

**MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
AND SUBSIDIARIES**

INTERIM CONSOLIDATED STATUTORY FINANCIAL STATEMENTS

As of September 30, 2022 and December 31, 2021 and for the nine months ended
September 30, 2022 and 2021

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

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

	September 30, 2022	December 31, 2021
(In Millions)		
Assets:		
Bonds	\$ 136,580	\$ 128,494
Preferred stocks	465	563
Common stocks – subsidiaries and affiliates	22,603	23,029
Common stocks – unaffiliated	1,383	1,284
Mortgage loans	25,578	27,394
Policy loans	16,957	16,356
Real estate	255	395
Partnerships and limited liability companies	12,733	12,724
Derivatives	24,505	17,008
Cash, cash equivalents and short-term investments	5,159	6,210
Other invested assets	2,703	1,577
Total invested assets	248,921	235,034
Investment income due and accrued	3,517	3,696
Federal income taxes	85	73
Net deferred income taxes	916	743
Other than invested assets	4,139	4,683
Total assets excluding separate accounts	257,578	244,229
Separate account assets	59,345	83,264
Total assets	\$ 316,923	\$ 327,493
 Liabilities and Surplus:		
Policyholders' reserves	\$ 150,742	\$ 142,293
Liabilities for deposit-type contracts	17,895	17,129
Contract claims and other benefits	690	800
Policyholders' dividends	1,913	1,828
General expenses due or accrued	1,108	1,385
Asset valuation reserve	5,856	6,525
Repurchase agreements	3,049	2,802
Commercial paper	250	250
Collateral	6,312	6,330
Derivatives	14,115	11,507
Funds held under coinsurance	21,695	19,255
Other liabilities	5,889	7,294
Total liabilities excluding separate accounts	229,514	217,398
Separate account liabilities	59,217	83,116
Total liabilities	288,731	300,514
Surplus	28,192	26,979
Total liabilities and surplus	\$ 316,923	\$ 327,493

See accompanying notes to interim consolidated statutory financial statements

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

	Nine Months Ended	
	September 30,	
	2022	2021
	<u>(In Millions)</u>	
Revenue:		
Premium income	\$ 15,647	\$ 14,766
Net investment income	6,725	6,161
Fees and other income	806	968
Total revenue	<u>23,178</u>	<u>21,895</u>
Benefits, expenses and other deductions:		
Policyholders' benefits	14,237	8,848
Change in policyholders' reserves	3,922	8,429
General insurance expenses	1,610	1,721
Commissions	961	895
State taxes, licenses and fees	243	264
Other deductions	445	707
Total benefits and expenses	<u>21,418</u>	<u>20,864</u>
Net gain from operations before dividends and federal income taxes	1,760	1,031
Dividends to policyholders	1,332	1,248
Net gain (loss) from operations before federal income taxes	428	(217)
Federal income tax benefit	(50)	(32)
Net gain (loss) from operations	478	(185)
Net realized capital gains (losses)	307	(870)
Net income (loss)	<u>\$ 785</u>	<u>\$ (1,055)</u>

See accompanying notes to interim consolidated statutory financial statements

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

	Nine Months Ended	
	September 30,	
	2022	2021
	(In Millions)	
Surplus, beginning of year	\$ 26,979	\$ 24,327
Net increase due to:		
Net income (loss)	785	(1,055)
Change in net unrealized capital gains, net of tax	2,431	3,325
Change in net unrealized foreign exchange capital losses, net of taxes	(2,791)	(630)
Change in other net deferred income taxes	345	463
Change in nonadmitted assets	(16)	6
Change in asset valuation reserve	669	(948)
Change in surplus notes	(24)	234
Prior period adjustments	(62)	14
Other	(124)	84
Net increase	<u>1,213</u>	<u>1,493</u>
Surplus, end of period	<u>\$ 28,192</u>	<u>\$ 25,820</u>

See accompanying notes to interim consolidated statutory financial statements

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

	Nine Months Ended September 30,	
	2022	2021
	(\$ In Millions)	
Cash from operations:		
Premium and other income collected	\$ 16,933	\$ 15,175
Net investment income	6,875	7,349
Benefit payments	(14,152)	(8,812)
Net transfers from separate accounts	4,784	1,214
Commissions and other expenses	(3,731)	(3,525)
Dividends paid to policyholders	(1,252)	(1,176)
Federal and foreign income taxes recovered	(4)	(636)
Net cash from operations	9,453	9,589
Cash from investments:		
Proceeds from investments sold, matured or repaid:		
Bonds	21,306	27,555
Preferred and common stocks – unaffiliated	368	449
Common stocks – affiliated	1	42
Mortgage loans	3,502	3,171
Real estate	243	75
Partnerships and limited liability companies	1,084	415
Derivatives	(399)	(682)
Other	(944)	174
Total investment proceeds	25,161	31,199
Cost of investments acquired:		
Bonds	(33,322)	(31,674)
Preferred and common stocks – unaffiliated	(345)	(361)
Common stocks – affiliated	(134)	(3,753)
Mortgage loans	(1,599)	(4,024)
Real estate	(37)	(150)
Partnerships and limited liability companies	(2,444)	(2,241)
Derivatives	(97)	(51)
Other	315	400
Total investments acquired	(37,663)	(41,854)
Net increase in policy loans	(600)	(449)
Net cash used in investing activities	(13,102)	(11,104)
Cash from financing and miscellaneous sources:		
Net deposits on deposit-type contracts	601	2,282
Cash provided by surplus note issuance	(25)	-
Change in repurchase agreements	247	(1,097)
Change in collateral	(38)	(369)
Other cash provided	1,812	1,706
Net cash provided from financing and miscellaneous sources	2,597	2,522
Net change in cash, cash equivalents and short-term investments	(1,052)	1,007
Cash, cash equivalents and short-term investments:		
Beginning of year	6,210	6,176
End of period	\$ 5,159	\$ 7,183

See accompanying notes to interim consolidated statutory financial statements

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

1. Nature of operations

Massachusetts Mutual Life Insurance Company (MassMutual), a mutual life insurance company domiciled in the Commonwealth of Massachusetts, and its domestic life insurance subsidiaries domiciled in the State of Connecticut (collectively, the Company), 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

These interim consolidated statutory financial statements include MassMutual and its wholly-owned U.S. domiciled life insurance subsidiary C.M. Life Insurance Company (C.M. Life), and C.M. Life's wholly-owned U.S. domiciled life insurance subsidiary, MML Bay State Life Insurance Company. All intercompany transactions and balances for these consolidated entities have been eliminated. Other subsidiaries and affiliates are accounted for under the equity method in accordance with statutory accounting practices. Statutory financial statements filed with regulatory authorities are not presented on a consolidated basis.

The interim consolidated 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; and for the wholly-owned U.S. domiciled life insurance subsidiaries, the State of Connecticut Insurance Department.

The interim consolidated statutory financial statements and notes as of September 30, 2022 and December 31, 2021 and for the nine months ended September 30, 2022 and 2021 are unaudited. The Interim Consolidated Statutory Statement of Financial Position as of December 31, 2021 has been derived from the audited consolidated 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 consolidated 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 consolidated statutory financial statements and notes should be read in conjunction with the consolidated statutory financial statements and notes thereto included in the Company's 2021 audited yearend financial statements as these interim consolidated 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 Consolidated Statutory Financial Statements included in the Company's 2021 audited consolidated yearend financial statements.

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

b. Common stocks - subsidiaries and affiliates

Common stocks of unconsolidated subsidiaries, primarily 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 \$1,406 million as of September 30, 2022 for a portion of its noncontrolling interests. Glidepath is valued on its underlying GAAP equity with adjustment to recognize its investment in MassMutual Ascend Life Insurance Company (formerly known as Great American Life Insurance Company) and other subsidiaries and affiliated entities (MM Ascend) based on MM Ascend'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 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 consolidated financial statements.

In June 2022, the NAIC adopted modifications to SSAP No. 25, *Affiliates and Other Related Parties* and SSAP No. 43R, *Loan-Backed and Structured Securities*, effective December 31, 2022. The modifications clarify application of the existing affiliate definition and incorporate disclosure requirements for all investments that involve related parties, regardless of whether they meet the affiliate definition. The revisions to SSAP No. 43R also included additional clarifications that the investments from any arrangements that results in direct or indirect control, which include but are not limited to control through a servicer, shall be reported as affiliated investments. The modifications are not expected to have a material effect on the Company's consolidated financial statements.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY AND SUBSIDIARIES
NOTES TO INTERIM CONSOLIDATED 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, 2022				
	Carrying Value	Fair Value	Level 1	Level 2	Level 3
(In Millions)					
Financial assets:					
Bonds:					
U. S. government and agencies	\$ 4,937	\$ 4,636	\$ -	\$ 4,636	\$ -
All other governments	1,657	1,342	-	1,258	84
States, territories and possessions	280	270	-	270	-
Political subdivisions	419	398	-	398	-
Special revenue	4,287	4,186	-	4,177	9
Industrial and miscellaneous	117,357	105,382	31	47,409	57,942
Parent, subsidiaries and affiliates	7,643	7,411	-	41	7,370
Preferred stocks	465	459	49	-	410
Common stocks - subsidiaries and affiliates	532	532	128	-	404
Common stocks - unaffiliated	1,383	1,383	467	4	912
Mortgage loans - commercial	21,134	19,350	-	-	19,350
Mortgage loans - residential	4,444	4,127	-	-	4,127
Derivatives:					
Interest rate swaps	18,968	19,115	-	19,115	-
Options	577	577	34	543	-
Currency swaps	4,557	4,557	-	4,557	-
Forward contracts	342	342	-	342	-
Credit default swaps	5	6	-	6	-
Financial futures	56	56	56	-	-
Cash, cash equivalents and short-term investments	5,159	5,159	863	4,296	-
Separate account assets	59,345	59,233	35,394	22,238	1,601
Financial liabilities:					
GICs	14,359	13,404	-	-	13,404
Group annuity contracts and other deposits	2,053	1,816	-	-	1,816
Individual annuity contracts	17,586	18,160	-	-	18,160
Supplementary contracts	1,260	1,262	-	-	1,262
Repurchase agreements	3,049	3,049	-	3,049	-
Commercial paper	250	250	-	250	-
Derivatives:					
Interest rate swaps	13,693	18,727	-	18,727	-
Options	11	11	11	-	-
Currency swaps	73	73	-	73	-
Forward contracts	65	65	-	65	-
Credit default swaps	1	1	-	1	-
Financial futures	272	272	272	-	-

Common stocks - subsidiaries and affiliates do not include unconsolidated subsidiaries, which had statutory carrying values of \$22,071 million.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY AND SUBSIDIARIES
NOTES TO INTERIM CONSOLIDATED 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	\$ 4,133	\$ 4,776	\$ -	\$ 4,776	\$ -
All other governments	1,846	1,970	-	1,909	61
States, territories and possessions	311	367	-	367	-
Political subdivisions	457	523	-	523	-
Special revenue	4,835	5,694	-	5,685	9
Industrial and miscellaneous	110,186	116,603	36	58,002	58,565
Parent, subsidiaries and affiliates	6,726	6,761	-	50	6,711
Preferred stocks	563	679	43	-	636
Common stocks - subsidiaries and affiliates	414	414	157	-	257
Common stocks - unaffiliated	1,284	1,284	526	-	758
Mortgage loans - commercial	22,309	23,060	-	-	23,060
Mortgage loans - residential	5,085	5,127	-	-	5,127
Derivatives:					
Interest rate swaps	15,556	16,794	-	16,794	-
Options	354	354	15	339	-
Currency swaps	984	984	-	984	-
Forward contracts	69	69	-	69	-
Credit default swaps	-	1	-	1	-
Financial futures	45	45	45	-	-
Cash, cash equivalents and short-term investments	6,210	6,210	1,552	4,658	-
Separate account assets	83,264	83,283	55,912	25,468	1,903
Financial liabilities:					
GICs	13,832	13,828	-	-	13,828
Group annuity contracts and other deposits	1,755	1,812	-	-	1,812
Individual annuity contracts	15,151	18,169	-	-	18,169
Supplementary contracts	1,246	1,248	-	-	1,248
Repurchase agreements	2,802	2,802	-	2,802	-
Commercial paper	250	250	-	250	-
Derivatives:					
Interest rate swaps	11,210	12,043	-	12,043	-
Options	14	14	4	10	-
Currency swaps	206	206	-	206	-
Forward contracts	71	71	-	71	-
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 \$22,615 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 AND SUBSIDIARIES
NOTES TO INTERIM CONSOLIDATED 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, 2022			
	Level 1	Level 2	Level 3	Total
	(In Millions)			
Financial assets:				
Bonds:				
All other governments	\$ -	\$ 5	\$ -	\$ 5
Special revenue	-	6	-	6
Industrial and miscellaneous	-	353	207	560
Preferred stocks	21	-	52	73
Common stocks - subsidiaries and affiliates	128	-	404	532
Common stocks - unaffiliated	467	4	912	1,383
Derivatives:				
Interest rate swaps	-	18,968	-	18,968
Options	35	542	-	577
Currency swaps	-	4,557	-	4,557
Forward contracts	-	342	-	342
Credit default swaps	-	5	-	5
Financial futures	56	-	-	56
Separate account assets	35,394	21,157	1,594	58,145
Total financial assets carried at fair value	\$ 36,101	\$ 45,939	\$ 3,169	\$ 85,209
Financial liabilities:				
Derivatives:				
Interest rate swaps	\$ -	\$ 13,693	\$ -	\$ 13,693
Options	11	-	-	11
Currency swaps	-	73	-	73
Forward contracts	-	65	-	65
Credit default swaps	-	1	-	1
Financial futures	272	-	-	272
Total financial liabilities carried at fair value	\$ 283	\$ 13,832	\$ -	\$ 14,115

The Company does not have any financial instruments that were carried at net asset value as a practical expedient.

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY AND SUBSIDIARIES
NOTES TO INTERIM CONSOLIDATED 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	252	206	503
Preferred stocks	43	-	18	61
Common stocks - subsidiaries and affiliates	157	-	258	415
Common stocks - unaffiliated	526	-	758	1,284
Derivatives:				
Interest rate swaps	-	15,556	-	15,556
Options	15	339	-	354
Currency swaps	-	984	-	984
Forward contracts	-	69	-	69
Financial futures	45	-	-	45
Separate account assets	55,912	24,226	1,894	82,032
Total financial assets carried at fair value	\$ 56,743	\$ 41,428	\$ 3,133	\$ 101,305
Financial liabilities:				
Derivatives:				
Interest rate swaps	\$ -	\$ 11,210	\$ -	\$ 11,210
Options	4	10	-	14
Currency swaps	-	206	-	206
Forward contracts	-	71	-	71
Credit default swaps	-	1	-	1
Financial futures	5	-	-	5
Total financial liabilities carried at fair value	\$ 9	\$ 11,498	\$ -	\$ 11,507

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 AND SUBSIDIARIES
NOTES TO INTERIM CONSOLIDATED 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 09/30/22
								In	Out	Other	
(In Millions)											
Financial assets:											
Bonds:											
Industrial and miscellaneous	\$ 206	\$ (1)	\$ (39)	\$ 16	\$ 8	\$ -	\$ (12)	\$ -	\$ -	\$ 29	\$ 207
Preferred stocks	18	-	-	-	-	-	-	34	-	-	52
Common stocks - subsidiaries and affiliates	258	-	(39)	9	179	-	(3)	-	-	-	404
Common stocks - unaffiliated	758	29	27	298	-	(27)	(170)	-	(3)	-	912
Separate account assets	1,894	(196)	-	169	-	(260)	-	-	(13)	-	1,594
Total financial assets	\$ 3,134	\$ (168)	\$ (51)	\$ 492	\$ 187	\$ (287)	\$ (185)	\$ 34	\$ (16)	\$ 29	\$ 3,169

	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	\$ 122	\$ (23)	\$ 4	\$ -	\$ 109	\$ -	\$ (1)	\$ -	\$ -	\$ (5)	\$ 206
Preferred stocks	19	-	(1)	-	-	-	-	-	-	-	18
Common stocks - subsidiaries and affiliates	193	1	(378)	26	422	-	(6)	-	-	-	258
Common stocks - unaffiliated	417	8	117	244	4	(29)	(3)	-	-	-	758
Separate account assets	1,834	15	-	363	-	(294)	-	2	(26)	-	1,894
Total financial assets	\$ 2,585	\$ 1	\$ (258)	\$ 633	\$ 535	\$ (323)	\$ (10)	\$ 2	\$ (26)	\$ (5)	\$ 3,134

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.

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.

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

a. Bonds

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

	September 30, 2022			
	Carrying Value	Gross		Fair Value
		Unrealized Gains	Unrealized Losses	
(In Millions)				
U.S. government and agencies	\$ 4,937	\$ 60	\$ 361	\$ 4,636
All other governments	1,657	9	324	1,342
States, territories and possessions	280	2	12	270
Political subdivisions	419	5	26	398
Special revenue	4,287	111	212	4,186
Industrial and miscellaneous	117,357	384	12,359	105,382
Parent, subsidiaries and affiliates	7,643	-	232	7,411
Total	<u>\$ 136,580</u>	<u>\$ 571</u>	<u>\$ 13,526</u>	<u>\$ 123,625</u>

The September 30, 2022 gross unrealized losses exclude \$157 million of losses included in the carrying value. These losses include \$153 million from NAIC Class 6 bonds and \$4 million from residential mortgage-backed securities (RMBS) and commercial mortgage-backed securities (CMBS) whose ratings were obtained from third-party modelers. These losses were primarily included in industrial and miscellaneous or parent, subsidiaries and affiliates.

	December 31, 2021			
	Carrying Value	Gross		Fair Value
		Unrealized Gains	Unrealized Losses	
(In Millions)				
U.S. government and agencies	\$ 4,133	\$ 655	\$ 12	\$ 4,776
All other governments	1,846	144	20	1,970
States, territories and possessions	311	56	-	367
Political subdivisions	457	66	-	523
Special revenue	4,835	863	4	5,694
Industrial and miscellaneous	110,186	7,072	655	116,603
Parent, subsidiaries and affiliates	6,726	56	21	6,761
Total	<u>\$ 128,494</u>	<u>\$ 8,912</u>	<u>\$ 712</u>	<u>\$ 136,694</u>

The December 31, 2021 gross unrealized losses exclude \$76 million of losses included in the carrying value. These losses include \$75 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.

As of September 30, 2022, investments in structured and loan-backed securities that had unrealized losses, which were not recognized in earnings, had a fair value of \$20,743 million. Securities in an unrealized loss position for less than 12 months had a fair value of \$17,396 million and unrealized losses of \$1,193 million. Securities in an unrealized loss position for greater than 12 months had a fair value of \$3,346 million and unrealized losses of \$556 million. These securities were primarily categorized as industrial and miscellaneous or parent, subsidiaries and affiliates.

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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 \$8,463 million. Securities in an unrealized loss position for less than 12 months had a fair value of \$6,536 million and unrealized losses of \$67 million. Securities in an unrealized loss position for greater than 12 months had a fair value of \$1,926 million and unrealized losses of \$136 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, 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 September 30, 2022, RMBS had a total carrying value of \$2,052 million and a fair value of \$2,020 million, of which approximately 10%, based on carrying value, was classified as Alt-A. Alt-A and subprime RMBS had a total carrying value of \$812 million and a fair value of \$811 million. As of December 31, 2021, RMBS had a total carrying value of \$2,108 million and a fair value of \$2,199 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 \$1,000 million and a fair value of \$1,052 million.

b. Common stocks – subsidiaries and affiliates

MMHLLC paid \$604 million in dividends to MassMutual for the nine months ended September 30, 2022, \$344 million of which were declared in 2021, and 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.

MassMutual contributed capital of \$526 million to MMHLLC for the nine months ended September 30, 2022 and \$167 million for the nine months ended September 30, 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 Consolidated 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.

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

	September 30, 2022		December 31, 2021	
	Carrying Value	Fair Value	Carrying Value	Fair Value
	(In Millions)			
Commercial mortgage loans:				
Primary lender	\$ 21,039	\$ 19,262	\$ 22,192	\$ 22,942
Mezzanine loans	95	88	117	118
Total commercial mortgage loans	21,134	19,350	22,309	23,060
Residential mortgage loans:				
FHA insured and VA guaranteed	2,656	2,445	4,348	4,381
Other residential loans	1,788	1,682	737	746
Total residential mortgage loans	4,444	4,127	5,085	5,127
Total mortgage loans	\$ 25,578	\$ 23,477	\$ 27,394	\$ 28,187

As of September 30, 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 September 30, 2022 and as of December 31, 2021:

	September 30, 2022				
	Average Carrying Value	Unpaid Carrying Value	Principal Balance	Valuation Allowance	Interest Income
	(In Millions)				
With no allowance recorded:					
Commercial mortgage loans:					
Primary lender	\$ 14	\$ 15	\$ 17	\$ -	\$ -
Total	14	15	17	-	-
Total impaired commercial mortgage loans	\$ 14	\$ 15	\$ 17	\$ -	\$ -

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		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	\$	52	\$	55	\$	113
Total		52		55	\$	-
Total impaired commercial mortgage loans	\$	52	\$	55	\$	113
					\$	-

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 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 \$20,281 million as of September 30, 2022 and \$22,623 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 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 \$4,593 million as of September 30, 2022 and \$5,288 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 \$616 million as of September 30, 2022 and \$238 million as of December 31, 2021. The statutory net amount at risk, defined as net collateral pledged and statement values excluding accrued interest, was \$5,656 million as of September 30, 2022 and \$616 million as of December 31, 2021.

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The Company had the right to rehypothecate or repledge securities totaling \$1,102 million of the \$4,593 million as of September 30, 2022 and \$718 million of the \$5,288 million as of December 31, 2021 of net collateral pledged by counterparties. There were no securities rehypothecated to other counterparties as of September 30, 2022 or December 31, 2021.

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

	September 30, 2022			
	Assets		Liabilities	
	Carrying Value	Notional Amount	Carrying Value	Notional Amount
(In Millions)				
Interest rate swaps	\$ 18,968	\$ 137,238	\$ 13,693	\$ 126,918
Options	577	15,423	11	311
Currency swaps	4,557	19,944	73	664
Forward contracts	342	6,513	65	1,996
Credit default swaps	5	1,500	1	85
Financial futures	56	707	272	2,420
Total	\$ 24,505	\$ 181,325	\$ 14,115	\$ 132,394

	December 31, 2021			
	Assets		Liabilities	
	Carrying Value	Notional Amount	Carrying Value	Notional Amount
(In Millions)				
Interest rate swaps	\$ 15,556	\$ 119,034	\$ 11,210	\$ 129,332
Options	354	16,388	14	356
Currency swaps	984	13,167	206	5,535
Forward contracts	69	4,634	71	5,230
Credit default swaps	-	60	1	35
Financial futures	45	2,753	5	373
Total	\$ 17,008	\$ 156,036	\$ 11,507	\$ 140,861

The average fair value of outstanding derivative assets was \$17,838 million for the nine months ended September 30, 2022 and \$17,609 million for the nine months ended September 30, 2021. The average fair value of outstanding derivative liabilities was \$10,218 million for the nine months ended September 30, 2022 and \$13,448 million for the nine months ended September 30, 2021.

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

	September 30, 2022	December 31, 2021
	(In Millions)	
Due after one year through five years	\$ 20	\$ 95
Due after five years through ten years	1,565	-
Total	\$ 1,585	\$ 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:

	Nine Months Ended September 30,			
	2022		2021	
	Net Realized (Losses) Gains on Closed Contracts	Change In Net Unrealized (Losses) Gains on Open Contracts	Net Realized (Losses) Gains on Closed Contracts	Change In Net Unrealized (Losses) Gains on Open Contracts
	(In Millions)			
Interest rate swaps	\$ (320)	\$ 929	\$ (313)	\$ 322
Currency swaps	40	3,706	(30)	994
Options	(53)	349	(122)	98
Credit default swaps	2	-	2	-
Forward contracts	759	279	(66)	350
Financial futures	(787)	(256)	(285)	(76)
Total	\$ (359)	\$ 5,007	\$ (814)	\$ 1,688

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

	September 30, 2022			December 31, 2021		
	Derivative Assets	Derivative Liabilities	Net	Derivative Assets	Derivative Liabilities	Net
	(In Millions)					
Gross	\$ 24,505	\$ 14,115	\$ 10,390	\$ 17,008	\$ 11,507	\$ 5,501
Due and accrued	950	1,902	(952)	1,142	1,911	(769)
Gross amounts offset	(12,320)	(12,320)	-	(13,023)	(13,023)	-
Net asset	13,135	3,697	9,438	5,127	395	4,732
Collateral posted	(7,357)	(2,764)	(4,593)	(7,046)	(1,759)	(5,287)
Net	\$ 5,778	\$ 933	\$ 4,845	\$ (1,919)	\$ (1,364)	\$ (555)

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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,	
	2022	2021
	<u>(In Millions)</u>	
Bonds	\$ 3,714	\$ 3,424
Preferred stocks	18	14
Common stocks - subsidiaries and affiliates	265	200
Common stocks - unaffiliated	64	16
Mortgage loans	884	847
Policy loans	863	824
Real estate	139	115
Partnerships and limited liability companies	894	757
Derivatives	355	352
Cash, cash equivalents and short-term investments	39	14
Other	17	9
Subtotal investment income	<u>7,252</u>	<u>6,572</u>
Amortization of the IMR	73	118
Investment expenses	<u>(600)</u>	<u>(529)</u>
Net investment income	<u>\$ 6,725</u>	<u>\$ 6,161</u>

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g. Net realized capital gains (losses)

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

	Nine Months Ended September 30,	
	2022	2021
	<u>(In Millions)</u>	
Bonds	\$ (716)	\$ 215
Preferred stocks	(6)	(2)
Common stocks - subsidiaries and affiliates	-	9
Common stocks - unaffiliated	64	111
Mortgage loans	(41)	-
Real estate	127	24
Partnerships and limited liability companies	(95)	(556)
Derivatives	(359)	(814)
Other	<u>(86)</u>	<u>8</u>
Net realized capital losses before federal and state taxes and deferral to the IMR	(1,112)	(1,005)
Net federal and state tax expense	<u>(66)</u>	<u>(83)</u>
Net realized capital losses before deferral to the IMR	(1,178)	(1,088)
Net after tax losses deferred to the IMR	<u>1,485</u>	<u>219</u>
Net realized capital gains (losses)	<u>\$ 307</u>	<u>\$ (869)</u>

The IMR liability balance was \$154 million as of September 30, 2022 and \$1,713 million as of December 31, 2021 and was included in other liabilities on the Interim Consolidated Statutory Statements of Financial Position.

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

	Nine Months Ended September 30,	
	2022	2021
	<u>(In Millions)</u>	
Bonds	\$ (398)	\$ (52)
Common stocks - unaffiliated	(3)	(11)
Preferred stocks	(6)	(1)
Mortgage loans	(8)	(8)
Partnerships and limited liability companies	<u>(102)</u>	<u>(457)</u>
Total OTTI	<u>\$ (517)</u>	<u>\$ (529)</u>

The Company recognized OTTI of \$8 million for the nine months ended September 30, 2022 and \$7 million for the nine months ended September 30, 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.

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6. Federal income taxes

On August 16th, 2022, the Inflation Reduction Act (IRA) was signed into law and includes certain corporate income tax provisions. Impacts to the Company include the imposition of a corporate alternative minimum tax (CAMT) applicable to tax years beginning after December 31, 2022. The CAMT imposes a 15% minimum tax on adjusted financial statement income on corporations that have an average adjusted financial statement income over \$1 billion in the prior three-year period (2020-2022). As of September 30, 2022 the Company has not determined if it will be liable for CAMT in 2023. In accordance with INT 22-02: Third Quarter 2022 Reporting of the IRA-CAMT, the third quarter 2022 financial statements do not include an estimated impact of the CAMT because a reasonable estimate cannot be made. The United States Treasury Secretary has been authorized to issue guidance on the CAMT and pending such guidance the Company is not able to make a reasonable estimate.

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.

On August 26, 2022, MassMutual issued a \$600 million funding agreement with a 4.15% fixed rate 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	\$	212
Incurred guarantee benefits		(165)
Paid guarantee benefits		(3)
Liability as of December 31, 2021		44
Incurred guarantee benefits		80
Paid guarantee benefits		(4)
Liability as of September 30, 2022	\$	120

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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, 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	\$ 9,744	\$ 302	67	\$ 13,191	\$ 60	66
GMIB Basic	454	34	71	675	4	71
GMIB Plus	1,140	548	68	1,565	158	68
GMAB	1,529	131	62	2,219	1	62
GLWB	94	26	74	136	6	73

9. Reinsurance

For the nine months ended September 30, 2022, the Company decreased its gross LTC policyholders' reserve by \$495 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 \$360 million. The total net impact of the change is \$135 million.

Effective February 1, 2022, approximately \$14.2 billion of in force statutory reserves of certain MM Ascend'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, in exchange for a \$320 million ceding commission paid by Martello Re. 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.

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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 Consolidated Statutory Statements of Operations. The net periodic cost recognized is as follows:

	Nine Months Ended September 30,			
	2022	2021	2022	2021
	Pension Benefits		Other Postretirement Benefits	
	(In Millions)			
Service cost	\$ 73	\$ 82	\$ 7	\$ 8
Interest cost	64	58	8	7
Expected return on plan assets	(145)	(137)	-	-
Amortization of unrecognized net actuarial and other losses	7	29	(1)	1
Amortization of unrecognized prior service cost	-	-	(4)	(4)
Total net periodic cost	\$ (1)	\$ 32	\$ 10	\$ 12

Effective May 6, 2022, the Company transitioned administrative and record keeping services from Empower to Fidelity Investments for the Defined Contribution Plans.

13. Employee compensation plans

No significant changes.

14. Surplus notes

No significant changes.

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15. Presentation of the Interim Consolidated 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, 2022 and 2021. Accordingly, the Company has excluded these non-cash activities from the Interim Consolidated Statutory Statements of Cash Flows for the nine months ended September 30, 2022 and 2021.

	Nine Months Ended	
	September 30,	
	2022	2021
	(In Millions)	
Bonds transferred to mortgage loans	\$ 626	\$ -
Bond conversions and refinancing	533	524
Transfer of partnerships to common stocks - subsidiaries and affiliates	285	-
Partnerships and LLCs transferred to bonds	173	-
Stock conversion	104	62
Transfer of mortgage loans to partnerships and limited liability companies	40	11
Deferred gain on sale of real estate	16	-
Net investment income payment-in-kind bonds	10	15
Cash equivalents transferred to bonds	5	-
Change in market value of corporate owned life insurance asset	(75)	214
Partnership conversion	-	4
Surplus notes issued in exchange for bonds	-	233
Bonds received as consideration for surplus notes	-	(233)
Premium income recognized for group annuity contracts	-	721
Bonds received as consideration for group annuity contracts	-	(720)
Exchange of mortgage loans for other assets	-	18
Common stock received as consideration for group annuity contracts	-	(4)
Stock transferred in exchange for premium ceded	-	3

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 consolidated statutory disclosure in the Company's 2021 audited year-end financial statements.

Insurance and underwriting risks

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

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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, 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 geopolitics 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 through September 30, 2022 was \$325 million. On March 25, 2022, all Russia securities and Ukraine sovereign investments were impaired to market value due to intent to sell. This has resulted in a year-to-date impaired realized loss of \$236 million. Some Russia related securities were sold through the nine months ended September 30, 2022 resulting in a realized loss of \$90 million. Total statutory surplus decreased by \$325 million.

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 consolidated statement of financial position. However, an adverse outcome in certain matters could have a material adverse effect on the consolidated results of operations for the period in which such matter is resolved, or an accrual is determined to be required, on the consolidated 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 AND SUBSIDIARIES
NOTES TO INTERIM CONSOLIDATED STATUTORY FINANCIAL STATEMENTS, continued
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17. Related party transactions

In August 2022, MassMutual made capital contributions of \$10 million to MassMutual International LLC.

In August 2022, MassMutual made capital contributions of \$10 million each to Haven Life Insurance Agency, LLC and HITPS LLC, which are indirectly wholly-owned subsidiaries.

In July 2022, MassMutual made capital contributions of \$25 million to MM Asset Management Holding LLC, which is an indirectly wholly-owned subsidiary.

In April 2022, MassMutual funded projected operational expenses for 2022 MML Investors Services, LLC and Haven Life Insurance Agency via capital contributions, \$25 million and \$15 million, respectively.

In March 2022, MassMutual contributed \$20 million to MassMutual Access Pine Point Fund to seed money to fund investments at the entity.

18. Subsequent events

Management of the Company has evaluated subsequent events through November 14, 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 AND SUBSIDIARIES
 NOTES TO INTERIM CONSOLIDATED STATUTORY FINANCIAL STATEMENTS, continued
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Glossary of Terms

<u>Term</u>	<u>Description</u>
CMBS	Commercial mortgage-backed securities
C.M. Life	C.M. Life Insurance Company
DD	Digital Distribution
DI	Disability Insurance
FHA	Federal Housing Administration
MM Ascend	MassMutual Ascend Life Insurance Company and other subsidiaries and affiliated entities
GIC	Guaranteed interest contracts
GMAB	Guaranteed minimum accumulation benefits
GMDB	Guaranteed minimum death benefits
GMI	Guaranteed minimum income benefits
Glidepath	Glidepath Holdings Inc.
GLWB	Guaranteed lifetime withdrawal benefits
IMR	Interest maintenance reserve
Invesco	Invesco Ltd
IS	Institutional Solutions
LLC	Limited liability companies
LTC	Long-term care
MassMutual	Massachusetts Mutual Life Insurance Company
MMFA	MassMutual Financial Advisors
MMHLLC	MassMutual Holding LLC
MMIH	MM Investment Holding
MMSD	MassMutual Strategic Distributors
NAIC	National Association of Insurance Commissioners
OAC	Oppenheimer Acquisition Corporation
OTTI	Other-than-temporary impairment(s)
RMBS	Residential mortgage-backed securities
SSAP	Statements of Statutory Accounting Principles
The Company	Massachusetts Mutual Life Insurance Company, a mutual life insurance company domiciled in the Commonwealth of Massachusetts, and its domestic life insurance subsidiaries domiciled in the State of Connecticut
U.S.	United States of America
U.S. GAAP	U.S. generally accepted accounting principles
VA	Veterans Administration