specifications for the study are excluded.

The row called "Guaranteed, Base records" is the subset of data comparable to what was used in the prior report, for 1999–2004. Other records were excluded.

In most cases in this report, the subset used is a smaller subset, referred to as the "standard subset of data". In addition to the exclusion used in the last study, it also excludes joint policies, policies rated other than standard, and policies arising from a conversion or a guaranteed insurability election (GIE). Although the standard subset is only about 75% of the valid data, it is more useful to consider because it is more homogeneous. Additional comparisons in section 5 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 valid records	4,87[illegible],930	[illegible]59,689,811	62,343	4,683,590	1.3%	1.3%
less Adjustable	194,016	14,766,343	3,260	249,565	1.7%	1.7%
Guaranteed Policies	4,[illegible]77,914	354,923,469	59,083	4,434,026	1.3%	1.2%
less Riders	205,678	11,950,892	3,362	180,309	1.6%	1.5%
Guaranteed, Base records	4,472,236	342,972,577	55,721	4,253,716	1.2%	1.2%
less Joint	280,860	40,542,418	3,009	396,478	1.1%	1.0%
Single, Gtd, Base records	4,191,376	302,430,159	52,712	3,857,239	1.3%	1.3%
less Substd, Conv, GIE	385,140	25,485,891	4,916	342,104	1.3%	1.3%
Standard subset of data	3,806,236	276,944,268	47,796	3,515,135	1.3%	1.3%

1.5 Contributing Companies

There were 10 contributing companies—see table 2. 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.

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

Company	Distribution
Canada Life	6.1%
Desjardins	9.7%
Empire Life	4.5%
Industrial Alliance	16.3%
London Life	3.9%
Manulife	14.8%
RBC Insurance	15.3%
Standard Life	2.3%
Sun Life	13.6%
Transamerica Life	2.5%
All	100.0%

The overall ratio of actual to expected values varies considerably by company. After dropping the two highest and lowest ratios, the remaining ones are 92%, 92%, 103%, 105%, 105%, and 109%. Some companies have standard deviations in the neighbourhood of 2%, but others are more than twice that. (Further information is not provided in order to keep company-specific information confidential.)

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 LapseT100 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 1999–2004

Table 3 shows the overall exposure and lapse rates for guaranteed policies for base coverages by policy count and by volume of insurance (in thousands of dollars). (In this report "volume" is synonymous with "sum assured" and "face amount".) This subset of data is the same as used for the 2007 study of calendar years 1999–2004. The numbers for the current study are shown on the left and the prior study on the right of table 3.

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

Study of 2005-2012				Duration	Study of 1999-2004			
Exposure		Lapse Rates			Exposure		Lapse Rates	
Count	Vol (000)	Count	Volume		Count	Vol (000)	Count	Volume
114,405	9,565,543	4.7%	4.0%	1	87,784	6,104,889	7.3%	5.4%
124,374	10,349,758	3.7%	3.8%	2	99,649	6,494,272	6.4%	5.7%
129,847	10,714,131	3.5%	3.5%	3	116,317	6,842,758	5.5%	5.2%
133,060	10,872,598	2.8%	2.8%	4	144,333	7,870,802	4.6%	4.4%
136,417	10,919,340	2.3%	2.5%	5	186,733	10,017,474	4.0%	3.8%
143,218	11,181,246	1.9%	1.8%	6	235,249	13,283,614	3.5%	3.4%
143,740	10,797,358	1.7%	1.5%	7	294,478	17,075,865	2.8%	2.7%
151,734	10,593,997	1.5%	1.5%	8	345,133	19,998,787	2.5%	2.3%
163,716	10,804,500	1.4%	1.5%	9	381,740	22,[illegible]4,773	2.0%	1.7%
178,106	11,371,941	1.6%	2.7%	10	414,576	26,10[illegible],209	1.7%	1.4%
197,637	12,403,553	1.3%	1.5%	11	4[illegible]1,453	[illegible]15,037	1.5%	1.4%
225,234	15,184,934	1.0%	0.9%	12	[illegible]72	23,847,878	1.2%	1.0%
253,804	18,217,328	0.9%	0.8%	13	289,[illegible]41	18,463,222	1.1%	0.9%
268,062	20,040,615	0.8%	0.8%	[illegible]	[illegible]23,751	14,645,754	0.9%	0.8%
274,762	21,154,284	0.8%	0.7%	[illegible]5	[illegible]9,839	11,609,010	0.9%	0.7%
273,872	21,853,271	0.7%	0.6%	16	115,188	8,382,067	0.9%	0.8%
271,694	22,464,209	0.6%	[illegible]5%	[illegible]7	66,771	4,822,260	0.6%	0.5%
260,622	22,167,841	0.5%	0.4%	18	40,481	2,570,429	0.6%	0.5%
233,733	20,320,521	0.5%	0.4%	19	27,673	1,582,466	0.7%	0.6%
196,868	16,875,463	0.7%	0.[illegible]%	20	19,800	1,064,217	0.8%	0.5%
158,031	13,160,168	0.[illegible]%	0.[illegible]%	21	12,277	591,168	0.7%	0.8%
128,491	10,358,478	0.[illegible]%	0.5%	22	5,636	190,973	0.8%	0.7%
104,423	8,075,680	0.5%	0.4%	23	1,843	53,843	0.9%	1.4%
78,623	5,824,[illegible]52	0.4%	0.6%	24	683	16,934	0.6%	0.5%
50,406	3,443,[illegible]	0.4%	0.4%	25	179	3,959	1.1%	0.9%
29,320	1,808,94[illegible]	0.5%	0.4%	26				
19,412	1,112,298	0.4%	0.4%	27				
13,568	728,689	0.5%	0.4%	28				
8,499	419,900	0.5%	0.3%	29				
3,914	126,024	0.6%	0.3%	30				
2,646	62,458	1.4%	1.2%	31+				
4,472,236	342,972,577	1.2%	1.2%	All	4,057,080	251,528,661	2.3%	2.0%

Lapse rates are generally lower in this study than in the prior one. Lapse rates at durations 26–30, which were not included in the prior study follow the downward trend observed at earlier durations.

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
29,815	2,936,726	3.7%	3.4%	1	38,161	3,060,242	3.8%	3.7%
33,160	3,260,098	3.4%	3.6%	2	42,366	3,344,407	3.2%	3.5%
35,359	3,457,083	3.2%	3.3%	3	45,192	3,525,413	3.0%	3.2%
36,470	3,552,333	2.6%	2.6%	4	47,003	3,610,569	2.4%	2.7%
36,901	3,511,267	2.3%	2.3%	5	48,291	3,641,107	2.0%	2.2%
37,947	3,598,163	1.8%	1.9%	6	50,395	3,677,458	1.6%	1.7%
37,591	3,480,131	1.6%	1.6%	7	50,314	3,595,897	1.4%	1.4%
39,183	3,379,285	1.5%	1.7%	8	53,197	3,399,591	1.2%	1.3%
42,159	3,476,012	1.5%	1.8%	9	57,214	3,404,927	1.0%	1.0%
46,237	3,745,060	1.7%	4.3%	10	61,916	3,507,749	1.2%	1.3%
52,117	4,195,495	1.3%	1.8%	11	67,827	3,764,320	1.0%	1.1%
61,765	5,561,128	0.9%	0.9%	12	75,723	4,337,537	0.7%	0.7%
72,447	7,094,084	0.8%	0.7%	13	83,937	4,977,073	0.6%	0.9%
78,756	8,071,806	0.8%	0.7%	14	87,713	5,308,111	0.7%	0.7%
82,773	8,757,334	0.7%	0.7%	15	88,779	5,468,805	0.6%	0.6%
85,282	9,376,763	0.7%	0.5%	16	86,668	5,498,897	0.5%	0.5%
87,895	9,900,102	0.5%	0.4%	17	84,554	5,551,133	0.5%	0.4%
87,153	10,008,416	0.4%	0.4%	18	80,188	5,415,700	0.4%	0.4%
80,301	9,343,728	0.4%	0.4%	19	71,258	4,911,256	0.4%	0.3%
68,640	7,831,623	0.7%	0.7%	20	59,538	4,071,514	0.6%	0.6%
55,969	6,180,699	0.8%	0.9%	21	47,346	3,159,137	0.5%	0.5%
46,694	4,990,805	0.4%	0.5%	22	37,930	2,472,615	0.4%	0.4%
38,453	3,959,957	0.4%	0.4%	23	30,371	1,915,384	0.4%	0.4%
29,292	2,860,016	0.4%	0.4%	24	22,615	1,382,446	0.3%	0.3%
18,774	1,719,961	0.5%	0.5%	25	13,915	802,783	0.4%	0.4%
10,571	907,101	0.5%	0.4%	26	7,345	384,851	0.4%	0.4%
6,674	555,756	0.4%	0.4%	27	4,363	203,878	0.4%	0.6%
4,645	373,397	0.6%	0.4%	28	2,858	114,624	0.3%	0.3%
2,890	209,288	0.4%	0.2%	29	1,659	57,975	0.2%	0.2%
1,228	53,191	0.4%	0.2%	30	679	13,925	0.7%	0.6%
718	23,144	1.0%	1.0%	31+	341	5,603	0.3%	0.2%
1,347,858	136,369,950	1.1%	1.1%	All	1,449,757	94,475,925	1.0%	1.2%

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
7,849	445,145	9.1%	8.1%	1	7,763	370,186	8.6%	8.5%
8,183	476,691	6.5%	7.8%	2	8,209	386,285	6.1%	7.4%
8,474	487,869	6.1%	6.2%	3	8,618	403,054	5.0%	5.2%
8,562	490,441	4.9%	6.1%	4	9,013	423,193	3.7%	3.9%
8,682	477,013	3.7%	4.5%	5	9,477	438,790	3.2%	5.7%
9,095	487,526	2.9%	2.9%	6	10,285	449,166	2.5%	2.8%
9,168	479,642	2.7%	2.9%	7	10,743	454,224	2.2%	2.5%
9,879	483,213	2.2%	2.0%	8	12,093	484,405	1.9%	1.8%
11,049	511,109	2.2%	2.7%	9	13,828	531,816	1.7%	1.9%
12,486	557,044	2.1%	2.6%	10	15,650	583,706	1.6%	1.7%
14,361	642,242	2.0%	2.6%	11	17,886	670,869	1.4%	1.7%
16,667	829,142	1.5%	1.8%	12	20,004	782,713	1.1%	1.2%
19,099	1,011,376	1.4%	1.5%	13	22,516	912,121	1.1%	1.1%
20,606	1,126,418	1.2%	1.4%	14	24,088	981,074	0.9%	0.8%
21,535	1,197,869	1.0%	0.9%	15	24,725	1,030,775	0.8%	0.9%
22,083	1,275,062	1.2%	1.1%	16	24,620	1,052,374	0.8%	0.8%
22,408	1,348,995	1.0%	0.9%	17	24,360	1,080,836	0.7%	0.8%
21,906	1,364,018	0.6%	0.6%	18	23,225	1,057,030	0.5%	0.6%
19,796	1,258,990	0.8%	0.7%	19	20,581	955,906	0.5%	0.5%
16,850	1,057,748	1.0%	1.1%	20	17,219	805,848	0.6%	0.7%
13,653	848,863	0.8%	0.9%	21	13,697	632,026	0.6%	0.6%
11,051	684,974	0.9%	0.7%	22	10,998	500,280	0.4%	0.4%
8,930	547,733	0.6%	0.5%	23	8,745	388,239	0.5%	0.5%
6,587	396,336	0.5%	0.5%	24	6,328	278,050	0.4%	0.4%
4,038	231,119	0.4%	0.6%	25	3,760	150,849	0.4%	0.6%
2,073	109,545	0.5%	0.5%	26	1,897	67,373	0.5%	0.4%
1,281	64,512	0.5%	0.4%	27	1,143	34,917	0.3%	0.2%
880	42,834	0.6%	0.4%	28	768	20,337	0.4%	0.2%
553	26,097	0.7%	0.4%	29	482	11,202	0.6%	0.8%
249	7,727	0.0%	0.0%	30	216	3,698	0.5%	0.1%
136	3,765	0.7%	0.4%	31+	102	1,516	0.0%	0.0%
338,170	18,971,255	1.9%	1.9%	All	373,838	15,947,860	1.5%	1.7%

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 LapseT100.

Table 6. Ungraduated lapse rates by duration for the standard subset of data, for non-smokers only, issue ages 18+. Expected on LapseT100. 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
2,936,726	3.4%	94%	7%	1	3,060,242	3.7%	96%	5%
3,260,098	3.6%	109%	7%	2	3,344,407	3.5%	102%	5%
3,457,083	3.3%	111%	7%	3	3,525,413	3.2%	105%	5%
3,552,333	2.6%	94%	7%	4	3,610,569	2.7%	104%	5%
3,511,267	2.3%	92%	7%	5	3,631,107	2.2%	99%	6%
3,598,163	1.9%	78%	8%	6	3,678,458	1.7%	90%	7%
3,480,131	1.6%	72%	8%	7	3,495,897	1.4%	85%	7%
3,379,285	1.7%	81%	8%	8	3,399,591	1.3%	95%	8%
3,476,012	1.8%	92%	9%	9	3,404,927	1.0%	87%	8%
3,745,060	4.3%	246%	9%	10	3,507,749	1.3%	123%	9%
4,195,495	1.8%	117%	8%	11	3,764,3[illegible]	1.1%	114%	9%
5,561,128	0.9%	71%	8%	12	4,337,537	0.7%	86%	8%
7,094,084	0.7%	65%	8%	13	1,917,073	0.9%	111%	8%
8,071,806	0.7%	81%	10%	14	5,[illegible]8,121	0.7%	104%	9%
8,757,334	0.7%	102%	11%	15	5,468,805	0.6%	91%	10%
9,376,763	0.5%	97%	12%	16	5,498,897	0.5%	93%	10%
9,900,102	0.4%	88%	12%	17	5,551,133	0.4%	86%	11%
10,008,416	0.4%	88%	12%	18	5,415,700	0.4%	89%	11%
9,343,728	0.4%	80%	13%	19	4,911,256	0.3%	74%	12%
7,831,625	0.7%	149%	14%	20	4,071,514	0.6%	140%	14%
6,180,699	0.9%	165%	13%	21	3,159,137	0.5%	124%	16%
4,990,801	0.5%	9[illegible]%	14%	22	2,472,615	0.4%	83%	15%
3,959,957	0.4%	82%	15%	23	1,915,384	0.4%	90%	16%
2,860,016	0.4%	71%	17%	24	1,382,446	0.3%	76%	18%
1,719,961	0.5%	98%	22%	25	802,783	0.4%	111%	22%
907,101	0.[illegible]%	99%	34%	26	384,851	0.4%	94%	31%
555,756	0.4%	86%	52%	27	203,878	0.6%	164%	45%
373,397	0.4%	117%	73%	28	114,624	0.3%	81%	61%
209,288	0.2%	67%	90%	29	57,975	0.2%	62%	88%
53,191	0.2%	70%	126%	30	13,925	0.6%	192%	125%
23,144	1.0%	326%	93%	31+	5,603	0.2%	59%	130%
136,369,950	1.1%	100%	2%	All	94,475,925	1.2%	99%	2%

Table 7. Ungraduated lapse rates by duration for the standard subset of data, for smokers only, issue ages 18+. Expected on LapseT100. Volume is sum assured in thousands of dollars.

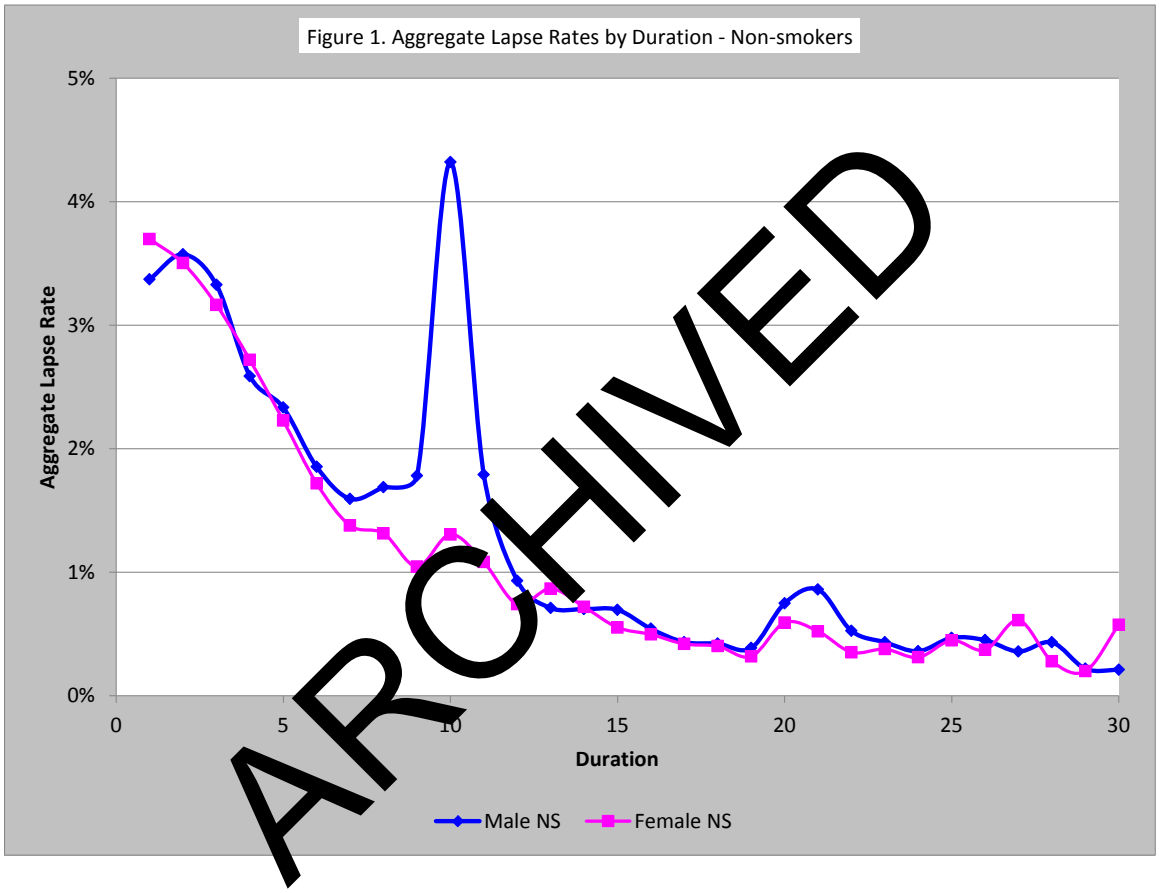
Adult male smokers				Duration	Adult female smokers			
Vol (000)	Lapse rate	A/E	Std Dev		Vol (000)	Lapse rate	A/E	Std Dev
445,145	8.1%	95%	6%	1	370,186	8.5%	102%	9%
476,691	7.8%	106%	7%	2	386,285	7.4%	106%	10%
487,869	6.2%	100%	8%	3	403,054	5.2%	91%	11%
490,441	6.1%	115%	8%	4	423,193	3.9%	82%	16%
477,013	4.5%	101%	9%	5	438,790	5.7%	143%	21%
487,526	2.9%	76%	10%	6	449,166	2.8%	87%	16%
479,642	2.9%	90%	11%	7	454,224	2.5%	92%	17%
483,213	2.0%	70%	11%	8	484,405	1.8%	83%	16%
511,109	2.7%	108%	12%	9	531,816	1.9%	99%	15%
557,044	2.6%	118%	12%	10	588,706	1.7%	104%	16%
642,242	2.6%	134%	11%	11	670,849	1.7%	126%	15%
829,142	1.8%	105%	16%	12	782,713	1.2%	101%	12%
1,011,376	1.5%	95%	15%	13	922,121	1.1%	103%	11%
1,126,418	1.4%	105%	14%	14	911,094	0.8%	89%	13%
1,197,869	0.9%	80%	14%	15	1,030,775	0.9%	106%	13%
1,275,062	1.1%	106%	15%	16	1,052,374	0.8%	99%	14%
1,348,995	0.9%	100%	15%	17	1,080,836	0.8%	107%	14%
1,364,018	0.6%	69%	16%	18	1,057,030	0.6%	91%	16%
1,258,990	0.7%	92%	17%	19	955,906	0.5%	80%	18%
1,057,748	1.1%	146%	17%	20	805,848	0.7%	114%	22%
848,863	0.9%	120%	18%	21	632,026	0.6%	113%	25%
684,974	0.7%	95%	20%	22	500,280	0.4%	78%	22%
547,733	0.5%	81%	24%	23	388,239	0.5%	110%	25%
396,536	0.5%	83%	29%	24	278,050	0.4%	89%	33%
231,113	0.6%	120%	35%	25	150,849	0.6%	134%	39%
109,545	0.3%	98%	57%	26	67,373	0.4%	107%	49%
64,512	0.4%	89%	89%	27	34,917	0.2%	49%	72%
42,834	0.4%	102%	119%	28	20,337	0.2%	67%	95%
26,097	0.4%	138%	163%	29	11,202	0.8%	244%	115%
7,727	0.0%	0%	220%	30	3,698	0.1%	45%	159%
3,765	0.4%	137%	215%	31+	1,516	0.0%	0%	212%
18,971,255	1.9%	100%	2%	All	15,947,860	1.7%	100%	3%

Although the fit between the actual data and LapseT100 by duration is good overall, there are peaks in actual lapse rates relative to expected at duration 10, 15, and 20 with valleys in-between. A study of the durations of CSV onset shows that there is a heaping at durations 10 and 20, and at 15 to a lesser extent. It is likely that there are higher lapses at these durations because cash values have become available and some policyholders were holding off on lapsing until cash values commenced. Ideally the

experience for durations in which cash values are available would be analyzed separately from durations with no cash values, but unfortunately not enough companies were able to provide information on cash values, their size, or when they commenced.

It is worth noting that the overall actual-to-expected ratios are close to 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.



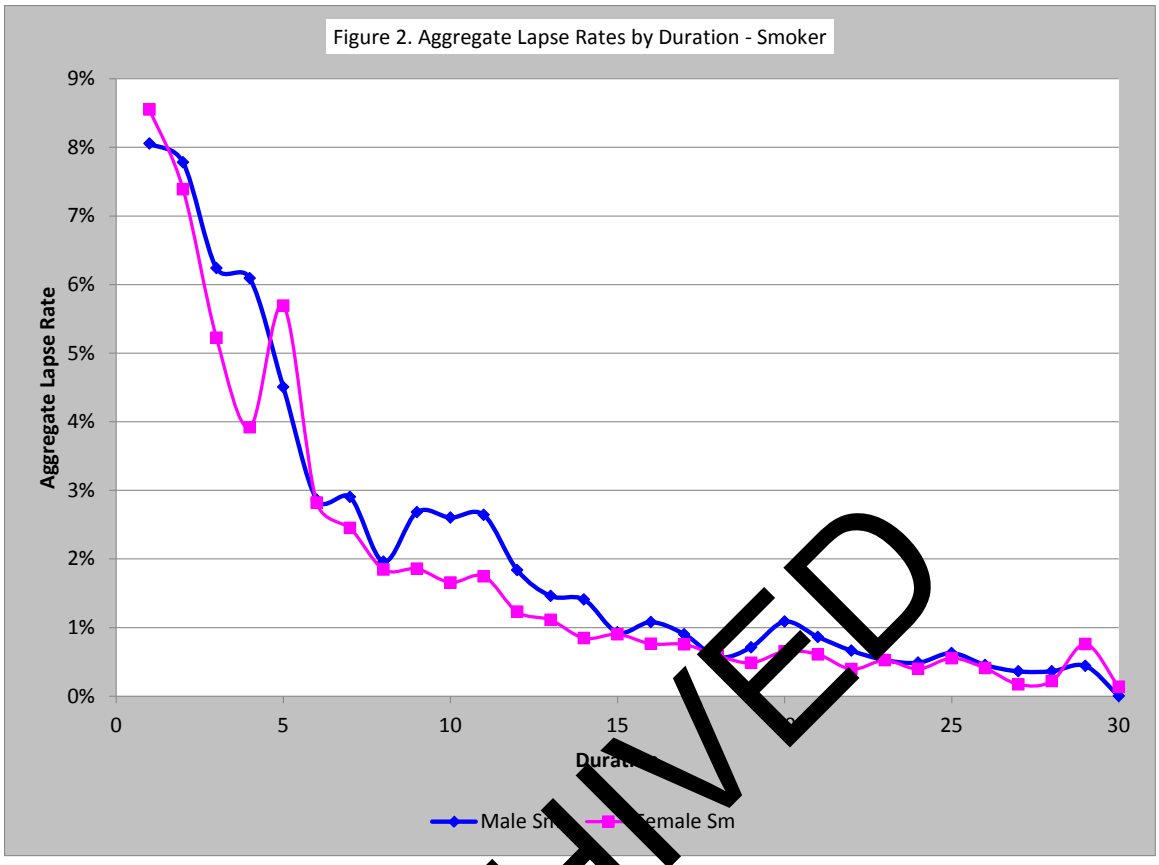


Table 8 shows the ratio of actual lapses to tabular lapses on male non-smoker LapseT100; that is, the male non-smoker table is used to calculate the tabular lapses for all four subsets. (The word "tabular" is used rather than "expected" because one does not expect lapses to be consistent with rates for 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 LapseT100 male non-smoker.

Duration	M NS	M Sm	F NS	F Sm
1-5	100%	211%	100%	200%
6-10	110%	124%	68%	100%
11-15	86%	148%	75%	105%
16-20	99%	163%	83%	117%
21-25	112%	128%	79%	95%
26+	97%	97%	98%	81%
16+	103%	151%	82%	111%
All	100%	164%	84%	134%

The difference in ratios is much larger between smoker and non-smoker than between male and female. The differentials trend downward with increasing duration. Male lapse ratios are generally higher than female, smoker than non-smoker.

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. Average lapse rates for issue ages 18+, measured by volume.

Duration	M NS	M Sm	F NS	F Sm
1-5	3.0%	6.5%	3.0%	6.1%
6-10	2.3%	2.6%	1.4%	2.1%
11-15	0.9%	1.5%	0.8%	1.1%
16-20	0.5%	0.9%	0.4%	0.7%
21-25	0.6%	0.7%	0.4%	0.5%
26+	0.4%	0.4%	0.4%	0.3%
16+	0.5%	0.8%	0.4%	0.6%
All	1.1%	1.9%	1.2%	1.7%

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 LapseT100.

Duration	Calendar Year of Experience									Std Dev
	2005	2006	2007	2008	2009	2010	2011	2012	2005-12	2012
1-5	89%	78%	94%	11[illegible]%	117%	112%	107%	81%	100%	6%
6-10	77%	64%	[illegible]5%	137%	185%	124%	88%	75%	101%	6%
11-15	76%	77%	90%	108%	129%	118%	91%	104%	94%	9%
16-20	68%	65%	87%	118%	119%	106%	97%	98%	98%	9%
21-25	52%	6[illegible]%	245%	177%	116%	79%	88%	102%	107%	11%
26+	44%	40%	135%	142%	60%	92%	113%	105%	101%	24%
16+	67%	[illegible]4%	106%	129%	117%	97%	94%	100%	100%	7%
All	80%	73%	93%	121%	132%	112%	96%	88%	99%	3%

There is no clear pattern of increase or decrease by year of experience. Actual-to-expected ratios were lowest in 2005 and 2006 and highest in 2008 and 2009. One might conclude that lapse rate rose in 2008–2010 because of the economic difficulties of those years, but there are no economic indicators directly in data to allow such an inference.

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,

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	3.1%	2.7%	3.3%	4.0%	3.8%	3.6%	3.7%	3.0%	3.4%	0.2%
6-10	1.4%	1.2%	1.6%	2.5%	3.5%	2.3%	1.7%	1.4%	1.9%	0.1%
11-15	0.8%	0.8%	0.9%	1.0%	1.2%	1.1%	0.9%	1.0%	0.9%	0.1%
16-20	0.4%	0.4%	0.5%	0.7%	0.6%	0.6%	0.5%	0.5%	0.5%	0.0%
21-25	0.3%	0.3%	1.3%	0.9%	0.6%	0.4%	0.4%	0.5%	0.5%	0.1%
26+	0.3%	0.2%	0.6%	0.6%	0.3%	0.4%	0.5%	0.4%	0.4%	0.1%
16+	0.4%	0.4%	0.6%	0.7%	0.6%	0.5%	0.6%	0.5%	0.5%	0.0%
All	1.2%	1.1%	1.3%	1.6%	1.6%	1.3%	1.1%	0.9%	1.3%	0.0%

gender, and smoking can vary between cells. The actual-to-expected ratios are better able to compensate for changes in distribution.

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 LapseT100.

	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	104%	104%	94%	101%	104%	71%	100%
	6-10	87%	101%	114%	133%	107%	82%	110%
	11-15	104%	105%	88%	59%	68%	114%	86%
	16-20	93%	96%	104%	105%	104%	61%	99%
	21-25	107%	96%	161%	86%	87%	69%	112%
	26+	82%	139%	63%	70%	45%	0%	97%
	16+	97%	97%	119%	98%	99%	62%	103%
	All	99%	102%	103%	98%	96%	79%	100%
Standard Deviation	1-5	5%	5%	7%	11%	9%	33%	3%
	6-10	6%	7%	8%	9%	14%	47%	4%
	11-15	8%	8%	8%	8%	21%	47%	4%
	16-20	9%	10%	11%	17%	29%	66%	6%
	21-25	11%	12%	16%	23%	58%	150%	7%
	26+	30%	38%	56%	58%	210%	845%	25%
	16+	7%	8%	9%	14%	26%	60%	4%
	All	3%	3%	4%	3%	8%	23%	2%
Aggregate Lapse Rate	1-5	3.8%	3.2%	2.8%	2.6%	2.8%	1.6%	3.0%
	6-10	1.8%	1.8%	2.3%	3.8%	1.6%	0.9%	2.3%
	11-15	1.1%	1.0%	0.9%	0.9%	0.5%	0.5%	0.9%
	16-20	0.6%	0.5%	0.8%	0.4%	0.4%	0.2%	0.5%
	21-25	0.6%	0.5%	0.8%	0.4%	0.4%	0.3%	0.6%
	26+	0.3%	0.6%	0.3%	0.3%	0.2%	0.0%	0.4%
	16+	0.5%	0.5%	0.6%	0.4%	0.4%	0.2%	0.5%
	All	1.3%	1.0%	1.1%	1.3%	1.0%	0.9%	1.1%

Table 13. Actual to Expected ratios for the standard subset of data by groups of issue ages and durations. Expected is calculated on LapseT100.

	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	102%	102%	99%	104%	101%	86%	101%
	6-10	97%	93%	95%	105%	93%	47%	94%
	11-15	103%	103%	99%	116%	83%	56%	101%
	16-20	93%	102%	102%	70%	68%	44%	94%
	21-25	88%	98%	146%	78%	45%	58%	99%
	26+	32%	189%	87%	52%	65%	0%	109%
	16+	91%	102%	112%	71%	64%	45%	95%
	All	99%	100%	100%	103%	93%	71%	99%
Standard Deviation	1-5	4%	4%	5%	5%	7%	22%	2%
	6-10	5%	7%	8%	9%	13%	29%	3%
	11-15	6%	7%	8%	11%	20%	34%	4%
	16-20	8%	9%	12%	19%	29%	44%	5%
	21-25	11%	13%	17%	29%	61%	105%	8%
	26+	35%	28%	91%	95%	116%	793%	22%
	16+	6%	7%	10%	17%	26%	41%	4%
	All	2%	3%	4%	4%	6%	15%	2%
Aggregate Lapse Rate	1-5	3.8%	3.4%	3.8%	2.6%	2.3%	1.7%	3.0%
	6-10	1.9%	1.6%	1.8%	1.2%	0.7%	0.3%	1.4%
	11-15	1.1%	0.8%	0.9%	0.7%	0.3%	0.2%	0.8%
	16-20	0.5%	0.5%	0.6%	0.2%	0.2%	0.1%	0.4%
	21-25	0.4%	0.4%	0.6%	0.3%	0.2%	0.2%	0.4%
	26+	0.1%	0.7%	0.3%	0.2%	0.2%	0.0%	0.4%
	16+	0.5%	0.5%	0.5%	0.3%	0.2%	0.1%	0.4%
	All	1.4%	1.2%	1.3%	1.0%	0.8%	0.6%	1.2%

Table 14. Actual to Expected ratios for the standard subset of data by groups of issue ages and durations. Expected is calculated on LapseT100.

	Duration	Male Smoker by issue age group						
		18-29	30-39	40-49	50-59	60-69	70+	18+
Actual to Expected	1-5	101%	110%	101%	100%	99%	104%	103%
	6-10	82%	87%	100%	96%	95%	79%	91%
	11-15	107%	98%	107%	111%	76%	17%	103%
	16-20	100%	107%	93%	97%	66%	125%	100%
	21-25	111%	76%	159%	87%	33%	0%	101%
	26+	100%	139%	11%	68%	0%	0%	98%
	16+	102%	99%	107%	94%	55%	117%	101%
	All	99%	100%	103%	100%	93%	92%	100%
Standard Deviation	1-5	6%	7%	8%	8%	12%	38%	3%
	6-10	10%	8%	10%	13%	13%	83%	5%
	11-15	11%	12%	10%	16%	7%	176%	6%
	16-20	10%	13%	13%	23%	98%	262%	7%
	21-25	18%	15%	22%	24%	233%	603%	10%
	26+	59%	69%	107%	13%	210%	1005%	42%
	16+	9%	10%	11%	19%	97%	248%	6%
	All	4%	5%	5%	8%	13%	35%	2%
Aggregate Lapse Rate	1-5	7.5%	7.1%	6.1%	6.3%	4.3%	3.3%	6.5%
	6-10	2.5%	3.1%	2.3%	1.9%	1.8%	1.2%	2.6%
	11-15	2.0%	1.6%	1.7%	1.1%	0.3%	0.1%	1.5%
	16-20	1.2%	0.8%	0.9%	0.7%	0.2%	0.4%	0.9%
	21-25	0.8%	0.5%	1.0%	0.6%	0.2%	0.0%	0.7%
	26+	0.4%	0.6%	0.0%	0.3%	0.0%	0.0%	0.4%
	16+	1.3%	0.7%	0.8%	0.7%	0.2%	0.4%	0.8%
	All	2.4%	1.7%	2.0%	2.0%	1.5%	1.4%	1.9%

Table 15. Actual to Expected ratios for the standard subset of data by groups of issue ages and durations. Expected is calculated on LapseT100.

	Duration	Female Smoker by issue age group						
		18-29	30-39	40-49	50-59	60-69	70+	18+
Actual to Expected	1-5	102%	110%	97%	97%	103%	117%	103%
	6-10	98%	72%	104%	124%	169%	25%	92%
	11-15	102%	115%	95%	96%	85%	75%	105%
	16-20	107%	97%	90%	79%	72%	17%	98%
	21-25	106%	84%	185%	46%	11%	0%	102%
	26+	192%	50%	9%	0%	0%	100%	94%
	16+	108%	93%	109%	71%	61%	15%	99%
	All	102%	99%	99%	99%	108%	72%	100%
Standard Deviation	1-5	5%	10%	20%	11%	16%	69%	6%
	6-10	7%	7%	31%	19%	32%	72%	7%
	11-15	8%	9%	17%	33%	38%	104%	6%
	16-20	10%	9%	13%	71%	52%	133%	7%
	21-25	15%	14%	22%	114%	132%	573%	13%
	26+	58%	49%	79%	212%	429%	100%	35%
	16+	8%	8%	11%	63%	48%	132%	6%
	All	3%	5%	12%	11%	13%	43%	3%
Aggregate Lapse Rate	1-5	8.1%	10.1%	4.1%	3.7%	2.7%	1.8%	6.1%
	6-10	2.7%	2.7%	1.7%	1.5%	1.3%	0.2%	2.1%
	11-15	1.5%	1.4%	0.9%	0.5%	0.3%	0.2%	1.1%
	16-20	0.9%	0.6%	0.3%	0.4%	0.3%	0.1%	0.7%
	21-25	0.5%	0.4%	0.9%	0.2%	0.1%	0.0%	0.5%
	26+	0.7%	0.2%	0.0%	0.0%	0.0%	100.0%	0.3%
	16+	0.8%	0.6%	0.6%	0.3%	0.3%	0.1%	0.6%
	All	2.0%	1.8%	1.5%	1.2%	1.0%	0.5%	1.7%

Table 16 completes the picture of tables 12–15 by showing quinquennial issue age groups for juveniles. Neither gender nor smoking status is distinguished. The ratios of actual to expected lapses are well above 100% for durations 21 and higher. (Rates for LapseT100 at these durations were obtained from experience for adult issue ages combined.)

Table 16. Actual to Expected ratios for the standard subset of data by groups of issue ages and durations. Expected is calculated on LapseT100.

	Duration	Male and Female, All smoking types			
		0-4	5-9	10-17	0-17
Actual to Expected	1-5	99%	106%	98%	100%
	6-10	103%	97%	100%	100%
	11-15	106%	96%	111%	107%
	16-20	98%	109%	97%	100%
	21-25	97%	104%	100%	100%
	26+	206%	178%	60%	103%
	16+	99%	109%	97%	100%
	All	101%	103%	100%	101%
Standard Deviation	1-5	6%	9%	6%	4%
	6-10	7%	10%	7%	4%
	11-15	8%	10%	7%	5%
	16-20	9%	11%	8%	5%
	21-25	17%	20%	13%	12%
	26+	61%	69%	71%	51%
	16+	8%	10%	7%	5%
	All	4%	5%	3%	2%
Aggregate Lapse Rate	1-5	2.7%	3%	3.0%	3.0%
	6-10	1.9%	1.8%	1.9%	1.9%
	11-15	1.1%	1.3%	1.8%	1.4%
	16-20	0.9%	1.5%	1.4%	1.3%
	21-25	1.1%	1.2%	1.2%	1.2%
	26+	2.4%	2.1%	0.7%	1.2%
	16+	1.0%	1.5%	1.3%	1.2%
	All	1.7%	2.0%	2.0%	1.9%

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 LapseT100 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 LapseT100 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 LapseT100. Volume in thousands.

Duration	Joint type	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	Single	3,524,303	266,842,949	97%	99%
	First to die	147,341	12,351,489	90%	108%
	Last to die	54,920	17,820,745	61%	54%
	All	3,726,565	297,015,184	96%	97%
1-15	Single	2,027,468	145,673,288	95%	99%
	First to die	82,722	7,815,272	92%	110%
	Last to die	41,310	11,209,641	6[illegible]%	[illegible]3%
	All	2,151,500	164,698,201	94%	[illegible]7%
16+	Single	1,496,835	121,169,6[illegible]2	1[illegible]6%	100%
	First to die	64,619	4,53[illegible],21[illegible]	80%	100%
	Last to die	13,611	6,611,[illegible]04	[illegible]%	63%
	All	1,575,065	132,[illegible]16,9[illegible]3	104%	99%

Actual-to-expected ratios for joint first-to-die are a little higher than for single life when measured by volume but lower by count. The ratios for joint last-to-dies are markedly lower than for single life.

5.2 Base/Rider

Records distinguish between base coverages and riders. LapseT100 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.

Table 18. Experience by base or rider for standard subset expanded for coverage type. Expected lapses are calculated on LapseT100. Volume is sum assured in thousands.

Duration	Coverage type	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	Base	3,806,236	276,944,268	99%	99%
	Rider	179,083	10,573,488	125%	120%
	All	3,985,319	287,517,755	100%	100%
1-15	Base	2,220,014	153,233,724	97%	99%
	Rider	97,703	5,195,059	118%	115%
	All	2,317,717	158,428,783	98%	99%
16+	Base	1,586,222	123,710,544	107%	100%
	Rider	81,380	5,378,429	149%	137%
	All	1,667,602	129,088,973	109%	102%

Riders experience markedly higher actual-to-expected ratios than base plans, particularly at higher durations.

5.3 Rating

Most companies indicated the mortality rating on each record. Some were able to distinguish only between standard and substandard. (These records represent less than 3% of exposure marked as substandard; the ratings were artificially set at 199%.) Some could not distinguish, and all records were marked as standard. LapseT100 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 to all ratings. Expected lapses are calculated on LapseT100. Volume is sum assured in thousands.

Duration	Rating	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	Standard	3,806,236	276,944,268	99%	99%
	101-200%	89,768	4,875,440	123%	162%
	>200%	22,063	698,209	137%	149%
	All	3,918,067	282,517,917	100%	100%
1-15	Standard	2,220,014	153,233,724	97%	99%
	101-200%	68,428	3,725,697	124%	162%
	>200%	15,949	489,895	137%	149%
	All	2,304,391	157,449,316	98%	100%
16+	Standard	1,586,222	123,710,544	107%	100%
	101-200%	21,340	1,149,743	123%	163%
	>200%	6,115	208,314	139%	146%
	All	1,613,676	125,068,601	107%	101%

The ratios are markedly higher for substandard than for standard when measured by volume.

5.4 Frequency

The data specifications allow the premium frequency to be specified as annual, semi-annual, quarterly, monthly, or not specified. Table 20 summarizes the experience for each. LapseT100 was constructed on data that did not distinguish frequency. The table is based on the standard subset of data.

Table 20. Experience by premium frequency for the standard subset of data. Expected lapses are calculated on LapseT100. Volume is sum assured in thousands.

Duration	Frequency	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	N/A	689,612	47,979,756	87%	109%
	Annual	623,155	65,166,081	101%	81%
	Semi-annual	78,550	5,534,158	346%	369%
	Quarterly	50,600	4,476,656	635%	570%
	Monthly	2,364,319	153,787,617	87%	81%
	All	3,806,236	276,944,268	99%	99%
1-15	N/A	564,812	38,915,915	75%	96%
	Annual	292,959	31,307,972	101%	83%
	Semi-annual	32,067	2,364,644	3[illegible]%	407%
	Quarterly	22,373	1,887,197	6[illegible]%	65%
	Monthly	1,307,803	78,757,9[illegible]	92%	87%
	All	2,220,014	153,233,7[illegible]	97%	99%
16+	N/A	124,801	9,06[illegible]842	27[illegible]%	326%
	Annual	330,196	[illegible]3,858,[illegible]09	100%	76%
	Semi-annual	46,483	3,16[illegible]5	246%	286%
	Quarterly	28,22[illegible]	[illegible]589,459	647%	585%
	Monthly	1,[illegible]56,51[illegible]	75,029,620	68%	59%
	All	1,58[illegible]22	123,710,544	107%	100%

This table is most surprising. However, at least one company reported changing the premium frequency (to semi-annual in this 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 gathered from this table.

5.5 Conversion Type

Some companies were able to identify conversion type. The allowed types were "group", "term", and "Other". Because few companies reported conversions, all conversion types are reported here combined. Table 21 shows the experience for not converted, converted, and both. The table is based on the standard subset expanded to include conversions. Note that "no" may include unidentified conversions. Records with a conversion type identified were excluded for the data underlying LapseT100.

Table 21. Experience by converted or not for the standard subset expanded for conversion. Expected lapses are calculated on LapseT100. Volume is sum assured in thousands.

Duration	Converted	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	No	3,806,236	276,944,268	99%	99%
	Yes	235,308	17,527,948	84%	90%
	All	4,041,544	294,472,216	98%	99%
1-15	No	2,220,014	153,233,724	97%	99%
	Yes	123,206	8,311,288	80%	90%
	All	2,343,220	161,545,013	96%	98%
16+	No	1,586,222	123,710,544	107%	100%
	Yes	112,102	9,216,660	97%	88%
	All	1,698,324	132,927,204	106%	99%

Because there are several types of conversions combined, little can be inferred.

5.6 Volume of Insurance

Table 22 summarizes experience into several ranges of volume of insurance. The table is based on the standard subset of data. The classification into ranges is based on the "current" volume indicated on the records submitted and ignores the fact that volume may be different in other years covered by the record.

Table 22. Experience by ranges of volume of insurance for the standard subset of data. Expected lapses are calculated on LapseT100. Volume is sum assured in thousands.

Duration	Volume	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	0-49k	1,659,556	31,473,134	102%	102%
	50-99k	983,240	52,272,931	100%	100%
	100-249k	1,006,708	116,003,197	93%	94%
	250-499k	102,091	28,761,408	103%	104%
	500k+	54,640	48,433,598	106%	107%
	All	3,806,236	276,944,268	99%	99%
1-15	0-49k	1,076,450	20,685,706	99%	99%
	50-99k	512,094	26,969,898	99%	99%
	100-249k	541,238	62,694,305	93%	93%
	250-499k	59,583	16,728,090	98%	99%
	500k+	30,647	26,155,774	111%	115%
	All	2,220,014	153,233,774	97%	99%
16+	0-49k	583,106	10,787,428	119%	117%
	50-99k	471,146	25,303,033	105%	105%
	100-249k	465,470	53,308,892	96%	99%
	250-499k	42,508	11,033,318	129%	129%
	500k+	23,993	22,277,874	83%	71%
	All	1,586,222	123,710,544	107%	100%

There is generally no trend in lapse ratios by volume.

5.7 Premium Amount

Most companies provided premium amounts, but for some companies the premium amount is not reliable. For example, some companies appear often unable to get the premium after lapse. Table 23 shows experience by count and volume for each of several bands of premium. In all cases the annualized premium is used. The table is based on the standard subset of data. The numbers with a positive premium may be usable, but it could be that lapses are disproportionately reported in the "none" category. The numbers with no premium are clearly not usable.

Table 23. Experience by ranges of annualized premium for the standard subset of data. Expected lapses are calculated on LapseT100. Volume is sum assured in thousands.

	Annualized Premium	Exposure		Actual/Expected	
		Count	Vol (000)	Count	Volume
All	Unknown	320,734	27,836,337	105%	105%
	None	44,480	4,196,428	965%	862%
	1-249	1,243,184	46,054,980	106%	99%
	250-499	1,160,114	66,979,543	84%	84%
	500-999	643,687	51,071,700	82%	87%
	1000-1999	254,077	32,273,391	76%	83%
	2000+	139,960	48,531,890	85%	97%
	All	3,806,236	276,944,268	99%	99%
1-15	Unknown	248,436	19,802,555	1[illegible]%	[illegible]97%
	None	27,048	2,337,373	92[illegible]%	[illegible]42%
	1-249	618,877	20,171,6[illegible]	109%	106%
	250-499	628,921	32,401,0[illegible]	84%	86%
	500-999	419,073	29,44[illegible]605	7[illegible]%	85%
	1000-1999	179,381	[illegible]0,037,[illegible]82	73%	81%
	2000+	98,279	29,030,[illegible]8	84%	102%
	All	2,220,01[illegible]	15[illegible],233,724	97%	99%
16+	Unknown	[illegible]72,29[illegible]	8,033,782	150%	165%
	None	17[illegible]32	1,859,054	1125%	926%
	1-249	624,30[illegible]	25,883,366	98%	83%
	250-499	53[illegible]193	34,578,526	82%	78%
	500-9[illegible]	[illegible]24,614	21,624,095	104%	98%
	1000-[illegible]	74,696	12,236,309	112%	98%
	2000+	41,681	19,495,411	92%	70%
	All	1,586,222	123,710,544	107%	100%

There does not appear to be any strong correlation between amount of premium and lapse experience.

5.8 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 is 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. Too few companies provided data by preferred class to justify displaying results in this report.

5.9 Adjustability

Records submitted distinguish 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 category, and very few for adjustable benefits. 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;
2. Lapse rates are generally lower than those reported in the prior studies;
3. Smoking status is more important than gender;
4. Joint type is very important;
5. Variation by size is small, whether measuring by sum assured or premium; and
6. There is considerable variation in lapse ratios by year of experience.

These observations are based on this industry study, which covers a range of product designs from different companies and different issue years. Lapse behavior is sensitive to product design. The observations here may not be valid for any particular product, company, or year.

Appendix: Construction of LapseT100

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. LapseT100 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 describes 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 20–70 the records are separated into male and female, non-smoker, smoker, and aggregate. For issue ages 0–15, 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 20–70. The raw rates of durations 18–28 (16–28 for female smokers) are graduated using order of difference 2. For males the smoothness factor is 200 and for females 100. The two numbers for the lowest and highest durations are then discarded to avoid the edge effects of graduation.

There is virtually no exposure over duration 30. However, the few data there are at the highest few durations available suggest that the lapse rate may be stabilizing around 0.3%. This number is used for durations 30 and higher, and it is used as a floor for the rates at earlier durations. The rates for durations 26–29 are obtained by fitting a cubic equation to the rates already obtained for durations 24, 25, 30, and 31.

Adult Select

The graduation encompassed issue ages 18–73 and durations 1–22 (1–20 for female smokers). The order of difference was 3 in all cases. The smoothness factor was 100 in all cases except that 50 was used in the direction of durations for female non-smokers. 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 4% 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 17 (over 15 for female smokers).

The adult section was completed by fitting a cubic equation for each issue age to the values for durations 17, 18, 23, 24, to determine rates for durations 18–22, except 2 durations earlier for female smoker.

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.

Juvenile

The graduation used data for issue ages 0–17 and durations 1–20. The order of difference was 3 and the smoothness factor was 600. The rates for durations 21–40 were set to the actual weighted aggregate lapse rate for ages 0–17 and durations 21–40 combined. The rates for durations 18–20 were changed to 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. In order to fit overall experience for aggregate, the smoker rates were used, increased by one-third for adults. Juvenile rates are not smoker-distinct.

Completed Tables

The tables are available in Excel format here.