



Mortality  
and Longevity

# Individual Life Waiver of Premium Experience Study

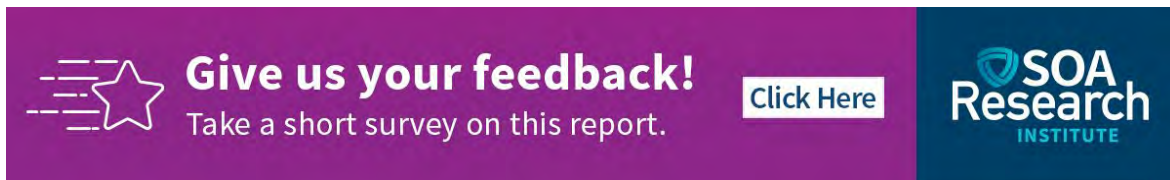
May | 2022





# Individual Life Waiver of Premium Experience Study

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**SPONSOR** SOA Research Institute

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# Individual Life Waiver of Premium Experience Study Report

## Section 1: Purpose of Study

The primary purposes of the study are the following:

1. Compare recent industry experience for individual life waiver of premium (ILWOP) insurance products to the claim incidence and claim termination rates from the 1952 SOA Disability Table;
2. Analyze actual-to-expected (A/E) claim incidence and claim termination ratios across key segments such as gender, attained age, etc.;
3. Develop an illustrative experience basis for calculating policy and claim reserves based on the results from the A/E studies; and
4. Compare reserves calculated using experience assumptions to the reserves calculated using the 1952 SOA Disability Table for an illustrative cohort of ILWOP business.

This study follows a survey that was undertaken by the Society of Actuaries in 2018 on ILWOP reserving and pricing methods (<https://www.soa.org/resources/research-reports/2018/survey-waiver-premium-monthly-deduction-rider/>). Based on the interest expressed by participants taking the survey, the SOA Research Institute commissioned this report to collect data and analyze the experience in the form of an Actual to Expected study.



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## Section 2: Background and Scope

Waiver of premium benefits are commonly featured in individual life insurance products, with variations among products and companies. In the event of disability, the life insurance premiums are waived and coverage is continued for part or all of the disability duration. Waiver of premium benefits typically feature a six-month waiting period before benefits begin and require the insured to be totally disabled for benefits to continue. Although the definitions of total disability vary among companies, they often include a requirement that the insured is unable to perform the material and substantial duties of their own occupation for a period of at least 24 months. ILWOP benefits are often provided as an optional rider, although they may be included in the base policy.

In 2018, the Society of Actuaries sponsored an industry survey of pricing and reserving methods for individual life waiver of premium (ILWOP) products. Most survey participants indicated that it had been over 10 years since repricing their ILWOP products, in part due to the lack of industry data to support repricing. The last time an industry experience study was performed was in 1952, which resulted in the 1952 Society of Actuaries Disability Table (1952 Table). This table includes disability incidence and claim termination rate assumptions, and it is the basis used by insurers for calculating statutory reserves. Many insurers use the 1952 Table for calculating GAAP reserves as well.

The 1952 Table is based on experience from 1935 through 1939 and is severely outdated. There have been significant changes in the population, demographics, and lifestyles since that time, including the availability of female data to have gender-distinct tables (the 1952 Table includes uni-gender rates). One of the primary objectives of the 2022 ILWOP Experience Study is to compare recent ILWOP experience to the incidence and claim termination rates from the 1952 Table. Another objective is to evaluate the potential impact of calculating ILWOP reserves based on more current incidence and claim termination rate assumptions that reflect recent trends in experience.

Actual-to-expected (A/E) incidence and claim termination rate studies were performed using ILWOP data from 2003-2016 provided by contributing insurance companies. The results are summarized in this report for the following segments:

### A/E Incidence Study

- Gender
- Attained age
- Issue age
- Policy duration
- Face amount
- Observation year
- Smoker status
- Issue state
- Annualized premium
- Policy type
- Optional rider
- Underwriting methods
- Insurance type

### A/E Claim Termination Study

- Gender and claim duration
- Attained age and claim duration
- Issue age and claim duration
- Diagnosis and claim duration
- Smoker status and claim duration
- Annualized premium and claim duration

### Section 3: Summary of Results

This section provides a summary of the key results and observations from the ILWOP Experience Study. The A/E ratios shown below are based on claim counts and the expected basis is the 1952 Table. Additional results from the A/E studies are provided in Appendices A and B, including details of the exposures across different segments and the A/E ratios on an amount basis.

#### 3.1 A/E CLAIM INCIDENCE

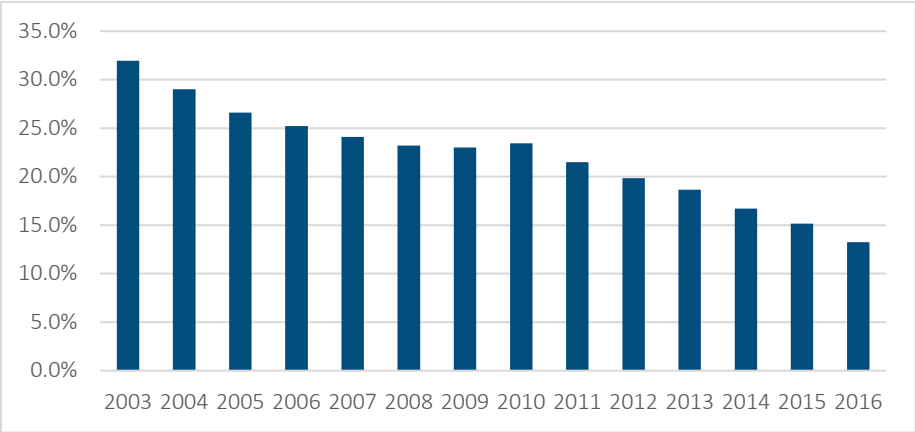
ILWOP claim incidence rates during the 2003-2016 experience period were significantly lower than the incidence rates included in the 1952 Table. The overall A/E incidence ratio was 22.1%. The A/E ratios were somewhat higher in total for males than females, and were lower at the youngest and highest attained age bands, as shown below:

**Table 3.1**  
A/E INCIDENCE RATIOS BY ATTAINED AGE AND GENDER

Attained Age	Male	Female	Total
<30	19.3%	14.6%	<b>17.0%</b>
30-39	32.7%	34.1%	<b>33.4%</b>
40-49	41.4%	39.5%	<b>40.6%</b>
50+	19.6%	14.3%	<b>17.6%</b>
<b>Total</b>	<b>23.4%</b>	<b>20.0%</b>	<b>22.1%</b>

A/E incidence ratios generally decreased during the experience period, as shown below. A flattening occurred in 2008-09, followed by a slight uptick in 2010, which may be linked to the recession during those years. Disability claim incidence rates often increase with rising unemployment rates.

**Figure 3.1**  
A/E INCIDENCE RATIOS BY OBSERVATION YEAR



A/E incidence ratios were significantly higher when ILWOP benefits were offered as an optional rider (26.4%) as opposed to when benefits were included in the base policy (14.5%), as shown below. This result suggests that adverse selection risk can be significant on voluntary ILWOP products. It may also suggest that policyholders are not as aware of waiver of premium benefits when they are included in the base policy.

**Table 3.2**  
**A/E INCIDENCE RATIOS BY COVERAGE TYPE**

Coverage Type	A/E Incidence
Included with Base Policy	14.5%
Optional Rider	26.4%
<b>Total</b>	<b>22.1%</b>

A/E incidence ratios were lower for ILWOP offered on life products that featured medical underwriting (20.6%) than products that were not underwritten (31.3%) or used term conversion underwriting methods (32.0%), as shown in table 3.3. The A/E ratios were significantly higher for substandard risk classes than standard risk classes.

**Table 3.3**  
**A/E INCIDENCE RATIOS BY UNDERWRITING METHOD AND RISK CLASS**

Underwriting Method	Risk Class		Total
	Standard	Substandard	
Not Underwritten	31.3%	47.0%	<b>31.3%</b>
Term Conversion	31.7%	45.1%	<b>32.0%</b>
Underwritten	20.3%	34.4%	<b>20.6%</b>
Unknown/Other	15.6%	28.6%	<b>16.0%</b>
<b>Total</b>	<b>21.8%</b>	<b>35.7%</b>	<b>22.1%</b>

### 3.2 A/E CLAIM TERMINATION RATIOS

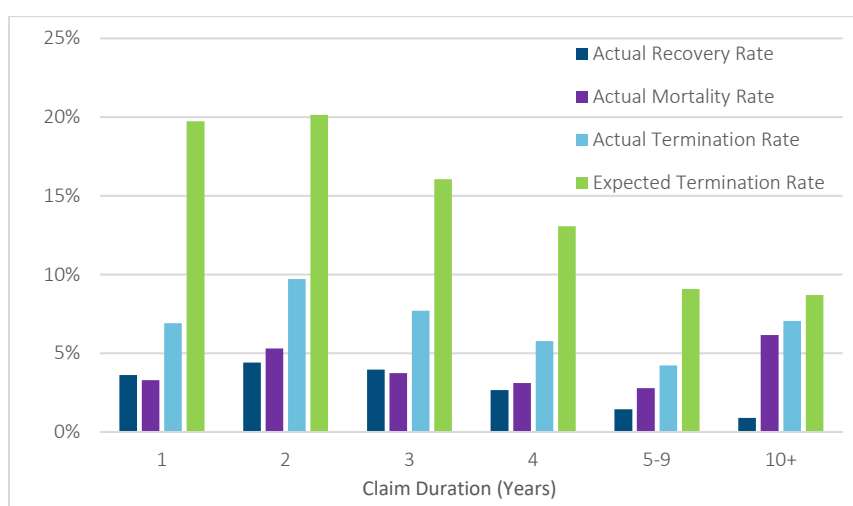
ILWOP claim termination rates during the 2003-2016 experience period were lower than the claim termination rates included in the 1952 Table. The overall A/E claim termination ratio was 54.7%, although the ratios were lower for claims in durations 1-9 than in durations 10 and beyond, as shown below:

**Table 3.4**  
**A/E CLAIM TERMINATION RATIOS BY GENDER AND CLAIM DURATION**

Gender	Claim Duration (Years)						Total
	1	2	3	4	5-9	10+	
Male	35.6%	45.1%	47.3%	42.2%	46.8%	82.2%	<b>59.2%</b>
Female	30.1%	36.0%	39.7%	35.5%	39.8%	69.6%	<b>45.4%</b>
<b>Total</b>	<b>33.6%</b>	<b>41.6%</b>	<b>44.4%</b>	<b>39.7%</b>	<b>44.3%</b>	<b>79.1%</b>	<b>54.7%</b>

The A/E claim termination ratios increased in later durations due to higher mortality rates (relative to the expected basis) for older attained ages that comprised most of the exposure in the 10+ duration segment. The following chart shows actual and expected claim termination rates for the attained age 50+ segment by claim duration. Note that the actual termination rate (light blue bar) is the sum of the recovery rate (dark blue bar) and mortality rate (purple bar) in the chart. The sharp increase in the mortality rate in duration 10+ moves the actual termination rate closer to the expected termination rate.

**Figure 3.2**  
ACTUAL AND EXPECTED TERMINATIONS FOR ATTAINED AGES 50 +



The A/E claim termination ratios vary significantly by cause of disability. The following table provides a summary of ILWOP claim termination experience from 2003-2016 by diagnosis category. Note that the experience in many of the segments may not be considered credible given the low number of terminations. The A/E ratio corresponding to cancer claims (96.8%)—whose experience may be considered credible because it includes 8,358 claim terminations—is much higher than the overall A/E ratio of 54.7%. On the other hand, the A/E ratios corresponding to other claims, such as circulatory claims (45.3%), back claims (29.9%), and mental & nervous claims (34.8%)—which may also be considered credible—are lower than the overall result.

**Table 3.5**  
ILWOP CLAIM TERMINATION EXPERIENCE BY DIAGNOSIS CATEGORY

Diagnosis Category	Actual Terminations	Expected Terminations	A/E Ratio
Back	1,987	6,646	29.9%
Cancer	8,358	8,638	96.8%
Circulatory	4,334	9,573	45.3%
Diabetes	253	609	41.6%
Digestive	645	1,168	55.2%
Ill-defined and Misc. Conditions	99	246	40.2%
Injury other than Back	3,133	5,959	52.6%
Maternity	272	118	230.2%
Mental & Nervous	3,457	9,941	34.8%
Nervous System	2,563	7,541	34.0%
Other	16,248	46,110	35.2%
Other Musculoskeletal	2,536	7,718	32.9%
Respiratory	647	1,279	50.6%
No Diagnosis	89,628	139,660	64.2%
<b>Total</b>	<b>134,160</b>	<b>245,205</b>	<b>54.7%</b>



### 3.3 EXPERIENCE RESERVES

Adjustment factors were applied to the incidence and claim termination rates from the 1952 Table for calculating “experience” reserves—i.e., reserves whose morbidity assumptions reflect the experience trends from 2003 through 2016, without any explicit margins for valuation purposes. The experience basis was used to compute active life reserves (ALR) and disabled life reserves (DLR) for an illustrative cohort of ILWOP business that assumes 1,500,000 inforce policies and 10,000 open claims. The following tables compare the experience reserves to the reserves calculated using the 1952 Table:

**Table 3.6**  
ILLUSTRATIVE ACTIVE LIFE RESERVE COMPARISONS

Attained Age	1952 Table Reserves (\$Millions)			Experience Reserves (\$Millions)			Ratio Experience / 1952 Table		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
<30	\$0.29	\$0.24	<b>\$0.53</b>	\$0.21	\$0.21	<b>\$0.42</b>	72%	87%	<b>79%</b>
30-39	\$5.65	\$3.59	<b>\$9.24</b>	\$3.77	\$2.56	<b>\$6.34</b>	67%	71%	<b>69%</b>
40-49	\$17.01	\$8.97	<b>\$25.98</b>	\$9.95	\$5.27	<b>\$15.22</b>	58%	59%	<b>59%</b>
50+	\$14.43	\$6.39	<b>\$20.82</b>	\$7.20	\$3.12	<b>\$10.31</b>	50%	49%	<b>50%</b>
<b>Total</b>	<b>\$37.38</b>	<b>\$19.19</b>	<b>\$56.57</b>	<b>\$21.13</b>	<b>\$11.16</b>	<b>\$32.29</b>	<b>57%</b>	<b>58%</b>	<b>57%</b>

**Table 3.7**  
ILLUSTRATIVE DISABLED LIFE RESERVE COMPARISONS

Claim Duration (Years)	1952 Table Reserves (\$Millions)			Experience Reserves (\$Millions)			Ratio Experience / 1952 Table		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
1	\$1.15	\$0.51	<b>\$1.65</b>	\$2.03	\$1.01	<b>\$3.04</b>	177%	200%	<b>184%</b>
2	\$1.35	\$0.61	<b>\$1.96</b>	\$2.04	\$1.02	<b>\$3.06</b>	151%	167%	<b>156%</b>
3	\$1.38	\$0.65	<b>\$2.03</b>	\$1.96	\$0.99	<b>\$2.95</b>	142%	153%	<b>145%</b>
4	\$1.38	\$0.66	<b>\$2.04</b>	\$1.85	\$0.93	<b>\$2.78</b>	134%	142%	<b>136%</b>
5-9	\$5.27	\$2.73	<b>\$8.00</b>	\$6.74	\$3.55	<b>\$10.29</b>	128%	130%	<b>129%</b>
10+	\$5.26	\$2.59	<b>\$7.86</b>	\$6.56	\$3.21	<b>\$9.77</b>	125%	124%	<b>124%</b>
<b>Total</b>	<b>\$15.80</b>	<b>\$7.75</b>	<b>\$23.54</b>	<b>\$21.19</b>	<b>\$10.71</b>	<b>\$31.90</b>	<b>134%</b>	<b>138%</b>	<b>136%</b>

Overall, the experience ALR (\$32.29 million) is approximately 43% lower than the ALR calculated using the 1952 Table (\$56.57 million). This is because the experience basis includes significantly lower claim incidence rates than the 1952 Table, which offsets the impact of the lower claim termination rate assumptions used for calculating the experience ALR.

On the other hand, the overall experience DLR (\$31.90 million) is approximately 36% higher than the DLR calculated using the 1952 Table (\$23.54 million). This is because experience claim termination rates are lower than the 1952 Table in all durations.

## Section 4: Data, Assumptions, and Analytical Methods

This section provides documentation on the data, assumptions, and analytical methods used in the ILWOP Experience Study.

### 4.1 ACTUAL-TO-EXPECTED INCIDENCE STUDY

The A/E incidence study uses ILWOP policy data from 2003 through 2016 provided by contributing insurance companies. This data was reviewed thoroughly by MIB, SOA, the ILWOP Project Oversight Group, and Milliman to resolve any issues, and it was validated by contributors prior to the analysis. The data associated with the largest contributor in the claims experience was dampened to prevent their experience from dominating the study results. Specifically, this contributor's exposure was dampened by 50% to represent 30% of the total dampened study exposure. In order to maintain consistency between the claim and policy data, this company's data was dampened by 50% in the policy data as well, even though such an adjustment was not required as the policy data included a more even spread of experience by company. All of the data was aggregated and deidentified by MIB. The following table summarizes the life years of exposure in the data used to perform the A/E incidence study.

**Table 4.1**  
ILWOP LIFE YEARS OF EXPOSURE FROM 2003 THROUGH 2016

Attained Age	Male	Female	Total
<30	20,749,573	20,100,210	<b>40,849,783</b>
30-39	17,559,372	15,334,133	<b>32,893,505</b>
40-49	22,382,278	16,723,459	<b>39,105,736</b>
50+	28,598,176	17,442,206	<b>46,040,382</b>
<b>Total</b>	<b>89,289,398</b>	<b>69,600,008</b>	<b>158,889,406</b>

The aggregated and deidentified policy data were used by MIB to develop a database that includes exposures, actual claims, expected claims (based on the 1952 Table), and A/E ratios by count and amount across various segments. This database was then converted to a pivot table and delivered to the Project Oversight Group and Milliman for performing the analysis.

### 4.2 ACTUAL-TO-EXPECTED CLAIM TERMINATION STUDY

The A/E claim termination study uses ILWOP claim data from 2003 through 2016 provided by contributing insurance companies. This data was reviewed and validated like the policy data prior to the analysis. Claim data associated with the largest contributor were dampened to prevent their experience from dominating the study results, as described above. The following table summarizes the number of claim terminations in the data used to perform the A/E claim termination study. Additional details are provided in Appendix B.

**Table 4.2**  
ILWOP CLAIM TERMINATIONS FROM 2003 THROUGH 2016

Claim Duration (Years)	Male	Female	Total
1	7,843	3,949	<b>11,792</b>
2	9,986	4,901	<b>14,887</b>
3	7,064	3,583	<b>10,647</b>
4	4,460	2,225	<b>6,685</b>
5-9	13,434	6,272	<b>19,706</b>
10+	55,151	15,294	<b>70,445</b>
<b>Total</b>	<b>97,938</b>	<b>36,223</b>	<b>134,160</b>

The claim data were used by MIB to develop a database that includes actual terminations, expected terminations (based on the 1952 Table), and A/E ratios by count and amount across various segments. This database was then converted to a pivot table and delivered to the Project Oversight Group and Milliman for performing the analysis.

### 4.3 EXPERIENCE RESERVES

The A/E incidence and claim termination ratios were used to develop morbidity assumptions for computing experience reserves. These assumptions include adjustment factors that were applied to the incidence and claim termination rates from the 1952 Table. The claim termination adjustment factors vary by age, gender, and claim duration, and are based on the raw A/E ratios by count. These factors are provided in table 4.3 below:

**Table 4.3**  
EXPERIENCE BASIS – CLAIM TERMINATION ADJUSTMENT FACTORS

Duration (Years)	Male				Female			
	<30	30-39	40-49	50+	<30	30-39	40-49	50+
1	0.27	0.33	0.33	0.38	0.39	0.39	0.27	0.29
2-4	0.25	0.41	0.41	0.49	0.24	0.31	0.32	0.43
5-9	0.23	0.41	0.42	0.49	0.23	0.37	0.38	0.41
10+	0.21	0.35	0.57	0.84	0.21	0.43	0.50	0.72

The incidence adjustment factors vary by age and gender and are based on smoothed A/E ratios in order to maintain logical relationships. Specifically, the incidence adjustment factors for attained ages 50+ were set equal to the factors for attained ages 40-49 for males and females<sup>1</sup>, in order to preserve an increasing pattern in incidence rates. As a result, the experience ALR may be somewhat high for attained ages 50+ relative to actual experience from 2003-2016. The experience adjustment factors are provided below:

**Table 4.4**  
EXPERIENCE BASIS - INCIDENCE ADJUSTMENT FACTORS

Attained Age	Male	Female
<30	0.19	0.15
30-39	0.33	0.34
40+	0.41	0.39

<sup>1</sup> See Table A.2 in Appendix A for the raw A/E ratios by attained age. The decrease in A/E ratios from attained ages 40-49 to attained ages 50+ is similar for males and females. The raw A/E ratio for attained ages 50+ was 20% for males and 14% for females.

The experience basis was used to calculate policy reserves and claim reserves for an illustrative cohort of ILWOP business. For the ALR calculations, an assumed distribution of inforce policies by attained age and gender was developed from the ILWOP Experience Study policy database, scaled to 1,500,000 policyholders, as shown below:

**Table 4.5**  
**ASSUMED DISTRIBUTION OF ILWOP INFORCE POLICIES**

Attained Age	Male	Female	Total
<30	195,887	189,757	<b>385,644</b>
30-39	165,770	144,762	<b>310,532</b>
40-49	211,301	157,878	<b>369,179</b>
50+	269,982	164,664	<b>434,646</b>
<b>Total</b>	<b>842,939</b>	<b>657,061</b>	<b>1,500,000</b>

For the DLR calculations, an assumed distribution of open claims by age, gender, and claim duration was developed from the ILWOP Experience Study claim database, scaled to 10,000 open claims. The majority of open claims correspond to older attained ages and later claim durations, as shown below:

**Table 4.6**  
**ASSUMED DISTRIBUTION OF ILWOP OPEN CLAIMS - MALES**

Attained Age	Duration						Total
	1	2	3	4	5-9	10+	
<30	16	14	12	11	40	44	<b>137</b>
30-39	30	26	22	19	60	62	<b>219</b>
40-49	97	86	77	69	235	206	<b>770</b>
50+	304	310	313	313	1,463	2,650	<b>5,354</b>
<b>Total</b>	<b>447</b>	<b>436</b>	<b>425</b>	<b>412</b>	<b>1,798</b>	<b>2,963</b>	<b>6,480</b>

**Table 4.7**  
**ASSUMED DISTRIBUTION OF ILWOP OPEN CLAIMS - FEMALES**

Attained Age	Duration						Total
	1	2	3	4	5-9	10+	
<30	10	9	8	7	21	24	<b>79</b>
30-39	30	26	22	19	57	39	<b>193</b>
40-49	78	70	64	58	207	155	<b>633</b>
50+	156	161	163	163	763	1,209	<b>2,614</b>
<b>Total</b>	<b>274</b>	<b>266</b>	<b>257</b>	<b>247</b>	<b>1,048</b>	<b>1,427</b>	<b>3,520</b>

The reserve calculations represent the present value of expected future premiums waived at 3.5% interest. A distribution of the monthly premiums waived by age and gender was developed from the ILWOP Experience Study policy database, and is provided below:

**Table 4.8**  
**ASSUMED DISTRIBUTION OF PREMIUMS WAIVED**

Attained Age	Male	Female
<30	\$26	\$22
30-39	\$48	\$35
40-49	\$62	\$43
50+	\$64	\$47

## Section 5: Reliance and Limitations

The results in this report are technical in nature and are dependent on certain assumptions and methods. No party should rely upon these results without a thorough understanding of those assumptions and methods. Such an understanding may require consultation with qualified professionals. This report should be distributed and reviewed only in its entirety.

In conducting the analysis, Milliman relied upon the policy data provided by contributors to the ILWOP Experience Study. Milliman did not audit or independently verify any of the information furnished, except for reviewing the data for reasonableness and consistency. To the extent that any of the data or other information supplied to us was incorrect or inaccurate, the results of this analysis could be materially affected.

This report is intended for the benefit of the Society of Actuaries. Although the authors understand that this report will be made available to third parties, Milliman does not assume any duty or liability to such third parties with its work. This report should be distributed and reviewed in its entirety, and is subject to the agreement between Milliman and the Society of Actuaries dated May 30, 2017.

This report includes illustrative reserve estimates that are based on a variety of assumptions about ILWOP incidence and claim termination experience. It is highly likely that actual experience on any given block of ILWOP business will vary from the assumptions, and that the illustrative reserves may be higher or lower than reserves calculated using a different set of assumptions. Also, the illustrative reserves are presented on a best estimate basis without any added valuation margins.

I, Paul Correia, FSA, MAAA am a consulting actuary for Milliman, Inc and a member of the American Academy of Actuaries. I meet the qualification standards of these organizations to render the actuarial opinion contained herein.



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## Section 6: Acknowledgments

The deepest gratitude goes to members of the Project Oversight Group and others for their volunteer efforts and diligent work overseeing the ILWOP Experience Study.

Project Oversight Group members:

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## Section 7: List of Participating Companies

The following insurance companies contributed data for performing the ILWOP Experience Study. We have estimated that these companies represent approximately 70% of the ILWOP industry, based on financial information reported in publicly available Annual Statements from individual life insurers as of December 31, 2021.

Massachusetts Mutual Life Insurance Company

New York Life Insurance and Annuity Corporation and New York Life Insurance Company

Northwestern Mutual Life Insurance Company

Prudential Insurance Company of America

State Farm Life Insurance Company

Thrivent Financial for Lutherans

Transamerica Life Insurance Company

## Appendix A: Actual-to-Expected Incidence Ratios

The ILWOP policy exposures and A/E incidence ratios are summarized below for the following segments:

- **Table A.1** – Gender
- **Table A.2** – Attained Age
- **Table A.3** – Issue Age
- **Table A.4** – Policy Duration
- **Table A.5** – Face Amount
- **Table A.6** – Observation Year
- **Table A.7** – Smoker Status
- **Table A.8** – Issue State
- **Table A.9** – Annualized Premium Band
- **Table A.10** – Policy Type
- **Table A.11** – Optional Rider
- **Table A.12** – Underwriting Method
- **Table A.13** – Insurance Type

The exposures shown below represent life years of exposure on a count basis and face amount of insurance on an amount basis.

**Table A.1**

### BY GENDER

	Male	Female	Total
<b>Exposures</b>			
Count (millions)	89.3	69.6	<b>158.9</b>
Amount (\$ billions)	\$96.6	\$43.6	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>			
Count	23.4%	20.0%	<b>22.1%</b>
Amount	27.8%	23.1%	<b>26.6%</b>

**Table A.2**

### BY ATTAINED AGE

	<30	30-39	40-49	50+	Total
<b>Exposures</b>					
Count (millions)	40.8	32.9	39.1	46.0	<b>158.9</b>
Amount (\$ billions)	\$13.4	\$24.6	\$43.0	\$59.2	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>					
Count	17.0%	33.4%	40.6%	17.6%	<b>22.1%</b>
Amount	20.7%	33.8%	37.9%	24.2%	<b>26.6%</b>

**Table A.3**

### BY ISSUE AGE

	<30	30-39	40-49	50+	Total
<b>Exposures</b>					
Count (millions)	89.2	46.5	19.4	3.8	<b>158.9</b>
Amount (\$ billions)	\$32.9	\$56.2	\$37.6	\$13.5	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>					
Count	17.3%	25.3%	25.4%	22.6%	<b>22.1%</b>
Amount	20.0%	28.4%	28.8%	23.8%	<b>26.6%</b>



**Table A.4**  
**BY POLICY DURATION (YEARS)**

	1	2	3	4	5-9	10+	Total
<b>Exposures</b>							
Count (millions)	9.7	8.7	8.0	7.5	31.6	93.3	<b>158.9</b>
Amount (\$ billions)	\$12.5	\$11.3	\$10.0	\$9.0	\$31.8	\$65.6	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>							
Count	33.5%	34.0%	35.3%	35.3%	33.9%	19.1%	<b>22.1%</b>
Amount	43.1%	36.8%	30.9%	30.7%	29.1%	23.6%	<b>26.6%</b>

**Table A.5**  
**BY FACE AMOUNT BAND**

	<10,000	10,000 – 49,999	50,000 – 99,999	100,000 – 149,999	150,000 – 499,999	500,000 – 999,999	>=1,000,000	Total
<b>Exposures</b>								
Count (millions)	9.5	55.8	33.0	25.6	23.5	10.0	1.4	<b>158.9</b>
Amount (\$ billions)	\$1.6	\$14.9	\$17.2	\$23.9	\$37.0	\$33.0	\$12.7	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>								
Count	7.3%	20.7%	26.4%	27.8%	27.1%	27.8%	31.6%	<b>22.1%</b>
Amount	6.9%	17.7%	23.5%	25.8%	25.2%	32.5%	45.0%	<b>26.6%</b>

**Table A.6**  
**BY OBSERVATION YEAR**

	2003	2004	2005	2006	2007	2008	2009	2010
<b>Exposures</b>								
Count (millions)	11.6	11.7	11.6	11.6	11.5	11.5	11.4	11.3
Amount (\$ billions)	\$8.7	\$9.2	\$9.4	\$9.6	\$9.9	\$10.2	\$9.7	\$9.7
<b>A/E Incidence Ratios</b>								
Count	32.0%	29.0%	26.6%	25.2%	24.1%	23.2%	23.0%	23.4%
Amount	36.6%	30.8%	29.2%	29.7%	31.2%	25.3%	28.5%	29.0%

	2011	2012	2013	2014	2015	2016	Total
<b>Exposures</b>							
Count (millions)	11.2	11.2	11.1	11.1	11.0	11.0	<b>158.9</b>
Amount (\$ billions)	\$9.9	\$10.1	\$10.4	\$10.8	\$11.1	\$11.7	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>							
Count	21.5%	19.9%	18.6%	16.7%	15.2%	13.3%	<b>22.1%</b>
Amount	31.9%	23.5%	24.4%	22.9%	19.1%	18.3%	<b>26.6%</b>

**Table A.7**  
**BY SMOKER STATUS**

	Nonsmoker	Smoker	Unknown	Total
<b>Exposures</b>				
Count (millions)	100.2	12.6	46.1	<b>158.9</b>
Amount (\$ billions)	\$108.4	\$12.4	\$19.4	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>				
Count	25.1%	39.6%	11.7%	<b>22.1%</b>
Amount	26.7%	35.3%	20.8%	<b>26.6%</b>

**Table A.8**  
**BY ISSUE STATE**

	CA	FL	Other	Total
<b>Exposures</b>				
Count (millions)	11.5	5.9	141.4	<b>158.9</b>
Amount (\$ billions)	\$12.7	\$6.5	\$121.0	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>				
Count	28.5%	23.9%	21.5%	<b>22.1%</b>
Amount	23.9%	34.9%	26.5%	<b>26.6%</b>

**Table A.9**  
**BY ANNUALIZED PREMIUM BAND**

	<100	100 - 199	200 - 299	300 - 399	400 - 499
<b>Exposures</b>					
Count (millions)	33.7	30.3	22.6	15.1	9.3
Amount (\$ billions)	\$0.8	\$4.6	\$5.6	\$5.2	\$4.1
<b>A/E Incidence Ratios</b>					
Count	27.2%	17.6%	17.6%	19.1%	20.3%
Amount	20.5%	17.1%	17.9%	19.0%	20.3%

	500 - 749	750 - 999	1,000 - 1,999	2,000+	Total
<b>Exposures</b>					
Count (millions)	15.2	8.3	13.8	10.6	<b>158.9</b>
Amount (\$ billions)	\$9.3	\$7.1	\$18.8	\$84.7	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>					
Count	22.2%	21.6%	22.9%	25.6%	<b>22.1%</b>
Amount	22.2%	21.6%	22.9%	29.3%	<b>26.6%</b>

**Table A.10**  
**BY POLICY TYPE**

	Not Substandard	Substandard	Total
<b>Exposures</b>			
Count (millions)	155.7	3.2	<b>158.9</b>
Amount (\$ billions)	\$135.3	\$4.9	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>			
Count	21.8%	35.7%	<b>22.1%</b>
Amount	26.3%	35.0%	<b>26.6%</b>

**Table A.11**  
**BY OPTIONAL RIDER**

	Included with Base Policy	Optional Rider	Total
<b>Exposures</b>			
Count (millions)	32.5	126.4	<b>158.9</b>
Amount (\$ billions)	\$26.7	\$113.5	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>			
Count	14.5%	26.4%	<b>22.1%</b>
Amount	14.2%	31.7%	<b>26.6%</b>

**Table A.12**  
**BY UNDERWRITING METHOD**

	Not Underwritten	Term Conversion	Underwritten	Unknown/Other	Total
<b>Exposures</b>					
Count (millions)	4.3	12.6	140.8	1.2	<b>158.9</b>
Amount (\$ billions)	\$1.7	\$16.2	\$121.6	\$0.8	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>					
Count	31.3%	32.0%	20.6%	16.0%	<b>22.1%</b>
Amount	33.3%	32.5%	25.7%	18.8%	<b>26.6%</b>

**Table A.13**  
**BY INSURANCE TYPE**

	Perm	Term	UL	ULSG	VL	VLSG	Total
<b>Exposures</b>							
Count (millions)	97.8	42.4	10.2	0.9	6.7	1.0	<b>158.9</b>
Amount (\$ billions)	\$72.6	\$45.3	\$3.5	\$3.4	\$14.1	\$1.2	<b>\$140.2</b>
<b>A/E Incidence Ratios</b>							
Count	20.2%	28.3%	31.0%	24.0%	19.6%	14.3%	<b>22.1%</b>
Amount	27.5%	30.2%	20.5%	4.8%	21.8%	18.6%	<b>26.6%</b>

## Appendix B: Actual-to-Expected Claim Termination Ratios

The claim exposures and A/E claim termination ratios are summarized below for the following segments:

- **Table B.1** – Gender and Duration
- **Table B.2** – Attained Age and Duration
- **Table B.3** – Diagnosis and Duration
- **Table B.4** – Issue Age and Duration
- **Table B.5** – Smoker Status and Duration
- **Table B.6** – Annualized Premium and Duration

The exposures shown below represent actual claim terminations that occurred during the experience period.

**Table B.1**

### BY GENDER AND CLAIM DURATION (YEARS)

	1	2	3	4	5-9	10+	Total
<b>Exposures (Terminations)</b>							
Male	7,843	9,986	7,064	4,460	13,434	55,151	97,938
Female	3,949	4,901	3,583	2,225	6,272	15,294	36,223
<b>Total</b>	<b>11,792</b>	<b>14,887</b>	<b>10,647</b>	<b>6,685</b>	<b>19,706</b>	<b>70,445</b>	<b>134,160</b>
<b>A/E Ratios (Count)</b>							
Male	35.6%	45.1%	47.3%	42.2%	46.8%	82.2%	59.2%
Female	30.1%	36.0%	39.7%	35.5%	39.8%	69.6%	45.4%
<b>Total</b>	<b>33.6%</b>	<b>41.6%</b>	<b>44.4%</b>	<b>39.7%</b>	<b>44.3%</b>	<b>79.1%</b>	<b>54.7%</b>
<b>A/E Ratios (Amount)</b>							
Male	31.9%	44.7%	46.7%	35.0%	33.2%	52.7%	41.7%
Female	29.1%	38.1%	36.8%	39.9%	29.9%	41.3%	35.4%
<b>Total</b>	<b>31.2%</b>	<b>42.9%</b>	<b>44.1%</b>	<b>36.2%</b>	<b>32.4%</b>	<b>50.4%</b>	<b>40.2%</b>

**Table B.2**

### BY ATTAINED AGE AND CLAIM DURATION (YEARS)

	1	2	3	4	5-9	10+	Total
<b>Exposures (Terminations)</b>							
<30	414	443	318	112	313	137	1,735
30-39	1,547	1,621	1,136	523	967	365	6,158
40-49	3,263	3,854	2,549	1,350	2,913	1,948	15,877
50+	6,568	8,969	6,645	4,701	15,514	67,995	110,391
<b>Total</b>	<b>11,792</b>	<b>14,887</b>	<b>10,647</b>	<b>6,685</b>	<b>19,706</b>	<b>70,445</b>	<b>134,160</b>
<b>A/E Ratios (Count)</b>							
<30	32.1%	25.9%	28.1%	14.8%	22.9%	21.0%	25.2%
30-39	35.6%	34.2%	41.8%	33.1%	38.9%	38.3%	36.6%
40-49	30.4%	36.0%	40.6%	35.2%	40.1%	54.2%	37.4%
50+	35.0%	48.2%	48.0%	44.1%	46.5%	81.0%	61.6%
<b>Total</b>	<b>33.6%</b>	<b>41.6%</b>	<b>44.4%</b>	<b>39.7%</b>	<b>44.3%</b>	<b>79.1%</b>	<b>54.7%</b>
<b>A/E Ratios (Amount)</b>							
<30	42.2%	28.0%	46.6%	19.7%	23.0%	15.8%	31.6%
30-39	42.7%	42.8%	47.9%	39.1%	38.5%	37.8%	42.6%
40-49	31.7%	35.2%	43.3%	41.2%	34.2%	42.4%	36.2%
50+	29.6%	46.1%	44.0%	35.2%	32.2%	50.8%	41.0%
<b>Total</b>	<b>31.2%</b>	<b>42.9%</b>	<b>44.1%</b>	<b>36.2%</b>	<b>32.4%</b>	<b>50.4%</b>	<b>40.2%</b>

**Table B.3**  
**BY DIAGNOSIS AND CLAIM DURATION (YEARS)**

	1	2	3	4	5-9	10+	Total
<b>Exposures (Terminations)</b>							
Back	288	354	214	124	272	735	<b>1,987</b>
Cancer	2,425	2,714	1,211	558	972	478	<b>8,358</b>
Circulatory	423	431	312	198	640	2,330	<b>4,334</b>
Diabetes	7	34	12	10	90	100	<b>253</b>
Digestive	117	139	62	43	139	145	<b>645</b>
Ill-defined and Misc. Conditions	10	8	12	2	8	59	<b>99</b>
Injury other than Back	870	737	378	177	315	656	<b>3,133</b>
Maternity	249	12	2	2	1	6	<b>272</b>
Mental & Nervous	431	485	448	268	749	1,076	<b>3,457</b>
Nervous System	193	289	253	131	505	1,192	<b>2,563</b>
Other	2,982	3,882	2,921	1,475	3,495	1,493	<b>16,248</b>
Other Musculoskeletal	450	440	301	123	379	843	<b>2,536</b>
Respiratory	41	77	69	28	166	266	<b>647</b>
No Diagnosis	3,306	5,285	4,452	3,546	11,975	61,066	<b>89,628</b>
<b>Total</b>	<b>11,792</b>	<b>14,887</b>	<b>10,647</b>	<b>6,685</b>	<b>19,706</b>	<b>70,445</b>	<b>134,160</b>
<b>A/E Ratios (Count)</b>							
Back	25.6%	33.1%	32.7%	28.7%	23.3%	33.5%	<b>29.9%</b>
Cancer	86.8%	117.7%	107.1%	88.4%	84.6%	76.0%	<b>96.8%</b>
Circulatory	29.3%	31.5%	35.1%	32.3%	38.8%	64.6%	<b>45.3%</b>
Diabetes	6.2%	30.1%	16.1%	18.6%	64.6%	86.9%	<b>41.6%</b>
Digestive	47.5%	63.4%	49.4%	55.4%	76.1%	45.7%	<b>55.2%</b>
Ill-defined and Misc. Conditions	18.7%	18.3%	63.4%	22.8%	40.3%	58.0%	<b>40.2%</b>
Injury other than Back	67.8%	64.8%	60.2%	46.6%	35.5%	40.0%	<b>52.6%</b>
Maternity	305.9%	115.6%	57.4%	102.9%	24.4%	35.6%	<b>230.2%</b>
Mental & Nervous	25.5%	27.6%	39.0%	35.2%	41.1%	38.9%	<b>34.8%</b>
Nervous System	14.2%	22.0%	29.9%	23.4%	35.0%	59.0%	<b>34.0%</b>
Other	29.2%	36.4%	41.6%	31.4%	35.7%	40.2%	<b>35.2%</b>
Other Musculoskeletal	30.5%	32.0%	35.0%	21.8%	26.9%	41.4%	<b>32.9%</b>
Respiratory	17.9%	36.9%	50.6%	31.1%	69.0%	71.1%	<b>50.6%</b>
No Diagnosis	25.4%	37.3%	42.7%	44.6%	48.8%	87.8%	<b>64.2%</b>
<b>Total</b>	<b>33.6%</b>	<b>41.6%</b>	<b>44.4%</b>	<b>39.7%</b>	<b>44.3%</b>	<b>79.1%</b>	<b>54.7%</b>
<b>A/E Ratios (Amount)</b>							
Back	23.6%	46.0%	26.4%	36.7%	24.5%	26.1%	<b>29.6%</b>
Cancer	95.4%	152.5%	165.7%	127.6%	96.1%	101.2%	<b>122.6%</b>
Circulatory	32.7%	43.0%	60.8%	39.3%	42.7%	63.5%	<b>48.9%</b>
Diabetes	3.4%	74.5%	8.6%	14.5%	70.2%	72.4%	<b>46.2%</b>
Digestive	65.5%	73.9%	65.3%	110.1%	36.6%	32.3%	<b>55.2%</b>
Ill-defined and Misc. Conditions	9.3%	3.9%	175.7%	13.9%	9.7%	69.2%	<b>38.4%</b>
Injury other than Back	59.5%	69.4%	67.4%	43.1%	38.0%	32.0%	<b>53.2%</b>
Maternity	260.2%	83.7%	27.0%	57.5%	11.6%	44.8%	<b>228.2%</b>
Mental & Nervous	35.6%	35.0%	60.8%	34.5%	44.1%	51.0%	<b>43.5%</b>
Nervous System	12.0%	20.8%	40.9%	58.4%	47.5%	56.0%	<b>35.8%</b>
Other	33.8%	41.3%	46.7%	35.9%	39.1%	44.3%	<b>39.7%</b>
Other Musculoskeletal	36.1%	36.4%	56.1%	31.0%	24.9%	26.4%	<b>33.9%</b>
Respiratory	23.7%	59.3%	45.5%	24.0%	29.6%	75.0%	<b>46.9%</b>
No Diagnosis	17.0%	29.2%	29.7%	29.2%	27.8%	51.4%	<b>34.2%</b>
<b>Total</b>	<b>31.2%</b>	<b>42.9%</b>	<b>44.1%</b>	<b>36.2%</b>	<b>32.4%</b>	<b>50.4%</b>	<b>40.2%</b>

**Table B.4**  
**BY ISSUE AGE AND CLAIM DURATION (YEARS)**

	1	2	3	4	5-9	10+	Total
<b>Exposures (Terminations)</b>							
<30	2,905	4,027	2,928	1,764	6,313	22,228	40,164
30-39	4,724	5,817	4,074	2,393	7,029	22,817	46,853
40-49	3,158	3,921	2,815	1,916	5,007	18,386	35,201
50+	1,006	1,123	831	612	1,357	7,015	11,942
<b>Total</b>	<b>11,792</b>	<b>14,887</b>	<b>10,647</b>	<b>6,685</b>	<b>19,706</b>	<b>70,445</b>	<b>134,160</b>
<b>A/E Ratios (Count)</b>							
<30	26.9%	32.8%	35.1%	30.1%	43.3%	89.3%	52.3%
30-39	34.5%	42.6%	45.9%	39.4%	45.0%	77.8%	53.7%
40-49	37.0%	49.1%	52.3%	49.7%	45.8%	75.6%	57.7%
50+	47.7%	61.7%	61.9%	58.8%	40.8%	66.6%	59.2%
<b>Total</b>	<b>33.6%</b>	<b>41.6%</b>	<b>44.4%</b>	<b>39.7%</b>	<b>44.3%</b>	<b>79.1%</b>	<b>54.7%</b>
<b>A/E Ratios (Amount)</b>							
<30	29.3%	35.6%	37.7%	31.8%	38.7%	68.4%	42.0%
30-39	36.1%	41.1%	52.0%	38.0%	33.8%	52.4%	42.1%
40-49	31.4%	52.6%	50.6%	41.6%	41.0%	54.3%	45.9%
50+	24.1%	34.8%	27.9%	29.6%	20.5%	40.2%	30.4%
<b>Total</b>	<b>31.2%</b>	<b>42.9%</b>	<b>44.1%</b>	<b>36.2%</b>	<b>32.4%</b>	<b>50.4%</b>	<b>40.2%</b>

**Table B.5**  
**BY SMOKER STATUS AND CLAIM DURATION (YEARS)**

	1	2	3	4	5-9	10+	Total
<b>Exposures (Terminations)</b>							
Nonsmoker	8,840	10,280	7,132	4,173	9,922	11,106	51,451
Smoker	1,616	2,424	1,826	1,308	3,943	7,980	19,095
Unknown	1,336	2,184	1,690	1,205	5,842	51,360	63,615
<b>Total</b>	<b>11,792</b>	<b>14,887</b>	<b>10,647</b>	<b>6,685</b>	<b>19,706</b>	<b>70,445</b>	<b>134,160</b>
<b>A/E Ratios (Count)</b>							
Nonsmoker	37.2%	43.8%	47.1%	40.8%	39.9%	49.5%	42.9%
Smoker	26.8%	38.5%	42.8%	43.2%	49.7%	88.5%	52.2%
Unknown	25.1%	36.3%	37.2%	33.7%	50.1%	89.1%	71.7%
<b>Total</b>	<b>33.6%</b>	<b>41.6%</b>	<b>44.4%</b>	<b>39.7%</b>	<b>44.3%</b>	<b>79.1%</b>	<b>54.7%</b>
<b>A/E Ratios (Amount)</b>							
Nonsmoker	32.0%	41.3%	44.3%	36.0%	28.9%	37.2%	35.8%
Smoker	25.4%	46.2%	36.3%	40.4%	41.3%	59.0%	44.8%
Unknown	33.7%	50.8%	55.0%	31.3%	41.9%	74.7%	57.1%
<b>Total</b>	<b>31.2%</b>	<b>42.9%</b>	<b>44.1%</b>	<b>36.2%</b>	<b>32.4%</b>	<b>50.4%</b>	<b>40.2%</b>

**Table B.6**  
**BY ANNUALIZED PREMIUM BAND AND CLAIM DURATION (YEARS)**

	1	2	3	4	5-9	10+	Total
<b>Exposures (Terminations)</b>							
<100	926	1,118	835	508	1,814	13,283	18,483
100 - 199	971	1,375	1,036	686	2,699	20,741	27,507
200 - 299	1,239	1,616	1,172	702	2,451	10,547	17,725
300 - 399	1,085	1,373	1,027	598	1,856	5,476	11,415
400 - 499	924	1,130	786	521	1,427	3,470	8,258
500 - 749	1,701	2,097	1,499	870	2,527	5,136	13,828
750 - 999	1,110	1,386	953	595	1,594	2,900	8,537
1,000 – 1,999	2,154	2,686	1,858	1,297	3,238	5,230	16,462
2,000+	1,683	2,108	1,483	910	2,101	3,664	11,947
<b>Total</b>	<b>11,792</b>	<b>14,887</b>	<b>10,647</b>	<b>6,685</b>	<b>19,706</b>	<b>70,445</b>	<b>134,160</b>
<b>A/E Ratios (Count)</b>							
<100	49.3%	58.0%	63.7%	53.2%	60.7%	86.0%	75.5%
100 - 199	24.3%	30.4%	33.5%	31.2%	45.5%	97.7%	67.1%
200 - 299	28.6%	35.3%	38.3%	33.0%	44.7%	82.0%	54.6%
300 - 399	29.2%	35.9%	40.7%	34.4%	42.5%	75.9%	48.8%
400 - 499	31.9%	38.8%	40.8%	39.1%	42.6%	72.2%	47.9%
500 - 749	33.5%	41.5%	44.7%	37.5%	43.1%	68.2%	47.4%
750 - 999	34.6%	43.5%	44.7%	39.7%	40.9%	63.8%	46.2%
1,000 – 1,999	37.2%	46.9%	48.0%	47.1%	44.4%	61.3%	48.5%
2,000+	39.9%	52.3%	55.1%	47.8%	39.8%	52.7%	47.7%
<b>Total</b>	<b>33.6%</b>	<b>41.6%</b>	<b>44.4%</b>	<b>39.7%</b>	<b>44.3%</b>	<b>79.1%</b>	<b>54.7%</b>
<b>A/E Ratios (Amount)</b>							
<100	26.5%	24.6%	31.2%	24.3%	49.8%	102.4%	79.5%
100 - 199	24.5%	30.6%	33.4%	31.5%	45.3%	96.0%	65.3%
200 - 299	28.8%	35.5%	38.5%	33.0%	44.8%	81.8%	54.5%
300 - 399	29.3%	35.9%	40.8%	34.5%	42.3%	75.8%	48.7%
400 - 499	31.9%	38.8%	40.8%	39.2%	42.6%	72.1%	47.9%
500 - 749	33.5%	41.3%	44.7%	37.6%	43.2%	67.9%	47.3%
750 - 999	34.5%	43.7%	44.6%	40.0%	41.0%	63.7%	46.2%
1,000 – 1,999	37.3%	47.1%	48.1%	47.5%	44.6%	61.1%	48.6%
2,000+	29.7%	43.0%	43.8%	33.4%	27.1%	38.4%	35.3%
<b>Total</b>	<b>31.2%</b>	<b>42.9%</b>	<b>44.1%</b>	<b>36.2%</b>	<b>32.4%</b>	<b>50.4%</b>	<b>40.2%</b>

## About The Society of Actuaries Research Institute

Serving as the research arm of the Society of Actuaries (SOA), the SOA Research Institute provides objective, data-driven research bringing together tried and true practices and future-focused approaches to address societal challenges and your business needs. The Institute provides trusted knowledge, extensive experience and new technologies to help effectively identify, predict and manage risks.

Representing the thousands of actuaries who help conduct critical research, the SOA Research Institute provides clarity and solutions on risks and societal challenges. The Institute connects actuaries, academics, employers, the insurance industry, regulators, research partners, foundations and research institutions, sponsors and non-governmental organizations, building an effective network which provides support, knowledge and expertise regarding the management of risk to benefit the industry and the public.

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