

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY

INTERIM STATUTORY FINANCIAL STATEMENTS

As of June 30, 2021 and December 31, 2020 and for the six months ended
June 30, 2021 and 2020

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
INTERIM STATUTORY FINANCIAL STATEMENTS
(UNAUDITED)

Table of Contents

	<u>Page</u>
Interim Statutory Statements of Financial Position	2
Interim Statutory Statements of Operations	3
Interim Statutory Statements of Changes in Surplus.....	4
Interim Statutory Statements of Cash Flows	5
Notes to Interim Statutory Financial Statements:	
1. Nature of operations	6
2. Summary of significant accounting policies.....	6
3. New accounting standards	7
4. Fair value of financial instruments	8
5. Investments	
a. Bonds	13
b. Common stocks – subsidiaries and affiliates	14
c. Mortgage loans.....	15
d. Partnerships and limited liability companies	16
e. Derivatives.....	17
f. Net investment income	20
g. Net realized capital (losses) gains	21
6. Federal income taxes.....	22
7. Other than invested assets.....	22
8. Policyholders’ liabilities	22
9. Reinsurance.....	23
10. Withdrawal characteristics.....	23
11. Debt	23
12. Employee benefit plans.....	23
13. Employee compensation plans.....	24
14. Surplus notes	24
15. Presentation of the Interim Statutory Statements of Cash Flows	25
16. Business risks, commitments and contingencies	25
17. Related party transactions.....	27
18. Subsequent events.....	28
19. Impairment listing for loan-backed and structured securities	29

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
INTERIM STATUTORY STATEMENTS OF FINANCIAL POSITION
(UNAUDITED)

	June 30, 2021	December 31, 2020
(In Millions)		
Assets:		
Bonds	\$ 114,074	\$ 114,684
Preferred stocks	494	470
Common stocks – subsidiaries and affiliates	23,849	19,895
Common stocks – unaffiliated	1,369	1,192
Mortgage loans	27,017	26,078
Policy loans	15,628	15,597
Real estate	419	362
Partnerships and limited liability companies	10,867	9,534
Derivatives	17,347	21,076
Cash, cash equivalents and short-term investments	7,843	5,738
Other invested assets	1,446	1,503
Total invested assets	220,353	216,129
Investment income due and accrued	3,687	3,859
Net deferred income taxes	634	509
Other than invested assets	4,037	3,996
Total assets excluding separate accounts	228,711	224,493
Separate account assets	77,782	75,966
Total assets	\$ 306,493	\$ 300,459
 Liabilities and Surplus:		
Policyholders' reserves	\$ 130,990	\$ 125,167
Liabilities for deposit-type contracts	16,153	14,580
Contract claims and other benefits	696	726
Policyholders' dividends	1,753	1,708
General expenses due or accrued	1,140	1,253
Federal income taxes	172	670
Asset valuation reserve	5,871	5,205
Repurchase agreements	2,820	4,006
Commercial paper	1,120	250
Collateral	5,002	5,551
Derivatives	12,403	17,349
Funds held under coinsurance	18,129	17,929
Other liabilities	6,763	5,772
Total liabilities excluding separate accounts	203,012	200,166
Separate account liabilities	77,782	75,966
Total liabilities	280,794	276,132
Surplus	25,699	24,327
Total liabilities and surplus	\$ 306,493	\$ 300,459

See notes to interim statutory financial statements

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
INTERIM STATUTORY STATEMENTS OF OPERATIONS
(UNAUDITED)

	Six Months Ended	
	June 30,	
	2021	2020
	<u>(In Millions)</u>	
Revenue:		
Premium income	\$ 9,522	\$ 13,026
Net investment income	4,019	3,589
Fees and other income	601	549
Total revenue	<u>14,142</u>	<u>17,164</u>
Benefits, expenses and other deductions:		
Policyholders' benefits	5,761	11,784
Change in policyholders' reserves	5,123	4,002
General insurance expenses	1,033	1,026
Commissions	569	538
State taxes, licenses and fees	180	127
Other deductions	381	94
Total benefits, expenses and other deductions	<u>13,047</u>	<u>17,571</u>
Net gain (loss) from operations before dividends and federal income taxes	1,095	(407)
Dividends to policyholders	815	806
Net gain (loss) from operations before federal income taxes	280	(1,213)
Federal income tax expense (benefit)	117	(340)
Net gain (loss) from operations	163	(873)
Net realized capital (losses) gains	(619)	153
Net loss	<u>\$ (456)</u>	<u>\$ (720)</u>

See notes to interim statutory financial statements

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
INTERIM STATUTORY STATEMENTS OF CHANGES IN SURPLUS
(UNAUDITED)

	Six Months Ended	
	June 30,	
	2021	2020
	<u>(In Millions)</u>	
Surplus, beginning of year	\$ 24,327	\$ 18,893
Net increase/(decrease) due to:		
Net loss	(456)	(720)
Change in net unrealized capital gains, net of tax	2,049	4,272
Change in net unrealized foreign exchange capital losses, net of tax	(191)	(445)
Change in other net deferred income taxes	451	(121)
Change in nonadmitted assets	(4)	22
Change in asset valuation reserve	(666)	(450)
Change in reserve valuation basis	-	13
Change in surplus notes	234	1,537
Prior period adjustments	(1)	30
Other	(44)	(15)
Net increase	<u>1,372</u>	<u>4,123</u>
Surplus, end of period	<u>\$ 25,699</u>	<u>\$ 23,016</u>

See notes to interim statutory financial statements

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
INTERIM STATUTORY STATEMENTS OF CASH FLOWS
(UNAUDITED)

	Six Months Ended June 30,	
	2021	2020
	<u>(In Millions)</u>	
Cash from operations:		
Premium and other income collected	\$ 9,936	\$ 13,543
Net investment income	4,502	3,352
Benefit payments	(5,742)	(11,474)
Net transfers from separate accounts	670	1,302
Net receipts from group annuity reserves assumed	(23)	416
Commissions and other expenses	(2,454)	(2,032)
Dividends paid to policyholders	(774)	(766)
Federal and foreign income taxes (paid) recovered	(614)	119
Net cash from operations	<u>5,501</u>	<u>4,460</u>
Cash from investments:		
Proceeds from investments sold, matured or repaid:		
Bonds	19,684	10,031
Preferred and common stocks – unaffiliated	163	451
Common stocks – affiliated	22	-
Mortgage loans	1,871	1,638
Partnerships and limited liability companies	196	744
Derivatives	(801)	2,075
Other	30	1,047
Total investment proceeds	<u>21,165</u>	<u>15,986</u>
Cost of investments acquired:		
Bonds	(18,860)	(16,674)
Preferred and common stocks – unaffiliated	(167)	(84)
Common stocks – affiliated	(3,720)	(51)
Mortgage loans	(2,793)	(1,981)
Real estate	(107)	(31)
Partnerships and limited liability companies	(999)	(819)
Derivatives	(27)	(297)
Other	613	394
Total investments acquired	<u>(26,060)</u>	<u>(19,543)</u>
Net increase in policy loans	<u>(30)</u>	<u>(322)</u>
Net cash used in investing activities	<u>(4,925)</u>	<u>(3,879)</u>
Cash from financing and miscellaneous sources:		
Net deposits on deposit-type contracts	1,621	2,425
Net cash provided by surplus notes	-	697
Change in repurchase agreements	(1,664)	1,332
Change in collateral	(666)	5,375
Other cash provided (used)	2,238	(1,043)
Net cash provided from financing and miscellaneous sources	<u>1,529</u>	<u>8,786</u>
Net change in cash, cash equivalents and short-term investments	2,105	9,367
Cash, cash equivalents and short-term investments:		
Beginning of year	5,738	3,793
End of period	<u>\$ 7,843</u>	<u>\$ 13,160</u>

See notes to interim statutory financial statements

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS
(UNAUDITED)

1. Nature of operations

Massachusetts Mutual Life Insurance Company (MassMutual or the Company), a mutual life insurance company domiciled in the Commonwealth of Massachusetts, and its domestic life insurance subsidiaries provide individual and group life insurance, disability insurance (DI), individual and group annuities and guaranteed interest contracts (GIC) to individual and institutional customers in all 50 states of the United States of America (U.S.), the District of Columbia and Puerto Rico. Products and services are offered primarily through the Company's MassMutual Financial Advisors (MMFA), MassMutual Strategic Distributors (MMSD), Digital Direct to Consumer and Business to Business (DTC&B2B), Institutional Solutions (IS) and Worksite distribution channels.

MMFA is a sales force that includes financial professionals that operate in the U.S. MMFA sells individual life, individual annuities, long-term care (LTC) and DI. The Company's MMSD channel sells life insurance, disability, annuity, and hybrid life and LTC solutions through a network of third-party distribution partners. The Company's DTC&B2B distribution channel sells individual life and supplemental health insurance primarily through direct response television advertising, digital media, search engine optimization and search engine marketing. The Company's IS distribution channel sells group annuities, group life and GIC primarily through retirement advisory firms, actuarial consulting firms, investment banks, insurance benefit advisors and investment management companies. The Company's Worksite channel partners with advisors and employers across the country to provide American workers with voluntary and executive benefits such as group whole life, critical illness, accident insurance and executive variable life and disability, through the workplace.

2. Summary of significant accounting policies

a. Basis of presentation

The interim statutory financial statements have been prepared in conformity with the statutory accounting practices of the National Association of Insurance Commissioners (NAIC) and the accounting practices prescribed or permitted by the Commonwealth of Massachusetts Division of Insurance.

The interim statutory financial statements and notes as of June 30, 2021 and December 31, 2020, and for the six months ended June 30, 2021 and 2020, are unaudited. The Interim Statutory Statement of Financial Position as of December 31, 2020 has been derived from the audited financial statements at that date, but do not include all of the information and footnotes required by statutory accounting practices for complete financial statements. These interim statutory financial statements, in the opinion of management, reflect the fair presentation of the financial position, results of operations, changes in surplus and cash flows for the interim periods. These interim statutory financial statements and notes should be read in conjunction with the statutory financial statements and notes thereto included in the Company's 2020 audited yearend financial statements as these interim statutory financial statements disclose only significant changes from yearend 2020. The results of operations for the interim periods should not be considered indicative of results to be expected for the full year.

For the full description of accounting policies, see *Note 2. "Summary of significant accounting policies"* of Notes to Statutory Financial Statements included in the Company's 2020 audited yearend financial statements.

b. Common stocks – subsidiaries and affiliates

On May 28, 2021, the Company, through a wholly owned subsidiary, Glidepath Holdings Inc. (Glidepath), acquired Great American Life Insurance Company and other subsidiaries and affiliated entities (GALIC) for \$3,560 million in cash. GALIC primarily offers traditional fixed and fixed indexed annuity products.

Common stocks of unconsolidated subsidiaries, primarily MassMutual Holding LLC (MMHLLC), Glidepath and MM Investment Holding (MMIH), are accounted for using the statutory equity method. The Company accounts for the value of MMHLLC at its underlying U.S. generally accepted accounting principles (U.S. GAAP) equity value less adjustments for the limited statutory basis of accounting related to foreign insurance subsidiaries and controlled affiliates entities and an adjustment of \$876 million as of June 30, 2021 for a portion of its noncontrolling interests. Glidepath is valued on its underlying GAAP equity with an adjustment to recognize its investment in GALIC based on GALIC's underlying statutory surplus, adjusted for any unamortized goodwill that would have been recognized

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

under the statutory purchase method. Operating results, less dividends declared, for MMHLLC, Glidepath and MMIH are reflected as net unrealized capital gains in the Statutory Statements of Changes in Surplus. Dividends declared from MMHLLC, Glidepath and MMIH are recorded in net investment income when declared and are limited to MMHLLC, Glidepath and MMIH's U.S. GAAP retained earnings. The cost basis of common stocks – subsidiaries and affiliates is adjusted for impairments deemed to be other than temporary.

3. *New accounting standards*

Adoption of new accounting standards

In July 2020, the NAIC adopted modifications to Statements of Statutory Accounting Principles (SSAP) No. 26R, *Bonds*, effective January 1, 2021. The modifications apply similar reporting for gains or losses due to a tender offer as previously adopted for calls. The difference between consideration and par is recognized as net investment income, while any difference between book value and par is recognized as realized gain or loss. The modifications did not have a material effect on the Company's financial statements.

In July 2020, the NAIC adopted modifications to SSAP No. 32, *Preferred Stock*, effective January 1, 2021. The modifications define carrying value of redeemable preferred stock as a mortgaged cost for NAIC 1-3 designations, the lower of a mortgaged cost or fair value for NAIC 4-6 designations, and new fair value measurement for perpetual and mandatorily convertible preferred stock. They clarify when failure to meet certain dividends or redemption payments could trigger an impairment assessment that preferred shares issued by joint ventures are included in the scope of this guidance, and clarifies scope related to sinking fund schedules, mandatory conversions, and various other features. They also clarify fair value would be capped by any currently effective call price. The revisions impacted the Company's current unaffiliated and affiliated perpetual preferred stock investments. The modifications did not have a material effect on the Company's financial statements.

In March 2021, the NAIC adopted modifications to SSAP No. 26R, *Bonds*, effective January 1, 2021. The modifications expand the called bond disclosures to also include bonds terminated early through a tender offer. The modifications did not have a material effect on the Company's financial statements.

In March 2021, the NAIC adopted modifications to SSAP No. 26R, *Bonds*, effective January 1, 2021. The modifications clarify that perpetual bonds are within scope. Perpetual bonds shall be reported at fair value regardless of NAIC designation, not to exceed any current effective call price. For perpetual bonds with an effective call option, any applicable premium shall be amortized to the next effective call date. For perpetual bonds purchased at a discount, any applicable discount shall be accreted utilizing the yield-to-worst concept. The modifications did not have a material effect on the Company's financial statements.

In May 2021, the NAIC adopted modifications to SSAP No. 2R, *Cash, Cash Equivalents, Drafts and Short-Term Investments*, effective May 20, 2021. The modifications clarify that cryptocurrencies do not meet the definition of cash, cash equivalents and short-term investments and therefore should be non-admitted assets if held directly by an insurer. The modifications did not have a material effect on the Company's financial statements.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

4. Fair value of financial instruments

The following presents a summary of the carrying values and fair values of the Company's financial instruments:

	June 30, 2021				
	Carrying	Fair			
	Value	Value	Level 1	Level 2	Level 3
(In Millions)					
Financial assets:					
Bonds:					
U. S. government and agencies	\$ 3,749	\$ 4,407	\$ -	\$ 4,407	\$ -
All other governments	1,691	1,862	-	1,766	96
States, territories and possessions	360	428	-	428	-
Political subdivisions	427	493	-	493	-
Special revenue	4,936	5,843	-	5,833	10
Industrial and miscellaneous	96,456	103,697	110	54,525	49,062
Parent, subsidiaries and affiliates	6,455	6,533	-	-	6,533
Preferred stocks	494	582	5	-	577
Common stocks - subsidiaries and affiliates	417	417	157	-	260
Common stocks - unaffiliated	1,369	1,369	806	-	563
Mortgage loans - commercial	22,374	23,380	-	-	23,380
Mortgage loans - residential	4,643	4,710	-	-	4,710
Derivatives:					
Interest rate swaps	16,155	17,267	-	17,267	-
Options	350	350	8	342	-
Currency swaps	571	571	-	571	-
Credit default swaps	-	1	-	1	-
Forward contracts	149	149	-	149	-
Financial futures	122	122	122	-	-
Cash, cash equivalents and short-term investments	7,843	7,843	601	7,242	-
Separate account assets	77,782	77,782	53,290	22,527	1,965
Financial liabilities:					
GICs	13,031	13,147	-	-	13,147
Group annuity contracts and other deposits	1,659	1,734	-	-	1,734
Individual annuity contracts	10,583	13,094	-	-	13,094
Supplementary contracts	1,133	1,134	-	-	1,134
Repurchase agreements	2,820	2,820	-	2,820	-
Commercial paper	1,120	1,120	-	1,120	-
Derivatives:					
Interest rate swaps	11,932	12,860	-	12,860	-
Currency swaps	453	453	-	453	-
Forward contracts	9	9	-	9	-
Credit default swaps	1	1	-	1	-
Financial futures	8	8	8	-	-

Common stocks - subsidiaries and affiliates do not include unconsolidated subsidiaries, which had statutory carrying values of \$23,432 million.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

	December 31, 2020				
	Carrying Value	Fair Value	Level 1	Level 2	Level 3
	(In Millions)				
Financial assets:					
Bonds:					
U. S. government and agencies	\$ 4,438	\$ 5,351	\$ -	\$ 5,351	\$ -
All other governments	1,848	2,121	-	2,034	87
States, territories and possessions	424	498	-	498	-
Political subdivisions	431	507	-	507	-
Special revenue	6,241	7,257	-	7,247	10
Industrial and miscellaneous	94,990	103,560	110	57,947	45,503
Parent, subsidiaries and affiliates	6,312	6,409	-	-	6,409
Preferred stocks	470	516	1	-	515
Common stocks - subsidiaries and affiliates	361	361	172	-	189
Common stocks - unaffiliated	1,192	1,192	780	-	412
Mortgage loans - commercial	22,216	23,150	-	-	23,150
Mortgage loans - residential	3,862	3,885	-	-	3,885
Derivatives:					
Interest rate swaps	20,081	22,591	-	22,591	-
Options	411	411	64	347	-
Currency swaps	517	517	-	517	-
Forward contracts	62	62	-	62	-
Credit default swaps	-	2	-	2	-
Financial futures	5	5	5	-	-
Cash, cash equivalents and short-term investments	5,738	5,738	532	5,206	-
Separate account assets	75,966	75,966	51,281	22,851	1,834
Financial liabilities:					
GICs	11,464	11,807	-	-	11,807
Group annuity contracts and other deposits	1,736	1,892	-	-	1,892
Individual annuity contracts	9,764	12,473	-	-	12,473
Supplementary contracts	1,129	1,130	-	-	1,130
Repurchase agreements	4,006	4,006	-	4,006	-
Commercial paper	250	250	-	250	-
Derivatives:					
Interest rate swaps	16,134	16,843	-	16,843	-
Options	8	8	8	-	-
Currency swaps	864	864	-	864	-
Forward contracts	279	279	-	279	-
Credit default swaps	1	1	-	1	-
Financial futures	63	63	63	-	-

Common stocks - subsidiaries and affiliates do not include unconsolidated subsidiaries, which had statutory carrying values of \$19,534 million.

The use of different assumptions or valuation methodologies may have a material impact on the estimated fair value amounts.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

The following presents the Company's fair value hierarchy for assets and liabilities that are carried at fair value:

	June 30, 2021			
	Level 1	Level 2	Level 3	Total
	(In Millions)			
Financial assets:				
Bonds:				
Special revenue	\$ -	\$ 2	\$ -	\$ 2
Industrial and miscellaneous	110	206	137	453
Preferred stocks	5	-	17	22
Common stocks - subsidiaries and affiliates	157	-	260	417
Common stocks - unaffiliated	806	-	563	1,369
Derivatives:				
Interest rate swaps	-	16,155	-	16,155
Options	8	342	-	350
Currency swaps	-	571	-	571
Forward contracts	-	149	-	149
Credit default swaps	-	1	-	1
Financial futures	122	-	-	122
Separate account assets	53,290	22,527	1,965	77,782
Total financial assets carried at fair value	\$ 54,498	\$ 39,953	\$ 2,942	\$ 97,393
Financial liabilities:				
Derivatives:				
Interest rate swaps	\$ -	\$ 11,932	\$ -	\$ 11,932
Currency swaps	-	453	-	453
Forward contracts	-	9	-	9
Credit default swaps	-	1	-	1
Financial futures	8	-	-	8
Total financial liabilities carried at fair value	\$ 8	\$ 12,395	\$ -	\$ 12,403

For the six months ended June 30, 2021 and the year ended December 31, 2020, the Company did not have any financial instruments that were carried at net asset value as a practical expedient.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

The following presents the Company's fair value hierarchy for assets and liabilities that are carried at fair value:

	December 31, 2020			
	Level 1	Level 2	Level 3	Total
	(In Millions)			
Financial assets:				
Bonds:				
Special revenue	\$ -	\$ 2	\$ -	\$ 2
Industrial and miscellaneous	110	221	112	443
Preferred stocks	-	-	18	18
Common stocks - subsidiaries and affiliates	172	-	189	361
Common stocks - unaffiliated	780	-	412	1,192
Derivatives:				
Interest rate swaps	-	20,081	-	20,081
Options	64	347	-	411
Currency swaps	-	517	-	517
Forward contracts	-	62	-	62
Credit default swaps	-	2	-	2
Financial futures	5	-	-	5
Separate account assets	51,281	22,851	1,834	75,966
Total financial assets carried at fair value	\$ 52,412	\$ 44,083	\$ 2,565	\$ 99,060
Financial liabilities:				
Derivatives:				
Interest rate swaps	\$ -	\$ 16,134	\$ -	\$ 16,134
Options	8	-	-	8
Currency swaps	-	864	-	864
Forward contracts	-	279	-	279
Credit default swaps	-	1	-	1
Financial futures	63	-	-	63
Total financial liabilities carried at fair value	\$ 71	\$ 17,278	\$ -	\$ 17,349

The Company reviews the fair value hierarchy classifications each reporting period. Changes in the observability of the valuation attributes and the level of market activity may result in a reclassification of certain financial assets or liabilities between fair value hierarchy classifications. Such reclassifications are reported as transfers between levels in the beginning fair value for the reporting period in which the changes occur.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

The following presents changes in the Company's Level 3 assets carried at fair value:

	Balance as of 1/1/21	Gains (Losses) in Net Income	Losses (Gains) in Surplus	Purchases	Issuances	Sales	Settlements	Transfers			Balance as of 06/30/21
								In	Out	Other	
(In Millions)											
Financial assets:											
Bonds:											
Industrial and miscellaneous	\$ 112	\$ (13)	\$ 4	\$ 1	\$ 2	\$ (5)	\$ (1)	\$ -	\$ -	\$ 37	\$ 137
Preferred stocks	18	-	(1)	-	-	-	-	-	-	-	17
Common stocks - subsidiaries and affiliates	189	-	(92)	10	151	-	(2)	-	-	4	260
Common stocks - unaffiliated	412	2	66	90	-	(4)	(3)	-	-	-	563
Separate account assets	1,834	17	-	138	-	(24)	-	-	-	-	1,965
Total financial assets	<u>\$ 2,565</u>	<u>\$ 6</u>	<u>\$ (23)</u>	<u>\$ 239</u>	<u>\$ 153</u>	<u>\$ (33)</u>	<u>\$ (6)</u>	<u>\$ -</u>	<u>\$ -</u>	<u>\$ 41</u>	<u>\$ 2,942</u>

	Balance as of 1/1/20	Gains (Losses) in Net Income	Losses (Gains) in Surplus	Purchases	Issuances	Sales	Settlements	Transfers			Balance as of 12/31/20
								In	Out	Other	
(In Millions)											
Financial assets:											
Bonds:											
Industrial and miscellaneous Parent, subsidiaries,	\$ 111	\$ (2)	\$ (16)	\$ 4	\$ 11	\$ -	\$ (2)	\$ 2	\$ (28)	\$ 32	\$ 112
Preferred stocks	13	-	(13)	7	2	-	-	-	-	9	18
Common stocks - subsidiaries and affiliates	120	-	18	41	15	-	(4)	-	-	(1)	189
Common stocks - unaffiliated	268	18	19	118	30	(6)	(36)	1	-	-	412
Separate account assets	966	50	1	836	-	(19)	-	-	-	-	1,834
Total financial assets	<u>\$ 1,478</u>	<u>\$ 66</u>	<u>\$ 9</u>	<u>\$ 1,006</u>	<u>\$ 58</u>	<u>\$ (25)</u>	<u>\$ (42)</u>	<u>\$ 3</u>	<u>\$ (28)</u>	<u>\$ 40</u>	<u>\$ 2,565</u>

Other transfers include assets that are either no longer carried at fair value, or have just begun to be carried at fair value, such as assets with no level changes but a change in the lower of cost or market carrying basis. Industrial and miscellaneous bonds in other contain assets that are now carried at fair value due to ratings changes and assets are no longer carried at fair value where the fair value is now higher than the book value.

Level 3 transfers in are assets that are consistently carried at fair value but have had a level change. Common stocks unaffiliated assets were transferred from Level 2 to Level 3 due to a change in the observability of pricing inputs, at the beginning fair value for the reporting period.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

5. Investments

The Company maintains a diversified investment portfolio. Investment policies limit concentration in any asset class, geographic region, industry group, economic characteristic, investment quality or individual investment.

a. Bonds

The carrying value and fair value of bonds were as follows:

	June 30, 2021			
	Carrying	Gross	Gross	Fair
	Value	Unrealized Gains	Unrealized Losses	Value
(In Millions)				
U.S. government and agencies	\$ 3,749	\$ 665	\$ 7	\$ 4,407
All other governments	1,691	179	8	1,862
States, territories and possessions	360	68	-	428
Political subdivisions	427	66	-	493
Special revenue	4,936	911	4	5,843
Industrial and miscellaneous	96,456	7,685	444	103,697
Parent, subsidiaries and affiliates	6,455	84	6	6,533
Total	\$ 114,074	\$ 9,658	\$ 469	\$ 123,263

The June 30, 2021 gross unrealized losses exclude \$64 million of losses included in the carrying value. These losses include \$62 million from NAIC Class 6 bonds and \$2 million from residential mortgage-backed securities (RMBS) and commercial mortgage-backed securities (CMBS) whose ratings were obtained from outside modelers. These losses were primarily included in industrial and miscellaneous or parent, subsidiaries and affiliates.

	December 31, 2020			
	Carrying	Gross	Gross	Fair
	Value	Unrealized Gains	Unrealized Losses	Value
(In Millions)				
U.S. government and agencies	\$ 4,438	\$ 914	\$ 1	\$ 5,351
All other governments	1,848	274	1	2,121
States, territories and possessions	424	74	-	498
Political subdivisions	431	76	-	507
Special revenue	6,241	1,020	4	7,257
Industrial and miscellaneous	94,990	9,122	552	103,560
Parent, subsidiaries and affiliates	6,312	97	-	6,409
Total	\$ 114,684	\$ 11,577	\$ 558	\$ 125,703

The December 31, 2020 gross unrealized losses exclude \$72 million of losses included in the carrying value. These losses include \$70 million from NAIC Class 6 bonds and \$2 million from RMBS and CMBS whose ratings were obtained from outside modelers. These losses were primarily included in industrial and miscellaneous or parent, subsidiaries and affiliates.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

As of June 30, 2021, investments in structured and loan-backed securities that had unrealized losses, which were not recognized in earnings, had a fair value of \$3,945 million. Securities in an unrealized loss position for less than 12 months had a fair value of \$2,033 million and unrealized losses of \$40 million. Securities in an unrealized loss position for greater than 12 months had a fair value of \$1,912 million and unrealized losses of \$109 million. These securities were primarily categorized as industrial and miscellaneous or parent, subsidiaries and affiliates.

As of December 31, 2020, investments in structured and loan-backed securities that had unrealized losses, which were not recognized in earnings, had a fair value of \$6,979 million. Securities in an unrealized loss position for less than 12 months had a fair value of \$3,970 million and unrealized losses of \$206 million. Securities in an unrealized loss position for greater than 12 months had a fair value of \$3,009 million and unrealized losses of \$86 million. These securities were primarily categorized as industrial and miscellaneous or parent, subsidiaries and affiliates.

In the course of the Company's investment management activities, securities may be sold and reacquired within 30 days to enhance the Company's yield on its investment portfolio. The Company did not sell any securities with the NAIC Designation 3 or below for the six months ended June 30, 2021 or 2020, that were reacquired within 30 days of the sale date.

Residential mortgage-backed exposure

RMBS are included in the U.S. government and agencies, special revenue, and industrial and miscellaneous bond categories. The Alt-A category includes option adjustable-rate mortgages and the subprime category includes 'scratch and dent' or reperforming pools, high loan-to-value pools, and pools where the borrowers have very impaired credit but the average loan-to-value is low, typically 70% or below. In identifying Alt-A and subprime exposure, management used a combination of qualitative and quantitative factors, including FICO scores and loan-to-value ratios.

As of June 30, 2021, RMBS had a total carrying value of \$2,049 million and a fair value of \$2,157 million, of which approximately 15%, based on carrying value, was classified as Alt-A. Alt-A and subprime RMBS had a total carrying value of \$967 million and a fair value of \$1,026 million. As of December 31, 2020, RMBS had a total carrying value of \$2,561 million and a fair value of \$2,670 million, of which approximately 11%, based on carrying value, was classified as Alt-A. Alt-A and subprime RMBS had a total carrying value of \$1,006 million and a fair value of \$1,062 million.

b. Common stocks – subsidiaries and affiliates

MMHLLC paid \$1,000 million in dividends to MassMutual for the six months ended June 30, 2021, which were declared in 2020, and declared \$200 million in dividends for the six months ended June 30, 2021. MMHLLC paid \$200 million in dividends for the six months ended June 30, 2020, which were declared in 2019.

MassMutual contributed capital of \$118 million to MMHLLC for the six months ended June 30, 2021 and \$34 million for the six months ended June 30, 2020.

MassMutual contributed capital of \$1,948 million to MMHLLC for the year ended December 31, 2020, of which \$1,884 million was used for the Rothesay additional investment. On December 1, 2020, MassMutual purchased, through an indirect, wholly owned subsidiary, an additional investment in Rothesay Holdco UK Limited (RHUK) for \$1,875 million. RHUK wholly owns Rothesay Life. The purchase increased MassMutual's indirect ownership in Rothesay Life from 24.9% to 48.9%.

In December 2020, MassMutual contributed its ownership in MMAF and MML Management LLC, wholly owned subsidiaries with a combined carrying value of \$1,602 million, to MMIH, a wholly owned subsidiary, in an affiliated transaction and therefore no gain or loss was recognized on the transaction. There was no impact to surplus.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

Subsidiaries of MMHLLC are involved in litigation and investigations arising in the ordinary course of their business, which seek compensatory damages, punitive damages and equitable remedies. Although the Company is not aware of any actions or allegations that reasonably could give rise to a material adverse impact to the Company's financial position or liquidity, the outcome of litigation cannot be foreseen with certainty. It is the opinion of management that the ultimate resolution of these matters will not materially impact the Company's financial position or liquidity. However, the outcome of a particular proceeding may be material to the Company's Interim Statutory Statements of Changes in Surplus for a particular period depending upon, among other factors, the size of the loss and the level of the Company's changes in surplus for the period.

c. Mortgage loans

Mortgage loans are comprised of commercial mortgage loans and residential mortgage loans. The Company's commercial mortgage loans primarily finance various types of real estate properties throughout the U.S., the United Kingdom and Canada. The Company holds commercial mortgage loans for which it is the primary lender or a participant or co-lender in a mortgage loan agreement and mezzanine loans that are subordinate to senior secured first liens. Residential mortgage loans are primarily seasoned pools of homogeneous residential mortgage loans substantially backed by Federal Housing Administration (FHA) and Veterans Administration (VA) guarantees.

The carrying value and fair value of the Company's mortgage loans were as follows:

	June 30, 2021		December 31, 2020	
	Carrying Value	Fair Value	Carrying Value	Fair Value
(In Millions)				
Commercial mortgage loans:				
Primary lender	\$ 22,278	\$ 23,283	\$ 22,116	\$ 23,048
Mezzanine loans	96	97	100	102
Total commercial mortgage loans	22,374	23,380	22,216	23,150
Residential mortgage loans:				
FHA insured and VA guaranteed	4,012	4,065	3,127	3,158
Other residential loans	631	645	735	727
Total residential mortgage loans	4,643	4,710	3,862	3,885
Total mortgage loans	\$ 27,017	\$ 28,090	\$ 26,078	\$ 27,035

As of June 30, 2021, and December 31, 2020, the loan-to-value ratios of 99% of the Company's commercial mortgage loans were less than 81%.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

As of June 30, 2021, the Company had impaired mortgage loans with or without a valuation allowance or mortgage loans derecognized as a result of foreclosure, including mortgage loans subject to a participant or co-lender mortgage loan agreement with a unilateral mortgage loan foreclosure restriction or mortgage loan derecognized as a result of a foreclosure.

The following presents a summary of the Company's impaired mortgage loans as of June 30, 2021 and as of December 31, 2020:

		June 30, 2021				
		Average	Unpaid			
		Carrying	Carrying	Principal	Valuation	Interest
		Value	Value	Balance	Allowance	Income
		(In Millions)				
With allowance recorded:						
Commercial mortgage loans:						
Primary lender	\$	32	\$ 31	\$ 36	\$ (4)	\$ -
Total		32	31	36	(4)	-
With no allowance recorded:						
Commercial mortgage loans:						
Primary lender	\$	58	\$ 56	\$ 104	\$ -	\$ -
Total		58	56	104	-	-
Total impaired commercial mortgage loans	\$	90	\$ 87	\$ 140	\$ (4)	\$ -
		December 31, 2020				
		Average	Unpaid			
		Carrying	Carrying	Principal	Valuation	Interest
		Value	Value	Balance	Allowance	Income
		(In Millions)				
With no allowance recorded:						
Commercial mortgage loans:						
Primary lender	\$	63	\$ 82	\$ 103	\$ -	\$ 2
Total		63	82	103	-	2
Total impaired commercial mortgage loans	\$	63	\$ 82	\$ 103	\$ -	\$ 2

d. Partnerships and limited liability companies

On February 1, 2021, the Company completed the acquisition of Flourish, a fintech platform for registered investment advisors (RIAs), from Stone Ridge Asset Management for a purchase price of \$6 million. Flourish provides digitally enabled products and services to RIAs through various modules, including an established cash management offering, Flourish Cash. Flourish Cash is offered through Stone Ridge Securities LLC, Stone Ridge's registered broker-dealer, which the Company acquired. MML CM LLC, a wholly owned subsidiary of MassMutual, owns Flourish.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

e. Derivatives

The Company uses derivative financial instruments in the normal course of business to manage risks, primarily to reduce currency, interest rate and duration imbalances determined in asset/liability analyses. The Company also uses a combination of derivatives and fixed income investments to create replicated synthetic investments. These replicated synthetic investments are created when they are economically more attractive than the actual instrument or when similar instruments are unavailable. Replicated synthetic investments are created either to hedge and reduce the Company's credit exposure or to create an investment in a particular asset. The Company held replicated synthetic investments with a notional amount of \$19,070 million as of June 30, 2021 and \$15,989 million as of December 31, 2020, as defined under statutory accounting practices as the result of pairing of a long derivative contract with cash instruments.

The Company's principal derivative exposures to market risk are interest rate risk, which includes inflation and credit risk. Interest rate risk pertains to the change in fair value of the derivative instruments as a result of changes in market interest rates. The Company is exposed to credit-related losses in the event of nonperformance by counterparties to derivative financial instruments. The Company regularly monitors counterparty credit ratings, derivative positions, valuations and the value of collateral posted to ensure counterparties are credit-worthy and the concentration of exposure is minimized and monitors its derivative credit exposure as part of its overall risk management program.

The Company enters derivative transactions through bilateral derivative agreements with counterparties, or through over the counter cleared derivatives with a counterparty and the use of a clearinghouse. To minimize credit risk for bilateral transactions, the Company and its counterparties generally enter into master netting agreements based on agreed upon requirements that outline the framework for how collateral is to be posted in the amount owed under each transaction, subject to certain minimums. For over the counter cleared derivative transactions between the Company and a counterparty, the parties enter into a series of master netting and other agreements that govern, among other things, clearing and collateral requirements. These transactions are cleared through a clearinghouse and each derivative counterparty is only exposed to the default risk of the clearinghouse. Certain interest rate swaps and credit default swaps are considered cleared transactions. These cleared transactions require initial and daily variation margin collateral postings. These agreements allow for contracts in a positive position, in which amounts are due to the Company, to be offset by contracts in a negative position. This right of offset, combined with collateral obtained from counterparties, reduces the Company's credit exposure.

Net collateral pledged by the counterparties was \$4,218 million as of June 30, 2021 and \$4,849 million as of December 31, 2020. In the event of default, the full market value exposure at risk in a net gain position, net of offsets and collateral, was \$265 million as of June 30, 2021 and \$194 million as of December 31, 2020. The statutory net amount at risk, defined as net collateral pledged and statement values excluding accrued interest, was \$637 million as of June 30, 2021 and \$296 million as of December 31, 2020.

The Company had the right to rehypothecate or repledge securities totaling \$593 million of the \$4,218 million as of June 30, 2021 and \$829 million of the \$4,849 million as of December 31, 2020 of net collateral pledged by counterparties. There were no securities rehypothecated to other counterparties as of June 30, 2021 or December 31, 2020.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

The following summarizes the carrying values and notional amounts of the Company's derivative financial instruments:

	June 30, 2021			
	Assets		Liabilities	
	Carrying Value	Notional Amount	Carrying Value	Notional Amount
	(In Millions)			
Interest rate swaps	\$ 16,155	\$ 108,857	\$ 11,932	\$ 125,119
Options	350	15,718	-	-
Currency swaps	571	8,364	453	7,884
Forward contracts	149	6,756	9	1,073
Credit default swaps	-	40	1	55
Financial futures	122	2,503	8	373
Total	\$ 17,347	\$ 142,238	\$ 12,403	\$ 134,504

	December 31, 2020			
	Assets		Liabilities	
	Carrying Value	Notional Amount	Carrying Value	Notional Amount
	(In Millions)			
Interest rate swaps	\$ 20,081	\$ 110,698	\$ 16,134	\$ 106,433
Options	411	17,234	8	53
Currency swaps	517	6,163	864	10,624
Forward contracts	62	4,793	279	9,009
Credit default swaps	-	5	1	95
Financial futures	5	373	63	2,595
Total	\$ 21,076	\$ 139,266	\$ 17,349	\$ 128,809

The average fair value of outstanding derivative assets was \$16,677 million for the six months ended June 30, 2021 and \$26,093 million for the six months ended June 30, 2020. The average fair value of outstanding derivative liabilities was \$12,897 million for the six months ended June 30, 2021 and \$19,255 million for the six months ended June 30, 2020.

The following summarizes the notional amounts of the Company's credit default swaps by contractual maturity:

	June 30, 2021	December 31, 2020
	(In Millions)	
Due after one year through five years	\$ 95	\$ 100
Total	\$ 95	\$ 100

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

The following summarizes the Company's net realized (losses) gains on closed contracts and change in net unrealized (losses) gains related to market fluctuations on open contracts by derivative type:

	Six Months Ended June 30,			
	2021		2020	
	Net Realized (Losses) Gains on Closed Contracts	Change In Net Unrealized Gains (Losses) on Open Contracts	Net Realized Gains (Losses) on Closed Contracts	Change In Net Unrealized Gains (Losses) on Open Contracts
(In Millions)				
Interest rate swaps	\$ (275)	\$ 275	\$ 239	\$ 2,827
Currency swaps	(33)	465	64	1,612
Options	(120)	110	509	(2)
Credit default swaps	1	-	2	-
Interest rate caps				
Forward contracts	(258)	356	255	70
Financial futures	(477)	172	603	93
Total	\$ (1,162)	\$ 1,378	\$ 1,672	\$ 4,600

The following summarizes gross and net information of derivative assets and liabilities, along with collateral posted in connection with master netting agreements:

	June 30, 2021			December 31, 2020		
	Derivative Assets	Derivative Liabilities	Net	Derivative Assets	Derivative Liabilities	Net
	(In Millions)					
Gross	\$ 15,227	\$ 11,639	\$ 3,588	\$ 21,076	\$ 17,349	\$ 3,727
Due and accrued	911	1,762	(851)	1,030	1,607	(577)
Gross amounts offset	(11,835)	(11,835)	-	(17,273)	(17,273)	-
Net asset	4,303	1,566	2,737	4,833	1,683	3,150
Collateral posted	(5,576)	(1,358)	(4,218)	(6,381)	(1,532)	(4,849)
Net	\$ (1,273)	\$ 208	\$ (1,481)	\$ (1,548)	\$ 151	\$ (1,699)

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

f. Net investment income

Net investment income, including interest maintenance reserve (IMR) amortization, comprised the following:

	Six Months Ended	
	June 30,	
	2021	2020
	<u>(In Millions)</u>	
Bonds	\$ 2,203	\$ 2,147
Preferred stocks	11	10
Common stocks - subsidiaries and affiliates	200	173
Common stocks - unaffiliated	13	25
Mortgage loans	542	604
Policy loans	531	462
Real estate	86	48
Partnerships and limited liability companies	456	146
Derivatives	246	204
Cash, cash equivalents and short-term investments	10	74
Other	<u>(1)</u>	<u>16</u>
Subtotal investment income	4,297	3,909
Amortization of the IMR	68	18
Investment expenses	<u>(346)</u>	<u>(338)</u>
Net investment income	<u>\$ 4,019</u>	<u>\$ 3,589</u>

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

k. Net realized capital (losses) gains

Net realized capital (losses) gains, which include other-than-temporary impairments (OTTI) and are net of deferral to the IMR, comprised the following:

	Six Months Ended	
	June 30,	
	2021	2020
	<u>(In Millions)</u>	
Bonds	\$ 109	\$ (61)
Preferred stocks	(2)	(20)
Common stocks - subsidiaries and affiliates	4	-
Common stocks - unaffiliated	10	(108)
Mortgage loans	3	-
Real estate	(5)	-
Partnerships and limited liability companies	(46)	(65)
Derivatives	(1,162)	1,672
Other	(3)	3
Net realized capital (losses) gains before federal and state taxes and deferral to the IMR	<u>(1,092)</u>	<u>1,421</u>
Net federal and state tax expense	(14)	(189)
Net realized capital (losses) gains before deferral to the IMR	<u>(1,106)</u>	<u>1,232</u>
Net after tax losses (gains) deferred to the IMR	487	(1,079)
Net realized capital (losses) gains	<u>\$ (619)</u>	<u>\$ 153</u>

The IMR liability balance was \$1,530 million as of June 30, 2021 and \$2,084 million as of December 31, 2020 and was included in other liabilities on the Statutory Statements of Financial Position.

OTTI, included in the realized capital losses, consisted of the following:

	Six Months Ended	
	June 30,	
	2021	2020
	<u>(In Millions)</u>	
Bonds	\$ (44)	\$ (63)
Common stocks - unaffiliated	(9)	(79)
Preferred stocks - unaffiliated	(2)	-
Mortgage loans	(6)	-
Partnerships and limited liability companies	<u>(40)</u>	<u>(69)</u>
Total OTTI	<u>\$ (101)</u>	<u>\$ (211)</u>

The Company recognized OTTI of \$7 million for the six months ended June 30, 2021 and \$6 million for the six months ended June 30, 2020 on structured and loan-backed securities, which are included in bonds, primarily due to the present value of expected cash flows being less than the amortized cost.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

6. Federal income taxes

No significant changes.

7. Other than invested assets

No significant changes.

8. Policyholders' liabilities

a. Liabilities for deposit-type contracts

On February 25, 2021, MassMutual issued a \$420 million funding agreement with a 1.45% fixed rate and a 7-year maturity.

On March 9, 2021, MassMutual issued a \$500 million funding agreement with a 2.15% fixed rate and a 10-year maturity.

On April 13, 2021, MassMutual issued a \$400 million funding agreement with a 0.60% fixed-rate and a 3-year maturity.

On April 13, 2021, MassMutual issued a \$600 million funding agreement with a floating rate based on the Secured Overnight Financing Rate (SOFR) plus 0.36% and a 3-year maturity.

On June 8, 2021, MassMutual issued a \$400 million funding agreement with a floating rate based on the Secured Overnight Financing Rate (SOFR) plus 0.22% and a 2-year maturity.

b. Additional liability for annuity contracts

Certain variable annuity contracts include additional death or other insurance benefit features, such as guaranteed minimum death benefits (GMDB), guaranteed minimum income benefits (GMIB), guaranteed minimum accumulation benefits (GMAB) and guaranteed lifetime withdrawal benefits (GLWB). In general, living benefit guarantees require the contract holder or policyholder to adhere to a company approved asset allocation strategy. Election of these benefit guarantees is generally only available at contract issue.

The following shows the changes in the liabilities for GMDB, GMIB, GMAB and GLWB (in millions):

Liability as of January 1, 2020	\$	584
Incurred guarantee benefits		(366)
Paid guarantee benefits		(7)
Liability as of December 31, 2020		211
Incurred guarantee benefits		(181)
Paid guarantee benefits		(2)
Liability as of June 30, 2021	\$	28

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

The following summarizes the account values, net amount at risk and weighted average attained age for variable annuity contracts with GMDB, GMIB, GMAB and GLWB classified as policyholders' reserves and separate account liabilities. The net amount at risk is defined as the minimum guarantee less the account value calculated on a policy-by-policy basis, but not less than zero.

	June 30, 2021			December 31, 2020		
	Account Value	Net Amount at Risk	Weighted Average Attained Age	Account Value	Net Amount at Risk	Weighted Average Attained Age
	(\$ In Millions)					
GMDB	\$ 11,579	\$ 38	65	\$ 11,434	\$ 36	65
GMIB Basic	703	6	70	705	11	70
GMIB Plus	1,573	135	67	1,494	185	67
GMAB	2,372	1	61	2,415	1	61
GLWB	145	6	73	146	7	72

As of June 30, 2021, the GMDB account value above consists of \$1,269 million within the general account and \$10,310 million within separate accounts. As of December 31, 2020, the GMDB account value above consists of \$1,293 million within the general account and \$10,141 million within separate accounts.

9. Reinsurance

No significant changes.

10. Withdrawal characteristics

No significant changes.

11. Debt

MassMutual issues commercial paper in the form of Notes in minimum denominations of \$250 thousand up to a total aggregation of \$1,000 million with maturity dates up to a maximum of 270 days from the date of issuance. Noninterest bearing Notes are sold at par less a discount representing an interest factor. Interest bearing Notes are sold at par. The Notes are not redeemable or subject to voluntary prepayments by MassMutual. The Notes had a carrying value and face amount of \$650 million as of June 30, 2021 and \$250 million as of December 31, 2020. The additional \$400 million of commercial paper was issued for the partial funding of the GALIC acquisition. Notes issued in 2021 had interest rates ranging from 0.08% to 0.15% with maturity dates ranging from 28 to 183 days. Interest expense for commercial paper was \$0.3 million for the six months ended June 30, 2021 and \$1.6 million for the six months ended June 30, 2020.

Refer to Note 17. "Related party transactions" for intercompany loan information.

12. Employee benefit plans

The Company sponsors multiple employee benefit plans, providing retirement, life, health and other benefits to employees, certain employees of unconsolidated subsidiaries, agents, general agents and retirees who meet plan eligibility requirements.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

Net periodic cost

The net periodic cost represents the annual accounting income or expense recognized by the Company and is included in general insurance expenses in the Interim Statutory Statements of Operations. The net periodic cost recognized is as follows:

	Six Months Ended June 30,			
	2021	2020	2021	2020
	Pension Benefits		Other Postretirement Benefits	
	(In Millions)			
Service cost	\$ 55	\$ 57	\$ 5	\$ 7
Interest cost	38	49	5	6
Expected return on plan assets	(91)	(89)	-	-
Amortization of unrecognized net actuarial and other losses	19	26	1	2
Amortization of unrecognized prior service cost	-	-	(3)	(4)
Total net periodic cost	\$ 21	\$ 43	\$ 8	\$ 11

13. Employee compensation plans

No significant changes.

14. Surplus notes

On June 26, 2020, MassMutual executed a drawdown of \$600 million from its pre-capitalized surplus notes (P-Caps) facility and received \$837 million in market value proceeds, and on March 1, 2021, MassMutual executed the remaining capacity of \$200 million from its P-Caps facility and received \$233 million in market value proceeds, at a fixed 5.077% coupon rate, maturing in 2069 and callable beginning in 2049.

On April 16, 2020, MassMutual issued \$700 million of surplus notes at a fixed 3.375% coupon rate maturing in 2050.

The following table summarizes the surplus notes issued and outstanding as of June 30, 2021:

Issue Date	Face Amount	Carrying Value	Interest Rate	Maturity Date	Scheduled Interest Payment Dates
	(\$ In Millions)				
11/15/1993	\$ 250	\$ 250	7.625%	11/15/2023	May 15 & Nov 15
03/01/1994	100	100	7.500%	03/01/2024	Mar 1 & Sept 1
05/12/2003	193	193	5.625%	05/15/2033	May 15 & Nov 15
06/01/2009	130	129	8.875%	06/01/2039	Jun 1 & Dec 1
01/17/2012	263	263	5.375%	12/01/2041	Jun 1 & Dec 1
04/15/2015	258	254	4.500%	04/15/2065	Apr 15 & Oct 15
03/23/2017	475	471	4.900%	04/01/2077	Apr 1 & Oct 1
10/11/2019	838	584	3.729%	10/15/2070	Apr 15 & Oct 15
04/16/2020	700	697	3.375%	04/15/2050	Apr 15 & Oct 15
06/26/2020	600	832	5.077%	02/15/2069	Feb 15 & Aug 15
03/01/2021	200	233	5.077%	02/15/2069	Feb 15 & Aug 15
Total	\$ 4,007	\$ 4,006			

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

15. Presentation of the Interim Statutory Statements of Cash Flows

The following table presents those transactions that have affected the Company's recognized assets or liabilities but have not resulted in cash receipts or payments during the six months ended June 30, 2021 and 2020. Accordingly, the Company has excluded these non-cash activities from the Statutory Statements of Cash Flows for the six months ended June 30, 2021 and 2020.

	Six Months Ended June 30,	
	2021	2020
	(In Millions)	
Bond conversions and refinancing	\$ 388	\$ 234
Premium income recognized for group annuity contracts	252	387
Bonds received as consideration for group annuity contracts	(249)	(387)
Surplus notes issued in exchange for bonds	233	837
Bonds received as consideration for surplus notes	(233)	(837)
Change in market value of COLI	163	55
Exchange of mortgage loans for other assets	18	-
Transfer of mortgage loans to partnerships and limited liability companies	11	354
Net investment income payment in-kind bonds	10	5
Stock conversion	4	62
Common stock received as consideration for group annuity contracts	(3)	-
Assets received in-kind for bond maturity	-	57

16. Business risks, commitments and contingencies

a. Risks and uncertainties

The Company operates in a business environment subject to various risks and uncertainties. The principal risks include insurance and underwriting risks, investment and interest rate risks, currency exchange risk and credit risk. The combined impact of these risks could have a material, adverse effect on the Company's financial statements or result in operating losses in future periods. The Company employs the use of reinsurance, portfolio diversification, asset/liability management processes and other risk management techniques to mitigate the impact of these risks. The interim risks and uncertainties disclosure should be read in conjunction with the statutory disclosure in the Company's 2020 audited yearend financial statements.

Insurance and underwriting risks

The Company prices its products based on estimated benefit payments reflecting assumptions with respect to mortality, morbidity, longevity, persistency, interest rates and other factors. If actual policy experience emerges that is significantly and adversely different from assumptions used in product pricing, the effect could be material to the profitability of the Company. For participating whole life products, the Company's dividends to policyholders primarily reflect the difference between actual investment, mortality, expense and persistency experience and the experience embedded in the whole life premiums and guaranteed elements. The Company also reinsures certain life insurance and other LTC insurance policies to mitigate the impact of its underwriting risk.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

Investment and interest rate risks

The fair value, cash flows and earnings of investments can be influenced by a variety of factors including changes in interest rates, credit spreads, equity markets, portfolio asset allocation and general economic conditions. The Company employs a rigorous asset/liability management process to help mitigate the economic impacts of various investment risks, in particular, interest rate risk. By effectively matching the market sensitivity of assets with the liabilities they support, the impact of interest rate changes is addressed, on an economic basis, as the change in the value of the asset is offset by a corresponding change in the value of the supported liability. The Company uses derivatives, such as interest rate swaps and swaptions, as well as synthetic assets to reduce interest rate and duration imbalances determined in asset/liability analyses.

The levels of U.S. interest rates are influenced by U.S. monetary policies and by the relative attractiveness of U.S. markets to investors versus other global markets. As interest rates increase, certain debt securities may experience amortization or prepayment speeds that are slower than those assumed at purchase, impacting the expected maturity of these securities and the ability to reinvest the proceeds at the higher yields. Rising interest rates may also result in a decrease in the fair value of the investment portfolio. As interest rates decline, certain debt securities may experience accelerated amortization and prepayment speeds than what was assumed at purchase. During such periods, the Company is at risk of lower net investment income as it may not be able to reinvest the proceeds at comparable yields. Declining interest rates may also increase the fair value of the investment portfolio.

Interest rates also have an impact on the Company's products with guaranteed minimum payouts and on interest credited to account holders. As interest rates decrease, investment spreads may contract as crediting rates approach minimum guarantees, resulting in an increased liability.

In periods of increasing interest rates, policy loans, surrenders and withdrawals may increase as policyholders seek investments with higher perceived returns. This could result in cash outflows requiring the Company to sell invested assets at a time when the prices of those assets are adversely affected by the increase in market interest rates, which could cause the Company to realize investment losses.

Currency exchange risk

The Company has currency risk due to its non-U.S. dollar denominated investments and medium-term notes along with its indirect international operations. The Company mitigates a portion of its currency risk through the use of cross-currency swaps and forward contracts. Cross-currency swaps are used to minimize currency risk for certain non-U.S. dollar assets and liabilities through a pre-specified exchange of interest and principal. Forward contracts are used to hedge movements in exchange rates.

Credit and other market risks

The Company manages its investments to limit credit and other market risks by diversifying its portfolio among various security types and industry sectors as well as purchasing credit default swaps to transfer some of the risk.

Stressed conditions, volatility and disruptions in global capital markets or in particular markets or financial asset classes can have an adverse effect on the Company, in part because the Company has a large investment portfolio and assets supporting the Company's insurance liabilities are sensitive to changing market factors. Global market factors, including interest rates, credit spread, equity prices, real estate markets, foreign currency exchange rates, consumer spending, business investment, government spending, the volatility and strength of the capital markets, deflation and inflation, all affect the business and economic environment and, ultimately, the profitability of the Company's business. Disruptions in one market or asset class can also spread to other markets or asset classes. Upheavals in the financial markets can also affect the Company's business through their effects on general levels of economic activity, employment and customer behavior.

Asset-based fees calculated as a percentage of the separate account assets are a source of revenue to the Company. Gains and losses in the investment markets may result in corresponding increases and decreases in the Company's separate account assets and related revenue.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

The spread of the coronavirus, causing increased cases of COVID-19, around the world in 2020 has caused significant volatility in U.S. and international markets. There is significant uncertainty around the breadth and duration of business disruptions related to COVID-19, as well as its impact on the U.S. and international economies. At this time, the Company is not able to reliably estimate the length and severity of the COVID-19 public health crises and, as such, cannot quantify its impact on the financial results, liquidity and capital resources and its operations in future periods.

Political Uncertainties

Political events, domestically or internationally, may directly or indirectly trigger or exacerbate risks related to product offerings, profitability, or any of the risk factors described above. Whether those underlying risk factors are driven by politics or not, the Company's dynamic approach to managing risks enables management to identify risks, internally and externally, develop mitigation plans, and respond to risks in an attempt to proactively reduce the potential impact of each underlying risk factor on the Company.

b. *Litigation and regulatory matters*

In the normal course of business, the Company is involved in disputes, litigation and governmental or regulatory inquiries, administrative proceedings, examinations and investigations, both pending and threatened. These matters, if resolved adversely against the Company or settled, may result in monetary damages, fines and penalties or require changes in the Company's business practices. The resolution or settlement of these matters is inherently difficult to predict. Based upon the Company's assessment of these pending matters, the Company does not believe that the amount of any judgment, settlement or other action arising from any pending matter is likely to have a material adverse effect on the statement of financial position. However, an adverse outcome in certain matters could have a material adverse effect on the results of operations for the period in which such matter is resolved, or an accrual is determined to be required, on the financial statement financial position, or on our reputation.

The Company evaluates the need for accruals of loss contingencies for each matter. When a liability for a matter is probable and can be estimated, the Company accrues an estimate of the loss offset by related insurance recoveries or other contributions, if any. An accrual may be subject to subsequent adjustment as a result of additional information and other developments. The resolution of matters is inherently difficult to predict, especially in the early stages of matter. Even if a loss is probable, due to many complex factors, such as speed of discovery and the timing of court decisions or rulings, a loss or range of loss may not be reasonably estimated until the later stages of the matter. For matters where a loss is material and it is either probable or reasonably possible then it is disclosed. For matters where a loss may be reasonably possible, but not probable, or is probable but not reasonably estimated, no accrual is established, but the matter, if material, is disclosed.

In connection with the May 24, 2019 sale of Oppenheimer Acquisition Corp. (OAC) to Invesco Ltd (Invesco), Invesco identified an accounting matter related to four Master Limited Partnership funds managed by a subsidiary of OAC prior to the sale that Invesco has stated may result in an indemnification claim against MassMutual under the terms of the acquisition agreement. Under the terms of the agreement, MassMutual may be liable to Invesco under the acquisition agreement for a portion of any actual losses incurred by Invesco in excess of \$173 million and up to a cap of \$575 million. There are currently considerable uncertainties as to the nature, scope and amount of the potential losses for which Invesco may seek indemnity. In addition to the \$173 million deductible, it is uncertain whether the indemnification obligations set forth in the acquisition agreement would apply to this situation and MassMutual believes it has a number of defenses available that may mitigate or eliminate its exposure to any losses claimed by Invesco should such obligations apply. However, the outcome of any indemnification dispute (including any resulting litigation), should Invesco assert such a claim, and its potential impact on MassMutual's financial position cannot be foreseen with certainty at this time.

17. *Related party transactions*

In June 2021, Insurance Road LLC declared \$100 million in dividends to MassMutual for the six months ended June 30, 2021, to be paid in September 2021.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

In May 2021, MassMutual entered into an intercompany loan agreement with its indirectly owned subsidiary Fern Street LLC, whereby MassMutual borrowed \$470 million with a rate of 0.2% and a 6-month maturity, for the partial funding of the GALIC acquisition.

18. Subsequent events

Management of the Company has evaluated subsequent events through August 12, 2021, the date the financial statements were available to be issued to state regulators and subsequently on the Company's website. No events have occurred subsequent to the date of the financial statements, except for:

On July 16, 2021, MassMutual issued a \$600 million funding agreement with a 1.20% fixed rate and a 5-year maturity.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

19. Impairment listing for loan-backed and structured securities

The following are the total cumulative adjustments and impairments for loan-backed and structured securities since July 1, 2009:

Period Ended	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
June 30, 2021	\$ 11,352,643	\$ -	\$ 11,352,643	\$ 10,386,580	\$ (966,063)	\$ 10,386,580	\$ 11,323,900
March 31, 2021	11,247,256	-	11,247,256	5,074,491	(6,172,765)	5,074,491	5,237,174
December 31, 2020	16,071,907	-	16,071,907	14,674,300	(1,397,607)	14,674,300	15,473,517
September 30, 2020	21,375,383	-	21,375,383	19,160,250	(2,215,134)	19,160,250	18,862,027
June 30, 2020	10,180,123	-	10,180,123	8,992,610	(1,187,513)	8,992,610	9,249,851
March 31, 2020	24,799,788	-	24,799,788	20,197,344	(4,602,443)	20,197,344	24,683,947
December 31, 2019	3,992,400	-	3,992,400	3,539,281	(453,119)	3,539,281	3,439,138
September 30, 2019	16,909,029	-	16,909,029	15,191,932	(1,717,097)	15,191,932	14,639,756
June 30, 2019	6,980,030	-	6,980,030	6,187,029	(793,001)	6,187,029	7,133,620
March 31, 2019	7,791,000	-	7,791,000	7,634,637	(156,363)	7,634,637	7,683,021
December 31, 2018	4,550,173	-	4,550,173	3,815,559	(734,614)	3,815,559	4,014,514
September 30, 2018	4,320,826	-	4,320,826	3,663,181	(657,645)	3,663,181	3,687,297
June 30, 2018	634,235	-	634,235	279,221	(355,014)	279,221	386,752
March 31, 2018	645,690	-	645,690	488,181	(157,509)	488,181	448,494
December 31, 2017	3,949,513	-	3,949,513	1,958,759	(1,990,754)	1,958,759	2,023,952
September 30, 2017	4,436,542	-	4,436,542	876,942	(3,559,600)	876,942	4,647,683
June 30, 2017	40,538,551	-	40,538,551	39,808,956	(729,595)	39,808,956	60,990,732
March 31, 2017	41,788,380	-	41,788,380	41,391,889	(396,491)	41,391,889	56,156,936
December 31, 2016	42,175,938	-	42,175,938	42,045,721	(130,217)	42,045,721	54,619,477
September 30, 2016	44,266,478	-	44,266,478	41,890,535	(2,375,942)	41,890,535	61,300,066
June 30, 2016	49,097,217	-	49,097,217	48,202,703	(894,514)	48,202,703	63,207,410
March 31, 2016	57,985,071	-	57,985,071	55,783,979	(2,201,092)	55,783,979	70,578,397
December 31, 2015	4,881,394	-	4,881,394	4,783,194	(98,200)	4,783,194	4,728,736
September 30, 2015	50,531,382	-	50,531,382	45,665,859	(4,865,524)	45,665,859	58,523,652
June 30, 2015	66,924,927	-	66,924,927	65,240,585	(1,684,341)	65,240,585	72,953,475
March 31, 2015	17,856,447	-	17,856,447	17,681,510	(174,937)	17,681,510	17,553,999
December 31, 2014	69,225,743	-	69,225,743	68,301,291	(924,452)	68,301,291	79,410,553
September 30, 2014	645,721	-	645,721	604,437	(41,284)	604,437	627,381
June 30, 2014	57,012,606	-	57,012,606	55,422,168	(1,590,438)	55,422,168	75,253,388
March 31, 2014	91,702,041	-	91,702,041	80,744,074	(10,957,967)	80,744,074	97,672,071
December 31, 2013	113,707,951	-	113,707,951	108,815,640	(4,892,311)	108,815,640	111,783,052
September 30, 2013	81,945,730	-	81,945,730	80,589,482	(1,356,248)	80,589,482	77,049,314
June 30, 2013	147,215,936	-	147,215,936	142,140,572	(5,075,365)	142,140,572	130,973,023
March 31, 2013	194,772,025	-	194,772,025	188,372,089	(6,399,936)	188,372,089	176,678,910
December 31, 2012	378,096,660	-	378,096,660	366,323,110	(11,773,550)	366,323,110	333,086,073
September 30, 2012	816,573,456	-	816,573,456	788,350,823	(28,222,633)	788,350,823	697,683,289
June 30, 2012	912,025,937	-	912,025,937	890,494,221	(21,531,716)	890,494,221	708,872,106
March 31, 2012	1,095,018,529	-	1,095,018,529	1,058,132,041	(36,886,488)	1,058,132,041	841,095,013
December 31, 2011	1,090,904,993	-	1,090,904,993	1,056,761,288	(34,143,705)	1,056,761,288	754,310,838
September 30, 2011	762,320,632	-	762,320,632	738,510,048	(23,810,584)	738,510,048	546,494,232
June 30, 2011	1,130,732,656	-	1,130,732,656	1,078,535,670	(52,196,986)	1,078,535,670	839,143,290
March 31, 2011	1,097,705,351	-	1,097,705,351	1,068,852,204	(28,853,147)	1,068,852,204	816,688,348
December 31, 2010	968,742,508	-	968,742,508	950,111,417	(18,631,091)	950,111,417	708,895,637
September 30, 2010	915,728,030	-	915,728,030	889,896,058	(25,831,972)	889,896,058	673,462,493
June 30, 2010	1,362,887,892	-	1,362,887,892	1,335,628,212	(27,259,681)	1,335,628,212	975,241,506
March 31, 2010	1,471,905,696	-	1,471,905,696	1,391,337,543	(80,568,153)	1,391,337,543	1,015,645,802
December 31, 2009	1,349,124,214	-	1,349,124,214	1,290,817,168	(58,307,047)	1,290,817,168	852,088,739
September 30, 2009	2,953,442,689	(106,853,708)	2,846,588,981	2,700,948,264	(145,640,717)	2,700,948,264	1,692,409,640
Totals		\$ (106,853,708)			\$ (665,562,563)		

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

The following is the impairment listing for loan-backed and structured securities for the three months ended June 30, 2021:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
040104TG6	\$ 751,483	\$ -	\$ 751,483	\$ 596,747	\$ (154,736)	\$ 596,747	\$ 700,223
05535DCF9	2,412,525	-	2,412,525	2,168,139	(244,386)	2,168,139	2,608,461
40431KAE0	2,389,667	-	2,389,667	2,348,253	(41,414)	2,348,253	2,745,165
61750FAE0	555,370	-	555,370	534,914	(20,456)	534,914	493,887
86359DXD4	394,726	-	394,726	364,961	(29,764)	364,961	369,964
05535DAN4	1,386,766	-	1,386,766	1,038,889	(347,877)	1,038,889	1,141,961
45660LYW3	959,375	-	959,375	942,757	(16,618)	942,757	927,049
79548KXQ6	121,590	-	121,590	96,975	(24,616)	96,975	97,070
92978EAA2	115,502	-	115,502	112,103	(3,399)	112,103	110,484
41161PWB5	1,112,829	-	1,112,829	1,079,360	(33,470)	1,079,360	969,681
576433H33	1,119,491	-	1,119,491	1,071,784	(47,707)	1,071,784	1,074,403
55274SAM3	33,318	-	33,318	31,698	(1,620)	31,698	85,553
Totals	\$ 11,352,643	\$ -	\$ 11,352,643	\$ 10,386,580	\$ (966,063)	\$ 10,386,580	\$ 11,323,900

The following is the impairment listing for loan-backed and structured securities for the three months ended March 31, 2021:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
36828QQJ8	\$ 5,796,000	\$ -	\$ 5,796,000	\$ -	\$ (5,796,000)	\$ -	\$ -
05535DCF9	2,560,946	-	2,560,946	2,505,562	(55,385)	2,505,562	2,647,762
61750FAE0	582,728	-	582,728	558,079	(24,649)	558,079	500,569
18974BAA7	203,962	-	203,962	193,231	(10,731)	193,231	197,038
22540V3F7	124,724	-	124,724	11,082	(113,642)	11,082	3,496
92978EAA2	123,118	-	123,118	119,363	(3,755)	119,363	115,107
41161PWB5	1,183,481	-	1,183,481	1,153,338	(30,143)	1,153,338	1,017,022
12669GXW6	153,925	-	153,925	20,285	(133,639)	20,285	173,435
55274SAM3	38,192	-	38,192	33,418	(4,774)	33,418	84,650
86359DME4	480,180	-	480,180	480,133	(45)	480,133	498,095
Totals	\$ 11,247,256	\$ -	\$ 11,247,256	\$ 5,074,491	\$ (6,172,763)	\$ 5,074,491	\$ 5,237,174

The following is the impairment listing for loan-backed and structured securities for the three months ended December 31, 2020:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
01853GAB6	\$ 166,318	\$ -	\$ 166,318	\$ 58,609	\$ (107,709)	\$ 58,609	\$ 136,619
05535DCF9	2,639,139	-	2,639,139	2,595,116	(44,023)	2,595,116	2,812,127
61750FAE0	594,740	-	594,740	584,887	(9,853)	584,887	530,736
61750MAB1	4,675	-	4,675	4,502	(173)	4,502	4,545
92926SAB2	585	-	585	567	(18)	567	562
124860CB1	21,523	-	21,523	14,872	(6,651)	14,872	17,887
18974BAA7	205,451	-	205,451	204,843	(608)	204,843	186,946
18974BAN9	101,669	-	101,669	101,513	(156)	101,513	98,300
2254W0NK7	89,902	-	89,902	23,726	(66,176)	23,726	94,611
45660LYW3	1,074,456	-	1,074,456	1,035,449	(39,007)	1,035,449	1,020,046
65535VRK6	681,735	-	681,735	601,631	(80,104)	601,631	653,481
79548KXQ6	99,323	-	99,323	98,725	(598)	98,725	92,899
92978EAA2	130,042	-	130,042	125,448	(4,594)	125,448	119,223
23332UBW3	26,310	-	26,310	21,116	(5,193)	21,116	30,347
576433H33	1,207,614	-	1,207,614	1,145,808	(61,806)	1,145,808	1,116,853
125435AA5	1,635,577	-	1,635,577	1,543,519	(92,058)	1,543,519	1,596,490
36298XAA0	6,639,520	-	6,639,520	5,802,921	(836,599)	5,802,921	6,153,831
55274SAM3	61,225	-	61,225	42,760	(18,465)	42,760	93,792
86359DME4	673,784	-	673,784	662,791	(10,993)	662,791	698,159
929227ZF6	18,319	-	18,319	5,496	(12,823)	5,496	16,063
Totals	\$ 16,071,907	\$ -	\$ 16,071,907	\$ 14,674,300	\$ (1,397,607)	\$ 14,674,300	\$ 15,473,517

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

The following is the impairment listing for loan-backed and structured securities for the three months ended September 30, 2020:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
US05618HAE53	\$ 555,162	\$ -	\$ 555,162	\$ 387,040	\$ (168,122)	\$ 387,040	\$ 162,575
00442FAB8	144,957	-	144,957	79,275	(65,682)	79,275	112,060
05535DCF9	2,755,413	-	2,755,413	2,649,186	(106,228)	2,649,186	2,553,142
46630KAA4	191,718	-	191,718	184,342	(7,376)	184,342	179,699
61749BAB9	105,432	-	105,432	91,620	(13,812)	91,620	88,204
61750MAB1	4,837	-	4,837	4,672	(165)	4,672	3,421
92926SAB2	604	-	604	588	(16)	588	438
07384YPP5	12,990	-	12,990	9,466	(3,524)	9,466	35,174
073879QF8	45,111	-	45,111	43,889	(1,222)	43,889	39,772
17307GRU4	104,250	-	104,250	55,590	(48,659)	55,590	91,680
18974BAA7	215,833	-	215,833	212,231	(3,602)	212,231	183,053
18974BAN9	106,359	-	106,359	104,851	(1,507)	104,851	97,631
9393365V1	399,194	-	399,194	394,263	(4,932)	394,263	364,935
23332UBW3	31,650	-	31,650	29,218	(2,432)	29,218	22,244
12669GWN7	849,557	-	849,557	799,224	(50,333)	799,224	782,638
12669GXW6	244,251	-	244,251	233,647	(10,604)	233,647	223,233
32051DCK6	79,208	-	79,208	61,819	(17,389)	61,819	82,998
36298XAA0	7,738,893	-	7,738,893	7,511,130	(227,763)	7,511,130	7,120,125
36298XAB8	7,666,120	-	7,666,120	6,250,751	(1,415,369)	6,250,751	6,539,292
45660LY94	13,115	-	13,115	6,394	(6,721)	6,394	26,528
74951PBT4	110,729	-	110,729	51,052	(59,676)	51,052	153,185
Totals	\$ 21,375,383	\$ -	\$ 21,375,383	\$ 19,160,250	\$ (2,215,134)	\$ 19,160,250	\$ 18,862,027

The following is the impairment listing for loan-backed and structured securities for the three months ended June 30, 2020:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
17307GRU4	\$ 107,326	\$ -	\$ 107,326	\$ 77,392	\$ (29,934)	\$ 77,392	\$ 160,449
18974BAA7	245,427	-	245,427	235,230	(10,197)	235,230	201,416
18974BAN9	119,509	-	119,509	114,571	(4,938)	114,571	107,924
362290AC2	220,776	-	220,776	219,541	(1,235)	219,541	307,360
79548KXQ6	172,175	-	172,175	170,007	(2,168)	170,007	130,248
855541AC2	508,940	-	508,940	384,558	(124,383)	384,558	460,800
9393365V1	433,313	-	433,313	415,261	(18,053)	415,261	356,247
45660LY94	28,987	-	28,987	13,258	(15,729)	13,258	21,174
57643QAE5	2,203,118	-	2,203,118	1,819,560	(383,558)	1,819,560	2,367,000
74951PBT4	260,811	-	260,811	143,231	(117,579)	143,231	157,616
86359DMC8	5,799,490	-	5,799,490	5,333,524	(465,966)	5,333,524	4,907,737
92990GAE3	80,251	-	80,251	66,477	(13,773)	66,477	71,880
Totals	\$ 10,180,123	\$ -	\$ 10,180,123	\$ 8,992,610	\$ (1,187,513)	\$ 8,992,610	\$ 9,249,851

The following is the impairment listing for loan-backed and structured securities for the three months ended March 31, 2020:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
05535DCF9	\$ 3,012,907	\$ -	\$ 3,012,907	\$ 2,862,429	\$ (150,478)	\$ 2,862,429	\$ 2,528,432
24763LFY1	147,758	-	147,758	146,827	(931)	146,827	180,454
45071KDD3	575,329	-	575,329	510,787	(64,542)	510,787	491,576
07384YPP5	33,493	-	33,493	28,061	(5,431)	28,061	46,723
12667GKG7	93,290	-	93,290	83,622	(9,668)	83,622	98,905
17307GRU4	114,325	-	114,325	112,699	(1,625)	112,699	157,144
362290AC2	316,883	-	316,883	225,907	(90,976)	225,907	322,987
59020UW43	214,183	-	214,183	182,719	(31,463)	182,719	200,181
65535VRK6	716,497	-	716,497	699,498	(16,998)	699,498	646,333
75115DAH8	6,842	-	6,842	6,564	(279)	6,564	6,397

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

76112BUE8	181,578	-	181,578	148,845	(32,733)	148,845	129,998
79548KXQ6	187,063	-	187,063	182,973	(4,090)	182,973	137,728
92926UAC5	136,220	-	136,220	130,734	(5,486)	130,734	130,957
23332UBW3	46,195	-	46,195	32,143	(14,052)	32,143	24,852
12669GWN7	889,281	-	889,281	871,126	(18,155)	871,126	863,235
32051DCK6	88,205	-	88,205	86,848	(1,358)	86,848	89,678
362334CN2	14,634	-	14,634	11,177	(3,457)	11,177	13,996
466247K93	7,584	-	7,584	6,335	(1,249)	6,335	7,318
57645LAA2	18,017,521	-	18,017,521	13,868,050	(4,149,471)	13,868,050	18,607,055
Totals	\$ 24,799,788	\$ -	\$ 24,799,788	\$ 20,197,344	\$ (4,602,443)	\$ 20,197,344	\$ 24,683,947

The following is the impairment listing for loan-backed and structured securities for the three months ended December 31, 2019:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
24763LFY1	\$ 182,113	\$ -	\$ 182,113	\$ 160,832	\$ (21,281)	\$ 160,832	\$ 200,613
05535DAN4	1,930,918	-	1,930,918	1,855,207	(75,711)	1,855,207	1,598,238
07384YPP5	187,700	-	187,700	39,691	(148,009)	39,691	71,760
17307GRU4	164,558	-	164,558	133,524	(31,034)	133,524	229,670
18974BAN9	134,619	-	134,619	125,398	(9,221)	125,398	126,170
65535VRK6	797,949	-	797,949	712,007	(85,942)	712,007	774,700
79548KXQ6	207,254	-	207,254	192,282	(14,972)	192,282	113,588
85554NAG5	194,730	-	194,730	158,214	(36,515)	158,214	187,575
12669FXR9	117,999	-	117,999	114,307	(3,692)	114,307	101,165
23332UBW3	74,561	-	74,561	47,819	(26,742)	47,819	35,659
Totals	\$ 3,992,400	\$ -	\$ 3,992,400	\$ 3,539,281	\$ (453,119)	\$ 3,539,281	\$ 3,439,138

The following is the impairment listing for loan-backed and structured securities for the three months ended September 30, 2019:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
12667F2A2	\$ 642,800	\$ -	\$ 642,800	\$ 484,346	\$ (158,455)	\$ 484,346	\$ 68,241
32053LAA0	47,447	-	47,447	40,280	(7,167)	40,280	47,846
761118FM5	2,843,393	-	2,843,393	2,789,133	(54,260)	2,789,133	2,918,992
79548KXQ6	297,379	-	297,379	277,239	(20,140)	277,239	60,979
23332UBW3	78,084	-	78,084	76,934	(1,151)	76,934	43,636
576433H33	1,579,401	-	1,579,401	1,448,247	(131,155)	1,448,247	1,448,863
12669GWN7	1,037,688	-	1,037,688	957,205	(80,484)	957,205	936,853
17309FAE8	161,243	-	161,243	129,536	(31,707)	129,536	159,357
36298XAA0	10,097,887	-	10,097,887	8,887,246	(1,210,641)	8,887,246	8,841,272
92990GAE3	86,314	-	86,314	85,680	(634)	85,680	87,117
US74951PBV94	37,392	-	37,392	16,087	(21,305)	16,087	26,602
Totals	\$ 16,909,029	\$ -	\$ 16,909,029	\$ 15,191,932	\$ (1,717,097)	\$ 15,191,932	\$ 14,639,756

The following is the impairment listing for loan-backed and structured securities for the three months ended June 30, 2019:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
61750MAB1	\$ 4,942	\$ -	\$ 4,942	\$ 4,899	\$ (42)	\$ 4,899	\$ 4,344
18974BAN9	143,913	-	143,913	143,911	(2)	143,911	141,999
761118FM5	3,338,972	-	3,338,972	3,276,460	(62,512)	3,276,460	3,468,889
79548KXQ6	335,309	-	335,309	321,864	(13,445)	321,864	218,663
55274SAM3	114,173	-	114,173	79,608	(34,565)	79,608	119,029
57643QAE5	3,042,722	-	3,042,722	2,360,287	(682,436)	2,360,287	3,180,695
Totals	\$ 6,980,030	\$ -	\$ 6,980,030	\$ 6,187,029	\$ (793,001)	\$ 6,187,029	\$ 7,133,620

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

The following is the impairment listing for loan-backed and structured securities for the three months ended March 31, 2019:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
61750MAB1	\$ 5,275	\$ -	\$ 5,275	\$ 4,933	\$ (341)	\$ 4,933	\$ 4,989
65106FAG7	232,843	-	232,843	215,726	(17,118)	215,726	6,316
18974BAA7	285,889	-	285,889	270,801	(15,088)	270,801	278,616
18974BAN9	149,774	-	149,774	139,333	(10,441)	139,333	148,234
22541QQR6	1,569	-	1,569	-	(1,569)	-	1
32051GCF0	22,786	-	22,786	(6,720)	(29,507)	(6,720)	17,553
761118FM5	3,259,303	-	3,259,303	3,218,368	(40,935)	3,218,368	3,244,154
17309FAE8	200,512	-	200,512	200,501	(11)	200,501	208,828
466247UG6	467,713	-	467,713	452,359	(15,354)	452,359	459,812
57643QAE5	3,114,325	-	3,114,325	3,109,376	(4,949)	3,109,376	3,256,107
US74951PBV94	51,011	-	51,011	29,960	(21,051)	29,960	58,411
Totals	\$ 7,791,000	\$ -	\$ 7,791,000	\$ 7,634,637	\$ (156,362)	\$ 7,634,637	\$ 7,683,021

The following is the impairment listing for loan-backed and structured securities for the three months ended December 31, 2018:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
65106FAG7	\$ 205,885	\$ -	\$ 205,885	\$ 17,668	\$ (188,218)	\$ 17,668	\$ 21,031
18974BAA7	306,428	-	306,428	295,291	(11,137)	295,291	294,986
22541QQR6	28,742	-	28,742	(9,704)	(38,446)	(9,704)	1
32051GCF0	32,493	-	32,493	20,481	(12,012)	20,481	20,063
17309FAE8	203,743	-	203,743	202,326	(1,417)	202,326	201,875
57643QAE5	3,657,695	-	3,657,695	3,177,611	(480,084)	3,177,611	3,365,017
92990GAE3	115,186	-	115,186	111,886	(3,300)	111,886	111,541
Totals	\$ 4,550,173	\$ -	\$ 4,550,173	\$ 3,815,559	\$ (734,614)	\$ 3,815,559	\$ 4,014,514

The following is the impairment listing for loan-backed and structured securities for the three months ended September 30, 2018:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
05535DCF9	\$ 3,454,425	\$ -	\$ 3,454,425	\$ 3,141,048	\$ (313,377)	\$ 3,141,048	\$ 3,134,409
07384YPP5	321,829	-	321,829	148,884	(172,945)	148,884	132,968
07386HCP4	2,164	-	2,164	(6,255)	(8,418)	(6,255)	320
76110H4M8	1,715	-	1,715	(3,719)	(5,434)	(3,719)	641
79548KXQ6	423,086	-	423,086	383,222	(39,864)	383,222	292,015
939336Z48	117,607	-	117,607	-	(117,607)	-	126,945
Totals	\$ 4,320,826	\$ -	\$ 4,320,826	\$ 3,663,181	\$ (657,645)	\$ 3,663,181	\$ 3,687,297

The following is the impairment listing for loan-backed and structured securities for the three months ended June 30, 2018:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
59020UW43	\$ 337,732	\$ -	\$ 337,732	\$ 271,686	\$ (66,046)	\$ 271,686	\$ 354,508
76110H4M8	6,848	-	6,848	1,969	(4,879)	1,969	1,713
863579DV7	289,655	-	289,655	5,567	(284,089)	5,567	30,531
Totals	\$ 634,235	\$ -	\$ 634,235	\$ 279,221	\$ (355,014)	\$ 279,221	\$ 386,752

The following is the impairment listing for loan-backed and structured securities for the three months ended March 31, 2018:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
07386HEN7	\$ 43,711	\$ -	\$ 43,711	\$ 2,334	\$ (41,377)	\$ 2,334	\$ 1,609
79548KXQ6	520,764	-	520,764	476,293	(44,471)	476,293	365,994
45660NZY4	81,215	-	81,215	9,554	(71,661)	9,554	80,891
Totals	\$ 645,690	\$ -	\$ 645,690	\$ 488,181	\$ (157,509)	\$ 488,181	\$ 448,494

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

The following is the impairment listing for loan-backed and structured securities for the three months ended December 31, 2017:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
03927RAA2	\$ 2,886,563	\$ -	\$ 2,886,563	\$ 1,464,907	\$ (1,421,656)	\$ 1,464,907	\$ 1,481,241
03927RAB0	910,639	-	910,639	363,543	(547,096)	363,543	362,176
07386HCP4	7,995	-	7,995	1,386	(6,609)	1,386	2,673
12669GMS7	25,101	-	25,101	21,923	(3,177)	21,923	21,921
22541QQR6	21,202	-	21,202	12,504	(8,698)	12,504	16,106
2254W0NK7	97,695	-	97,695	94,495	(3,200)	94,495	139,833
86359ACG6	318	-	318	-	(318)	-	2
Totals	\$ 3,949,513	\$ -	\$ 3,949,513	\$ 1,958,759	\$ (1,990,754)	\$ 1,958,759	\$ 2,023,952

The following is the impairment listing for loan-backed and structured securities for the three months ended September 30, 2017:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
22541NMA4	\$ 42,273	\$ -	\$ 42,273	\$ 41,434	\$ (839)	\$ 41,434	\$ 41,095
22541NMB2	11,869	-	11,869	11,634	(234)	11,634	11,535
22541SSD1	12,232	-	12,232	20	(12,213)	20	5,978
52108MDP5	3,497,947	-	3,497,947	-	(3,497,947)	-	1,925,413
55274SAM3	167,196	-	167,196	153,991	(13,206)	153,991	179,429
76110W4J2	1,131	-	1,131	229	(902)	229	556
88157QAL2	686,945	-	686,945	660,921	(26,024)	660,921	2,125,943
89789KAC9	16,949	-	16,949	8,714	(8,235)	8,714	357,735
Totals	\$ 4,436,542	\$ -	\$ 4,436,542	\$ 876,942	\$ (3,559,600)	\$ 876,942	\$ 4,647,683

The following is the impairment listing for loan-backed and structured securities for the three months ended June 30, 2017:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
76110H4M8	\$ 4,413	\$ -	\$ 4,413	\$ 2,326	\$ (2,087)	\$ 2,326	\$ 4,073
86358RLG0	3,485	-	3,485	2,670	(815)	2,670	30,171
86359ACG6	16,324	-	16,324	2	(16,322)	2	2
88157QAL2	774,182	-	774,182	675,599	(98,583)	675,599	1,947,675
89789KAC9	17,294	-	17,294	8,920	(8,374)	8,920	356,047
77277LAF4	22,514,590	-	22,514,590	22,167,493	(347,097)	22,167,493	34,318,674
77277LAH0	1,135,088	-	1,135,088	1,118,159	(16,929)	1,118,159	2,738,435
77277LAJ6	16,073,175	-	16,073,175	15,833,787	(239,388)	15,833,787	21,595,653
Totals	\$ 40,538,551	\$ -	\$ 40,538,551	\$ 39,808,956	\$ (729,595)	\$ 39,808,956	\$ 60,990,732

The following is the impairment listing for loan-backed and structured securities for the three months ended March 31, 2017:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
17307GH76	\$ 274,894	\$ -	\$ 274,894	\$ 44,730	\$ (230,163)	\$ 44,730	\$ 152,777
22541QJR4	11,175	-	11,175	54	(11,122)	54	6,866
32051DCK6	182,177	-	182,177	160,728	(21,449)	160,728	179,180
55274SAM3	225,790	-	225,790	209,839	(15,951)	209,839	218,832
86358RA23	1,326,199	-	1,326,199	1,253,636	(72,563)	1,253,636	1,289,099
86359ACG6	6,287	-	6,287	49	(6,239)	49	2
US77277LAF40	22,537,014	-	22,537,014	22,514,590	(22,424)	22,514,590	31,699,907
US77277LAH06	1,136,182	-	1,136,182	1,135,088	(1,094)	1,135,088	2,662,526
US77277LAJ61	16,088,661	-	16,088,661	16,073,175	(15,486)	16,073,175	19,947,746
Totals	\$ 41,788,380	\$ -	\$ 41,788,380	\$ 41,391,889	\$ (396,491)	\$ 41,391,889	\$ 56,156,936