

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY

INTERIM STATUTORY FINANCIAL STATEMENTS

As of March 31, 2022 and December 31, 2021 and for the three months ended
March 31, 2022 and 2021

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

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

	March 31, 2022	December 31, 2021
(In Millions)		
Assets:		
Bonds	\$ 125,887	\$ 124,287
Preferred stocks	545	555
Common stocks – subsidiaries and affiliates	24,731	24,640
Common stocks – unaffiliated	1,455	1,277
Mortgage loans	25,590	26,345
Policy loans	16,192	16,120
Real estate	345	395
Partnerships and limited liability companies	12,932	12,545
Derivatives	14,807	16,379
Cash, cash equivalents and short-term investments	5,650	5,943
Other invested assets	1,665	1,286
Total invested assets	229,799	229,772
Investment income due and accrued	3,312	3,584
Federal income taxes	35	55
Net deferred income taxes	815	710
Other than invested assets	4,188	4,686
Total assets excluding separate accounts	238,149	238,807
Separate account assets	70,470	76,160
Total assets	\$ 308,619	\$ 314,967
 Liabilities and Surplus:		
Policyholders' reserves	\$ 140,579	\$ 138,269
Liabilities for deposit-type contracts	18,003	17,041
Contract claims and other benefits	706	797
Policyholders' dividends	1,849	1,828
General expenses due or accrued	994	1,385
Asset valuation reserve	6,189	6,414
Repurchase agreements	2,656	2,802
Commercial paper	250	250
Collateral	3,872	6,158
Derivatives	8,516	10,877
Funds held under coinsurance	19,842	19,255
Other liabilities	7,572	6,900
Total liabilities excluding separate accounts	211,028	211,976
Separate account liabilities	70,330	76,012
Total liabilities	281,358	287,988
Surplus	27,261	26,979
Total liabilities and surplus	\$ 308,619	\$ 314,967

See accompanying notes to interim statutory financial statements

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

	Three Months Ended	
	March 31,	
	2022	2021
	<u>(\$ In Millions)</u>	
Revenue:		
Premium income	\$ 5,145	\$ 4,146
Net investment income	1,946	1,707
Fees and other income	240	271
Total revenue	<u>7,331</u>	<u>6,124</u>
Benefits, expenses and other deductions:		
Policyholders' benefits	3,674	3,295
Change in policyholders' reserves	2,245	1,504
General insurance expenses	495	416
Commissions	315	268
State taxes, licenses and fees	96	93
Other deductions	162	167
Total benefits, expenses and other deductions	<u>6,987</u>	<u>5,743</u>
Net gain from operations before dividends and federal income taxes	344	381
Dividends to policyholders	419	394
Net loss from operations before federal income taxes	(75)	(13)
Federal income tax expense (benefit)	36	73
Net loss from operations	(111)	(86)
Net realized capital losses	(122)	(478)
Net loss	<u>\$ (233)</u>	<u>\$ (564)</u>

See accompanying notes to interim statutory financial statements

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

	Three Months Ended March 31,	
	2022	2021
	<u>(In Millions)</u>	
Surplus, beginning of year	<u>\$ 26,979</u>	<u>\$ 24,327</u>
Net increase/(decrease) due to:		
Net loss	(233)	(564)
Change in net unrealized capital gains, net of tax	553	306
Change in net unrealized foreign exchange capital losses, net of tax	(350)	(223)
Change in other net deferred income taxes	148	296
Change in nonadmitted assets	(5)	5
Change in asset valuation reserve	225	(232)
Change in surplus notes	(25)	233
Other	<u>(31)</u>	<u>(21)</u>
Net increase (decrease)	<u>282</u>	<u>(200)</u>
Surplus, end of period	<u>\$ 27,261</u>	<u>\$ 24,127</u>

See accompanying notes to interim statutory financial statements

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

	Three Months Ended	
	March 31,	
	2022	2021
	<u>(In Millions)</u>	
Cash from operations:		
Premium and other income collected	\$ 5,667	\$ 4,532
Net investment income	2,276	2,829
Benefit payments	(3,740)	(3,309)
Net transfers from separate accounts	383	153
Commissions and other expenses	(1,525)	(1,561)
Dividends paid to policyholders	(401)	(377)
Federal and foreign income taxes recovered	4	33
Net cash from operations	<u>2,664</u>	<u>2,300</u>
Cash from investments:		
Proceeds from investments sold, matured or repaid:		
Bonds	8,105	9,979
Preferred and common stocks – unaffiliated	88	120
Common stocks – affiliated	1	6
Mortgage loans	1,415	671
Real estate	97	-
Partnerships and limited liability companies	240	109
Derivatives	(245)	(835)
Other	(262)	(649)
Total investment proceeds	<u>9,439</u>	<u>9,401</u>
Cost of investments acquired:		
Bonds	(10,467)	(8,565)
Preferred and common stocks – unaffiliated	(128)	(88)
Common stocks – affiliated	(94)	(58)
Mortgage loans	(732)	(1,101)
Real estate	(14)	(57)
Partnerships and limited liability companies	(769)	(414)
Derivatives	(39)	(15)
Other	289	621
Total investments acquired	<u>(11,954)</u>	<u>(9,677)</u>
Net increase in policy loans	<u>(72)</u>	<u>(23)</u>
Net cash used in investing activities	<u>(2,587)</u>	<u>(299)</u>
Cash from financing and miscellaneous sources:		
Net deposits on deposit-type contracts	911	773
Net cash provided by surplus notes	(25)	-
Change in repurchase agreements	(319)	(891)
Change in collateral	(2,263)	(2,319)
Other cash provided	1,326	1,154
Net cash provided from financing and miscellaneous sources	<u>(370)</u>	<u>(1,283)</u>
Net change in cash, cash equivalents and short-term investments	<u>(293)</u>	<u>718</u>
Cash, cash equivalents and short-term investments:		
Beginning of year	5,943	5,738
End of period	<u>\$ 5,650</u>	<u>\$ 6,456</u>

See accompanying 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 Distribution (DD), 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 DD 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 works 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 March 31, 2022 and December 31, 2021, and for the three months ended March 31, 2022 and 2021, are unaudited. The Interim Statutory Statement of Financial Position as of December 31, 2021 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 2021 audited yearend financial statements as these interim statutory financial statements disclose only significant changes from yearend 2021. 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 2021 audited yearend financial statements.

b. Common stocks – subsidiaries and affiliates

Common stocks of unconsolidated subsidiaries, primarily C.M. Life Insurance Company, MML Bay State Life Insurance Company, MassMutual Holding LLC (MMHLLC), Glidepath Holdings Inc. (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 as well as an adjustment of \$613 million as of March 31, 2022 for a portion of its noncontrolling interests. Glidepath is valued on its underlying GAAP equity with adjustment to recognize its investment in Great American Life Insurance Company and other subsidiaries and affiliated entities (GALIC) based on GALIC's underlying statutory surplus, adjusted for any unamortized goodwill that would have been recognized under the statutory purchase method. Operating results, less dividends declared, for MMHLLC, Glidepath and MMIH are

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

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*

Future adoption of new accounting standards

In November 2021, the NAIC adopted modifications to SSAP No. 43R, *Loan-Backed and Structured Securities*, effective December 31, 2022. The modifications require investments in residual tranches to be reported on Schedule BA as Other Invested Assets. Residual tranches will be carried at the lower of amortized cost or fair value, with changes in value recorded as unrealized gains or losses. The modifications are not expected to 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:

	March 31, 2022				
	Carrying	Fair			
	Value	Value	Level1	Level2	Level3
	(In Millions)				
Financial assets:					
Bonds:					
U. S. government and agencies	\$ 4,314	\$ 4,614	\$ -	\$ 4,614	\$ -
All other governments	1,821	1,777	-	1,718	59
States, territories and possessions	268	293	-	293	-
Political subdivisions	422	449	-	449	-
Special revenue	4,264	4,688	-	4,679	9
Industrial and miscellaneous	107,598	106,886	-	50,352	56,534
Parent, subsidiaries and affiliates	7,200	7,147	-	41	7,106
Preferred stocks	545	547	38	-	509
Common stocks - subsidiaries and affiliates	481	481	321	-	160
Common stocks - unaffiliated	1,455	1,455	558	-	897
Mortgage loans - commercial	21,426	21,163	-	-	21,163
Mortgage loans - residential	4,164	4,050	-	-	4,050
Derivatives:					
Interest rate swaps	13,006	13,171	-	13,171	-
Options	492	492	13	479	-
Currency swaps	1,189	1,189	-	1,189	-
Forward contracts	105	105	-	105	-
Credit default swaps	-	1	-	1	-
Financial futures	15	15	15	-	-
Cash, cash equivalents and short-term investments	5,650	5,650	-	5,650	-
Separate account assets	70,470	70,470	47,200	21,522	1,748
Financial liabilities:					
GICs	14,738	14,302	-	-	14,302
Group annuity contracts and other deposits	1,937	1,909	-	-	1,909
Individual annuity contracts	12,515	15,038	-	-	15,038
Supplementary contracts	1,172	1,174	-	-	1,174
Repurchase agreements	2,656	2,656	-	2,656	-
Commercial paper	250	250	-	250	-
Derivatives:					
Interest rate swaps	8,179	10,301	-	10,301	-
Options	3	3	3	-	-
Currency swaps	109	109	-	109	-
Forward contracts	81	81	-	81	-
Credit default swaps	2	2	-	2	-
Financial futures	142	142	142	-	-

Common stocks - subsidiaries and affiliates do not include unconsolidated subsidiaries, which had statutory carrying values of \$24,250 million.

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

	December 31, 2021				
	Carrying Value	Fair Value	Level 1	Level 2	Level 3
	(In Millions)				
Financial assets:					
Bonds:					
U. S. government and agencies	\$ 4,125	\$ 4,769	\$ -	\$ 4,769	\$ -
All other governments	1,844	1,969	-	1,908	61
States, territories and possessions	297	350	-	350	-
Political subdivisions	442	504	-	504	-
Special revenue	4,741	5,582	-	5,573	9
Industrial and miscellaneous	106,290	112,386	36	55,849	56,501
Parent, subsidiaries and affiliates	6,548	6,586	-	43	6,543
Preferred stocks	555	669	42	-	627
Common stocks - subsidiaries and affiliates	390	390	137	-	253
Common stocks - unaffiliated	1,277	1,277	524	-	753
Mortgage loans - commercial	21,536	22,259	-	-	22,259
Mortgage loans - residential	4,809	4,849	-	-	4,849
Derivatives:					
Interest rate swaps	15,004	16,234	-	16,234	-
Options	321	321	15	306	-
Currency swaps	948	948	-	948	-
Forward contracts	68	68	-	68	-
Credit default swaps	-	1	-	1	-
Financial futures	38	38	38	-	-
Cash, cash equivalents and short-term investments	5,943	5,943	-	5,943	-
Separate account assets	76,160	76,160	52,405	21,861	1,894
Financial liabilities:					
GICs	13,832	13,828	-	-	13,828
Group annuity contracts and other deposits	1,755	1,812	-	-	1,812
Individual annuity contracts	12,109	14,581	-	-	14,581
Supplementary contracts	1,167	1,168	-	-	1,168
Repurchase agreements	2,802	2,802	-	2,802	-
Commercial paper	250	250	-	250	-
Derivatives:					
Interest rate swaps	10,598	11,431	-	11,431	-
Options	4	4	4	-	-
Currency swaps	200	200	-	200	-
Forward contracts	69	69	-	69	-
Credit default swaps	1	2	-	2	-
Financial futures	5	5	5	-	-

Common stocks - subsidiaries and affiliates do not include unconsolidated subsidiaries, which had statutory carrying values of \$24,250 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:

	March 31, 2022			
	Level 1	Level 2	Level 3	Total
	(In Millions)			
Financial assets:				
Bonds:				
Special revenue	\$ -	\$ 1	\$ -	\$ 1
Industrial and miscellaneous	-	309	211	520
Preferred stocks	40	-	19	59
Common stocks - subsidiaries and affiliates	321	-	160	481
Common stocks - unaffiliated	558	-	897	1,455
Derivatives:				
Interest rate swaps	-	13,006	-	13,006
Options	13	479	-	492
Currency swaps	-	1,189	-	1,189
Forward contracts	-	105	-	105
Credit default swaps	-	1	-	1
Financial futures	15	-	-	15
Separate account assets	47,199	21,523	1,748	70,470
Total financial assets carried at fair value	\$ 48,146	\$ 36,613	\$ 3,035	\$ 87,794
Financial liabilities:				
Derivatives:				
Interest rate swaps	\$ -	\$ 8,179	\$ -	\$ 8,179
Options	3	-	-	3
Currency swaps	-	109	-	109
Forward contracts	-	81	-	81
Credit default swaps	-	2	-	2
Financial futures	142	-	-	142
Total financial liabilities carried at fair value	\$ 145	\$ 8,371	\$ -	\$ 8,516

For the three months ended March 31, 2022 and the year ended December 31, 2021, 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, 2021			
	Level 1	Level 2	Level 3	Total
	(In Millions)			
Financial assets:				
Bonds:				
Special revenue	\$ -	\$ 2	\$ -	\$ 2
Industrial and miscellaneous	45	248	187	480
Preferred stocks	43	-	18	61
Common stocks - subsidiaries and affiliates	137	-	253	390
Common stocks - unaffiliated	524	-	753	1,277
Derivatives:				
Interest rate swaps	-	15,004	-	15,004
Options	15	306	-	321
Currency swaps	-	948	-	948
Forward contracts	-	68	-	68
Credit default swaps	-	1	-	1
Financial futures	38	-	-	38
Separate account assets	52,405	21,861	1,894	76,160
Total financial assets carried at fair value	\$ 53,207	\$ 38,438	\$ 3,105	\$ 94,750
Financial liabilities:				
Derivatives:				
Interest rate swaps	\$ -	\$ 10,598	\$ -	\$ 10,598
Options	4	-	-	4
Currency swaps	-	200	-	200
Forward contracts	-	69	-	69
Credit default swaps	-	1	-	1
Financial futures	5	-	-	5
Total financial liabilities carried at fair value	\$ 9	\$ 10,868	\$ -	\$ 10,877

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 1/1/22	Gains (Losses) in Net Income	Losses (Gains) in Surplus	Purchases	Issuances	Sales	Settlements	Transfers			Balance as of 03/31/22
								In	Out	Other	
(In Millions)											
Financial assets:											
Bonds:											
Industrial and miscellaneous	\$ 187	\$ (4)	\$ (12)	\$ 3	\$ 2	\$ -	\$ -	\$ -	\$ -	\$ 35	\$ 211
Preferred stocks	18	-	(4)	5	-	-	-	-	-	-	19
Common stocks - subsidiaries and affiliates	253	-	(185)	69	25	-	(2)	-	-	-	160
Common stocks - unaffiliated	753	27	66	88	-	(1)	(58)	22	-	-	897
Separate account assets	1,894	(71)	-	25	-	(87)	-	-	(13)	-	1,748
Total financial assets	<u>\$ 3,105</u>	<u>\$ (48)</u>	<u>\$ (135)</u>	<u>\$ 190</u>	<u>\$ 27</u>	<u>\$ (88)</u>	<u>\$ (60)</u>	<u>\$ 22</u>	<u>\$ (13)</u>	<u>\$ 35</u>	<u>\$ 3,035</u>

	Balance as of 1/1/21	Gains (Losses) in Net Income	Losses (Gains) in Surplus	Purchases	Issuances	Sales	Settlements	Transfers			Balance as of 12/31/21
								In	Out	Other	
(In Millions)											

Financial assets:											
Bonds:											
Industrial and miscellaneous	\$ 112	\$ (21)	\$ 4	\$ -	\$ 99	\$ -	\$ (1)	\$ -	\$ (1)	\$ (5)	\$ 187
Preferred stocks	18	-	(1)	-	-	-	-	-	-	1	18
Common stocks - subsidiaries and affiliates	189	1	(376)	23	422	-	(6)	-	-	-	253
Common stocks - unaffiliated	412	8	115	244	3	(26)	(3)	-	-	-	753
Separate account assets	1,834	15	-	363	-	(294)	-	2	(26)	-	1,894
Total financial assets	<u>\$ 2,565</u>	<u>\$ 3</u>	<u>\$ (258)</u>	<u>\$ 630</u>	<u>\$ 524</u>	<u>\$ (320)</u>	<u>\$ (10)</u>	<u>\$ 2</u>	<u>\$ (27)</u>	<u>\$ (4)</u>	<u>\$ 3,105</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:

	March 31, 2022			
	Carrying Value	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
	(In Millions)			
U.S. government and agencies	\$ 4,314	\$ 350	\$ 50	\$ 4,614
All other governments	1,821	54	98	1,777
States, territories and possessions	268	26	1	293
Political subdivisions	422	28	1	449
Special revenue	4,264	453	29	4,688
Industrial and miscellaneous	107,598	2,332	3,044	106,886
Parent, subsidiaries and affiliates	7,200	19	72	7,147
Total	\$ 125,887	\$ 3,262	\$ 3,295	\$ 125,854

The March 31, 2022 gross unrealized losses exclude \$109 million of losses included in the carrying value. These losses include \$103 million from NAIC Class 6 bonds and \$6 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, 2021			
	Carrying Value	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
	(In Millions)			
U.S. government and agencies	\$ 4,125	\$ 656	\$ 12	\$ 4,769
All other governments	1,844	144	19	1,969
States, territories and possessions	297	53	-	350
Political subdivisions	442	62	-	504
Special revenue	4,741	845	4	5,582
Industrial and miscellaneous	106,290	6,742	642	112,390
Parent, subsidiaries and affiliates	6,548	57	19	6,586
Total	\$ 124,287	\$ 8,559	\$ 696	\$ 132,150

The December 31, 2021 gross unrealized losses exclude \$74 million of losses included in the carrying value. These losses include \$73 million from NAIC Class 6 bonds and \$1 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 March 31, 2022, investments in structured and loan-backed securities that had unrealized losses, which were not recognized in earnings, had a fair value of \$15,525 million. Securities in an unrealized loss position for less than 12 months had a fair value of \$13,156 million and unrealized losses of \$327 million. Securities in an unrealized loss position for greater than 12 months had a fair value of \$2,369 million and unrealized losses of \$227 million. These securities were primarily categorized as industrial and miscellaneous or parent, subsidiaries and affiliates.

As of December 31, 2021, investments in structured and loan-backed securities that had unrealized losses, which were not recognized in earnings, had a fair value of \$8,162 million. Securities in an unrealized loss position for less than 12 months had a fair value of \$6,285 million and unrealized losses of \$66 million. Securities in an unrealized loss position for greater than 12 months had a fair value of \$1,877 million and unrealized losses of \$134 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 three months ended March 31, 2022 or 2021, 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 March 31, 2022, RMBS had a total carrying value of \$1,693 million and a fair value of \$1,731 million, of which approximately 19%, based on carrying value, was classified as Alt-A. Alt-A and subprime RMBS had a total carrying value of \$936 million and a fair value of \$969 million. As of December 31, 2021, RMBS had a total carrying value of \$2,068 million and a fair value of \$2,154 million, of which approximately 16%, based on carrying value, was classified as Alt-A. Alt-A and subprime RMBS had a total carrying value of \$975 million and a fair value of \$1,025 million.

b. Common stocks – subsidiaries and affiliates

MMHLLC paid \$344 million in dividends to MassMutual for the three months ended March 31, 2022, which were declared in 2021, and paid \$1,000 million in dividends to MassMutual for the three months ended March 31, 2021, which were declared in 2020.

MassMutual contributed capital of \$65 million to MMHLLC for the three months ended March 31, 2022 and \$22 million for the three months ended March 31, 2021.

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.

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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:

	March 31, 2022		December 31, 2021	
	Carrying Value	Fair Value	Carrying Value	Fair Value
	(In Millions)			
Commercial mortgage loans:				
Primary lender	\$ 21,309	\$ 21,046	\$ 21,419	\$ 22,141
Mezzanine loans	117	117	117	118
Total commercial mortgage loans	21,426	21,163	21,536	22,259
Residential mortgage loans:				
FHA insured and VA guaranteed	3,279	3,195	4,107	4,138
Other residential loans	885	855	702	711
Total residential mortgage loans	4,164	4,050	4,809	4,849
Total mortgage loans	\$ 25,590	\$ 25,213	\$ 26,345	\$ 27,108

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As of March 31, 2022, 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 March 31, 2022 and as of December 31, 2021:

		March 31, 2022				
		Average	Unpaid			
		Carrying	Carrying	Principal	Valuation	Interest
		Value	Value	Balance	Allowance	Income
		(In Millions)				
With no allowance recorded:						
Commercial mortgage loans:						
Primary lender	\$	48	\$	48	\$	105
Total		48		48	-	-
Total impaired commercial mortgage loans	\$	48	\$	48	\$	105
					-	-
		December 31, 2021				
		Average	Unpaid			
		Carrying	Carrying	Principal	Valuation	Interest
		Value	Value	Balance	Allowance	Income
		(In Millions)				
With no allowance recorded:						
Commercial mortgage loans:						
Primary lender	\$	48	\$	51	\$	105
Total		48		51	-	-
Total impaired commercial mortgage loans	\$	48	\$	51	\$	105
					-	-

d. Partnerships and limited liability companies

No significant changes.

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 a 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 \$19,534 million as of March 31, 2022 and \$21,873 million as of December 31, 2021, 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

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
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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 a 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 \$3,217 million as of March 31, 2022 and \$5,369 million as of December 31, 2021. In the event of default, the full market value exposure at risk in a net gain position, net of offsets and collateral, was \$544 million as of March 31, 2022 and \$230 million as of December 31, 2021. The statutory net amount at risk, defined as net collateral pledged and statement values excluding accrued interest, was \$2,695 million as of March 31, 2022 and \$579 million as of December 31, 2021.

The Company had the right to rehypothecate or repledge securities totaling \$1,038 million of the \$3,217 million as of March 31, 2022 and \$717 million of the \$5,369 million as of December 31, 2021 of net collateral pledged by counterparties. There were no securities rehypothecated to other counterparties as of March 31, 2022 or December 31, 2021.

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

	March 31, 2022			
	Assets		Liabilities	
	Carrying Value	Notional Amount	Carrying Value	Notional Amount
	(In Millions)			
Interest rate swaps	\$ 13,006	\$ 115,769	\$ 8,179	\$ 129,031
Options	492	16,775	3	-
Currency swaps	1,189	15,256	109	3,249
Forward contracts	105	4,893	81	4,046
Credit default swaps	-	40	2	75
Financial futures	15	257	142	2,410
Total	\$ 14,807	\$ 152,990	\$ 8,516	\$ 138,811

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NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
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	December 31, 2021			
	Assets		Liabilities	
	Carrying Value	Notional Amount	Carrying Value	Notional Amount
	(In Millions)			
Interest rate swaps	\$ 15,004	\$ 112,580	\$ 10,598	\$ 123,919
Options	321	15,970	4	-
Currency swaps	948	12,662	200	5,363
Forward contracts	68	4,532	69	5,041
Credit default swaps	-	60	1	35
Financial futures	38	2,303	5	373
Total	\$ 16,379	\$ 148,107	\$ 10,877	\$ 134,731

The average fair value of outstanding derivative assets was \$15,124 million for the three months ended March 31, 2022 and \$16,965 million for the three months ended March 31, 2021. The average fair value of outstanding derivative liabilities was \$9,069 million for the three months ended March 31, 2022 and \$13,479 million for the three months ended March 31, 2021.

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

	March 31, 2022	December 31, 2021
	(In Millions)	
	Due after one year through five years	\$ 115
Total	\$ 115	\$ 95

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:

	Three Months Ended March 31,			
	2022		2021	
	Net Realized (Losses) Gains on Closed Contracts	Change In Net Unrealized (Losses) Gains On Open Contracts	Net Realized Gains (Losses) on Closed Contracts	Change In Net Unrealized Gains (Losses) on Open Contracts
	(In Millions)			
Interest rate swaps	\$ 24	\$ 421	\$ (115)	\$ (431)
Currency swaps	11	332	(36)	34
Options	(6)	137	(70)	140
Credit default swaps	(10)	-	1	-
Forward contracts	47	25	(229)	322
Financial futures	(157)	(159)	(400)	(103)
Total	\$ (91)	\$ 756	\$ (849)	\$ (38)

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

	March 31, 2022			December 31, 2021		
	Derivative Assets	Derivative Liabilities	Net	Derivative Assets	Derivative Liabilities	Net
	(In Millions)					
Gross	\$ 16,379	\$ 10,877	\$ 5,502	\$ 16,379	\$ 10,877	\$ 5,502
Due and accrued	1,093	1,769	(676)	1,093	1,769	(676)
Gross amounts	(12,429)	(12,429)	-	(12,429)	(12,429)	-
Net asset	5,043	217	4,826	5,043	217	4,826
Collateral posted	(4,895)	(1,677)	(3,218)	(6,873)	(1,503)	(5,370)
Net	\$ 148	\$ (1,460)	\$ 1,608	\$ (1,830)	\$ (1,286)	\$ (544)

f. Net investment income

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

	Three Months Ended	
	March 31,	
	2022	2021
	(In Millions)	
Bonds	\$ 1,132	\$ 1,071
Preferred stocks	11	4
Common stocks - subsidiaries and affiliates	-	(4)
Common stocks - unaffiliated	30	10
Mortgage loans	301	231
Policy loans	282	261
Real estate	56	44
Partnerships and limited liability companies	153	126
Derivatives	116	123
Cash, cash equivalents and short-term investments	11	5
Other	32	2
Subtotal investment income	2,124	1,873
Amortization of the IMR	23	30
Investment expenses	(201)	(196)
Net investment income	\$ 1,946	\$ 1,707

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NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
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g. Net realized capital losses

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

	Three Months Ended March 31,	
	2022	2021
	<u>(In Millions)</u>	
Bonds	\$ (368)	\$ 77
Preferred stocks	(6)	-
Common stocks - subsidiaries and affiliates	-	1
Common stocks - unaffiliated	29	7
Mortgage loans	(1)	(2)
Real estate	55	-
Partnerships and limited liability companies	(2)	(20)
Derivatives	(91)	(849)
Other	(19)	(3)
Net realized capital losses before federal and state taxes and deferral to the IMR	<u>(403)</u>	<u>(789)</u>
Net federal and state tax benefit (expense)	16	(21)
Net realized capital losses before deferral to the IMR	<u>(387)</u>	<u>(810)</u>
Net after tax losses deferred to the IMR	265	332
Net realized capital losses	<u>\$ (122)</u>	<u>\$ (478)</u>

The IMR liability balance was \$1,265 million as of March 31, 2022 and \$1,552 million as of December 31, 2021 and was included in other liabilities on the Statutory Statements of Financial Position.

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

	Three Months Ended March 31,	
	2022	2021
	<u>(In Millions)</u>	
Bonds	\$ (236)	\$ (30)
Common stocks - unaffiliated	-	(7)
Preferred stocks	(6)	-
Mortgage loans	-	(4)
Partnerships and limited liability companies	(6)	(19)
Total OTTI	<u>\$ (248)</u>	<u>\$ (60)</u>

The Company recognized OTTI of \$7 million for the three months ended March 31, 2022 and \$6 million for the three months ended March 31, 2021 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.

Refer to *Note 16. "Risk and uncertainties"* for further information on realized losses from Russia and Ukraine exposure.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
 NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
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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 1, 2022, MassMutual issued a \$300 million funding agreement with a 2.11% fixed rate and a 6.5-year maturity.

On February 1, 2022, MassMutual issued a \$300 million funding agreement with a 2.26% fixed rate and a 9-year maturity.

On March 16, 2022, MassMutual issued a \$600 million funding agreement with \$300 million at a fixed rate of treasury rate plus 0.75% and \$300 million with a floating rate based on the Secured Overnight Financing Rate plus 0.87% and a 3-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, 2021	\$	211
Incurred guarantee benefits		(166)
Paid guarantee benefits		(3)
Liability as of December 31, 2021		42
Incurred guarantee benefits		(20)
Paid guarantee benefits		(1)
Liability as of March 31, 2022	\$	21

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NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
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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.

	March 31, 2022			December 31, 2021		
	Account Value	Net Amount at Risk	Weighted Average Attained Age	Account Value	Net Amount at Risk	Weighted Average Attained Age
	(\$ In Millions)					
GMDB	\$ 10,496	\$ 74	66	\$ 11,423	\$ 41	66
GMIB Basic	598	7	71	674	4	71
GMIB Plus	1,444	265	68	1,565	158	68
GMAB	2,003	19	62	2,219	1	62
GLWB	123	11	73	136	6	73

As of March 31, 2022, the GMDB account value above consists of \$1,263 million within the general account and \$9,233 million within separate accounts. As of December 31, 2021, the GMDB account value above consists of \$1,263 million within the general account and \$10,160 million within separate accounts.

9. Reinsurance

For the three months ended March 31, 2022, the Company increased its gross LTC policyholders' reserve by \$40 million through a combination of various assumption changes to reflect the risk inherent in the cash flows of this business. The majority of the risk is ceded to an unaffiliated reinsurer resulting in the ceded policyholders' reserves decreasing by \$10 million. The total net impact of the change is \$50 million.

Effective February 1, 2022, approximately \$14.2 billion of in force statutory reserves of certain GALIC's fixed and fixed indexed annuities had been reinsured, on a coinsurance with funds withheld basis to Martello Re, a Bermuda reinsurer focusing on annuities and other investment returns driven products. MassMutual has a noncontrolling interest in Martello Re

10. Withdrawal characteristics

No significant changes.

11. Debt

No significant changes

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:

	Three Months Ended March 31,			
	2022	2021	2022	2021
	Pension Benefits		Other Postretirement Benefits	
	(In Millions)			
Service cost	\$ 24	\$ 28	\$ 2	\$ 3
Interest cost	21	19	3	2
Expected return on plan assets	(48)	(46)	-	-
Amortization of unrecognized net actuarial and other losses	2	10	-	-
Amortization of unrecognized prior service cost	-	-	(1)	(1)
Total net periodic cost	\$ (1)	\$ 11	\$ 4	\$ 4

13. *Employee compensation plans*

No significant changes.

14. *Surplus notes*

No significant changes

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15. Presentation of the 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 three months ended March 31, 2022 and 2021. Accordingly, the Company has excluded these non-cash activities from the Statutory Statements of Cash Flows for the three months ended March 31, 2022 and 2021.

	Three Months Ended March 31,	
	2022	2021
	(In Millions)	
Bond conversions and refinancing	\$ 127	\$ 168
Stock conversion	52	-
Change in market value of corporate owned life insurance asset	(19)	60
Net investment income payment in-kind bonds	5	7
Transfer of stocks to partnerships	5	-
Surplus notes issued in exchange for bonds	-	233
Bonds received as consideration for surplus notes	-	(233)
Premium income recognized for group annuity contracts	-	54
Bonds received as consideration for group annuity contracts	-	(53)
Exchange of mortgage loans for other assets	-	18
Transfer of mortgage loans to partnerships and limited liability companies	-	11
Common stock received as consideration for group annuity contracts	-	(1)

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 2021 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 a 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.

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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.

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NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
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The spread of the coronavirus, causing increased cases of COVID-19, 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.

Total realized loss from Russian exposure for the quarter was \$320 million. On March 25, 2022, all Russia securities and Ukraine sovereign investments were impaired to market value due to intent to sell. This resulted in an impaired realized loss of \$225 million. Some Russia related securities were sold during the quarter resulting in a realized loss of \$95 million. Total statutory surplus decreased by \$320 million. Ukraine corporate bonds were not impaired as the current plan is to not sell and hold to recovery.

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.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
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17. Related party transactions

No significant changes.

18. Subsequent events

Management of the Company has evaluated subsequent events through May 13, 2022, 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.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
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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
March 31, 2022	\$ 30,135,996	\$ -	\$ 30,135,996	\$ 23,857,778	\$ (6,278,218)	\$ 23,857,778	\$ 23,674,371
December 31, 2021	6,658,614	-	6,658,615	6,490,508	(168,107)	6,490,508	6,369,198
September 30, 2021	4,061,382	-	4,061,382	3,955,723	(105,659)	3,955,723	3,595,213
June 30, 2021	11,352,643	-	11,352,642	10,386,581	(966,063)	10,386,581	11,323,900
March 31, 2021	11,247,256	-	11,247,257	5,074,493	(6,172,764)	5,074,493	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)			\$ (672,114,546)		

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The following is the impairment listing for loan-backed and structured securities for the three months ended March 31, 2022:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
00256DAA0	\$ 1,762,699	\$ -	\$ 1,762,699	\$ 1,364,210	\$ -398,489	\$ 1,364,210	\$ 1,122,333
07388VAH1	2,364,730	-	2,364,730	244,594	-2,120,137	244,594	244,594
22545XBB8	1,683,921	-	1,683,921	211,871	-1,472,050	211,871	210,934
00442FAB8	70,075	-	70,075	52,264	-17,811	52,264	10,685
040104TF8	59,249	-	59,249	53,852	-5,397	53,852	41,892
040104TG6	623,388	-	623,388	531,410	-91,978	531,410	545,952
04012XAC9	178,777	-	178,777	162,199	-16,578	162,199	136,446
1248MGAJ3	52,182	-	52,182	51,033	-1,149	51,033	45,331
17311YAC7	1,623,994	-	1,623,994	1,327,822	-296,172	1,327,822	1,502,602
24763LFY1	134,155	-	134,155	67,703	-66,452	67,703	106,050
35729RAE6	4,416,912	-	4,416,912	4,231,274	-185,638	4,231,274	3,947,591
40431KAE0	2,521,316	-	2,521,316	2,214,702	-306,614	2,214,702	2,513,960
45071KDD3	488,363	-	488,363	436,903	-51,460	436,903	448,752
55291KAC1	633,248	-	633,248	169,402	-463,846	169,402	598,172
57643LMP8	906,102	-	906,102	809,314	-96,788	809,314	815,499
617463AA2	10,553	-	10,553	9,894	-659	9,894	8,101
61750FAE0	509,354	-	509,354	473,873	-35,481	473,873	435,242
617526AE8	262,688	-	262,688	214,229	-48,459	214,229	243,939
86359DXD4	304,264	-	304,264	279,462	-24,802	279,462	275,224
07384YPP5	314,885	-	314,885	207,555	-107,330	207,555	66,352
32053LAA0	27,875	-	27,875	22,820	-5,055	22,820	25,221
45660LAU3	78,731	-	78,731	75,334	-3,397	75,334	76,824
59020UW43	176,900	-	176,900	108,489	-68,411	108,489	132,229
65535VRK6	592,663	-	592,663	536,987	-55,676	536,987	561,983
761118FM5	1,932,729	-	1,932,729	1,911,872	-20,857	1,911,872	1,863,619
76112HAE7	13,536	-	13,536	10,283	-3,253	10,283	13,495
92978EAA2	102,806	-	102,806	97,782	-5,024	97,782	94,757
93935PAH2	137,585	-	137,585	115,483	-22,102	115,483	131,766
41161PWB5	884,324	-	884,324	852,993	-31,331	852,993	771,130
45660N5H4	1,600,750	-	1,600,750	1,533,921	-66,829	1,533,921	1,444,261
36298XAB8	5,320,204	-	5,320,204	5,307,865	-12,338	5,307,865	5,034,048
55274SAM3	177,495	-	177,495	25,133	-152,362	25,133	29,827
59024WAB3	137,567	-	137,567	119,223	-18,344	119,223	142,528
94984GAD9	31,976	-	31,976	26,026	-5,950	26,026	33,031
Totals	\$ 30,135,997	\$ -	\$ 30,135,997	\$ 23,857,778	\$ (6,278,218)	\$ 23,857,778	\$ 23,674,371

The following is the impairment listing for loan-backed and structured securities for the three months ended December 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
040104TF8	\$ 59,686	\$ -	\$ 59,686	\$ 59,300	\$ -386	\$ 59,300	\$ 49,870
04012XAC9	130,314	-	130,314	122,160	-8,154	122,160	107,581
1248MGAJ3	35,096	-	35,096	34,855	-241	34,855	31,996
35729RAE6	4,028,108	-	4,028,108	3,999,290	-28,818	3,999,290	3,995,059
617463AA2	6,685	-	6,685	5,767	-918	5,767	5,247
61749BAB9	61,698	-	61,698	51,363	-10,335	51,363	60,638
61750FAE0	342,930	-	342,930	319,304	-23,626	319,304	307,808
61750MAB1	3,456	-	3,456	3,113	-343	3,113	3,182

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86359DXD4	335,476	-	335,476	308,315	-27,161	308,315	309,361
92926SAB2	558	-	558	494	-64	494	521
45660LYW3	677,413	-	677,413	675,162	-2,251	675,162	630,760
79548KXQ6	51,835	-	51,835	37,121	-14,714	37,121	65,254
92978EAA2	75,569	-	75,569	72,635	-2,934	72,635	72,325
41161PWB5	822,378	-	822,378	776,768	-45,610	776,768	706,114
55274SAM3	27,413	-	27,413	24,861	-2,552	24,861	23,482
Totals	\$ 6,658,614	\$ -	\$ 6,658,615	\$ 6,490,508	\$ (168,107)	\$ 6,490,508	\$ 6,369,198

The following is the impairment listing for loan-backed and structured securities for the three months ended September 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
00442FAB8	\$ 95,903	\$ -	\$ 95,903	\$ 70,276	\$ (25,627)	\$ 70,276	\$ 60,821
86359DXD4	359,657	-	359,657	339,761	(19,896)	339,761	337,895
05535DAN4	1,260,315	-	1,260,315	1,255,426	(4,889)	1,255,426	1,020,099
073879QF8	247,750	-	247,750	226,078	(21,672)	226,078	256,430
45660LYW3	907,047	-	907,047	906,647	(400)	906,647	879,977
92978EAA2	110,354	-	110,354	108,384	(1,970)	108,384	106,564
41161PWB5	1,049,397	-	1,049,397	1,023,087	(26,310)	1,023,087	908,082
55274SAM3	30,959	-	30,959	26,064	(4,895)	26,064	25,345
Totals	\$ 4,061,382	\$ -	\$ 4,061,382	\$ 3,955,723	\$ (105,659)	\$ 3,955,723	\$ 3,595,213

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	364,962	(29,764)	364,962	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	96,976	(24,616)	96,976	97,070
92978EAA2	115,502	-	115,502	112,103	(3,399)	112,103	110,484
41161PWB5	1,112,829	-	1,112,829	1,079,359	(33,470)	1,079,359	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	\$ -	\$ 11,352,642	\$ 10,386,581	\$ (966,063)	\$ 10,386,581	\$ 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	2,505,561	(55,385)	2,505,561	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	20,286	(133,639)	20,286	173,435
55274SAM3	38,192	-	38,192	33,418	(4,774)	33,418	84,650
86359DME4	480,180	-	480,180	480,135	(45)	480,135	498,095
Totals	\$ 11,247,256	\$ -	\$ 11,247,257	\$ 5,074,493	\$ (6,172,764)	\$ 5,074,493	\$ 5,237,174

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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

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

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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
05535DCP9	\$ 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
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

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
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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

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

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
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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

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

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
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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