

**MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY**

**Address:** 1295 State Street, Springfield, MA 01111

**513 Series Actuarial Memorandum**

**December 22, 2023**

<u>Product</u>	<u>Number</u>
513 Series	
Tax-Qualified Comprehensive Long-Term Care Policy Form	MM500-P-2-MD et al.
Tax-Qualified Facility Only Long-Term Care Policy Form	MM501-P-2-MD et al.

Massachusetts Mutual Life Insurance Company (MassMutual) is requesting a rate increase on the above-listed long-term care policy forms. The company issued these policy forms in Maryland between January 17, 2013 and March 22, 2019.

Nationwide, the company intends to pursue an actuarially equivalent rate level (based on the lifetime loss ratio) in all jurisdictions, except where required due to regulatory and jurisdiction-specific requirements.

As indicated in the enclosed cover letter, in Maryland, the company is requesting a rate increase phased in over two years pursuant to COMAR 31.14.01.04.A(5).

This actuarial memorandum reflects the nationwide requested rate increase, except the requested rate increase in this jurisdiction is reflected in Section 19, the proposed rate tables, and the experience provided in the supplement to the actuarial memorandum. The nationwide requested rate increase is described in Section 2 below and the jurisdiction-specific request is described in the enclosed cover letter.

**1. Purpose of Filing**

This actuarial memorandum has been prepared for the purpose of demonstrating that the requested rate increase meets the minimum requirements of the 2014 National Association of Insurance Commissioners (NAIC) Long-Term Care Insurance Model Regulation (Model Regulation). The supplement to the actuarial memorandum demonstrates compliance with the applicable regulatory requirements of this jurisdiction to the extent that they differ from the Model Regulation. It may not be suitable for other purposes.

**2. Requested Rate Increase**

The company is requesting a premium rate increase on the above-listed forms, including all associated riders. These forms need a premium rate increase due to emerging and projected experience running more adversely than previously expected.

This rate increase request is a follow up to a 2022 nationwide request that sought a 30% rate increase for insureds with an automatic inflation option, except where required due to regulatory and jurisdiction-specific requirements. No rate increase was requested for insureds without an automatic inflation option. In jurisdictions that did not approve the 2022 nationwide increase as requested, the company is requesting a follow-up increase that is actuarially equivalent (based on the lifetime loss ratio) to the 2022 nationwide request. The requested rate levels were developed with consideration for the prior rate increase history of each jurisdiction.

Table 2.1 provides the average prior approved increase, the average requested increase, and the resulting average cumulative rate increase based on the nationwide increase request. The Maryland-specific phased-in rate increase request is described in the enclosed cover letter. If this requested premium rate schedule increase is implemented and the underlying assumptions with moderately adverse conditions reflected are realized, no further premium rate schedule increases are anticipated.

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**Table 2.1  
Nationwide Rate Increase Summary by Inflation Option<sup>[1]</sup>**

Inflation Option	Average Prior Approved Increase <sup>[2]</sup>	Average Requested Increase	Average Cumulative Increase
Auto	6%	24%	31%
None	0	0	0
All	5	20	26

[1] Values based on insureds in force as of 12/31/2022.

[2] Reflects the full implementation of rate increases approved through February 2023.

Corresponding rate tables reflecting the current and proposed rate level are enclosed with this filing. An Excel version of the rate tables is also enclosed and represents the rate basis the administrator will use in implementing this rate increase. Actual rates implemented may vary from those in the enclosed rate tables due to implementation rounding algorithms.

As the company is not currently marketing new standalone long-term care products, the required statement that the renewal premium rate schedules are not greater than the new business premium rate schedules is not applicable.

Options for Reducing Benefits

The company offers insureds affected by the premium increase the option of reducing their policy benefits to provide flexibility of choice for those insureds who wish to maintain a premium level reasonably close to what they were paying prior to the rate increase. The company's notification letter outlines several available reduced benefit options (RBO) including:

- reducing the benefit period;
- reducing the maximum daily benefit amount;
- extending the elimination period;
- removing or reducing inflation protection; and
- removing or reducing other optional riders.

The company administers the reduction or removal of inflation protection in a consumer-friendly manner that exceeds industry norms. Insureds who elect to reduce or drop their inflation protection keep their inflated (current) daily benefit amounts and their premium rates are determined using the reduced inflation option factor and their uninflated (original) daily benefit. This allows for these insureds to significantly mitigate a rate increase, as their premiums are based on their uninflated daily benefit, while maintaining meaningful long-term care coverage, as they will retain all daily benefit inflation accrued to date.

**3. Description of Benefits**

These are existing tax-qualified policy forms that provide long-term care coverage on a reimbursement basis. They are individually underwritten and provide either comprehensive coverage or facility-only coverage. These forms have benefit eligibility requirements that involve activities of daily living (ADL) deficiencies or cognitive impairment. Waiver of premium is provided when certain benefits are being paid.

A daily benefit amount, benefit period, and elimination period were selected at issue.

At issue, the policyowner may have had the option to choose one of the following inflation options: no inflation, compound 3% inflation, compound 3.5% inflation, or compound 5% inflation. The compound inflation options provide for benefit levels that increase on each anniversary date by 3%, 3.5%, or 5% compounded annually for the life of the insured. These automatic increasing benefits apply even when the insured is in claim status.

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The available choices for benefit period, elimination period, and inflation option are shown in Section 21.

Premiums are paid for the life of the policy.

At issue, the policyowner may have been offered the option of selecting riders (e.g., restoration of benefits, shared care) that provide the types of coverage shown in the enclosed rate tables.

These are participating policy forms. Explicit dividend margin was incorporated into the pricing for the business in this filing that was to be released to policyowners if experience emerged as originally expected in pricing. However, as emerging experience is worse than that expected with the dividend margin, no dividends have been paid historically nor are expected to be paid going forward on the long-term care business in this filing.

Most jurisdictions included a Partnership-eligible policy form or option, subject to the individual Partnership requirements of each jurisdiction.

The options to reduce benefits, like those described in Section 2, are available any time and not only at the time of a rate increase.

A contingent benefit upon lapse (CBUL) will be available to all insureds affected by the rate increase, even if the increase is not considered substantial.

In some jurisdictions, the benefits made available to insureds were limited relative to what was offered nationwide and described above.

#### 4. Renewability

These policies are guaranteed renewable for life.

#### 5. Applicability

This rate increase applies to all policies issued on the above-listed policy forms in this jurisdiction. The rate changes will apply to the premium of the base policy form and all associated options and riders.

#### 6. Actuarial Assumptions

The following assumptions are used to project the experience shown in this filing (current assumptions). As described in Appendix A to this memorandum, experience on all of MassMutual's standalone long-term care products available at the time of development was combined in determining the assumptions such that not all product attributes described in Appendix A may apply to this filing as highlighted below.

##### a. Active Assumptions

- i. Claim Incidence Probabilities were developed using the 2017 Milliman *Long-Term Care Guidelines (Guidelines)* incidence curves with adjustments for retrospective improvement. The incidence curves were developed based on starting site of care—assisted living facility (ALF), home health care (HHC), or skilled nursing facility (SNF)—and further adjusted based on historical experience for sex, partner status at issue, benefit period, inflation option, payment type, underwriting, rate series, and attained age.
- ii. Voluntary Lapse Probabilities vary by policy duration (ultimate for 9+), attained age (ultimate for 70+), inflation option, benefit period, payment method, and partner status at issue (i.e., partnered versus non-partnered). Exhibit A-2a of Appendix A to this memorandum summarizes the ultimate lapse probabilities by key characteristics. The non-lifetime benefit period and lifetime payment option are the only characteristics applicable to the 513 Series as shown in Section 21.

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- iii. Active Mortality Probabilities were developed using the 2012 Individual Annuitant Mortality (IAM) Basic table with adjustments to make it applicable to an active life exposure base and reflect retrospective active mortality improvement. These mortality probabilities were then adjusted based on historical mortality experience by sex, partner status at issue, underwriting, policy duration, and attained age. The mortality adjustment factors can be found in Exhibit A-3a of Appendix A to this memorandum.
- b. Disabled Assumptions
  - i. Disabled Mortality Probabilities reflect disabled mortality tables developed in conjunction with the *Guidelines*. These mortality probabilities were then adjusted based on historical experience by starting site of care, sex, benefit period, partner status at issue, payment type, claim duration, and incurred age.
  - ii. Implied Recovery Probabilities were developed from the composite claim terminations and the disabled mortality assumption with adjustments to ensure the resulting recovery probabilities were reasonable by claim month and across key claimant characteristics. Appendix A to this memorandum provides the formula used to develop the implied recovery probabilities.
- c. Utilization Assumption
  - i. Policy Duration Utilization was developed using the *Guidelines* with adjustments to reflect recent utilization experience and cost of care trends. The policy duration utilization assumption also captures how utilization by site of care changes over time due to (1) inflation of the daily benefit and (2) cost of care trends.
  - ii. Claim Duration Utilization was developed based on the policy duration utilization assumption described above with adjustments for actual claim experience by starting site of care. These adjustments were based on historical utilization experience by benefit period, inflation option, and incurred age. The claim duration adjustment factors can be found in Exhibit A-8a of Appendix A to this memorandum. The non-lifetime benefit period is the only characteristic applicable to the 513 Series as shown in Section 21.
- d. Insured Behavior Due to the Rate Increase

At the time of a rate increase, insureds have the option to elect a CBUL or RBO. An increase in morbidity for adverse selection due to the rate increase is assumed based on the percentage of insureds that elect a CBUL and RBO.

Insureds who elect a CBUL are modeled as a lapse (i.e., the CBUL benefit is not modeled), which results in a slightly lower lifetime loss ratio than if the CBUL benefit had been modeled.

CBUL and RBO election rates are determined as a function of the rate increase magnitude. Adverse selection associated with the requested increase is a function of CBUL and RBO election. These assumptions are applied on a seriatim basis. The following provides approximate averages for these assumptions based on the nationwide experience for policies with automatic inflation in this filing and the average requested increase described in Section 2: 2% CBUL election rate, 4% reduction in premium and claims due to RBO elections, and 3% morbidity increase due to adverse selection.
- e. Prospective Improvement is not assumed for any assumption.
- f. Interest Rate consistent with the maximum valuation interest rate applicable to the year of issue (ranges from 3.0% to 4.0% and averages 3.5%) is used to demonstrate compliance with the minimum loss ratio requirements.

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- g. Expenses have not been explicitly projected. Originally filed expense assumptions are assumed to remain appropriate, except that commissions are not paid on the increased premium.
- h. Dividends are not projected in the current experience as the company has not historically paid a dividend and does not anticipate paying a dividend in the future on its long-term care business in this filing.

The above assumptions are based on the experience of the above-listed policy forms and similar forms issued by MassMutual, industry experience, and actuarial judgment. These assumptions are based on the nationwide experience of all standalone long-term care business issued by MassMutual at the time of development, which includes the 200-513 Series. The assumptions above are deemed reasonable for the policy forms in this filing and are considered "current" and "best estimate" (most likely without explicit margin) based on the experience used to develop the assumptions.

In establishing the assumptions described in this section, the policy design, underwriting, and claims adjudication practices for the above-listed policy forms were taken into consideration. Appendix A to this memorandum provides a description of the development of and justification for the assumptions used in this filing.

The company is not currently marketing standalone long-term care products. As a result, the requirement to reflect on any assumptions that deviate from those used for pricing other forms currently available for sale is not applicable.

**7. Marketing Method**

These policy forms were marketed by agents of MassMutual and/or by independent brokers.

**8. Underwriting Description**

These policies were individually underwritten with the use of various underwriting tools in addition to the application, which may have included cognitive screenings, phone interviews, face-to-face interviews, prescription drug profiles, motor vehicle records, paramedical exams, and attending physician statements.

**9. Premiums**

Premiums are unisex and payable for life. The premiums may vary by issue age, elimination period, benefit period, uninflated daily benefit amount, inflation option, payment mode, underwriting class, discounts (e.g., partner status), home care coverage, and the selection of any riders.

**10. Issue Age Range**

Issue ages are from 18 to 84.

**11. Area Factors**

Area factors are not used for these products.

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**12. Premium Modalization Rules**

The following modal factors and percent distributions (based on the nationwide in-force insured count as of December 31, 2022) are applied to the annual premium (AP):

**Table 12.1  
Nationwide Modal Factors and Distribution**

Premium Mode	Modal Factors	Percent Distribution
Annual	1.000*AP	54%
Semi-Annual	0.520*AP	4
Quarterly	0.265*AP	6
Monthly	0.088*AP	36

**13. Reserves**

Active life reserves and reserves for the election of a CBUL have not been used in the experience exhibits for this rate increase analysis, except as described in the supplement to the actuarial memorandum. Claim reserves as of December 31, 2022 have been discounted to the incurral date of each respective claim and included in historical incurred claims. An incurred but not reported (IBNR) reserve balance as of December 31, 2022 has been allocated to the 2022 calendar year and included in historical incurred claims.

**14. Trend Assumptions**

As this is not medical insurance, an explicit medical cost trend is not included in the projections.

**15. Demonstration of Satisfaction of Loss Ratio Requirements**

Exhibit I provides actual and projected experience using the assumptions described in Section 6. Actual experience is provided from inception through 2022 and then projected on a seriatim basis for 60 years. The actual and projected experience is based on nationwide premiums reflecting the full implementation of rate increases approved through February 2023. The after-increase projected experience reflects the requested increase (described in Section 2) on a seriatim basis.

Values in Exhibit I are shown (a) before and (b) after the requested rate increase. Included are calendar year earned premiums, incurred claims, end of year lives, and annual loss ratios. As shown in Exhibit I, the anticipated lifetime loss ratio with the requested rate increase exceeds the minimum loss ratio required by pre-rate stability regulation.

Table 15.1 demonstrates that the lifetime loss ratio exceeds the minimum loss ratio required by pre-rate stability regulation. While compliance with the minimum loss ratio requirement is evaluated on a series-specific basis, additional splits by inflation option are included in Table 15.1 for reference. The 'All' row corresponds to that shown in Exhibit I.

**Table 15.1  
Lifetime Loss Ratios by Inflation Option  
Using Maximum Valuation Interest**

Inflation Option	Before Increase <sup>[1]</sup>	After Increase
All	73%	65%
Auto	74	65
None	64	64

[1] Reflects full implementation of rate increases approved through February 2023.

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Exhibit II provides a demonstration that the requested rate increase nationwide meets the 58%/85% minimum loss ratio test under moderately adverse conditions as required by rate stability regulation. Exhibit II shows that the sum of the accumulated value of incurred claims, without the inclusion of active life reserves, and the present value of projected incurred claims, without the inclusion of active life reserves, will not be less than the sum of the following:

1. Accumulated value of the initial earned premium times 58%,
2. 85% of the accumulated value of prior premium rate schedule increases,
3. Present value of projected initial earned premium times 58%, and
4. 85% of the present value of projected premium in excess of the projected initial earned premium.

Moderately adverse conditions are defined as any combination of deterioration in experience and/or assumptions that results in a deterioration in future experience. The projected incurred claims in Exhibit II were increased by 14% (equivalent to a 12.5% reduction to premiums) from the assumptions described above in Section 6 to reflect assumptions that include moderately adverse conditions.

Table 15.2 demonstrates that the 58%/85% test is passed with the requested rate increase. While compliance with the minimum loss ratio requirement is evaluated on a series-specific basis, additional splits by inflation option are included in Table 15.2 for reference. The 'All' row corresponds to that shown in Exhibit II.

**Table 15.2  
58%/85% Test by Inflation Option (\$ in millions)**

Inflation Option	Item 5 <sup>[1]</sup>	Item 7 <sup>[2]</sup>	Result <sup>[3]</sup>
All	\$797	\$955	Pass
Auto	695	827	Pass
None	102	128	Pass

[1] Item 5 is the Lifetime Earned Premium Times Prescribed Factor. Reflects full implementation of rate increases approved through February 2023.

[2] Item 7 is Lifetime Incurred Claims with Rate Increase.

[3] Test of whether Item 7 is not less than Item 5.

**16. Actual-to-Expected Experience**

The following table provides a comparison of actual and projected experience using the assumptions described in Section 6 to that expected using original pricing assumptions. Values in the following table are shown (a) before and (b) after the requested rate increase.

**Table 16.1  
Actual and Expected Loss Ratios by Inflation Option**

Inflation Option	Lifetime Loss Ratio			Actual-to-Expected	
	Before Increase <sup>[1]</sup>	After Increase	Expected <sup>[2]</sup>	Before Increase	After Increase
All	73%	65%	56%	1.30	1.15
Auto	74	65	56	1.32	1.15
None	64	64	55	1.16	1.16

[1] Reflects full implementation of rate increases approved through February 2023.

[2] Projected actual policies sold from issue using original pricing assumptions.

Actual and projected experience in the above table is identical to that described in Exhibit I. Expected experience uses the actual policies sold and projects from issue on a seriatim basis using the original pricing assumptions. The expected loss ratio based on actual mix of business sold exceeded the original pricing loss ratio based on assumed sales mix with dividend margin. As such, no adjustment for dividend margin is included for the expected experience.

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Exhibit III provides a summary of the original pricing assumptions that underlie the expected experience.

**17. History of Previous Rate Revisions**

Nationwide, there has been one prior rate increase request on the above-listed forms.

Exhibit IV provides a status of the rate increase filings nationwide. The status is shown for each jurisdiction in which there is business in force as of December 31, 2022. Also included are the number of insureds and annualized premium based on insureds in force as of December 31, 2022. Annualized premium in Exhibit IV reflects full implementation of rate increases approved through February 2023. The status listing provides the status of (i) the initial round of requested increases and (ii) the associated follow-up filings.

**18. Analysis Performed to Consider a Rate Increase**

This rate increase request is a follow up to the 2022 nationwide rate increase request. To comply with rate stability regulation, an analysis was performed at the time of the 2022 nationwide request demonstrating that the projected loss ratio compared to that assumed at the time of original pricing revealed that experience unfolded more than moderately adverse and crossed the original pricing threshold for which the company could consider a rate increase.

Table 16.1 demonstrates that experience continues to be more adverse than that expected using original pricing assumptions as the actual-to-expected (A:E) loss ratios exceed 1.0. The adverse experience is driven by higher-than-expected persistency and morbidity.

**19. Average Annual Premium**

Table 19.1 shows the number of insureds and the corresponding average annual premium that will be affected by this rate increase filing based on insureds in force as of December 31, 2022.

**Table 19.1  
Number of Insureds and Average Annual Premium**

Inflation Option	Number of Insureds	Before Increase Premium <sup>[1]</sup>	After Increase Premium
Maryland			
Auto	450	\$3,390	\$4,474
None	78	2,246	2,246
All	528	3,221	4,145
Nationwide			
Auto	13,965	\$3,396	\$4,213
None	3,422	2,487	2,487
All	17,387	3,217	3,873

[1] Reflects full implementation of rate increases approved through February 2023.

**20. Proposed Effective Date**

This rate increase will apply to policies on their next policy anniversary date following at least a 60-day policyowner notification period following being filed for use by the department. Should a phased-in rate increase be approved, the company will notify policyowners of the remaining approved rate increases at the time of each annual rate increase. No policyowner would receive more than one increase during a 12-month period.



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**21. Distribution of Business**

Table 21.1 provides distributions of business based on insureds in force as of December 31, 2022.

**Table 21.1  
Nationwide Distributions of Business**

Issue Ages	Percent Distribution		
	All	Auto	None
<40	1%	1%	1%
40-44	3	3	2
45-49	8	9	5
50-54	18	18	15
55-59	28	29	24
60-64	28	28	28
65-69	13	11	19
70-74	2	1	5
75-79	<1	<1	1
80+	0	0	0
Average Issue Age	58	57	59

Elimination Period	Percent Distribution		
	All	Auto	None
30-Day	1%	1%	3%
60-Day	1	1	2
90-Day	92	93	89
180-Day	5	5	5

Benefit Period	Percent Distribution		
	All	Auto	None
2 Years	8%	8%	11%
3 Years	33	34	31
4 Years	17	18	14
5 Years	16	16	13
6 Years	26	24	31

Inflation Option	Percent Distribution		
	All	Auto	None
None	20%	0%	100%
Compound 3%	75	94	0
Compound 3.5%	1	1	0
Compound 5%	4	5	0

Premium Payment Duration	Percent Distribution		
	All	Auto	None
Lifetime Payment	100%	100%	100%
Limited Payment	N/A	N/A	N/A

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Premium Payment Option	Percent Distribution		
	All	Auto	None
No Discounted Renewal	100%	100%	100%
Discounted Renewal	N/A	N/A	N/A

Coverage Type	Percent Distribution		
	All	Auto	None
Facility Only	1%	1%	2%
Comprehensive	99	99	98

Benefit Type	Percent Distribution		
	All	Auto	None
Reimbursement	100%	100%	100%
Indemnity	N/A	N/A	N/A

Underwriting Class <sup>[1]</sup>	Percent Distribution		
	All	Auto	None
Preferred	33%	34%	31%
Standard	52	52	52
Substandard	15	14	18

[1] At issue, the labels may have differed, but were grouped into these three generic labels.

Partner Status at Issue	Percent Distribution		
	All	Auto	None
Partnered	82%	82%	80%
Non-Partnered	18	18	20

**22. Number of Insureds and Annualized Premium**

Table 22.1 shows the number of insureds and annualized premium that will be affected by this rate increase filing based on insureds in force as of December 31, 2022.

**Table 22.1  
Number of Insureds and Annualized Premium**

Inflation Option	Number of Insureds	Annualized Premium <sup>[1]</sup>
Maryland		
Auto	450	\$1,525,304
None	78	175,174
Total	528	1,700,478
Nationwide		
Auto	13,965	\$47,423,254
None	3,422	8,511,955
Total	17,387	55,935,209

[1] Reflects full implementation of rate increases approved through February 2023.

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**23. Actuarial Certification**

I am a Principal and Consulting Actuary for Milliman, Inc. and retained by MassMutual to render an opinion with regard to long-term care insurance rates. I am a member of the American Academy of Actuaries. I meet the Academy's qualification standards to render this actuarial opinion and am familiar with the requirements for filing long-term care insurance premiums and rate increases.

This memorandum has been prepared in conformity with all applicable Actuarial Standards of Practice, including Actuarial Standards of Practice No. 8, "Regulatory Filings for Health Benefits, Accident and Health Insurance, and Entities Providing Health Benefits" and 18, "Long-Term Care" and other applicable standards.

I hereby certify that, to the best of my knowledge and judgment, this rate submission is in compliance with the applicable laws and regulations of this jurisdiction and the rules of the department of insurance. In my opinion, the rates are not excessive or unfairly discriminatory, and bear reasonable relationship to the benefits based on the loss ratio standards of this jurisdiction. If the requested premium rate schedule increase is implemented and the underlying assumptions, with moderately adverse conditions reflected, are realized, no further premium rate schedule increases are anticipated. Under moderately adverse conditions, a lifetime loss ratio of 74% is anticipated. This loss ratio is the threshold that must be crossed before additional rate increases may be considered in the future.

In forming my opinion, I have used actuarial assumptions and actuarial methods (which gave consideration to policy design, underwriting, and claim adjudication) and such tests of the actuarial calculations as I considered necessary. Based on these assumptions, or statutory requirements where necessary, the premium rate filing is in compliance with the loss ratio standards of this jurisdiction.

Certain models were developed to estimate the values included in this filing. The intent of the models was to estimate future experience. I have reviewed the models for consistency, reasonableness, and appropriateness to the intended purpose and in compliance with generally accepted actuarial practice and relevant actuarial standards of practice.

I have relied on data and information provided by MassMutual and its third-party administrator to develop this filing, including but not limited to management's view of when a rate change may be considered, policy design, underwriting and claim adjudication process, seriatim in-force data, claim data, dividend expectation, and the company's long-term earnings rate. I have not audited or verified this data and information. If the underlying data or information is inaccurate or incomplete, the results of this filing may likewise be inaccurate or incomplete.

The basis for contract reserves has been previously filed and there is no anticipation of any changes.



Missy Gordon, FSA, MAAA  
Principal and Consulting Actuary

Date: December 22, 2023

This filing has been prepared solely for the use and benefit of MassMutual. Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit any third-party recipient of its work product, even if Milliman consents to the release of its work product to such third party.

Milliman's work is being delivered to the department, in accordance with its statutory and regulatory requirements. Milliman recognizes that materials it delivers to the department may be public records subject to disclosure to third parties, however, Milliman does not intend to benefit and assumes no duty or liability to any third parties, including the department, who receive Milliman's work and may include disclaimer language on its work product so stating. The department agrees not to remove any such disclaimer language from Milliman's work. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, the department agrees that it shall not disclose Milliman's work product to third parties without Milliman's prior written consent; provided, however, that the department may distribute Milliman's work to (i) its professional service providers who are subject to a duty of confidentiality and who agree to not use Milliman's work product for any purpose other than to provide services to the department, or (ii) any applicable regulatory or governmental agency, as required.

A limited review was performed of the data used directly in this filing for reasonableness and consistency and no material defects in the data were found. If there are material defects in the data, it is possible that they would be uncovered by a detailed, systematic review and comparison of the data to search for data values that are questionable or for relationships that are materially inconsistent. Such a review was beyond the scope of this assignment.

Differences between the projections in this filing and actual amounts depend on the extent to which future experience conforms to the assumptions made for this analysis. It is certain that actual experience will not conform exactly to the assumptions used in this analysis. Actual amounts will differ from projected amounts to the extent that actual experience deviates from expected experience.

Milliman recommends recipient be aided by its own actuary or other qualified professional when reviewing the Milliman work product.

**Exhibit I-a**  
**Massachusetts Mutual Life Insurance Company**  
**Actual and Projected Experience by Calendar Year**  
**Nationwide Experience Before Requested Rate Increase**  
**513 Series**

	Calendar Year	Without Interest			D End of Year Lives	With Max. Val. Interest		
		A	B	C = B / A		E	F	G = F / E
		Earned Premium	Incurred Claims	Incurred Loss Ratio		Earned Premium	Incurred Claims	Incurred Loss Ratio
Historical Experience	2012	624	0	0%	4	942	0	0%
	2013	2,098,119	0	0%	1,818	2,909,862	0	0%
	2014	9,677,230	399,191	4%	4,775	12,964,778	534,779	4%
	2015	19,566,914	6,250	0%	8,269	25,327,022	8,090	0%
	2016	30,081,672	277,314	1%	11,498	37,620,053	346,804	1%
	2017	38,391,878	738,132	2%	13,909	46,388,961	891,879	2%
	2018	45,659,549	558,598	1%	16,054	53,304,700	652,126	1%
	2019	51,396,968	731,034	1%	17,281	57,973,608	824,573	1%
	2020	53,383,613	977,973	2%	17,567	58,178,154	1,065,805	2%
	2021	54,406,141	3,183,742	6%	17,631	57,280,027	3,352,343	6%
	2022	53,684,578	3,059,546	6%	17,387	54,613,353	3,112,617	6%
Projected Future Experience	2023	53,125,044	3,401,728	6%	17,126	52,221,535	3,343,739	6%
	2024	53,665,823	4,289,494	8%	16,887	50,973,762	4,073,852	8%
	2025	53,233,017	5,334,107	10%	16,684	48,857,165	4,894,720	10%
	2026	52,506,233	6,547,518	12%	16,485	46,564,698	5,805,119	12%
	2027	51,745,216	7,962,704	15%	16,279	44,342,020	6,821,266	15%
	2028	50,946,766	9,611,531	19%	16,063	42,185,392	7,955,533	19%
	2029	50,094,092	11,527,594	23%	15,832	40,080,512	9,219,119	23%
	2030	49,176,366	13,751,919	28%	15,587	38,019,446	10,626,479	28%
	2031	48,185,654	16,317,173	34%	15,323	35,997,393	12,182,731	34%
	2032	47,116,040	19,259,607	41%	15,040	34,011,641	13,893,830	41%
	2033	45,962,304	22,601,749	49%	14,735	32,060,327	15,754,104	49%
	2034	44,719,707	26,351,891	59%	14,406	30,142,172	17,747,728	59%
	2035	43,384,400	30,497,203	70%	14,052	28,256,675	19,845,989	70%
	2036	41,954,280	34,988,016	83%	13,671	26,404,525	21,999,721	83%
	2037	40,428,879	39,748,833	98%	13,261	24,587,345	24,149,611	98%
	2038	38,809,476	44,757,557	115%	12,822	22,807,580	26,275,273	115%
	2039	37,099,518	49,901,646	135%	12,352	21,068,581	28,307,000	134%
	2040	35,305,407	55,090,530	156%	11,853	19,374,854	30,196,766	156%
	2041	33,436,858	60,126,840	180%	11,326	17,732,005	31,846,590	180%
	2042	31,506,349	64,864,166	206%	10,772	16,146,224	33,198,290	206%
	2043	29,528,388	69,237,026	234%	10,196	14,623,755	34,243,269	234%
	2044	27,518,629	73,067,322	266%	9,599	13,170,383	34,921,342	265%
	2045	25,494,643	76,243,345	299%	8,988	11,791,787	35,213,658	299%
	2046	23,475,224	78,715,340	335%	8,367	10,493,165	35,132,511	335%
	2047	21,479,241	80,336,532	374%	7,741	9,278,750	34,650,971	373%
	2048	19,525,283	81,056,399	415%	7,118	8,151,730	33,786,799	414%
	2049	17,630,638	80,893,757	459%	6,502	7,113,954	32,585,819	458%
	2050	15,811,144	79,867,757	505%	5,899	6,166,040	31,092,961	504%
2051	14,080,255	78,069,467	554%	5,316	5,307,175	29,372,556	553%	
2052	12,449,362	75,444,651	606%	4,757	4,535,451	27,433,752	605%	
2053	10,928,192	72,199,492	661%	4,227	3,848,168	25,374,390	659%	
2054	9,522,770	68,353,169	718%	3,729	3,241,259	23,217,670	716%	
2055	8,237,037	64,114,339	778%	3,266	2,710,066	21,049,692	777%	
2056	7,071,976	59,613,697	843%	2,840	2,249,169	18,917,099	841%	
2057	6,026,350	54,833,025	910%	2,451	1,852,777	16,818,943	908%	
2058-2062	18,301,517	202,983,776	1,109%	7,715	5,153,011	56,740,726	1,101%	
2063-2067	6,624,497	103,820,697	1,567%	3,005	1,580,342	24,590,130	1,556%	
2068-2072	1,953,400	41,791,977	2,139%	964	395,241	8,398,693	2,125%	
2073-2077	459,562	12,918,382	2,811%	250	78,849	2,202,263	2,793%	
2078-2082	86,119	3,097,854	3,597%	53	12,470	445,721	3,574%	
History		358,347,287	9,931,783	3%		406,561,461	10,789,016	3%
Future		1,178,605,657	1,983,589,807	168%		783,587,394	854,326,425	109%
Lifetime		1,536,952,944	1,993,521,590	130%		1,190,148,855	865,115,441	73%

**Exhibit I-b**  
**Massachusetts Mutual Life Insurance Company**  
**Actual and Projected Experience by Calendar Year**  
**Nationwide Experience After Requested Rate Increase**  
**513 Series**

	Calendar Year	Without Interest			D End of Year Lives	With Max. Val. Interest		
		A Earned Premium	B Incurred Claims	C = B / A Incurred Loss Ratio		E Earned Premium	F Incurred Claims	G = F / E Incurred Loss Ratio
		Historical Experience	2012	624		0	0%	4
	2013	2,098,119	0	0%	1,818	2,909,862	0	0%
	2014	9,677,230	399,191	4%	4,775	12,964,778	534,779	4%
	2015	19,566,914	6,250	0%	8,269	25,327,022	8,090	0%
	2016	30,081,672	277,314	1%	11,498	37,620,053	346,804	1%
	2017	38,391,878	738,132	2%	13,909	46,388,961	891,879	2%
	2018	45,659,549	558,598	1%	16,054	53,304,700	652,126	1%
	2019	51,396,968	731,034	1%	17,281	57,973,608	824,573	1%
	2020	53,383,613	977,973	2%	17,567	58,178,154	1,065,805	2%
	2021	54,406,141	3,183,742	6%	17,631	57,280,027	3,352,343	6%
	2022	53,684,578	3,059,546	6%	17,387	54,613,353	3,112,617	6%
Projected Future Experience	2023	53,125,044	3,362,916	6%	17,126	52,221,535	3,305,589	6%
	2024	54,840,223	4,233,438	8%	16,785	52,089,096	4,020,615	8%
	2025	60,560,368	5,227,186	9%	16,481	55,582,553	4,796,606	9%
	2026	60,583,936	6,408,070	11%	16,283	53,728,922	5,681,481	11%
	2027	59,709,956	7,790,172	13%	16,080	51,167,957	6,673,465	13%
	2028	58,793,492	9,399,933	16%	15,865	48,683,539	7,780,389	16%
	2029	57,814,890	11,269,438	19%	15,636	46,258,896	9,012,656	19%
	2030	56,761,436	13,437,981	24%	15,393	43,884,682	10,383,885	24%
	2031	55,623,661	15,936,894	29%	15,131	41,555,121	11,898,800	29%
	2032	54,394,584	18,800,909	35%	14,850	39,266,994	13,562,918	35%
	2033	53,068,054	22,051,384	42%	14,547	37,018,093	15,370,473	42%
	2034	51,638,459	25,695,895	50%	14,221	34,806,888	17,305,910	50%
	2035	50,101,226	29,720,330	59%	13,870	32,632,757	19,340,427	59%
	2036	48,453,840	34,076,024	70%	13,491	30,496,497	21,426,263	70%
	2037	46,695,724	38,688,895	83%	13,085	28,400,010	23,505,620	83%
	2038	44,828,378	43,537,173	97%	12,649	26,346,186	25,558,813	97%
	2039	42,855,741	48,509,886	113%	12,183	24,338,919	27,517,489	113%
	2040	40,785,238	53,518,233	131%	11,688	22,383,475	29,334,915	131%
	2041	38,628,139	58,370,614	151%	11,165	20,486,398	30,916,361	151%
	2042	36,398,995	62,925,947	173%	10,616	18,654,945	32,206,251	173%
	2043	34,114,689	67,120,637	197%	10,044	16,896,416	33,196,503	196%
	2044	31,793,405	70,781,253	223%	9,453	15,217,562	33,828,706	222%
	2045	29,455,500	73,801,763	251%	8,848	13,624,983	34,085,939	250%
	2046	27,122,780	76,134,617	281%	8,233	12,124,739	33,980,613	280%
	2047	24,817,100	77,640,615	313%	7,614	10,721,749	33,488,094	312%
	2048	22,560,002	78,271,765	347%	6,998	9,419,727	32,625,997	346%
	2049	20,371,453	78,048,507	383%	6,389	8,220,807	31,439,608	382%
2050	18,269,774	76,991,515	421%	5,794	7,125,714	29,973,133	421%	
2051	16,270,524	75,190,869	462%	5,219	6,133,515	28,289,434	461%	
2052	14,386,841	72,598,194	505%	4,667	5,241,995	26,398,607	504%	
2053	12,629,945	69,411,889	550%	4,145	4,448,030	24,394,582	548%	
2054	11,006,712	65,652,776	596%	3,654	3,746,891	22,300,318	595%	
2055	9,521,639	61,521,805	646%	3,199	3,133,187	20,198,425	645%	
2056	8,175,849	57,147,212	699%	2,780	2,600,654	18,134,330	697%	
2057	6,967,884	52,512,674	754%	2,398	2,142,597	16,107,153	752%	
2058-2062	21,167,456	193,835,417	916%	7,534	5,960,955	54,187,110	909%	
2063-2067	7,661,847	98,611,181	1,287%	2,925	1,828,161	23,358,077	1,278%	
2068-2072	2,255,369	39,463,075	1,750%	935	456,415	7,931,297	1,738%	
2073-2077	529,051	12,123,605	2,292%	241	90,772	2,066,835	2,277%	
2078-2082	99,108	2,891,443	2,917%	51	14,345	415,978	2,900%	
History		358,347,287	9,931,783	3%		406,561,461	10,789,016	3%
Future		1,344,838,311	1,912,712,131	142%		889,152,677	825,999,664	93%
Lifetime		1,703,185,598	1,922,643,913	113%		1,295,714,138	836,788,680	65%

Projected incurred claims in 2023 are different from those in the before increase projections due to an immaterial modeling simplification in the application of the assumed reduced benefit option elections.

**Exhibit II**  
**Demonstration that the Requested Rate Increase Passes the 58%/85% Loss Ratio Minimum**  
**Massachusetts Mutual Life Insurance Company**  
**513 Series Nationwide Experience**

1	Accumulated value of initial earned premium	406,561,461	x	58%	=	235,805,647
2a	Accumulated value of earned premium	406,561,461				
2b	Accumulated value of prior premium rate schedule increases (2a - 1)	0	x	85%	=	0
3	Present value of future projected initial earned premium	722,070,080	x	58%	=	418,800,646
4a	Present value of future projected premium	889,152,677				
4b	Present value of future projected premium in excess of the projected initial earned premiums (4a - 3)	167,082,597	x	85%	=	142,020,207
5	Lifetime Earned Premium Times Prescribed Factor: Sum of 1, 2b, 3, and 4b					796,626,501
6a	Accumulated value of incurred claims without the inclusion of active life reserves					10,789,016
6b	Present value of future projected incurred claims without the inclusion of active life reserves					943,999,616
7	Lifetime Incurred Claims with Rate Increase: Sum 6a and 6b					954,788,632
8	Test: 7 is not less than 5					Pass

Items 2a, 4a, and 6a are consistent with the accumulated and present values shown in Exhibit I-b.  
All accumulated or present values use the maximum valuation interest rate for contract reserves applicable to the year of issue, which ranges from 3.0% to 4.0% and averages 3.5%.  
Item 3 reflects the impact of CBUL and RBO to align persistency with that in Item 4a.  
Item 6b is 14% higher than incurred claims shown in Exhibit I-b to reflect moderately adverse conditions.

**Exhibit III  
Massachusetts Mutual Life Insurance Company  
Original Pricing Assumptions  
513 Series**

**Morbidity**

The morbidity assumption was derived using industry experience as reported in the Intercompany Study 1984-2004 published by the Society of Actuaries Long Term Care Experience Committee (2004 Study) and adjusted, to the extent credible, by the aggregate experience of the company's reinsurer.

**Mortality**

A2000 Mortality table is used for active lives along with adjustments by attained age and gender. The disabled mortality assumption is derived using industry experience as reported in the 2004 Study.

**Lapse Rates**

Voluntary lapse rates vary by duration and issue age.

Duration	Lifetime-Payment Lapse Rates									
	Issue Ages									
	<40	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
1	8.60%	4.50%	3.70%	3.55%	2.85%	3.50%	3.50%	3.85%	4.05%	3.55%
2	5.55%	4.15%	3.60%	2.90%	2.40%	2.35%	2.75%	3.15%	3.00%	3.10%
3	3.55%	3.00%	2.25%	2.10%	1.80%	1.85%	1.95%	1.95%	2.05%	2.05%
4	3.30%	2.05%	2.15%	1.70%	1.50%	1.55%	1.60%	1.80%	1.85%	1.75%
5	2.15%	1.95%	1.70%	1.35%	1.05%	1.00%	1.20%	1.15%	1.20%	1.35%
6	2.15%	1.95%	1.60%	1.10%	1.00%	1.00%	1.10%	1.15%	1.15%	1.25%
7	2.15%	1.95%	1.60%	1.10%	1.00%	1.00%	1.10%	1.15%	1.15%	1.25%
8	1.35%	1.35%	1.25%	1.05%	0.95%	0.90%	0.95%	1.05%	1.00%	1.00%
9	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%
10	0.70%	0.70%	0.70%	0.70%	0.70%	0.70%	0.70%	0.70%	0.70%	0.70%
11+	0.55%	0.55%	0.55%	0.55%	0.55%	0.55%	0.55%	0.55%	0.55%	0.55%

**Benefit Expiry Rates**

An explicit benefit expiry assumption was not included in the original pricing memoranda.

**Interest Rate**

3.5% maximum valuation rate

**Improvement**

An annual improvement assumption was not included in pricing.

**Exhibit IV**  
**Massachusetts Mutual Life Insurance Company**  
**Status of Filings as of December 15, 2023**  
**All Jurisdictions in Which These Forms Are in Force**  
**513 Series**

Jurisdiction	12/31/2022 Insureds In Force	12/31/2022 Annualized Premium <sup>[1]</sup>	Percent of Total Premium	Initial Round Rate Increase					Initial Round Follow-Up Rate Increase					Average Cumulative Increase to be Implemented <sup>[2][4]</sup>
				Average Requested Increase <sup>[2]</sup>	Status <sup>[3]</sup>	Date Submitted	Disposition Date	Average Increase to be Implemented <sup>[2][4]</sup>	Average Requested Increase <sup>[2]</sup>	Status <sup>[3][5]</sup>	Date Submitted	Disposition Date	Average Increase to be Implemented <sup>[2][4]</sup>	
Alaska	9	\$29,330	0.1%	30%	Not Applicable <sup>[6]</sup>	Not Applicable <sup>[6]</sup>	Not Applicable <sup>[6]</sup>	30%	No Follow-Up				30%	
Alabama	146	\$464,706	0.8%	14%	Approved	10/19/2022	1/6/2023	14%	12%	Approved	11/15/2023	12/11/2023	12%	27%
Arkansas	37	\$93,592	0.2%	29%	Approved	12/15/2022	3/8/2023	14%		Not Yet Filed				14%
Arizona	275	\$728,937	1.3%	26%	Pending	10/24/2022				TBD				0%
California	2,558	\$8,209,005	14.7%	25%	Pending	1/13/2023				TBD				0%
Connecticut	376	\$1,386,558	2.5%	25%	Approved	10/3/2022	3/8/2023	25%		No Follow-Up				25%
District of Columbia	52	\$221,456	0.4%	8%	Approved	10/3/2022	10/27/2022	8%	8%	Pending	11/16/2023			8%
Delaware	25	\$71,800	0.1%	23%	Approved	11/17/2022	3/14/2023	25%		No Follow-Up				25%
Florida	1,037	\$3,051,329	5.5%	26%	Not Yet Filed					TBD				0%
Georgia	602	\$1,668,140	3.0%	26%	Approved	10/26/2022	12/21/2022	11%	14%	Approved	10/19/2023	12/13/2023	11%	22%
Hawaii	139	\$330,624	0.6%	27%	Pending	10/4/2022				TBD				0%
Iowa	115	\$376,839	0.7%	28%	Approved	10/10/2022	2/10/2023	28%		No Follow-Up				28%
Idaho	28	\$65,854	0.1%	25%	Pending	10/5/2022				TBD				0%
Illinois	540	\$2,029,789	3.6%	26%	Approved	10/24/2022	1/23/2023	26%		No Follow-Up				26%
Indiana	154	\$488,730	0.9%	22%	Pending	12/2/2022				TBD				0%
Kansas	153	\$375,588	0.7%	29%	Approved	11/17/2022	5/22/2023	14%	13%	Pending	11/14/2023			14%
Kentucky	131	\$386,023	0.7%	23%	Approved	10/6/2022	10/12/2022	23%		No Follow-Up				23%
Louisiana	128	\$338,672	0.6%	23%	Approved	11/28/2022	3/3/2023	23%		No Follow-Up				23%
Massachusetts	788	\$2,788,386	5.0%	26%	Approved	9/26/2022	6/12/2023	18%		Not Yet Filed				18%
Maryland	528	\$1,700,478	3.0%	28%	Disapproved	10/12/2022	1/6/2023	0%	29%	Not Yet Filed				0%
Maine	78	\$329,582	0.6%	29%	Approved	12/20/2022	2/3/2023	29%		No Follow-Up				29%
Michigan	336	\$1,061,460	1.9%	23%	Approved	10/19/2022	11/22/2022	23%		No Follow-Up				23%
Minnesota	261	\$636,900	1.1%	29%	Approved	11/15/2022	7/14/2023	14%		Not Yet Filed				14%
Mississippi	120	\$310,119	0.6%	19%	Approved	9/27/2022	8/8/2023	15%		Not Yet Filed				15%
Montana	24	\$92,557	0.2%	29%	Approved	12/9/2022	7/26/2023	29%		No Follow-Up				29%
North Carolina	627	\$1,763,343	3.2%	27%	Approved	10/6/2022	9/27/2023	14%		Not Yet Filed				14%
North Dakota	55	\$137,325	0.2%	23%	Approved	3/8/2023	5/11/2023	23%		No Follow-Up				23%
Nebraska	155	\$492,182	0.9%	29%	Approved	11/11/2022	1/6/2023	29%		No Follow-Up				29%
New Hampshire	130	\$546,320	1.0%	28%	Approved	11/21/2022	1/26/2023	28%		No Follow-Up				28%
New Jersey	906	\$3,100,011	5.5%	25%	Pending	10/11/2022				TBD				0%
New Mexico	77	\$210,151	0.4%	24%	Approved	3/3/2023	5/26/2023	24%		Not Yet Filed				24%
Nevada	55	\$140,233	0.3%	28%	Approved	12/7/2022	5/22/2023	28%		No Follow-Up				28%
New York	2,132	\$8,548,948	15.3%	22%	Pending	11/14/2022				TBD				0%
Ohio	363	\$1,007,737	1.8%	28%	Pending	10/20/2022				TBD				0%
Oklahoma	173	\$523,772	0.9%	29%	Approved	11/15/2022	12/5/2022	29%		No Follow-Up				29%
Oregon	77	\$233,766	0.4%	29%	Pending	12/2/2022				TBD				0%
Pennsylvania	717	\$2,724,522	4.9%	27%	Approved	10/4/2022	12/13/2022	27%		No Follow-Up				27%
Puerto Rico	157	\$290,811	0.5%	10%	Approved	10/17/2022	3/20/2023	10%		No Follow-Up				10%
Rhode Island	58	\$203,674	0.4%	26%	Pending	10/14/2022				TBD				0%
South Carolina	329	\$851,645	1.5%	24%	Approved	11/30/2022	3/2/2023	20%	3%	Pending	11/27/2023			20%
South Dakota	40	\$120,244	0.2%	27%	Approved	11/22/2022	1/19/2023	27%		No Follow-Up				27%
Tennessee	355	\$1,215,210	2.2%	27%	Approved	10/3/2022	2/10/2023	27%		No Follow-Up				27%
Texas	975	\$2,599,950	4.6%	26%	Approved	12/30/2022	4/13/2023	26%		No Follow-Up				26%
Utah	105	\$284,541	0.5%	25%	Approved	11/14/2022	1/28/2023	25%		No Follow-Up				25%
Virginia	647	\$1,864,694	3.3%	28%	Pending	10/14/2022				TBD				0%
Vermont	53	\$177,120	0.3%	25%	Approved	10/31/2022	8/23/2023	25%		No Follow-Up				25%
Washington	301	\$803,977	1.4%	29%	Disapproved	12/30/2022	1/10/2023	0%		Not Yet Filed				0%
Wisconsin	195	\$709,207	1.3%	28%	Approved	10/24/2022	1/12/2023	28%		No Follow-Up				28%
West Virginia	38	\$88,159	0.2%	24%	Approved	11/21/2022	4/17/2023	25%		No Follow-Up				25%
Wyoming	27	\$61,212	0.1%	25%	Approved	11/22/2022	3/27/2023	26%		No Follow-Up				26%

[1] Reflects increases approved through February 2023.

[2] Average rate increase percentages are based on the distribution of business in force as of December 31, 2022.

[3] "Approved" is used in a generic sense to indicate that a rate increase has been approved, accepted, filed for use, etc., by a jurisdiction.

[4] Certain jurisdictions may have approved a multi-year increase, which results in a slightly higher rate level than requested.

[5] "TBD" (to be determined) is used in jurisdictions where the prior filing is still pending.

[6] Alaska does not require Long-Term Care rates to be filed before use.



## Appendix A Development and Justification of Assumptions Used in this Filing

This appendix describes the development of, and justification for, the actuarial assumptions used in this filing.

The persistency and morbidity assumptions were developed using historical experience of MassMutual policies. Where actual experience had low credibility or did not exist, industry experience and actuarial judgment was also used. Historical experience through 2018 was used in the assumption development and morbidity experience included claim runout through 2019. Experience on all of MassMutual's standalone long-term care (LTC) products available at the time of development was combined in determining the assumptions described herein. Due to this pooling, not all product attributes and related assumptions described below may apply to this filing.

The persistency and morbidity assumptions were developed on a first principles basis. In this context, "first principles" means developing key assumptions (namely, morbidity and mortality) at the component level and modeling active and disabled lives separately. Separate assumptions were developed for: (1) claim incidence, (2) voluntary lapse, (3) active mortality, (4) claim termination (including separate assumptions for disabled mortality and recovery), and (5) utilization. For each assumption except utilization, experience from 2009 through 2018 with runout through 2019 was used. The utilization assumption was developed based on historical experience from 2015 through September 30, 2019 with runout through December 31, 2019 to capture more recent information as cost of care and utilization trends can fluctuate over short periods of time. Experience adjustment factors were developed using predictive analytics as described in the Predictive Analytics section below.

As an additional consideration, the COVID-19 pandemic has created uncertainty regarding future LTC experience. However, due to the long duration nature of LTC insurance, minor deviations in experience over a relatively small number of calendar years are not expected to have a significant impact on lifetime projections. Therefore, no adjustments were made to these assumptions to capture anticipated impacts of the pandemic. However, emerging experience and trends will continue to be monitored so that adjustments can be included in the future if believed to be representative of long-term trends.

The rate increase dependent assumptions were developed using historical experience and actuarial judgment where experience was limited or did not exist. A nationwide rate increase was filed for 200-511 Series beginning in 2018 such that this experience and considerations for these prior rate increases are described as applicable in the sections that follow.

The sections that follow provide more detail on the development of and justification for the assumptions used in the projections in this filing.

### **Active Assumptions**

The assumptions for active (i.e., healthy) lives were developed based on MassMutual's historical experience from 2009 through 2018, with runout through 2019. Experience adjustment factors were developed using predictive analytics as described in the Predictive Analytics section below. The active assumptions include (1) claim incidence (the probability that an active life becomes disabled), (2) voluntary lapse, and (3) active mortality.

#### *Claim Incidence*

Claim incidence probabilities (i.e., the probability of an insured becoming disabled) were developed using the 2017 Milliman *Long-Term Care Guidelines (Guidelines)* incidence curves with adjustments for retrospective morbidity improvement. These assumptions were developed based on the following three starting sites of care—assisted living facility (ALF), home health care (HHC), or skilled nursing facility (SNF).

Exhibit A-1 provides a summary of actual-to-expected (A:E) experience by site of care for claim incidence in policy durations 7 and later for each characteristic by which the claim incidence assumption varies. The following items are included:

- Exposure [A] reflects the length of time a covered life is exposed to the risk of becoming disabled (i.e., an exact exposure basis).
- Claim counts [B] are based on historical claim experience and are provided by situs.
- A:E ratios are calculated as actual claim incidence probabilities to the *Guidelines* with a retrospective morbidity improvement adjustment [C] and to the assumption used in this filing [D]. This fit will not be perfect (i.e., ratios deviate from 1.0) because the main goal is to develop an assumption that generalizes well to new data by balancing assumption complexity and fit on the historical experience.

**Appendix A**  
**Development and Justification of Assumptions Used in this Filing**

*Lifetime Payment Voluntary Lapse*

The voluntary lapse assumption for policies with a lifetime payment option, without a discounted renewal payment option, uses the base lapse probabilities underlying the all-lives assumption used in the company's 2018 rate increase filings, which varied by policy duration and partner status at issue (i.e., partnered versus non-partnered). This prior assumption was developed for use with an all-lives exposure base (i.e., including both active and disabled insureds); however, it is considered an appropriate expected basis for an active assumption because lapses due to benefit expiry were explicitly removed from the prior study and the ultimate lapse probability was assumed to be constant (rather than decreasing).

The attained age adjustment factors developed from the predictive model produced a U-shaped pattern (i.e., decreased and then increased) by attained age. However, the attained age adjustment factors are held constant for attained ages less than 50 and for attained ages 70 and older to produce an ultimate voluntary lapse assumption that is constant rather than increasing by attained age. The adjustments are held constant after this point because an increasing attained age lapse trend is not widely used in the industry, and this increasing lapse trend may be due to miscoding of deaths or underreporting of deaths in the Social Security Death Master File. An additional attained age adjustment to mortality was developed (Exhibit A-3a) to capture these terminations (i.e., higher lapses at older attained ages) such that the combined mortality and voluntary lapse assumption better aligns with actual experience as shown in Exhibit A-4.

Exhibit A-2 supports the voluntary lapse assumption and provides the following information by benefit period (non-lifetime or lifetime), inflation protection option (auto or none), payment method (with or without discounted renewal payment option), and attained age.

- Exhibit A-2a provides the ultimate voluntary lapse probabilities after all experience adjustments. These ultimate voluntary lapse probabilities are applicable for attained ages 70 and older in policy durations 9 and later.
- Exhibit A-2b provides A:E experience and includes the following:
  - Exposure [A] reflects the length of time a covered life is exposed to the risk of voluntary lapse (i.e., exact exposure basis).
  - Actual lapses [B].
  - A:E ratios are calculated as actual lapse probabilities to the unadjusted voluntary lapse assumption used in the company's nationwide 2018 rate increase filings [C], the assumption with experience adjustments directly from the predictive model (i.e., without the attained age caps) [D], and the assumption used in this filing (i.e., with the attained age caps) [E]. This fit will not be perfect (i.e., ratios deviate from 1.0) because the main goal is to develop an assumption that generalizes well to new data by balancing assumption complexity and fit on the historical experience. Additionally, the A:E in column [E] is greater than 1.0 due to the reallocation of lapses at higher attained ages as described above.

The experience underlying Exhibit A-2b captures policies with a lifetime payment option, without a discounted renewal payment option, for policy durations 9 and later to focus on the fit of the ultimate voluntary lapse assumption and excludes "shock" lapses. For all cohorts except the 513 Series, there have been prior rate increases, and thus the option to lapse with a contingent benefit (a.k.a., shock lapse). Policyowners that elected a contingent benefit upon lapse (CBUL) were not counted as a voluntary lapse; however, their annual policy exposure was valued up to the date of election. That said, the number of rate increases approved prior to December 31, 2018 is limited and considered immaterial to the development of this assumption.

*Discounted Renewal or Limited Payment Voluntary Lapse*

For policies with a discounted renewal payment option and/or limited payment option, the voluntary lapse assumption is a function of the voluntary lapse probabilities for policies with a lifetime payment option, without a discounted renewal payment option. The discounted renewal payment option and limited payment option lapse adjustments are unchanged from the all-lives assumption used in the company's 2018 rate increase filings and were validated using sensitivity testing analysis in lieu of leveraging predictive analytics or traditional A:E studies. Based on this sensitivity testing, the impact of adjustments to the discounted renewal payment option and limited payment option voluntary lapse assumptions on the projections is immaterial.

## **Appendix A**

### **Development and Justification of Assumptions Used in this Filing**

#### *Active Mortality*

Active mortality was developed based on the 2012 Individual Annuity Mortality table (2012IAM) with adjustments to make it applicable to an active-life exposure base and reflect retrospective active mortality improvement. Experience adjustment factors were developed using predictive analytics with additional adjustments to increase mortality for ages 70 and older commensurate with the capping applied for voluntary lapse mentioned above.

Exhibit A-3 supports the active mortality assumption and provides the following information by policy duration, sex, partner status at issue, attained age, and underwriting class:

- Exhibit A-3a provides the adjustment factors that are to be applied to the 2012IAM hazard rates; the adjusted hazard rates are converted back into mortality probabilities to create the adjusted mortality assumption. The attained age adjustment factors are applicable to policy durations 7 and later.
- Exhibit A-3b provides A:E results for business in policy durations 7 and later, and includes the following:
  - Exposure [A] reflects the length of time a covered life is exposed to the risk of death (i.e., exact exposure basis).
  - Actual deaths of active insureds [B].
  - A:E ratios are calculated as actual mortality probabilities to the unadjusted active 2012IAM mortality probabilities with a retrospective mortality improvement adjustment [C], the assumption with experience adjustments directly from the predictive model (i.e., without the composite termination attained age adjustments) [D], and the assumption used in this filing (i.e., with the composite termination attained age adjustments) [E]. This fit will not be perfect (i.e., ratio deviates from 1.0) because the main goal is to develop an assumption that generalizes well to new data by balancing assumption complexity and fit on the historical experience. Additionally, the A:E in column [E] is less than 1.0 due to the reallocation of lapses at higher attained ages as described above.

#### *Composite Policy Terminations*

Exhibit A-4 supports the active composite termination (i.e., active mortality and voluntary lapse combined) assumption. It provides an A:E comparison of the composite termination experience and includes the following:

- Exposure [A] reflects the length of time a covered life is exposed to the risk of termination (i.e., exact exposure basis).
- Actual composite terminations of active insureds [B].
- A:E ratios are calculated as actual termination probabilities to the expected composite termination probabilities [C]. The A:E provides an indication of fit. This fit will not be perfect (i.e., ratios deviate from 1.0) because the main goal is to develop an assumption that generalizes well to new data by balancing assumption complexity and fit on the historical experience.

The experience underlying Exhibit A-4 reflects policies with a lifetime payment option, without a discounted renewal payment option, for policy durations 9 and later to focus on the fit of the ultimate composite termination assumption. It also excludes “shock” lapses as described above for Exhibit A-2b.

#### *Disabled Assumptions*

The assumptions for disabled (i.e., on-claim) lives were developed based on detailed historical experience from 2009 through 2018 with runout through 2019. Experience adjustment factors were developed using predictive analytics as described in the Predictive Analytics section below. The disabled assumptions include (1) disabled mortality and (2) recovery. A composite claim termination assumption was also developed and used to derive an implied recovery assumption, as described below.

#### *Disabled Mortality*

Disabled mortality probabilities were developed based on the disabled mortality tables developed in conjunction with the *Guidelines* with adjustments to reflect experience from 2009 through 2018 with runout through 2019. The

## Appendix A Development and Justification of Assumptions Used in this Filing

experience adjustment factors were developed using predictive analytics as described in the Predictive Analytics section below.

Exhibit A-5 provides a summary of A:E results for experience in claim months 4 through 96 for each characteristic by which the disabled mortality assumption varies (starting site of care, sex, benefit period, partner status at issue, payment type, claim duration, and incurred age) and includes the following:

- Exposure [A] reflects the length of time a disabled insured is exposed to the risk of death (i.e., exact exposure basis).
- Actual deaths [B] of disabled insureds.
- A:E ratios are calculated as actual deaths of disabled insureds to the unadjusted disabled mortality tables developed in conjunction with the *Guidelines* [C] and the disabled mortality assumption used in this filing [D]. The A:E provides an indication of fit. This fit will not be perfect (i.e., ratios deviate from 1.0) because the main goal is to develop an assumption that generalizes well to new data by balancing assumption complexity and fit on the historical experience.

### *Implied Recovery*

Implied recovery probabilities were developed from the composite claim termination (described below) and disabled mortality assumptions using the following formula:

$$\text{Implied Recovery Probability} = 1 - [(1 - \text{Claim Termination Probability}) / (1 - \text{Disabled Mortality Probability})]$$

Minor smoothing was applied to ensure that the resulting recovery probabilities were reasonable by claim month and across key claimant characteristics.

Exhibit A-6 provides a summary of A:E results for experience in claim months 4 through 96 for each characteristic by which the implied recovery assumption varies (starting site of care, sex, benefit period, partner status at issue, payment type, claim duration, and incurred age) and includes the following:

- Exposure [A] reflects the length of time a disabled insured is exposed to the opportunity of recovery (i.e., exact exposure basis).
- Actual recoveries [B] of disabled insureds.
- A:E ratios are calculated as actual recoveries of disabled insureds to the recovery tables developed in conjunction with the *Guidelines* [C] and the implied recovery assumption used in this filing [D]. The *Guidelines* A:E result is included for illustrative purposes only as this expected basis was not directly used in developing the implied recovery assumption.

### *Composite Claim Terminations*

Composite claim termination probabilities were developed using the *Guidelines* with adjustments to reflect experience from 2009 through 2018 with runout through 2019. The experience adjustment factors were developed using predictive analytics as described in the Predictive Analytics section below.

Exhibit A-7 provides a summary of A:E results for experience in claim months 4 through 96 for each characteristic by which the composite claim termination assumption varies (starting site of care, sex, benefit period, partner status at issue, payment type, claim duration, and incurred age) and includes the following:

- Exposure [A] reflects the length of time a disabled insured is exposed to the risk of claim termination (i.e., exact exposure basis).
- Actual terminations [B] of disabled insureds.
- A:E ratios are calculated as actual claim terminations to the unadjusted *Guidelines* claim termination tables [C] and the claim termination assumption used in this filing [D]. The A:E provides an indication of fit. This fit will not be perfect (i.e., ratios deviate from 1.0) because the main goal is to develop an assumption that generalizes well to new data by balancing assumption complexity and fit on the historical experience.

**Appendix A**  
**Development and Justification of Assumptions Used in this Filing**

***Utilization Assumption***

Utilization recognizes that less than the full potential benefit may be paid for an LTC claim due to services received less frequently than daily (“day” utilization) or actual charges less than the daily maximum (“dollar” utilization). The utilization assumption is a “total” utilization assumption—that is, it captures the impact of both day and dollar utilization. The utilization assumption was developed based on historical experience from 2015 through September 30, 2019 with runout through December 31, 2019.

For MassMutual’s in-force business that pays services on a reimbursement basis, total utilization was split into two components (1) policy duration utilization and (2) claim duration utilization.

***Policy Duration Utilization***

Total policy duration utilization was developed using the *Guidelines* utilization projection model with inputs based on MassMutual’s actual utilization percentages and cost of care trends.

The policy duration utilization assumption also captures how utilization by site of care changes over time due to (1) inflation of the daily benefit and (2) cost of care trends.

The policy duration utilization assumption produced using these assumptions and the *Guidelines* utilization projection model were then used as the underlying expectation for the claim duration utilization analysis described below.

***Claim Duration Utilization***

Total utilization by claim duration was developed based on the policy duration utilization assumption described above with adjustments for MassMutual’s actual claim experience by starting site of care. Experience adjustment factors were developed using predictive analytics as described in the Predictive Analytics section below, with additional adjustments to trend the utilization assumption towards an ultimate level in late claim durations where experience was limited.

Exhibit A-8 supports the claim duration total utilization assumption for policies that pay services on a reimbursement basis and provides the following information by starting site of care, claim duration month, benefit period (non-lifetime or lifetime), inflation protection option (auto or none), and incurred age.

- Exhibit A-8a provides the claim duration adjustment factors described above.
- Exhibit A-8b provides A:E results for experience in claim months 4 through 96 and includes the following:
  - Actual paid claims [A].
  - A:E ratios are shown separately for the policy duration utilization assumption described above [B] and the utilization assumption used in this filing [C]. This fit will not be perfect (i.e., ratios deviate from 1.0) because the main goal is to develop an assumption that generalizes well to new data by balancing assumption complexity and fit on the historical experience. Additionally, as seen in Exhibit A-8b, the trend adjustments applied move the overall fit for claim years 5 and later further from 1.00 as this is the point at which the trend adjustments are applied to the assumption.

For MassMutual’s in-force business that pays services on an indemnity basis, an explicit day utilization assumption was developed based on the days of care used only. Indemnity business has dollar utilization of 100%; therefore, its total utilization assumption is equal to the day utilization. Exhibit A-9 provides information like Exhibit A-8, except for policies that pay services on an indemnity basis.

***Prospective Improvement***

No prospective improvement is assumed for any assumption.

**Appendix A**  
**Development and Justification of Assumptions Used in this Filing**

**Rate Increase Dependent Assumptions**

At the time of a rate increase, policyowners have options to elect a CBUL or reduced benefit options (RBO). Adverse selection is assumed relative to CBUL and RBO elections. These policyowner behavior assumptions are provided below and were developed primarily based on MassMutual's actual CBUL and RBO election rate experience and actuarial judgment—particularly at the higher rate increase magnitudes where limited experience exists.

*Contingent Benefit Upon Lapse Election Rates*

A CBUL election rate is determined as a function of the magnitude of the rate increase. The assumption is applied on a seriatim basis based on the cumulative increase, as shown in the following table. The CBUL election rate is then prorated between that for the cumulative increase and, if applicable, the prior approved increase.

Cumulative Rate Increase	CBUL Election Assumption
15-80%	Rate Increase x 6.0%
80%+	(80% x 6.0%) + (Rate Increase - 80%) x 3.0%

No CBUL elections are assumed for cumulative increases less than 15% or for policies with a limited payment option.

*Reduced Benefit Options*

The RBO election rate and its impact on premium is determined as a function of the magnitude of the rate increase. The assumption is applied on a seriatim basis based on the cumulative increase. The RBO election rate is assumed to be 15% plus the cumulative increase times 7%. The RBO election rate and impact for the requested increase is then prorated between that for the cumulative increase and, if applicable, the prior approved increase. The percent reduction in premium is assumed to correspond to an equivalent percent reduction in claims.

No RBO is assumed for cumulative increases less than 15% or for policies with a limited payment option. The RBO election rate is capped at 40%.

Based on the RBO election function, the reduction to premium and claims can then be determined as follows:

Reduction to premium and claims due to the election of RBO  
= 1 – (Average premium level after the cumulative rate increase with RBO election / Premium level after the full cumulative rate increase without any RBO election), where

Average premium level after the cumulative rate increase with RBO election  
= weighted average premium level of the assumed percentage of policyowners electing RBO with the percentage assumed to accept the full cumulative rate increase

*Adverse Selection*

The adverse selection assumption is a function of the CBUL and RBO election rates such that the relative increase to morbidity due to adverse selection varies by the cumulative rate increase's magnitude. The percentage increase in morbidity due to adverse selection was developed from the following formula and actuarial judgment. It is assumed that at the time of the rate increase, policyowners that elect a CBUL will be selective in that their relative morbidity is 25% lower than that of the remaining pool. Similarly, it is assumed that at the time of the rate increase, policyowners that elect an RBO will be selective in that their relative morbidity is 12.5% lower than that of the remaining pool.

PoolMorb = AdvSelMorb x (1 – CBUL – RBO) + [(1 – 25%) x AdvSelMorb] x CBUL + [(1 – 12.5%) x AdvSelMorb] x RBO, where

PoolMorb = morbidity of the pool before the rate increase = 1.0  
AdvSelMorb = adverse morbidity of the remaining pool after the rate increase due to selective lapses  
CBUL = percentage of policyowners that elect CBUL  
RBO = percentage of policyowners that elect RBO

Solving the above for the adverse selection component results in the following formula:

$$\text{Adverse Selection} = 1 / (1 - 25\% \times \text{CBUL} - 12.5\% \times \text{RBO})$$

## **Appendix A**

### **Development and Justification of Assumptions Used in this Filing**

#### ***Predictive Analytics***

In developing the experience adjustment factors described above, predictive analytics was employed in the form of a penalized generalized linear model (GLM) as well as a gradient boosting machine (GBM) model.

#### ***Penalized Generalized Linear Model***

A penalized GLM was used to develop adjustments for (1) situs-specific incidence, (2) lifetime payment option voluntary lapse, (3) active mortality, (4) on-claim utilization, and (5) day utilization.

A penalized GLM is like a traditional GLM. The key difference is that it adds an additional constraint that penalizes the size of the model's coefficients to control overfitting the model to the historical data. This penalty placed on the coefficients can be seen as a credibility lever which controls how much weight is given to the company's actual experience. A high penalty would give no weight to the data, leaving the benchmark assumption (e.g., *Guidelines*) unadjusted. No penalty would give full weight to the company's historical data, potentially making large adjustments to the benchmark assumption, which could be overfitting the historical experience. Therefore, when using a penalized GLM it is important to choose a penalty that gives the right amount of weight to the actual data to avoid underfitting or overfitting the experience. A standard approach for choosing such a penalty is to use a k-fold cross-validation (described below) to test a series of penalty values.

#### ***Gradient Boosting Machine***

GBM models were used to develop adjustments for (1) composite claim termination and (2) disabled mortality. As part of our experience analyses, GBM models were also used to explore key drivers for certain assumptions which informed our decisions regarding assumption complexity, the predictive modeling technique(s) to use in developing adjustments, and the variables to capture in the experience analyses.

A GBM model is a nonparametric algorithm that uses an ensemble of decision trees to develop predictions which automatically create key interactions of the independent variables in the model to minimize the prediction error of the model (i.e., the difference between the actual versus predicted counts). At each decision point in the trees, the model cycles through each variable and chooses the optimal data split that minimizes the prediction error. This process determines variable importance and how to partition variables such that the model can navigate complex interactions in an automated fashion.

A GBM model includes several inputs that control the model complexity and learning process, which are referred to as hyperparameters. These inputs are used to produce a model that determines the amount of weight to place on the historical data (i.e., not overfitting or underfitting) such that it will generalize well to future experience. A standard approach for tuning such hyperparameters is to use a k-fold cross-validation (described below).

#### ***K-Fold Cross-Validation***

A k-fold cross-validation is an automated process by which model hyperparameters can be selected and evaluated. This process splits the data into "k" subsets and iteratively trains and tests the model independently on each subset of the data. This process gives an estimation of how well a model will generalize to new data that was not used to develop assumptions. Through the k-fold cross-validation the impact that hyperparameters had on a model's ability to predict on the unseen data was evaluated by testing a range of hyperparameters. Hyperparameters were selected to balance minimizing the k-fold cross-validation prediction error with the generalizability of the model. This allows for a robust and automated approach to determine the amount of weight to give actual experience versus the benchmark assumptions.

#### ***Hazard Rates and Probabilities***

Each assumption consists of a base assumption and experience adjustment factors. The base assumption was converted to a hazard rate for use in predictive modeling. The experience adjustment factors are applied to the base hazard rate. The assumption is then converted back to a probability for use in projection. Adjustment factors were developed to be applied to hazard rates as part of the predictive modeling process described above. Hazard rates are converted from the base probability assumption and equal  $-\text{LN}[1-\text{probability}]$ . After applying all applicable adjustments, adjusted hazard rates are converted back to probabilities to create the assumption, where probability =  $1 - \text{EXP}[-\text{hazard rate}]$ .

A hazard rate represents the instantaneous likelihood (rate per unit of time) of an event (i.e., incidence, death, lapse, or recovery) at different times, whereas the probability is the likelihood that an event will occur within a specific time

**Appendix A**  
**Development and Justification of Assumptions Used in this Filing**

interval (e.g., one policy year). Because exact exposure is used in the predictive model, hazard rates were used in the development. They are then converted to probabilities for use in the projection models. Please note that this conversion of probabilities to hazard rates is only applicable for assumptions that follow a Poisson distribution (i.e., whether an event occurs) and as such are not applicable to the claim duration utilization assumption and indemnity day utilization assumption, which are non-binary (i.e., based on dollars and days, respectively, versus events).



**Exhibit A-1**  
**Actual-to-Expected Claim Incidence Experience 2009-2018**  
**Policy Durations 7+**  
**All Rate Series Combined**

Policy or Insured Characteristic	Exposure [A]	ALF			HHC			SNF			Total		
		Claim Count [B]	Actual-to-Expected (A:E)		Claim Count [B]	A:E		Claim Count [B]	A:E		Claim Count [B]	A:E	
			2017 Guidelines [C]	Expected <sup>[1]</sup> [D]		2017 Guidelines [C]	Expected <sup>[1]</sup> [D]		2017 Guidelines [C]	Expected <sup>[1]</sup> [D]		2017 Guidelines [C]	Expected <sup>[1]</sup> [D]
<b>Sex</b>													
Female	259,872	309	1.00	0.96	839	1.07	1.03	139	0.39	0.69	1,286	0.88	0.95
Male	205,434	180	1.22	1.12	520	1.08	1.01	114	0.46	0.81	814	0.92	0.99
<b>Partner Status</b>													
Partnered	341,646	210	0.98	0.96	811	1.21	1.09	119	0.39	0.70	1,140	0.96	1.00
Non-Partnered	123,660	279	1.15	1.07	547	0.92	0.93	133	0.44	0.77	960	0.83	0.93
<b>Benefit Period</b>													
Lifetime	329,616	261	1.00	0.97	899	1.13	1.06	149	0.42	0.75	1,310	0.92	0.99
Non-Lifetime	135,691	228	1.16	1.07	459	0.97	0.96	103	0.42	0.73	790	0.85	0.94
<b>Inflation Option</b>													
Auto	416,899	339	1.10	1.03	1,044	1.08	1.04	166	0.39	0.71	1,549	0.91	0.98
None	48,407	150	1.01	0.98	314	1.04	0.97	86	0.48	0.79	551	0.86	0.93
<b>Payment Type</b>													
Indemnity	152,745	71	0.78	0.81	394	1.28	1.18	70	0.54	0.89	535	1.01	1.07
Reimbursement	312,562	418	1.14	1.06	964	1.01	0.97	183	0.38	0.69	1,565	0.86	0.94
<b>Underwriting</b>													
Preferred	305,777	295	1.02	0.97	801	0.99	0.96	143	0.37	0.66	1,239	0.83	0.91
Standard	136,705	155	1.08	1.03	457	1.16	1.08	88	0.48	0.82	701	0.97	1.02
Substandard	22,824	39	1.55	1.45	100	1.60	1.44	22	0.69	1.11	161	1.34	1.38
<b>Rate Series</b>													
200 Series	197,434	335	1.20	1.10	857	1.22	1.08	162	0.45	0.80	1,355	1.00	1.03
300+ Series	267,872	154	0.86	0.87	501	0.89	0.93	90	0.37	0.65	745	0.75	0.87
<b>Attained Age</b>													
<65	200,211	19	0.82	0.87	141	0.98	1.03	16	0.40	0.55	177	0.85	0.94
65 - 69	124,121	50	1.14	1.07	176	0.80	0.94	24	0.33	0.61	250	0.74	0.92
70 - 74	87,189	88	1.01	0.99	288	0.97	1.00	51	0.41	0.79	427	0.84	0.97
75 - 79	38,217	123	1.04	0.99	325	1.13	1.00	66	0.44	0.81	515	0.92	0.97
80 - 84	12,137	117	1.11	1.06	279	1.41	1.08	57	0.47	0.80	453	1.05	1.02
85+	3,431	92	1.17	1.03	149	1.24	1.07	38	0.42	0.68	279	0.93	0.95
<b>Total</b>	<b>465,306</b>	<b>489</b>	<b>1.07</b>	<b>1.02</b>	<b>1,358</b>	<b>1.07</b>	<b>1.02</b>	<b>252</b>	<b>0.42</b>	<b>0.74</b>	<b>2,100</b>	<b>0.90</b>	<b>0.97</b>

[1] Expected = assumption used in this filing reflecting all experience adjustments.

**Exhibit A-2a**  
**Ultimate Voluntary Lapse Probabilities**  
**Lifetime Payment Option for Attained Age 70 and Older and Policy Durations 9+**  
**All Rate Series**

Inflation Option	Benefit Period	Lifetime Payment		Discounted Renewal Lifetime Payment	
		Non-Partnered	Partnered	Non-Partnered	Partnered
None	Non-Lifetime	0.9%	0.5%	0.7%	0.4%
	Lifetime	0.7%	0.4%	0.5%	0.3%
Auto	Non-Lifetime	0.6%	0.4%	0.5%	0.3%
	Lifetime	0.5%	0.3%	0.4%	0.2%

**Exhibit A-2b**  
**Actual-to-Expected Voluntary Lapse Experience 2009-2018**  
**Lifetime Payment Option<sup>[1]</sup> for Policy Durations 9+**  
**All Rate Series Combined**

Policy or Insured Characteristic	Policy Year	Actual	Actual-to-Expected Lapse Probability		
	Exposure [A]	Lapses [B]	Unadjusted <sup>[2]</sup> [C]	Modeled [D]	Expected <sup>[3]</sup> [E]
<b>Benefit Period and Inflation Option</b>					
Lifetime and Auto	178,652	841	0.77	0.96	0.99
Lifetime and None	18,095	122	1.04	1.11	1.22
Non-Lifetime and Auto	66,603	364	0.88	1.01	1.07
Non-Lifetime and None	14,132	199	2.12	1.64	1.94
<b>Attained Age</b>					
<65	89,326	672	1.25	1.17	1.15
65 - 69	78,049	318	0.67	0.97	0.97
70 - 74	64,439	285	0.72	0.98	1.08
75 - 79	31,826	133	0.65	0.82	0.94
80 - 84	10,689	86	1.18	1.08	1.56
85+	3,152	32	1.37	1.11	1.63
<b>Total</b>	<b>277,482</b>	<b>1,526</b>	<b>0.89</b>	<b>1.04</b>	<b>1.10</b>

[1] Excludes experience for policies with Discounted Renewal Payment Option.

[2] All-lives lapse assumption from the 2018 rate increase filings.

[3] Expected = assumption used in this filing reflecting all experience adjustments.

**Exhibit A-3a**  
**Active Mortality Hazard Rate Adjustment Factors**  
**All Rate Series**

Attained Age <sup>[1]</sup>	Preferred Underwriting				Standard Underwriting				Substandard Underwriting				Duration	Policy Duration Adjustment	
	Female		Male		Female		Male		Female		Male				
	Partnered	Non-Partnered	Partnered	Non-Partnered	Partnered	Non-Partnered	Partnered	Non-Partnered	Partnered	Non-Partnered	Partnered	Non-Partnered			
<50	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1	0.94
50	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2	0.90
51	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3	0.86
52	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4	0.83
53	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5	0.81
54	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	6	0.84
55	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	7	0.87
56	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	8	0.89
57	0.97	0.98	0.97	0.97	0.98	0.99	0.98	0.98	0.99	0.99	0.98	0.99	0.99	9	0.91
58	0.95	0.96	0.94	0.95	0.97	0.98	0.96	0.97	0.97	0.98	0.97	0.98	0.98	10	0.93
59	0.93	0.94	0.92	0.94	0.95	0.96	0.94	0.96	0.96	0.97	0.95	0.97	0.97	11	0.94
60	0.90	0.92	0.90	0.92	0.92	0.95	0.92	0.95	0.94	0.96	0.94	0.96	0.96	12	0.96
61	0.86	0.89	0.86	0.89	0.89	0.92	0.89	0.92	0.90	0.94	0.91	0.94	0.94	13	0.98
62	0.85	0.89	0.85	0.89	0.87	0.91	0.88	0.92	0.89	0.94	0.90	0.94	0.94	14	1.00
63	0.82	0.87	0.83	0.88	0.85	0.91	0.86	0.91	0.88	0.93	0.88	0.94	0.94	15	1.02
64	0.81	0.87	0.81	0.87	0.84	0.90	0.85	0.91	0.87	0.93	0.87	0.94	0.94	16	1.02
65	0.80	0.86	0.80	0.87	0.83	0.90	0.84	0.91	0.86	0.93	0.87	0.94	0.94	17	1.02
66	0.81	0.88	0.82	0.89	0.85	0.92	0.87	0.93	0.88	0.95	0.90	0.97	0.97	18	1.01
67	0.83	0.88	0.85	0.90	0.87	0.93	0.89	0.95	0.91	0.97	0.93	0.99	0.99	19	1.01
68	0.86	0.90	0.89	0.94	0.89	0.94	0.93	0.98	0.93	0.98	0.97	1.02	1.02	20	1.00
69	0.88	0.92	0.93	0.97	0.92	0.96	0.97	1.01	0.95	0.99	1.00	1.05	1.05	21	1.01
70	0.92	0.95	0.98	1.02	0.95	0.99	1.02	1.06	0.98	1.01	1.05	1.08	1.08	22+	1.00
71	0.94	0.97	1.01	1.04	0.98	1.01	1.05	1.09	0.99	1.02	1.07	1.11	1.11		
72	0.96	0.99	1.04	1.07	1.00	1.04	1.08	1.12	1.01	1.05	1.09	1.13	1.13		
73	0.98	1.02	1.06	1.09	1.04	1.07	1.12	1.15	1.03	1.06	1.11	1.14	1.14		
74	1.02	1.03	1.09	1.11	1.06	1.07	1.14	1.15	1.05	1.07	1.13	1.15	1.15		
75	1.03	1.03	1.09	1.10	1.06	1.07	1.13	1.14	1.06	1.06	1.13	1.13	1.13		
76	1.04	1.04	1.09	1.09	1.07	1.06	1.12	1.12	1.07	1.06	1.12	1.12	1.12		
77	1.04	1.02	1.07	1.06	1.06	1.05	1.10	1.09	1.07	1.05	1.11	1.09	1.09		
78	1.02	1.02	1.03	1.03	1.05	1.05	1.06	1.06	1.06	1.06	1.07	1.07	1.07		
79	1.02	1.02	1.01	1.01	1.06	1.06	1.05	1.05	1.06	1.07	1.06	1.06	1.06		
80	1.02	1.03	1.01	1.02	1.07	1.08	1.05	1.07	1.07	1.09	1.06	1.07	1.07		
81	1.02	1.04	1.01	1.02	1.07	1.09	1.05	1.07	1.07	1.09	1.06	1.07	1.07		
82	1.02	1.04	1.01	1.03	1.07	1.09	1.06	1.08	1.07	1.09	1.06	1.08	1.08		
83	1.02	1.03	1.03	1.04	1.07	1.08	1.08	1.09	1.06	1.07	1.07	1.09	1.09		
84	1.02	1.03	1.04	1.05	1.06	1.06	1.08	1.09	1.05	1.06	1.08	1.09	1.09		
85	1.00	1.01	1.03	1.03	1.04	1.04	1.07	1.07	1.04	1.04	1.07	1.07	1.07		
86	1.01	1.01	1.04	1.04	1.04	1.04	1.07	1.07	1.04	1.04	1.07	1.07	1.07		
87	1.01	1.01	1.04	1.04	1.04	1.04	1.07	1.07	1.04	1.04	1.06	1.06	1.06		
88	1.02	1.02	1.04	1.04	1.05	1.05	1.06	1.06	1.05	1.05	1.06	1.06	1.06		
89	1.03	1.03	1.04	1.04	1.05	1.05	1.06	1.06	1.05	1.05	1.06	1.06	1.06		
90	1.05	1.05	1.05	1.05	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06		
91	1.05	1.05	1.05	1.05	1.06	1.06	1.06	1.06	1.05	1.05	1.06	1.06	1.06		
92	1.05	1.05	1.05	1.05	1.06	1.06	1.06	1.06	1.05	1.05	1.05	1.05	1.05		
93	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05		
94	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05		
95	1.04	1.04	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05		
96	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04		
97	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04		
98	1.03	1.03	1.03	1.03	1.03	1.03	1.04	1.04	1.03	1.03	1.03	1.03	1.03		
99	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03		
100	1.02	1.02	1.02	1.02	1.02	1.02	1.03	1.03	1.02	1.02	1.03	1.03	1.03		
101	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02		
102	1.01	1.01	1.02	1.02	1.02	1.02	1.02	1.02	1.01	1.01	1.02	1.02	1.02		
103	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01		
104	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01		
105+	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		

[1] Attained age adjustments are applicable to policy durations 7+.

**Exhibit A-3b**  
**Actual-to-Expected Active Mortality Experience 2009-2018**  
**Policy Durations 7+**  
**All Rate Series Combined**

Policy or Insured Characteristic	Policy Year Exposure [A]	Actual Deaths [B]	Actual-to-Expected Active Mortality Probability		
			Unadjusted [C]	Modeled [D]	Expected <sup>[1]</sup> [E]
<b>Sex</b>					
Female	259,872	917	0.82	0.92	0.89
Male	205,434	1,107	0.93	1.02	0.99
<b>Partner Status</b>					
Partnered	341,646	1,338	0.83	0.93	0.91
Non-Partnered	123,660	686	0.97	1.05	1.02
<b>Underwriting Class</b>					
Preferred	305,777	1,214	0.79	0.88	0.86
Standard	136,705	629	0.95	1.04	1.01
Substandard	22,824	181	1.64	1.78	1.73
<b>Policy Duration</b>					
7 - 9	185,581	537	0.77	0.93	0.92
10 - 14	228,952	1,057	0.88	0.97	0.94
15+	50,774	430	1.02	1.03	0.99
<b>Attained Age</b>					
<65	200,211	322	0.74	0.90	0.90
65 - 69	124,121	402	0.75	0.91	0.91
70 - 74	87,189	541	0.96	1.01	0.98
75 - 79	38,217	400	0.98	1.01	0.96
80 - 84	12,137	238	1.03	1.06	1.01
85+	3,431	121	0.90	0.93	0.88
<b>Total</b>	<b>465,306</b>	<b>2,024</b>	<b>0.88</b>	<b>0.97</b>	<b>0.95</b>

[1] Expected = assumption used in this filing reflecting all experience adjustments.

**Exhibit A-4**  
**Actual-to-Expected Composite<sup>[1]</sup> Termination Experience 2009-2018**  
**Lifetime Payment Option<sup>[2]</sup> for Policy Durations 9+**  
**All Rate Series Combined**

Attained Age	Policy Year Exposure [A]	Actual Terminations [B]	Actual-to-Expected Composite Termination Probability [C]
<65	89,326	844	1.12
65 - 69	78,049	575	0.94
70 - 74	64,439	698	1.03
75 - 79	31,826	482	0.98
80 - 84	10,689	300	1.14
85+	3,152	142	0.97
<b>Total</b>	<b>277,482</b>	<b>3,041</b>	<b>1.03</b>

[1] Combination of active mortality and voluntary lapse.

[2] Excludes experience for policies with Discounted Renewal Payment Option

**Exhibit A-5**  
**Actual-to-Expected Disabled Mortality Experience 2009-2018**  
**Claim Months 4 to 96**  
**All Rate Series Combined**

Policy or Insured Characteristic	ALF Starting Site of Care				HHC Starting Site of Care				SNF Starting Site of Care				Total			
	Exposure [A]	Actual Deaths [B]	Actual-to-Expected (A:E)		Exposure [A]	Actual Deaths [B]	A:E		Exposure [A]	Actual Deaths [B]	A:E		Exposure [A]	Actual Deaths [B]	A:E	
			2017 Guidelines [C]	Expected <sup>[1]</sup> [D]			2017 Guidelines [C]	Expected <sup>[1]</sup> [D]			2017 Guidelines [C]	Expected <sup>[1]</sup> [D]			2017 Guidelines [C]	Expected <sup>[1]</sup> [D]
<b>Sex</b>																
Female	8,222	91	0.79	0.93	18,755	231	0.86	0.97	2,281	45	0.98	1.09	29,259	367	0.86	0.97
Male	4,523	72	0.74	0.88	10,859	218	0.97	1.03	1,803	45	0.88	0.98	17,185	335	0.90	0.99
<b>Benefit Period</b>																
Lifetime	7,405	80	0.74	0.90	21,074	290	0.89	0.98	2,683	52	0.89	1.01	31,162	422	0.86	0.97
Non-Lifetime	5,340	83	0.80	0.91	8,540	159	0.95	1.02	1,401	38	0.98	1.07	15,282	280	0.90	0.99
<b>Partner Status</b>																
Partnered	4,976	73	0.83	0.95	16,867	280	0.95	1.01	1,737	50	1.13	1.22	23,580	403	0.94	1.02
Non-Partnered	7,769	90	0.73	0.88	12,747	169	0.85	0.97	2,347	40	0.75	0.87	22,863	299	0.80	0.93
<b>Payment Type</b>																
Indemnity	2,080	27	0.81	1.08	9,529	106	0.68	0.83	1,141	22	0.80	0.97	12,751	155	0.72	0.88
Reimbursement	10,665	136	0.76	0.88	20,085	343	1.01	1.06	2,943	68	0.98	1.05	33,693	547	0.93	1.01
<b>Claim Duration (Annual)</b>																
1	3,446	42	0.62	0.76	7,403	133	0.75	0.88	1,322	45	0.99	1.11	12,170	220	0.76	0.89
2	3,346	45	0.93	1.09	7,584	90	0.82	0.90	1,029	22	1.11	1.23	11,960	157	0.88	0.99
3	2,376	24	0.66	0.77	5,256	90	1.26	1.28	725	6	0.45	0.49	8,358	120	0.99	1.05
4	1,605	22	0.86	0.99	3,556	53	1.10	1.12	470	8	0.95	1.04	5,630	83	1.01	1.07
5	889	15	1.00	1.17	2,340	35	1.03	1.07	261	3	0.60	0.65	3,490	53	0.98	1.05
6+	1,083	15	0.77	0.90	3,475	48	0.91	0.97	277	6	1.18	1.34	4,836	69	0.89	0.98
<b>Incurred Age</b>																
<65	1,026	10	0.66	0.83	5,236	74	0.87	0.99	474	7	0.69	0.81	6,736	91	0.83	0.96
65 - 69	2,349	25	0.70	0.87	4,339	69	0.96	1.08	579	9	0.62	0.72	7,267	103	0.84	0.98
70 - 74	2,542	23	0.55	0.69	5,600	91	0.99	1.09	1,021	14	0.58	0.69	9,163	128	0.81	0.93
75 - 79	3,101	40	0.81	0.97	6,671	89	0.82	0.90	998	26	1.17	1.28	10,770	155	0.86	0.97
80 - 84	2,007	30	0.88	1.02	5,312	86	0.95	1.00	723	22	1.28	1.34	8,042	138	0.97	1.04
85+	1,719	35	0.97	1.01	2,456	40	0.88	0.90	289	12	1.31	1.32	4,465	87	0.96	0.99
<b>Total</b>	<b>12,745</b>	<b>163</b>	<b>0.77</b>	<b>0.91</b>	<b>29,614</b>	<b>449</b>	<b>0.91</b>	<b>0.99</b>	<b>4,084</b>	<b>90</b>	<b>0.93</b>	<b>1.03</b>	<b>46,443</b>	<b>702</b>	<b>0.87</b>	<b>0.98</b>

[1] Expected = assumption used in this filing reflecting all experience adjustments.

**Exhibit A-6**  
**Actual-to-Expected Disabled Recovery Experience 2009-2018**  
**Claim Months 4 to 96**  
**All Rate Series Combined**

Policy or Insured Characteristic	ALF Starting Site of Care				HHC Starting Site of Care				SNF Starting Site of Care				Total			
	Exposure [A]	Actual Recoveries [B]	Actual-to-Expected (A:E)		Exposure [A]	Actual Recoveries [B]	A:E		Exposure [A]	Actual Recoveries [B]	A:E		Exposure [A]	Actual Recoveries [B]	A:E	
			2017 Guidelines <sup>[1]</sup> [C]	Expected <sup>[2]</sup> [D]			2017 Guidelines <sup>[1]</sup> [C]	Expected <sup>[2]</sup> [D]			2017 Guidelines <sup>[1]</sup> [C]	Expected <sup>[2]</sup> [D]			2017 Guidelines <sup>[1]</sup> [C]	Expected <sup>[2]</sup> [D]
<b>Sex</b>																
Female	8,222	17	1.04	0.93	18,755	121	0.84	0.90	2,281	16	1.44	1.24	29,259	154	0.90	0.93
Male	4,523	5	0.41	0.38	10,859	57	1.01	1.06	1,803	12	1.33	1.10	17,185	74	0.95	0.95
<b>Benefit Period</b>																
Lifetime	7,405	9	0.61	0.52	21,074	115	0.91	0.96	2,683	15	1.23	1.01	31,162	139	0.91	0.91
Non-Lifetime	5,340	13	0.95	0.92	8,540	63	0.84	0.93	1,401	13	1.64	1.46	15,282	89	0.92	0.98
<b>Partner Status</b>																
Partnered	4,976	4	0.34	0.37	16,867	85	0.74	0.82	1,737	12	1.36	1.26	23,580	101	0.75	0.82
Non-Partnered	7,769	18	1.07	0.87	12,747	93	1.08	1.09	2,347	16	1.41	1.12	22,863	127	1.11	1.06
<b>Payment Type</b>																
Indemnity	2,080	3	0.66	0.46	9,529	75	1.21	1.09	1,141	10	1.81	1.27	12,751	88	1.22	1.06
Reimbursement	10,665	19	0.80	0.76	20,085	103	0.74	0.86	2,943	18	1.23	1.13	33,693	140	0.79	0.87
<b>Claim Duration (Annual)</b>																
1	3,446	6	0.69	0.53	7,403	110	1.10	1.08	1,322	13	1.39	1.08	12,170	129	1.09	1.03
2	3,346	7	1.02	0.94	7,584	34	0.68	0.74	1,029	10	2.10	1.84	11,960	51	0.83	0.86
3	2,376	3	0.58	0.59	5,256	15	0.65	0.81	725	3	1.03	1.01	8,358	21	0.67	0.79
4	1,605	1	0.26	0.29	3,556	9	0.67	0.89	470	1	0.55	0.57	5,630	11	0.57	0.71
5	889	2	1.15	1.08	2,340	4	0.59	0.76	261	0	0.00	0.00	3,490	6	0.66	0.76
6+	1,083	3	1.46	1.42	3,475	6	0.80	0.95	277	1	1.50	1.21	4,836	10	0.98	1.08
<b>Incurred Age</b>																
<65	1,026	0	0.00	0.00	5,236	54	1.41	1.30	474	4	1.87	1.36	6,736	58	1.37	1.23
65 - 69	2,349	2	0.39	0.32	4,339	40	1.27	1.26	579	3	1.03	0.79	7,267	45	1.14	1.08
70 - 74	2,542	4	0.68	0.56	5,600	33	0.82	0.89	1,021	9	1.82	1.36	9,163	46	0.90	0.91
75 - 79	3,101	7	1.01	0.93	6,671	28	0.62	0.70	998	4	0.79	0.72	10,770	39	0.68	0.74
80 - 84	2,007	8	1.78	1.87	5,312	15	0.46	0.58	723	5	1.34	1.41	8,042	28	0.68	0.83
85+	1,719	1	0.26	0.29	2,456	8	0.61	0.65	289	3	2.18	2.18	4,465	12	0.65	0.70
<b>Total</b>	<b>12,745</b>	<b>22</b>	<b>0.77</b>	<b>0.70</b>	<b>29,614</b>	<b>178</b>	<b>0.89</b>	<b>0.95</b>	<b>4,084</b>	<b>28</b>	<b>1.39</b>	<b>1.18</b>	<b>46,443</b>	<b>228</b>	<b>0.91</b>	<b>0.94</b>

[1] The 2017 Guidelines is included for illustrative purposes only as this expected basis was not directly used in developing the implied recovery assumption.

[2] Expected = assumption used in this filing reflecting all experience adjustments.



**Exhibit A-7**  
**Actual-to-Expected Composite Claim Termination Experience 2009-2018**  
**Claim Months 4 to 96**  
**All Rate Series Combined**

Policy or Insured Characteristic	ALF Starting Site of Care				HHC Starting Site of Care				SNF Starting Site of Care				Total				
	Exposure [A]	Claim Terminations [B]	Actual-to-Expected (A:E)		Exposure [A]	Claim Terminations [B]	A:E		Exposure [A]	Claim Terminations [B]	A:E		Exposure [A]	Claim Terminations [B]	A:E		
			2017 Guidelines [C]	Expected <sup>[1]</sup> [D]			2017 Guidelines [C]	Expected <sup>[1]</sup> [D]			2017 Guidelines [C]	Expected <sup>[1]</sup> [D]			2017 Guidelines [C]	Expected <sup>[1]</sup> [D]	
<b>Sex</b>																	
Female	8,222	108	0.82	0.93	18,755	352	0.85	0.94	2,281	61	1.06	1.13	29,259	521	0.86	0.96	
Male	4,523	77	0.71	0.81	10,859	275	0.97	1.03	1,803	57	0.94	1.00	17,185	409	0.90	0.98	
<b>Benefit Period</b>																	
Lifetime	7,405	89	0.72	0.84	21,074	405	0.89	0.98	2,683	67	0.94	1.01	31,162	561	0.87	0.95	
Non-Lifetime	5,340	96	0.81	0.91	8,540	222	0.91	0.99	1,401	51	1.09	1.15	15,282	369	0.90	0.99	
<b>Partner Status</b>																	
Partnered	4,976	77	0.77	0.88	16,867	365	0.88	0.96	1,737	62	1.17	1.23	23,580	504	0.89	0.97	
Non-Partnered	7,769	108	0.77	0.88	12,747	262	0.92	1.01	2,347	56	0.86	0.93	22,863	426	0.87	0.96	
<b>Payment Type</b>																	
Indemnity	2,080	30	0.79	0.95	9,529	181	0.83	0.92	1,141	32	0.96	1.05	12,751	243	0.84	0.94	
Reimbursement	10,665	155	0.76	0.87	20,085	446	0.93	1.01	2,943	86	1.02	1.07	33,693	687	0.89	0.98	
<b>Claim Duration (Annual)</b>																	
1	3,446	48	0.63	0.72	7,403	243	0.87	0.96	1,322	58	1.05	1.11	12,170	349	0.85	0.94	
2	3,346	52	0.94	1.07	7,584	124	0.78	0.85	1,029	32	1.30	1.37	11,960	208	0.87	0.95	
3	2,376	27	0.65	0.74	5,256	105	1.11	1.18	725	9	0.55	0.59	8,358	141	0.92	1.00	
4	1,605	23	0.78	0.89	3,556	62	1.00	1.07	470	9	0.88	0.95	5,630	94	0.92	1.01	
5	889	17	1.02	1.16	2,340	39	0.96	1.02	261	3	0.53	0.56	3,490	59	0.93	1.01	
6+	1,083	18	0.83	0.95	3,475	54	0.90	0.97	277	7	1.21	1.32	4,836	79	0.90	0.99	
<b>Incurred Age</b>																	
<65	1,026	10	0.58	0.68	5,236	128	1.03	1.10	474	11	0.89	0.95	6,736	149	0.97	1.05	
65 - 69	2,349	27	0.66	0.78	4,339	109	1.05	1.14	579	12	0.69	0.74	7,267	148	0.91	1.01	
70 - 74	2,542	27	0.56	0.67	5,600	124	0.93	1.03	1,021	23	0.79	0.86	9,163	174	0.83	0.92	
75 - 79	3,101	47	0.83	0.97	6,671	117	0.76	0.84	998	30	1.10	1.16	10,770	194	0.82	0.91	
80 - 84	2,007	38	0.98	1.13	5,312	101	0.81	0.90	723	27	1.29	1.35	8,042	166	0.90	1.00	
85+	1,719	36	0.90	0.94	2,456	48	0.81	0.85	289	15	1.42	1.44	4,465	99	0.90	0.94	
<b>Total</b>	<b>12,745</b>	<b>185</b>	<b>0.77</b>	<b>0.88</b>	<b>29,614</b>	<b>627</b>	<b>0.90</b>	<b>0.98</b>	<b>4,084</b>	<b>118</b>	<b>1.00</b>	<b>1.06</b>	<b>46,443</b>	<b>930</b>	<b>0.88</b>	<b>0.97</b>	

[1] Expected = assumption used in this filing reflecting all experience adjustments.







**Exhibit A-8b**  
**Actual-to-Expected Claim Duration Utilization Experience January 1, 2015-September 30, 2019**  
**Reimbursement Payment Type with Claim Months 4 to 96**  
**All Rate Series Combined**

Policy or Insured Characteristic	ALF Starting Site of Care			HHC Starting Site of Care			SNF Starting Site of Care			Total		
	Paid Claims [A]	Actual-to-Expected (A:E)		Paid Claims [A]	A:E		Paid Claims [A]	A:E		Paid Claims [A]	A:E	
		Policy Duration [B]	Expected <sup>[1]</sup> [C]		Policy Duration [B]	Expected <sup>[1]</sup> [C]		Policy Duration [B]	Expected <sup>[1]</sup> [C]		Policy Duration [B]	Expected <sup>[1]</sup> [C]
<b>Inflation Option</b>												
Auto	33,114,855	1.04	1.00	43,673,599	1.23	1.01	7,177,014	0.86	0.92	83,965,467	1.11	0.99
None	6,877,349	0.94	0.95	11,484,533	1.34	1.08	2,901,278	0.93	0.96	21,263,161	1.12	1.02
<b>Benefit Period</b>												
Lifetime	24,909,371	1.04	1.00	38,534,998	1.31	1.04	6,800,301	0.87	0.92	70,244,670	1.15	1.01
Non-Lifetime	15,082,834	0.98	0.97	16,623,134	1.12	0.98	3,277,990	0.90	0.95	34,983,958	1.03	0.97
<b>Incurral Age</b>												
<75	18,875,970	1.05	1.00	22,061,201	1.22	0.99	3,252,523	0.77	0.83	44,189,693	1.10	0.98
75-84	16,838,435	0.99	0.98	26,935,259	1.23	1.01	5,692,446	0.95	1.00	49,466,140	1.10	1.00
85+	4,277,799	0.99	0.99	6,161,672	1.49	1.21	1,133,323	0.91	0.95	11,572,795	1.19	1.09
<b>Claim Duration (Annual)</b>												
1	9,451,948	0.88	0.96	9,355,082	0.88	0.98	2,890,881	0.82	0.91	21,697,911	0.87	0.96
2	10,879,620	1.05	1.01	13,999,327	1.20	1.02	2,554,593	0.91	0.95	27,433,540	1.11	1.01
3	7,618,306	1.09	1.01	11,415,469	1.41	1.06	2,074,441	0.92	0.96	21,108,216	1.22	1.03
4	5,425,831	1.09	1.02	8,138,340	1.51	1.09	1,333,358	0.87	0.92	14,897,529	1.26	1.05
5	3,210,531	1.07	1.00	5,046,337	1.51	1.06	787,707	0.92	0.93	9,044,575	1.26	1.03
6+	3,405,969	1.03	0.92	7,203,576	1.38	0.91	437,312	0.92	0.87	11,046,857	1.23	0.91
<b>Total</b>	<b>39,992,204</b>	<b>1.02</b>	<b>0.99</b>	<b>55,158,132</b>	<b>1.25</b>	<b>1.02</b>	<b>10,078,292</b>	<b>0.88</b>	<b>0.93</b>	<b>105,228,628</b>	<b>1.11</b>	<b>1.00</b>

[1] Expected = assumption used in this filing reflecting all experience adjustments.

**Exhibit A-9a**  
**Day Utilization Adjustment Factors**  
**All Rate Series**  
**Indemnity Payment Type**

Attained Age	Starting Site of Care		
	ALF	HHC	SNF
<70	0.96	0.80	0.89
70	0.96	0.80	0.89
71	0.96	0.80	0.89
72	0.96	0.80	0.89
73	0.96	0.80	0.89
74	0.96	0.80	0.89
75	0.96	0.80	0.89
76	0.96	0.81	0.89
77	0.96	0.81	0.89
78	0.96	0.81	0.91
79	0.96	0.81	0.92
80	0.96	0.81	0.92
81	0.96	0.81	0.93
82	0.96	0.81	0.93
83	0.96	0.82	0.93
84	0.96	0.83	0.93
85	0.96	0.84	0.93
86	0.96	0.86	0.93
87	0.96	0.88	0.93
88	0.96	0.90	0.93
89	0.96	0.91	0.93
90	0.96	0.91	0.93
91	0.96	0.91	0.93
92	0.96	0.92	0.94
93	0.96	0.93	0.95
94	0.96	0.94	0.96
95	0.96	0.96	0.97
96	0.96	0.97	0.98
97	0.96	0.97	0.98
98	0.96	0.97	0.99
99	0.96	0.97	0.99
100	0.97	0.97	0.99
101	0.98	0.97	0.99
102	0.98	0.97	0.99
103	0.98	0.97	0.99
104	0.98	0.97	0.99
105+	0.98	0.97	0.99

**Exhibit A-9b**  
**Actual-to-Expected Claim Duration Utilization Experience January 1, 2015-September 30, 2019**  
**Indemnity Payment Type<sup>[1]</sup> with Claim Months 4 to 96**  
**All Rate Series Combined**

Attained Age	ALF Starting Site of Care			HHC Starting Site of Care			SNF Starting Site of Care			Total		
	Days Paid [A]	Actual-to-Expected (A:E)		Days Paid [A]	A:E		Days Paid [A]	A:E		Days Paid [A]	A:E	
		Unadjusted <sup>[2]</sup> [B]	Expected <sup>[3]</sup> [C]		Unadjusted <sup>[2]</sup> [B]	Expected <sup>[3]</sup> [C]		Unadjusted <sup>[2]</sup> [B]	Expected <sup>[3]</sup> [C]		Unadjusted <sup>[2]</sup> [B]	Expected <sup>[3]</sup> [C]
<65	2,930	0.85	0.89	22,663	0.91	1.11	1,610	0.88	0.99	27,203	0.90	1.07
65-69	5,640	0.94	0.97	20,034	0.71	0.86	2,613	0.67	0.75	28,286	0.74	0.87
70-74	13,484	1.01	1.05	37,587	0.87	1.07	3,234	0.69	0.76	54,305	0.89	1.04
75-79	14,505	0.97	1.00	38,297	0.90	1.08	4,733	0.77	0.84	57,534	0.90	1.03
80-84	9,145	0.95	0.98	28,267	0.87	1.04	2,392	0.75	0.80	39,804	0.88	1.01
85+	3,522	0.84	0.86	25,240	0.96	1.05	2,853	0.65	0.70	31,615	0.91	0.98
<b>Total</b>	<b>49,225</b>	<b>0.95</b>	<b>0.99</b>	<b>172,088</b>	<b>0.87</b>	<b>1.04</b>	<b>17,435</b>	<b>0.72</b>	<b>0.79</b>	<b>238,748</b>	<b>0.87</b>	<b>1.01</b>

[1] Excludes experience from policies with a caregiver indemnity rider.

[2] Actual days utilization experience.

[3] Expected = assumption used in this filing reflecting all experience adjustments.