

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY

INTERIM STATUTORY FINANCIAL STATEMENTS

As of September 30, 2021 and December 31, 2020 and for the nine months ended
September 30, 2021 and 2020

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)

	September 30, 2021	December 31, 2020
(In Millions)		
Assets:		
Bonds	\$ 119,494	\$ 114,684
Preferred stocks	543	470
Common stocks – subsidiaries and affiliates	24,559	19,895
Common stocks – unaffiliated	1,214	1,192
Mortgage loans	26,841	26,078
Policy loans	16,056	15,597
Real estate	394	362
Partnerships and limited liability companies	11,852	9,534
Derivatives	16,593	21,076
Cash, cash equivalents and short-term investments	6,357	5,738
Other invested assets	1,492	1,503
Total invested assets	225,395	216,129
Investment income due and accrued	3,045	3,859
Net deferred income taxes	649	509
Other than invested assets	4,264	3,996
Total assets excluding separate accounts	233,353	224,493
Separate account assets	75,858	75,966
Total assets	\$ 309,211	\$ 300,459
Liabilities and Surplus:		
Policyholders' reserves	\$ 134,877	\$ 125,167
Liabilities for deposit-type contracts	16,880	14,580
Contract claims and other benefits	735	726
Policyholders' dividends	1,785	1,708
General expenses due or accrued	1,354	1,253
Federal income taxes	89	670
Asset valuation reserve	6,153	5,205
Repurchase agreements	2,909	4,006
Commercial paper	1,120	250
Collateral	5,280	5,551
Derivatives	11,319	17,349
Funds held under coinsurance	18,573	17,929
Other liabilities	6,609	5,772
Total liabilities excluding separate accounts	207,683	200,166
Separate account liabilities	75,708	75,966
Total liabilities	283,391	276,132
Surplus	25,820	24,327
Total liabilities and surplus	\$ 309,211	\$ 300,459

See notes to interim statutory financial statements

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

	Nine Months Ended September 30,	
	2021	2020
	<u>(In Millions)</u>	
Revenue:		
Premium income	\$ 14,552	\$ 19,999
Net investment income	5,962	5,500
Fees and other income	906	976
Total revenue	<u>21,420</u>	<u>26,475</u>
Benefits, expenses and other deductions:		
Policyholders' benefits	8,352	17,142
Change in policyholders' reserves	8,617	6,056
General insurance expenses	1,663	1,660
Commissions	874	811
State taxes, licenses and fees	255	201
Other deductions	713	270
Total benefits, expenses and other deductions	<u>20,474</u>	<u>26,140</u>
Net gain from operations before dividends and federal income taxes	946	335
Dividends to policyholders	1,248	1,227
Net loss from operations before federal income taxes	(302)	(892)
Federal income tax benefit	(45)	(236)
Net loss from operations	(257)	(656)
Net realized capital losses	(861)	(394)
Net loss	<u>\$ (1,118)</u>	<u>\$ (1,050)</u>

See notes to interim statutory financial statements

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

	Nine Months Ended	
	September 30,	
	2021	2020
	<u>(In Millions)</u>	
Surplus, beginning of year	\$ 24,327	\$ 18,893
Net increase/(decrease) due to:		
Net loss	(1,118)	(1,050)
Change in net unrealized capital gains, net of tax	3,375	3,538
Change in net unrealized foreign exchange capital		
(losses) gains, net of tax	(613)	200
Change in other net deferred income taxes	454	5
Change in nonadmitted assets	6	72
Change in asset valuation reserve	(948)	(611)
Change in reserve valuation basis	-	18
Change in surplus notes	234	1,537
Prior period adjustments	14	30
Other	89	(19)
Net increase	<u>1,493</u>	<u>3,720</u>
Surplus, end of period	<u>\$ 25,820</u>	<u>\$ 22,613</u>

See notes to interim statutory financial statements

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

	Nine Months Ended	
	September 30, 2021	2020
	(In Millions)	
Cash from operations:		
Premium and other income collected	\$ 14,873	\$ 17,580
Net investment income	7,126	5,491
Benefit payments	(8,316)	(17,533)
Net transfers from separate accounts	1,030	1,706
Commissions and other expenses	(3,481)	(2,766)
Dividends paid to policyholders	(1,176)	(1,163)
Federal and foreign income taxes (paid) recovered	(607)	101
Net cash from operations	9,449	3,416
Cash from investments:		
Proceeds from investments sold, matured or repaid:		
Bonds	26,784	15,073
Preferred and common stocks – unaffiliated	449	473
Common stocks – affiliated	42	8
Mortgage loans	3,106	2,335
Real estate	75	1
Partnerships and limited liability companies	405	830
Derivatives	(634)	1,828
Other	122	1,105
Total investment proceeds	30,349	21,653
Cost of investments acquired:		
Bonds	(31,239)	(27,945)
Preferred and common stocks – unaffiliated	(355)	(176)
Common stocks – affiliated	(3,751)	(120)
Mortgage loans	(3,902)	(3,334)
Real estate	(150)	(75)
Partnerships and limited liability companies	(2,222)	(1,056)
Derivatives	(46)	(345)
Other	367	690
Total investments acquired	(41,298)	(32,361)
Net increase in policy loans	(458)	(774)
Net cash used in investing activities	(11,407)	(11,482)
Cash from financing and miscellaneous sources:		
Net deposits on deposit-type contracts	2,277	2,670
Net cash provided by surplus notes	-	697
Change in repurchase agreements	(1,097)	268
Change in collateral	(282)	3,153
Other cash provided	1,679	7,034
Net cash provided from financing and miscellaneous sources	2,577	13,822
Net change in cash, cash equivalents and short-term investments	619	5,756
Cash, cash equivalents and short-term investments:		
Beginning of year	5,738	3,793
End of period	\$ 6,357	\$ 9,549

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 September 30, 2021 and December 31, 2020, and for the nine months ended September 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 \$603 million as of September 30, 2021 for a portion of its noncontrolling interests. Glidepath is valued on its underlying GAAP equity with adjustment to recognize its investment in GALIC based on GALIC's underlying statutory surplus, adjusted for any unamortized goodwill that would have been

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

recognized 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 amortized cost for NAIC 1-3 designations, the lower of amortized 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:

	September 30, 2021				
	Carrying	Fair			
	Value	Value	Level1	Level2	Level3
	(In Millions)				
Financial assets:					
Bonds:					
U. S. government and agencies	\$ 4,176	\$ 4,814	\$ -	\$ 4,814	\$ -
All other governments	1,739	1,875	-	1,779	96
States, territories and possessions	327	383	-	383	-
Political subdivisions	442	507	-	507	-
Special revenue	4,786	5,640	-	5,630	10
Industrial and miscellaneous	101,375	107,904	514	55,852	51,538
Parent, subsidiaries and affiliates	6,649	6,717	-	-	6,717
Preferred stocks	543	647	5	-	642
Common stocks - subsidiaries and affiliates	359	359	140	-	219
Common stocks - unaffiliated	1,214	1,214	565	-	649
Mortgage loans - commercial	22,049	22,926	-	-	22,926
Mortgage loans - residential	4,792	4,836	-	-	4,836
Derivatives:					
Interest rate swaps	15,224	16,128	-	16,128	-
Options	354	354	17	337	-
Currency swaps	866	866	-	866	-
Forward contracts	132	132	-	132	-
Credit default swaps	-	1	-	1	-
Financial futures	17	17	17	-	-
Cash, cash equivalents and short-term investments	6,357	6,357	907	5,450	-
Separate account assets	75,858	75,858	51,655	22,183	2,020
Financial liabilities:					
GICs	13,737	13,792	-	-	13,792
Group annuity contracts and other deposits	1,745	1,824	-	-	1,824
Individual annuity contracts	11,486	13,883	-	-	13,883
Supplementary contracts	1,154	1,156	-	-	1,156
Repurchase agreements	2,909	2,909	-	2,909	-
Commercial paper	1,120	1,120	-	1,120	-
Derivatives:					
Interest rate swaps	10,925	12,017	-	12,017	-
Currency swaps	248	248	-	248	-
Forward contracts	9	9	-	9	-
Credit default swaps	1	2	-	2	-
Financial futures	136	136	136	-	-

Common stocks - subsidiaries and affiliates do not include unconsolidated subsidiaries, which had statutory carrying values of \$24,200 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	272	5,466	-
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:

	September 30, 2021			
	Level 1	Level 2	Level 3	Total
	(In Millions)			
Financial assets:				
Bonds:				
Special revenue	\$ -	\$ 2	\$ -	\$ 2
Industrial and miscellaneous	512	208	159	879
Preferred stocks	5	-	21	26
Common stocks - subsidiaries and affiliates	140	-	219	359
Common stocks - unaffiliated	565	-	649	1,214
Derivatives:				
Interest rate swaps	-	15,224	-	15,224
Options	17	337	-	354
Currency swaps	-	866	-	866
Forward contracts	-	132	-	132
Credit default swaps	-	1	-	1
Financial futures	17	-	-	17
Separate account assets	51,655	22,183	2,020	75,858
Total financial assets carried at fair value	\$ 52,911	\$ 38,953	\$ 3,068	\$ 94,932
Financial liabilities:				
Derivatives:				
Interest rate swaps	\$ -	\$ 10,925	\$ -	\$ 10,925
Currency swaps	-	248	-	248
Forward contracts	-	9	-	9
Credit default swaps	-	1	-	1
Financial futures	136	-	-	136
Total financial liabilities carried at fair value	\$ 136	\$ 11,183	\$ -	\$ 11,319

For the nine months ended September 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 09/30/21
								In	Out	Other	
(In Millions)											
Financial assets:											
Bonds:											
Industrial and miscellaneous	\$ 112	\$ (18)	\$ 13	\$ 2	\$ 2	\$ (4)	\$ (2)	\$ -	\$ (1)	\$ 55	\$ 159
Preferred stocks	18	-	2	-	-	-	-	-	-	1	21
Common stocks - subsidiaries and affiliates	189	-	(159)	14	177	-	(3)	-	-	1	219
Common stocks - unaffiliated	412	1	77	166	-	(4)	(3)	-	-	-	649
Separate account assets	1,834	18	-	274	-	(106)	-	-	-	-	2,020
Total financial assets	\$ 2,565	\$ (2)	\$ (72)	\$ 466	\$ 179	\$ (114)	\$ (8)	\$ 24	\$ (27)	\$ 57	\$ 3,068

	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	\$ 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	\$ 1,478	\$ 66	\$ 9	\$ 1,006	\$ 58	\$ (25)	\$ (42)	\$ 3	\$ (28)	\$ 40	\$ 2,565

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:

	September 30, 2021			
	Carrying	Gross	Gross	Fair
	Value	Unrealized Gains	Unrealized Losses	Value
(In Millions)				
U.S. government and agencies	\$ 4,176	\$ 646	\$ 8	\$ 4,814
All other governments	1,739	149	13	1,875
States, territories and possessions	327	56	-	383
Political subdivisions	442	65	-	507
Special revenue	4,786	857	3	5,640
Industrial and miscellaneous	101,375	7,058	529	107,904
Parent, subsidiaries and affiliates	6,649	75	7	6,717
Total	\$ 119,494	\$ 8,907	\$ 561	\$ 127,840

The September 30, 2021 gross unrealized losses exclude \$65 million of losses included in the carrying value. These losses include \$58 million from NAIC Class 6 bonds and \$7 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
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As of September 30, 2021, investments in structured and loan-backed securities that had unrealized losses, which were not recognized in earnings, had a fair value of \$3,557 million. Securities in an unrealized loss position for less than 12 months had a fair value of \$1,834 million and unrealized losses of \$41 million. Securities in an unrealized loss position for greater than 12 months had a fair value of \$1,723 million and unrealized losses of \$107 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 nine months ended September 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 September 30, 2021, RMBS had a total carrying value of \$1,976 million and a fair value of \$2,078 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 \$916 million and a fair value of \$971 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 \$1,200 million in dividends to MassMutual for the nine months ended September 30, 2021, \$1,000 million of which were declared in 2020. MMHLLC paid \$200 million in dividends for the nine months ended September 30, 2020, which were declared in 2019.

MassMutual contributed capital of \$167 million to MMHLLC for the nine months ended September 30, 2021 and \$64 million for the nine months ended September 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
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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:

	September 30, 2021		December 31, 2020	
	Carrying Value	Fair Value	Carrying Value	Fair Value
	(In Millions)			
Commercial mortgage loans:				
Primary lender	\$ 21,929	\$ 22,805	\$ 22,116	\$ 23,048
Mezzanine loans	120	121	100	102
Total commercial mortgage loans	22,049	22,926	22,216	23,150
Residential mortgage loans:				
FHA insured and VA guaranteed	4,245	4,279	3,127	3,158
Other residential loans	547	557	735	727
Total residential mortgage loans	4,792	4,836	3,862	3,885
Total mortgage loans	\$ 26,841	\$ 27,762	\$ 26,078	\$ 27,035

As of September 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
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As of September 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 September 30, 2021 and as of December 31, 2020:

		September 30, 2021				
		Average	Unpaid			
		Carrying	Carrying	Principal	Valuation	Interest
		Value	Value	Balance	Allowance	Income
		(In Millions)				
With allowance recorded:						
Commercial mortgage loans:						
Primary lender	\$	31	\$ 31	\$ 34	\$ (4)	\$ 1
Total		31	31	34	(4)	1
With no allowance recorded:						
Commercial mortgage loans:						
Primary lender	\$	58	\$ 56	\$ 105	\$ -	\$ -
Total		58	56	105	-	-
Total impaired commercial mortgage loans	\$	89	\$ 87	\$ 139	\$ (4)	\$ 1

		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 CMLLC, a wholly owned subsidiary of MassMutual, owns Flourish.

In September 2021, the Company recognized a \$411 million other-than-temporary-impairment (OTTI) from one investment.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
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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 an asset/liability analysis. 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 \$22,515 million as of September 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 \$4,124 million as of September 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 \$121 million as of September 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 \$885 million as of September 30, 2021 and \$296 million as of December 31, 2020.

The Company had the right to rehypothecate or repledge securities totaling \$286 million of the \$4,124 million as of September 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 September 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:

	September 30, 2021			
	Assets		Liabilities	
	Carrying Value	Notional Amount	Carrying Value	Notional Amount
	(In Millions)			
Interest rate swaps	\$ 15,224	\$ 114,051	\$ 10,925	\$ 124,203
Options	354	15,731	-	-
Currency swaps	866	11,307	248	5,401
Forward contracts	132	6,879	9	1,478
Credit default swaps	-	60	1	35
Financial futures	17	291	136	2,585
Total	\$ 16,593	\$ 148,319	\$ 11,319	\$ 133,702

	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 \$16,900 million for the nine months ended September 30, 2021 and \$26,823 million for the nine months ended September 30, 2020. The average fair value of outstanding derivative liabilities was \$12,732 million for the nine months ended September 30, 2021 and \$19,916 million for the nine months ended September 30, 2020.

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

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

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
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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:

	Nine Months Ended September 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	\$ (313)	\$ 351	\$ 318	\$ 2,857
Currency swaps	(30)	965	137	574
Options	(126)	108	500	(61)
Credit default swaps	2	-	8	-
Interest rate caps				
Forward contracts	(63)	340	(101)	142
Financial futures	(246)	(62)	539	74
Total	\$ (776)	\$ 1,702	\$ 1,401	\$ 3,586

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

	September 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	(11,835)	(11,835)	-	(17,273)	(17,273)	-
Net asset	4,303	1,566	2,737	4,833	1,683	3,150
Collateral posted	(5,567)	(1,442)	(4,125)	(6,381)	(1,532)	(4,849)
Net	\$ (1,264)	\$ 124	\$ (1,388)	\$ (1,548)	\$ 151	\$ (1,699)

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
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f. Net investment income

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

	Nine Months Ended	
	September 30,	
	2021	2020
	<u>(In Millions)</u>	
Bonds	\$ 3,299	\$ 3,302
Preferred stocks	14	14
Common stocks - subsidiaries and affiliates	200	238
Common stocks - unaffiliated	16	29
Mortgage loans	820	910
Policy loans	815	710
Real estate	115	65
Partnerships and limited liability companies	740	249
Derivatives	326	344
Cash, cash equivalents and short-term investments	13	88
Other	<u>6</u>	<u>36</u>
Subtotal investment income	6,364	5,985
Amortization of the IMR	114	40
Investment expenses	<u>(516)</u>	<u>(525)</u>
Net investment income	<u><u>\$ 5,962</u></u>	<u><u>\$ 5,500</u></u>

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
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g. Net realized capital (losses) gains

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

	Nine Months Ended	
	September 30,	
	2021	2020
	<u>(In Millions)</u>	
Bonds	\$ 208	\$ (55)
Preferred stocks	(2)	(20)
Common stocks - subsidiaries and affiliates	9	1
Common stocks - unaffiliated	111	(112)
Mortgage loans	1	(58)
Real estate	24	(30)
Partnerships and limited liability companies	(550)	(74)
Derivatives	(776)	1,401
Other	7	37
Net realized capital (losses) gains before federal and state taxes and deferral to the IMR	<u>(968)</u>	<u>1,090</u>
Net federal and state tax expense	(79)	(178)
Net realized capital (losses) gains before deferral to the IMR	<u>(1,047)</u>	<u>912</u>
Net after tax losses (gains) deferred to the IMR	186	(1,306)
Net realized capital (losses)	<u>\$ (861)</u>	<u>\$ (394)</u>

The IMR liability balance was \$1,784 million as of September 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:

	Nine Months Ended	
	September 30,	
	2021	2020
	<u>(In Millions)</u>	
Bonds	\$ (50)	\$ (121)
Common stocks - unaffiliated	(10)	(80)
Preferred stocks	(2)	-
Mortgage loans	(7)	(12)
Partnerships and limited liability companies	<u>(455)</u>	<u>(78)</u>
Total OTTI	<u>\$ (524)</u>	<u>\$ (291)</u>

The Company recognized OTTI of \$7 million for the nine months ended September 30, 2021 and \$8 million for the nine months ended September 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
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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 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 SOFR plus 0.22% and a 2-year maturity.

On July 16, 2021, MassMutual issued a \$600 million funding agreement with a 1.20% fixed rate and a 5-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		(175)
Paid guarantee benefits		(2)
Liability as of September 30, 2021	\$	34

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
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.

	September 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	\$ 11,273	\$ 44	65	\$ 11,434	\$ 36	65
GMIB Basic	677	7	71	705	11	70
GMIB Plus	1,528	163	67	1,494	185	67
GMAB	2,248	4	61	2,415	1	61
GLWB	138	7	73	146	7	72

As of September 30, 2021, the GMDB account value above consists of \$1,267 million within the general account and \$10,006 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

For the nine months ended September 30, 2021, the Company increased its gross LTC policyholders' reserve by \$2,370 million through a combination of various assumption changes to reflect the risk inherent in the cash flows of this business, totaling \$2,751 million, offset by a prior year error correction of \$381 million. The majority of the risk is ceded to an unaffiliated reinsurer resulting in the ceded policyholders' reserves increasing by an additional \$2,140 million. The total net impact of the change is \$230 million, which was recorded as an increase to policyholders' liabilities on the Interim Statutory Statements of Financial Position and an increase to change in policyholders' reserves on the Interim Statutory Statements of Operations.

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 September 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 \$0.4 million for the nine months ended September 30, 2021 and \$1.5 million for the nine months ended September 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.

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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:

	Nine Months Ended September 30,			
	2021	2020	2021	2020
	Pension Benefits		Other Postretirement Benefits	
	(In Millions)			
Service cost	\$ 82	\$ 86	\$ 8	\$ 11
Interest cost	58	73	7	8
Expected return on plan assets	(137)	(132)	-	-
Amortization of unrecognized net actuarial and other losses	29	38	1	1
Amortization of unrecognized prior service cost	-	-	(4)	(4)
Total net periodic cost	<u>\$ 32</u>	<u>\$ 65</u>	<u>\$ 12</u>	<u>\$ 16</u>

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 September 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	128	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	587	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	830	5.077%	02/15/2069	Feb 15 & Aug 15
03/01/2021	200	233	5.077%	02/15/2069	Feb 15 & Aug 15
Total	<u>\$ 4,007</u>	<u>\$ 4,006</u>			

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
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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 nine months ended September 30, 2021 and 2020. Accordingly, the Company has excluded these non-cash activities from the Statutory Statements of Cash Flows for the nine months ended September 30, 2021 and 2020.

	Nine Months Ended September 30,	
	2021	2020
	(In Millions)	
Premium income recognized for group annuity contracts	\$ 721	\$ 924
Bonds received as consideration for group annuity contracts	(720)	(924)
Bond conversions and refinancing	510	584
Surplus notes issued in exchange for bonds	233	837
Bonds received as consideration for surplus notes	(233)	(837)
Change in market value of corporate owned life insurance asset	214	40
Stock conversion	62	62
Exchange of mortgage loans for other assets	18	-
Net investment income payment in-kind bonds	14	8
Transfer of mortgage loans to partnerships and limited liability companies	11	353
Transfer of stocks to partnerships	4	-
Common stock received as consideration for group annuity contracts	(4)	-
Stock transferred in exchange for premium ceded	3	-
Premium income recognized for individual annuity contracts	-	3,736
Bonds received as consideration for individual annuity contracts	-	(3,720)
Assets received in-kind for bond maturity	-	57
Partnerships and LLCs received as consideration for individual annuity contracts	-	(15)
Preferred stock received as consideration for individual 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 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 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.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
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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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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, which was paid in September 2021.

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In May 2021, MassMutual entered into an intercompany loan agreement with its indirectly owned subsidiary Fem 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 November 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 October 21, 2021, MassMutual issued a \$500 million funding agreement with a floating rate based on SOFR plus 0.27% and a 3-year maturity.

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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
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	-	11,352,643	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)			\$ (665,668,223)		

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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	339,762	(19,896)	339,762	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	906,646	(400)	906,646	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	364,961	(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
36828QQI8	\$ 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

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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

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

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
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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
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
12667FZA2	\$ 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

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
NOTES TO INTERIM STATUTORY FINANCIAL STATEMENTS, continued
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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
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
05535DCP9	\$ 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

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, 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
2254INMA4	\$ 42,273	\$ -	\$ 42,273	\$ 41,434	\$ (839)	\$ 41,434	\$ 41,095
2254INMB2	11,869	-	11,869	11,634	(234)	11,634	11,535
2254ISSD1	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

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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, 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