

**MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
AND SUBSIDIARIES**

INTERIM CONSOLIDATED STATUTORY FINANCIAL STATEMENTS

As of June 30, 2023 and December 31, 2022 and for the six months ended
June 30, 2023 and 2022

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)

| | June 30, 2023 | December 31, 2022 |
|---|------------------|----------------------|
| (In Millions) | | |
| Assets: | | |
| Bonds | \$ 143,749 | \$ 140,394 |
| Preferred stocks | 379 | 458 |
| Common stocks – subsidiaries and affiliates | 22,896 | 22,926 |
| Common stocks – unaffiliated | 1,710 | 1,479 |
| Mortgage loans | 25,490 | 25,892 |
| Policy loans | 15,243 | 17,294 |
| Real estate | 342 | 355 |
| Partnerships and limited liability companies | 13,362 | 12,468 |
| Derivatives | 21,292 | 22,756 |
| Cash, cash equivalents and short-term investments | 5,915 | 5,737 |
| Other invested assets | 2,680 | 2,199 |
| Total invested assets | 253,058 | 251,958 |
| Investment income due and accrued | 4,119 | 4,332 |
| Federal income taxes | 87 | 262 |
| Net deferred income taxes | 1,514 | 1,254 |
| Other than invested assets | 4,254 | 4,236 |
| Total assets excluding separate accounts | 263,032 | 262,042 |
| Separate account assets | 60,546 | 59,537 |
| Total assets | \$ 323,578 | \$ 321,579 |
| Liabilities and Surplus: | | |
| Policyholders' reserves | \$ 160,321 | \$ 157,063 |
| Liabilities for deposit-type contracts | 19,030 | 18,170 |
| Contract claims and other benefits | 787 | 702 |
| Policyholders' dividends | 1,992 | 1,927 |
| General expenses due or accrued | 867 | 1,108 |
| Asset valuation reserve | 5,770 | 5,774 |
| Repurchase agreements | 2,909 | 3,042 |
| Commercial paper | 50 | 250 |
| Collateral | 2,796 | 4,268 |
| Derivatives | 13,919 | 14,483 |
| Funds held under coinsurance | 21,318 | 21,916 |
| Other liabilities | 6,481 | 5,528 |
| Total liabilities excluding separate accounts | 236,240 | 234,231 |
| Separate account liabilities | 60,415 | 59,407 |
| Total liabilities | 296,655 | 293,638 |
| Surplus | 26,923 | 27,941 |
| Total liabilities and surplus | \$ 323,578 | \$ 321,579 |

See accompanying notes to interim consolidated statutory financial statements

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

| | Six Months Ended | |
|---|----------------------|---------------|
| | June 30, | |
| | 2023 | 2022 |
| | <u>(In Millions)</u> | |
| Revenue: | | |
| Premium income | \$ 11,010 | \$ 10,784 |
| Net investment income | 4,953 | 4,624 |
| Fees and other income | 531 | 511 |
| Total revenue | <u>16,494</u> | <u>15,919</u> |
| Benefits, expenses and other deductions: | | |
| Policyholders' benefits | 10,850 | 9,986 |
| Change in policyholders' reserves | 2,264 | 2,536 |
| General insurance expenses | 1,097 | 1,067 |
| Commissions | 655 | 641 |
| State taxes, licenses and fees | 183 | 179 |
| Other deductions | 550 | 284 |
| Total benefits and expenses | <u>15,599</u> | <u>14,693</u> |
| Net gain from operations before dividends and federal income taxes | 895 | 1,226 |
| Dividends to policyholders | 922 | 871 |
| Net (loss) gain from operations before federal income taxes | <u>(27)</u> | <u>355</u> |
| Federal income tax expense | 139 | 27 |
| Net (loss) gain from operations | <u>(166)</u> | <u>328</u> |
| Net realized capital (losses) gains | <u>(448)</u> | <u>64</u> |
| Net (loss) income | <u>\$ (614)</u> | <u>\$ 392</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)

| | Six Months Ended | |
|---|----------------------|------------------|
| | June 30, | |
| | 2023 | 2022 |
| | <u>(In Millions)</u> | |
| Surplus, beginning of year | <u>\$ 27,941</u> | <u>\$ 26,979</u> |
| Net (decrease)/increase due to: | | |
| Net income (loss) | (614) | 392 |
| Change in net unrealized capital (losses) gains, net of tax | (586) | 1,065 |
| Change in net unrealized foreign exchange capital | | |
| gains (losses), net of taxes | 227 | (1,500) |
| Change in other net deferred income taxes | 264 | 299 |
| Change in nonadmitted assets | (237) | (8) |
| Change in asset valuation reserve | 4 | 696 |
| Change in surplus notes | (25) | (24) |
| Prior period adjustments | (52) | (74) |
| Other | 1 | (98) |
| Net (decrease)/increase | <u>(1,018)</u> | <u>748</u> |
| Surplus, end of period | <u>\$ 26,923</u> | <u>\$ 27,727</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)

| | Six Months Ended June 30, | |
|---|------------------------------|-----------|
| | 2023 | 2022 |
| | (\$ In Millions) | |
| Cash from operations: | | |
| Premium and other income collected | \$ 11,721 | \$ 11,605 |
| Net investment income | 5,805 | 4,481 |
| Benefit payments | (10,843) | (10,007) |
| Net transfers from separate accounts | 811 | 3,127 |
| Commissions and other expenses | (2,555) | (2,667) |
| Dividends paid to policyholders | (860) | (826) |
| Federal and foreign income taxes recovered | 197 | (2) |
| Net cash provided from operations | 4,276 | 5,711 |
| Cash from investments: | | |
| Proceeds from investments sold, matured or repaid: | | |
| Bonds | 11,208 | 15,868 |
| Preferred and common stocks – unaffiliated | 48 | 230 |
| Common stocks – affiliated | - | 1 |
| Mortgage loans | 1,512 | 2,553 |
| Real estate | - | 196 |
| Partnerships and limited liability companies | 644 | 810 |
| Derivatives | (173) | (400) |
| Other | (463) | (751) |
| Total investment proceeds | 12,776 | 18,507 |
| Cost of investments acquired: | | |
| Bonds | (14,421) | (21,816) |
| Preferred and common stocks – unaffiliated | (162) | (321) |
| Common stocks – affiliated | (111) | (171) |
| Mortgage loans | (1,057) | (1,168) |
| Real estate | (3) | (47) |
| Partnerships and limited liability companies | (1,558) | (1,604) |
| Derivatives | (72) | (69) |
| Other | 501 | 143 |
| Total investments acquired | (16,883) | (25,053) |
| Net decrease (increase) in policy loans | 2,050 | (89) |
| Net cash used in investing activities | (2,057) | (6,635) |
| Cash from financing and miscellaneous sources: | | |
| Net deposits on deposit-type contracts | 726 | 610 |
| Change in surplus notes | (25) | (25) |
| Change in repurchase agreements | (133) | 304 |
| Change in collateral | (1,457) | (1,542) |
| Other cash (used) provided | (1,152) | 1,437 |
| Net cash (applied to) provided from financing and miscellaneous sources | (2,041) | 784 |
| Net change in cash, cash equivalents and short-term investments | 178 | (140) |
| Cash, cash equivalents and short-term investments: | | |
| Beginning of year | 5,737 | 6,210 |
| End of period | \$ 5,915 | \$ 6,070 |

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 of financial professionals that operate in the U.S. MMFA sells individual life, individual annuities, hybrid life and 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 digital media, search engine optimization and search engine marketing. The Company's IS distribution channel places group annuities, life insurance 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 DI, 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 June 30, 2023 and December 31, 2022 and for the six months ended June 30, 2023 and 2022 are unaudited. The Interim Consolidated Statutory Statement of Financial Position as of December 31, 2022 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 2022 audited yearend financial statements as these interim consolidated statutory financial statements disclose only significant changes from yearend 2022. 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 2022 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 \$1,547 million as of June 30, 2023 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

Adoption of new accounting standards

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 did not have a material effect on the Company's 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:

| | June 30, 2023 | | | | |
|---|---------------|----------|---------|----------|---------|
| | Carrying | Fair | | | |
| | Value | Value | Level 1 | Level 2 | Level 3 |
| (In Millions) | | | | | |
| Financial assets: | | | | | |
| Bonds: | | | | | |
| U. S. government and agencies | \$ 5,110 | \$ 4,825 | \$ - | \$ 4,825 | \$ - |
| All other governments | 1,261 | 1,083 | - | 1,053 | 30 |
| States, territories and possessions | 249 | 246 | - | 246 | - |
| Political subdivisions | 381 | 371 | - | 371 | - |
| Special revenue | 4,269 | 4,249 | - | 4,224 | 25 |
| Industrial and miscellaneous | 123,701 | 112,708 | 24 | 48,897 | 63,787 |
| Parent, subsidiaries and affiliates | 8,778 | 8,087 | - | 1,170 | 6,917 |
| Preferred stocks | 379 | 384 | 65 | - | 319 |
| Common stocks - subsidiaries and affiliates | 544 | 544 | 137 | - | 407 |
| Common stocks - unaffiliated | 1,710 | 1,710 | 707 | - | 1,003 |
| Mortgage loans - commercial | 20,893 | 19,222 | - | - | 19,222 |
| Mortgage loans - residential | 4,597 | 4,290 | - | - | 4,290 |
| Derivatives: | | | | | |
| Interest rate swaps | 17,621 | 12,675 | - | 12,675 | - |
| Options | 588 | 588 | 60 | 528 | - |
| Currency swaps | 3,033 | 3,033 | - | 3,033 | - |
| Forward contracts | 38 | 38 | - | 38 | - |
| Credit default swaps | 1 | 1 | - | 1 | - |
| Financial futures | 11 | 11 | 11 | - | - |
| Cash, cash equivalents and short-term investments | 5,915 | 5,915 | 387 | 5,528 | - |
| Separate account assets | 60,546 | 60,460 | 39,120 | 19,648 | 1,692 |
| Financial liabilities: | | | | | |
| GICs | 15,568 | 14,799 | - | - | 14,799 |
| Group annuity contracts and other deposits | 2,219 | 1,948 | - | - | 1,948 |
| Individual annuity contracts | 22,488 | 21,973 | - | - | 21,973 |
| Supplementary contracts | 1,061 | 1,062 | - | - | 1,062 |
| Repurchase agreements | 2,909 | 2,909 | - | 2,909 | - |
| Commercial paper | 50 | 50 | - | 50 | - |
| Derivatives: | | | | | |
| Interest rate swaps | 12,592 | 12,985 | - | 12,985 | - |
| Options | 45 | 45 | 32 | 13 | - |
| Currency swaps | 1,161 | 603 | - | 603 | - |
| Forward contracts | 61 | 61 | - | 61 | - |
| Credit default swaps | 40 | 40 | - | 40 | - |
| Financial futures | 20 | 20 | 20 | - | - |

Common stocks - subsidiaries and affiliates do not include unconsolidated subsidiaries, which had statutory carrying values of \$22,352 million.

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

| | December 31, 2022 | | | | |
|---|-------------------|----------|---------|----------|---------|
| | Carrying | Fair | | | |
| | Value | Value | Level 1 | Level 2 | Level 3 |
| | (In Millions) | | | | |
| Financial assets: | | | | | |
| Bonds: | | | | | |
| U. S. government and agencies | \$ 4,772 | \$ 4,435 | \$ - | \$ 4,435 | \$ - |
| All other governments | 1,636 | 1,385 | - | 1,323 | 62 |
| States, territories and possessions | 261 | 254 | - | 254 | - |
| Political subdivisions | 418 | 402 | - | 402 | - |
| Special revenue | 4,263 | 4,187 | - | 4,178 | 9 |
| Industrial and miscellaneous | 120,641 | 109,053 | - | 47,235 | 61,818 |
| Parent, subsidiaries and affiliates | 8,403 | 8,151 | - | 1,052 | 7,099 |
| Preferred stocks | 458 | 453 | 46 | - | 407 |
| Common stocks - subsidiaries and affiliates | 483 | 483 | 128 | - | 355 |
| Common stocks - unaffiliated | 1,479 | 1,479 | 507 | 1 | 971 |
| Mortgage loans - commercial | 21,484 | 19,832 | - | - | 19,832 |
| Mortgage loans - residential | 4,408 | 4,066 | - | - | 4,066 |
| Derivatives: | | | | | |
| Interest rate swaps | 18,889 | 19,066 | - | 19,066 | - |
| Options | 654 | 654 | 30 | 624 | - |
| Currency swaps | 3,175 | 3,175 | - | 3,175 | - |
| Forward contracts | 16 | 16 | - | 16 | - |
| Credit default swaps | - | 1 | - | 1 | - |
| Financial futures | 22 | 22 | 22 | - | - |
| Cash, cash equivalents and short-term investments | 5,737 | 5,737 | 442 | 5,295 | - |
| Separate account assets | 59,537 | 59,440 | 37,498 | 20,242 | 1,700 |
| Financial liabilities: | | | | | |
| GICs | 14,701 | 13,803 | - | - | 13,803 |
| Group annuity contracts and other deposits | 2,162 | 1,890 | - | - | 1,890 |
| Individual annuity contracts | 19,874 | 18,986 | - | - | 18,986 |
| Supplementary contracts | 1,211 | 1,213 | - | - | 1,213 |
| Repurchase agreements | 3,042 | 3,042 | - | 3,042 | - |
| Commercial paper | 250 | 250 | - | 250 | - |
| Derivatives: | | | | | |
| Interest rate swaps | 13,506 | 18,870 | - | 18,870 | - |
| Options | 12 | 12 | 7 | 5 | - |
| Currency swaps | 710 | 362 | - | 362 | - |
| Forward contracts | 239 | 239 | - | 239 | - |
| Credit default swaps | 13 | 13 | - | 13 | - |
| Financial futures | 3 | 3 | 3 | - | - |

Common stocks - subsidiaries and affiliates do not include unconsolidated subsidiaries, which had statutory carrying values of \$22,443 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:

| | June 30, 2023 | | | |
|--|---------------|-----------|----------|-----------|
| | Level 1 | Level 2 | Level 3 | Total |
| | (In Millions) | | | |
| Financial assets: | | | | |
| Bonds: | | | | |
| Special revenue | - | 1 | - | 1 |
| Industrial and miscellaneous | 66 | 81 | 156 | 303 |
| Preferred stocks | 24 | - | 62 | 86 |
| Common stocks - subsidiaries and affiliates | 137 | - | 407 | 544 |
| Common stocks - unaffiliated | 706 | 1 | 1,003 | 1,710 |
| Derivatives: | | | | |
| Interest rate swaps | - | 17,621 | - | 17,621 |
| Options | 60 | 528 | - | 588 |
| Currency swaps | - | 3,031 | - | 3,031 |
| Forward contracts | - | 38 | - | 38 |
| Credit default swaps | - | 1 | - | 1 |
| Financial futures | 11 | - | - | 11 |
| Separate account assets | 39,120 | 18,504 | 1,685 | 59,309 |
| Total financial assets carried at fair value | \$ 40,124 | \$ 39,806 | \$ 3,313 | \$ 83,243 |
| Financial liabilities: | | | | |
| Derivatives: | | | | |
| Interest rate swaps | \$ - | \$ 12,592 | \$ - | \$ 12,592 |
| Options | 32 | 13 | - | 45 |
| Currency swaps | - | 174 | - | 174 |
| Forward contracts | - | 61 | - | 61 |
| Credit default swaps | - | 40 | - | 40 |
| Financial futures | 20 | - | - | 20 |
| Total financial liabilities carried at fair value | \$ 52 | \$ 12,880 | \$ - | \$ 12,932 |

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, 2022 | | | |
|---|-------------------|-----------|----------|-----------|
| | Level 1 | Level 2 | Level 3 | Total |
| | (In Millions) | | | |
| Financial assets: | | | | |
| Bonds: | | | | |
| All other governments | \$ - | \$ 6 | \$ - | \$ 6 |
| Special revenue | \$ - | \$ 1 | \$ - | \$ 1 |
| Industrial and miscellaneous | - | 85 | 230 | 315 |
| Preferred stocks | 21 | - | 51 | 72 |
| Common stocks - subsidiaries and affiliates | 128 | - | 355 | 483 |
| Common stocks - unaffiliated | 507 | 1 | 971 | 1,479 |
| Derivatives: | | | | |
| Interest rate swaps | - | 18,889 | - | 18,889 |
| Options | 30 | 624 | - | 654 |
| Currency swaps | - | 3,175 | - | 3,175 |
| Forward contracts | - | 16 | - | 16 |
| Financial futures | 22 | - | - | 22 |
| Separate account assets | 37,498 | 19,130 | 1,693 | 58,321 |
| Total financial assets carried at fair value | \$ 38,206 | \$ 41,927 | \$ 3,300 | \$ 83,433 |
| Financial liabilities: | | | | |
| Derivatives: | | | | |
| Interest rate swaps | \$ - | \$ 13,506 | \$ - | \$ 13,506 |
| Options | 7 | 5 | - | 12 |
| Currency swaps | - | 122 | - | 122 |
| Forward contracts | - | 239 | - | 239 |
| Credit default swaps | - | 13 | - | 13 |
| Financial futures | 3 | - | - | 3 |
| Total financial liabilities carried at fair value | \$ 10 | \$ 13,885 | \$ - | \$ 13,895 |

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 1/1/23 | Gains (Losses) in Net Income | Losses (Gains) in Surplus | Purchases | Issuances | Sales | Settlements | Transfers | | | Balance as of 06/30/23 |
|--|----------------------------|---------------------------------------|------------------------------------|-----------|-----------|---------|-------------|-----------|------|---------|------------------------------|
| | | | | | | | | In | Out | Other | |
| (In Millions) | | | | | | | | | | | |
| Financial assets: | | | | | | | | | | | |
| Bonds: | | | | | | | | | | | |
| Industrial and miscellaneous | \$ 230 | \$ (1) | \$ (2) | \$ 4 | \$ - | \$ - | \$ (6) | \$ - | \$ - | \$ (69) | \$ 156 |
| Preferred stocks | 51 | - | 7 | 1 | - | - | - | - | - | 3 | 62 |
| Common stocks - subsidiaries and affiliates | 355 | - | (32) | 25 | 63 | - | - | - | - | (4) | 407 |
| Common stocks - unaffiliated | 971 | - | (58) | 71 | 21 | - | (1) | - | - | (1) | 1,003 |
| Separate account assets | 1,693 | 19 | - | 18 | - | (50) | (1) | 5 | - | 1 | 1,685 |
| Total financial assets | \$ 3,300 | \$ 18 | \$ (85) | \$ 119 | \$ 84 | \$ (50) | \$ (8) | \$ 5 | \$ - | \$ (70) | \$ 3,313 |

| | Balance as of 1/1/22 | Gains (Losses) in Net Income | Losses (Gains) in Surplus | Purchases | Issuances | Sales | Settlements | Transfers | | | Balance as of 12/31/22 |
|---------------|----------------------------|------------------------------------|------------------------------------|-----------|-----------|-------|-------------|-----------|-----|-------|------------------------------|
| | | | | | | | | In | Out | Other | |
| (In Millions) | | | | | | | | | | | |

| | | | | | | | | | | | |
|--|----------|----------|---------|----------|--------|----------|----------|------|---------|---------|----------|
| Financial assets: | | | | | | | | | | | |
| Bonds: | | | | | | | | | | | |
| Industrial and miscellaneous | \$ 206 | \$ 2 | \$ (10) | \$ 19 | \$ 10 | \$ - | \$ (52) | \$ - | \$ - | \$ 55 | \$ 230 |
| Preferred stocks | 18 | - | (19) | - | - | - | - | - | - | 52 | 51 |
| Common stocks - subsidiaries and affiliates | 258 | (13) | 128 | (792) | 963 | (65) | (6) | - | - | (118) | 355 |
| Common stocks - unaffiliated | 758 | 29 | - | 327 | 3 | (27) | (114) | - | (4) | (1) | 971 |
| Separate account assets | 1,894 | (174) | - | 282 | - | (296) | - | - | (13) | - | 1,693 |
| Total financial assets | \$ 3,134 | \$ (156) | \$ 99 | \$ (164) | \$ 976 | \$ (388) | \$ (172) | \$ - | \$ (17) | \$ (12) | \$ 3,300 |

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:

| | June 30, 2023 | | | |
|-------------------------------------|-------------------|---------------------|----------------------|-------------------|
| | Carrying | Gross | Gross | Fair |
| | Value | Unrealized Gains | Unrealized Losses | Value |
| (In Millions) | | | | |
| U.S. government and agencies | \$ 5,110 | \$ 52 | \$ 337 | \$ 4,825 |
| All other governments | 1,261 | 12 | 190 | 1,083 |
| States, territories and possessions | 249 | 3 | 6 | 246 |
| Political subdivisions | 381 | 7 | 17 | 371 |
| Special revenue | 4,269 | 117 | 137 | 4,249 |
| Industrial and miscellaneous | 123,701 | 423 | 11,416 | 112,708 |
| Parent, subsidiaries and affiliates | 8,778 | 3 | 694 | 8,087 |
| Total | <u>\$ 143,749</u> | <u>\$ 617</u> | <u>\$ 12,797</u> | <u>\$ 131,569</u> |

The June 30, 2023 gross unrealized losses exclude \$95 million of losses included in the carrying value. These losses include \$95 million from NAIC Class 6 bonds and \$0 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, 2022 | | | |
|-------------------------------------|-------------------|---------------------|----------------------|-------------------|
| | Carrying | Gross | Gross | Fair |
| | Value | Unrealized Gains | Unrealized Losses | Value |
| (In Millions) | | | | |
| U.S. government and agencies | \$ 4,772 | \$ 58 | \$ 395 | \$ 4,435 |
| All other governments | 1,636 | 15 | 266 | 1,385 |
| States, territories and possessions | 261 | 2 | 9 | 254 |
| Political subdivisions | 418 | 7 | 23 | 402 |
| Special revenue | 4,263 | 109 | 185 | 4,187 |
| Industrial and miscellaneous | 120,641 | 406 | 11,994 | 109,053 |
| Parent, subsidiaries and affiliates | 8,403 | 1 | 253 | 8,151 |
| Total | <u>\$ 140,394</u> | <u>\$ 598</u> | <u>\$ 13,125</u> | <u>\$ 127,867</u> |

The December 31, 2022 gross unrealized losses exclude \$108 million of losses included in the carrying value. These losses include \$106 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.

As of June 30, 2023, investments in structured and loan-backed securities that had unrealized losses, which were not recognized in earnings, had a fair value of \$20,447 million. Securities in an unrealized loss position for less than 12 months had a fair value of \$3,119 million and unrealized losses of \$115 million. Securities in an unrealized loss position for greater than 12 months had a fair value of \$17,326 million and unrealized losses of \$1,523 million. These securities were primarily categorized as industrial and miscellaneous or parent, subsidiaries and affiliates.

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

As of December 31, 2022, investments in structured and loan-backed securities that had unrealized losses, which were not recognized in earnings, had a fair value of \$20,895 million. Securities in an unrealized loss position for less than 12 months had a fair value of \$15,107 million and unrealized losses of \$918 million. Securities in an unrealized loss position for greater than 12 months had a fair value of \$5,786 million and unrealized losses of \$918 million. These securities were primarily categorized as industrial and miscellaneous or parent, subsidiaries and affiliates.

In the course of the Company's investment management activities, securities may be sold and reacquired within 30 days to enhance the Company's yield on its investment portfolio. The Company did not sell any securities with the NAIC Designation 3 or below for the six months ended June 30, 2023 or 2022 that were reacquired within 30 days of the sale date.

Residential mortgage-backed exposure

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

As of June 30, 2023, RMBS had a total carrying value of \$2,868 million and a fair value of \$2,819 million, of which approximately 6%, based on carrying value, was classified as Alt-A. Alt-A and subprime RMBS had a total carrying value of \$1,174 million and a fair value of \$1,163 million. As of December 31, 2022, RMBS had a total carrying value of \$2,337 million and a fair value of \$2,292 million, of which approximately 8%, based on carrying value, was classified as Alt-A. Alt-A and subprime RMBS had a total carrying value of \$1,018 million and a fair value of \$1,010 million.

b. Common stocks – subsidiaries and affiliates

MMHLLC paid \$730 million in dividends to MassMutual for the six months ended June 30, 2023, \$450 million of which were declared in 2022, and paid \$604 million in dividends to MassMutual for the six months ended June 30, 2022, which were declared in 2021.

MassMutual contributed capital of \$53 million to MMHLLC for the six months ended June 30, 2023 and \$219 million for the six months ended June 30, 2022.

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.

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

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

| | June 30, 2023 | | December 31, 2022 | |
|----------------------------------|-------------------|---------------|-------------------|---------------|
| | Carrying Value | Fair Value | Carrying Value | Fair Value |
| (In Millions) | | | | |
| Commercial mortgage loans: | | | | |
| Primary lender | \$ 20,811 | \$ 19,151 | \$ 21,390 | \$ 19,745 |
| Mezzanine loans | 82 | 71 | 94 | 87 |
| Total commercial mortgage loans | 20,893 | 19,222 | 21,484 | 19,832 |
| Residential mortgage loans: | | | | |
| FHA insured and VA guaranteed | 2,163 | 1,993 | 2,461 | 2,273 |
| Other residential loans | 2,434 | 2,297 | 1,947 | 1,793 |
| Total residential mortgage loans | 4,597 | 4,290 | 4,408 | 4,066 |
| Total mortgage loans | \$ 25,490 | \$ 23,512 | \$ 25,892 | \$ 23,898 |

As of June 30, 2023, the Company had impaired mortgage loans with or without a valuation allowance or mortgage loans derecognized as a result of foreclosure, including mortgage loans subject to a participant or co-lender mortgage loan agreement with a unilateral mortgage loan foreclosure restriction or mortgage loan derecognized as a result of a foreclosure.

The following presents a summary of the Company's impaired mortgage loans as of June 30, 2023 and as of December 31, 2022:

| | June 30, 2023 | | | | |
|---|------------------------------|-----------------------------|----------------------|------------------------|--------------------|
| | Average Carrying Value | Unpaid Carrying Value | Principal Balance | Valuation Allowance | Interest Income |
| (In Millions) | | | | | |
| With allowance recorded: | | | | | |
| Commercial mortgage loans: | | | | | |
| Primary lender | \$ 192 | \$ 206 | \$ 232 | \$ (36) | \$ 7 |
| Total | 192 | 206 | 232 | (36) | 7 |
| With no allowance recorded: | | | | | |
| Commercial mortgage loans: | | | | | |
| Primary lender | \$ 14 | \$ 14 | \$ 17 | \$ - | \$ - |
| Total | 14 | 14 | 17 | - | - |
| Total impaired commercial mortgage loans | \$ 206 | \$ 220 | \$ 249 | \$ (36) | \$ 7 |

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

| | | December 31, 2022 | | | | |
|--|----|-------------------|----------|-----------|-----------|----------|
| | | Average | Unpaid | | | |
| | | Carrying | Carrying | Principal | Valuation | Interest |
| | | Value | Value | Balance | Allowance | Income |
| | | (In Millions) | | | | |
| With no allowance recorded: | | | | | | |
| Commercial mortgage loans: | | | | | | |
| Primary lender | \$ | 14 | \$ | 15 | \$ | 17 |
| Total | | 14 | | 15 | - | \$ 1 |
| Total impaired commercial mortgage loans | | | | | | |
| | \$ | 14 | \$ | 15 | \$ | 17 |
| | | 14 | | 15 | - | \$ 1 |

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 \$31,946 million as of June 30, 2023 and \$32,084 million as of December 31, 2022, 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 \$1,439 million as of June 30, 2023 and \$2,336 million as of December 31, 2022. In the event of default, the full market value exposure at risk in a net gain position, net of offsets and collateral, was \$523 million as of June 30, 2023 and \$659 million as of December 31, 2022. The statutory net amount at risk, defined as net collateral pledged and statement values excluding accrued interest, was \$5,382 million as of June 30, 2023 and \$5,702 million as of December 31, 2022.

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

The Company had the right to rehypothecate or repledge securities totaling \$1,919 million of the \$1,439 million as of June 30, 2023 and \$771 million of the \$2,336 million as of December 31, 2022 of net collateral pledged by counterparties. There were no securities rehypothecated to other counterparties as of June 30, 2023 or December 31, 2022.

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

| | June 30, 2023 | | | |
|----------------------|-------------------|--------------------|-------------------|--------------------|
| | Assets | | Liabilities | |
| | Carrying Value | Notional Amount | Carrying Value | Notional Amount |
| (In Millions) | | | | |
| Interest rate swaps | \$ 17,621 | \$ 149,323 | \$ 12,592 | \$ 135,311 |
| Options | 588 | 13,760 | 45 | 644 |
| Currency swaps | 3,033 | 28,688 | 1,161 | 15,110 |
| Forward contracts | 38 | 4,717 | 61 | 4,592 |
| Credit default swaps | 1 | 22 | 40 | 2,713 |
| Financial futures | 11 | 910 | 20 | 489 |
| Total | \$ 21,292 | \$ 197,420 | \$ 13,919 | \$ 158,859 |

| | December 31, 2022 | | | |
|----------------------|-------------------|--------------------|-------------------|--------------------|
| | Assets | | Liabilities | |
| | Carrying Value | Notional Amount | Carrying Value | Notional Amount |
| (In Millions) | | | | |
| Interest rate swaps | \$ 18,889 | \$ 139,716 | \$ 13,506 | \$ 143,074 |
| Options | 654 | 14,944 | 12 | 359 |
| Currency swaps | 3,175 | 28,282 | 710 | 14,841 |
| Forward contracts | 16 | 1,289 | 239 | 7,457 |
| Credit default swaps | - | - | 13 | 1,580 |
| Financial futures | 22 | 2,784 | 3 | 369 |
| Total | \$ 22,756 | \$ 187,015 | \$ 14,483 | \$ 167,680 |

The average fair value of outstanding derivative assets was \$20,764 million for the six months ended June 30, 2023 and \$16,518 million for the six months ended June 30, 2022. The average fair value of outstanding derivative liabilities was \$12,941 million for the six months ended June 30, 2023 and \$9,696 million for the six months ended June 30, 2022.

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

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

| | June 30, 2023 | December 31, 2022 |
|---------------------------------------|------------------|----------------------|
| | (In Millions) | |
| Due after one year through five years | \$ 2,735 | \$ 1,580 |
| Total | <u>\$ 2,735</u> | <u>\$ 1,580</u> |

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

| | Six Months Ended June 30, | | | |
|----------------------|---|---|---|---|
| | 2023 | | 2022 | |
| | 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 | \$ 25 | \$ (357) | \$ (110) | \$ 552 |
| Currency swaps | 54 | (193) | 24 | 1,743 |
| Options | (14) | (119) | (18) | 215 |
| Credit default swaps | (21) | (1) | (11) | 10 |
| Forward contracts | (240) | 200 | 372 | 187 |
| Financial futures | (26) | (29) | (649) | (88) |
| Total | <u>\$ (222)</u> | <u>\$ (499)</u> | <u>\$ (392)</u> | <u>\$ 2,619</u> |

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

| | June 30, 2023 | | | December 31, 2022 | | |
|----------------------|----------------------|---------------------------|-----------------|----------------------|---------------------------|-----------------|
| | Derivative Assets | Derivative Liabilities | Net | Derivative Assets | Derivative Liabilities | Net |
| | (In Millions) | | | | | |
| Gross | \$ 21,292 | \$ 13,919 | \$ 7,373 | \$ 22,756 | \$ 14,483 | \$ 8,273 |
| Due and accrued | 1,074 | 2,240 | (1,166) | 757 | 1,822 | (1,065) |
| Gross amounts offset | (17,689) | (17,689) | - | (15,793) | (15,793) | - |
| Net asset | 4,677 | (1,530) | 6,207 | 7,720 | 512 | 7,208 |
| Collateral posted | (4,705) | (3,266) | (1,439) | (5,025) | (2,689) | (2,336) |
| Net | <u>\$ (28)</u> | <u>\$ (4,796)</u> | <u>\$ 4,768</u> | <u>\$ 2,695</u> | <u>\$ (2,177)</u> | <u>\$ 4,872</u> |

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

f. Net investment income

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

| | Six Months Ended | |
|---|----------------------|-----------------|
| | June 30, | |
| | 2023 | 2022 |
| | <u>(In Millions)</u> | |
| Bonds | \$ 3,466 | \$ 2,361 |
| Preferred stocks | 15 | 15 |
| Common stocks - subsidiaries and affiliates | 280 | 265 |
| Common stocks - unaffiliated | 69 | 45 |
| Mortgage loans | 545 | 607 |
| Policy loans | 570 | 570 |
| Real estate | 36 | 111 |
| Partnerships and limited liability companies | 217 | 658 |
| Derivatives | 22 | 248 |
| Cash, cash equivalents and short-term investments | 163 | 45 |
| Other | 120 | 52 |
| Subtotal investment income | <u>5,503</u> | <u>4,977</u> |
| Amortization of the IMR | (26) | 43 |
| Investment expenses | <u>(524)</u> | <u>(396)</u> |
| Net investment income | <u>\$ 4,953</u> | <u>\$ 4,624</u> |

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

g. Net realized capital (losses) gains

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

| | Six Months Ended | |
|--|----------------------|--------------|
| | June 30, | |
| | 2023 | 2022 |
| | <u>(In Millions)</u> | |
| Bonds | \$ (441) | \$ (608) |
| Preferred stocks | - | (6) |
| Common stocks - unaffiliated | 11 | 4 |
| Mortgage loans | (36) | (19) |
| Real estate | - | 127 |
| Partnerships and limited liability companies | (134) | (12) |
| Derivatives | (222) | (392) |
| Other | <u>(17)</u> | <u>(61)</u> |
| Net realized capital losses before federal and state taxes and deferral to the IMR | (839) | (967) |
| Net federal and state tax benefit (expense) | <u>156</u> | <u>(9)</u> |
| Net realized capital losses before deferral to the IMR | (683) | (976) |
| Net after tax losses deferred to the IMR | <u>235</u> | <u>1,040</u> |
| Net realized capital (losses) gains | <u>\$ (448)</u> | <u>\$ 64</u> |

The IMR liability balance was \$1 million as of June 30, 2023 and \$1 million as of December 31, 2022 and was included in other liabilities on the Interim Consolidated Statutory Statements of Financial Position.

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

| | Six Months Ended | |
|--|----------------------|-----------------|
| | June 30, | |
| | 2023 | 2022 |
| | <u>(In Millions)</u> | |
| Bonds | \$ (101) | \$ (356) |
| Common stocks - unaffiliated | - | (3) |
| Preferred stocks | - | (6) |
| Mortgage loans | (13) | (2) |
| Partnerships and limited liability companies | <u>(134)</u> | <u>(16)</u> |
| Total OTTI | <u>\$ (248)</u> | <u>\$ (383)</u> |

The Company recognized OTTI of \$14 million for the six months ended June 30, 2023 and \$8 million for the six months ended June 30, 2022 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 AND SUBSIDIARIES
NOTES TO INTERIM CONSOLIDATED STATUTORY FINANCIAL STATEMENTS, continued
(UNAUDITED)

6. Federal income taxes

No significant changes.

7. Other than invested assets

No significant changes.

8. Policyholders' liabilities

a. Liabilities for deposit-type contracts

On January 19, 2023, MassMutual issued a €500 million funding agreement with a 3.75% fixed rate and a 7-year maturity.

On February 3, 2023, MassMutual issued a NOK 1,000 million funding agreement with a 4.01% fixed rate and an 8-year maturity.

On April 12, 2023, MassMutual issued a \$750 million funding agreement with a 4.50% fixed rate and a 3-year maturity.

On May 3, 2023, MassMutual issued a CHF 215 million funding agreement with 2.65% fixed rate and a 5-year maturity.

On June 14, 2023, MassMutual issued a \$600 million funding agreement with a 5.05% 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, 2022 | \$ | 44 |
| Incurred guarantee benefits | | 18 |
| Paid guarantee benefits | | (6) |
| Liability as of December 31, 2022 | | 56 |
| Incurred guarantee benefits | | (45) |
| Paid guarantee benefits | | (4) |
| Liability as of June 30, 2023 | \$ | 7 |

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY AND SUBSIDIARIES
NOTES TO INTERIM CONSOLIDATED 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.

| | June 30, 2023 | | | December 31, 2022 | | |
|------------|------------------|--------------------|-------------------------------|-------------------|--------------------|-------------------------------|
| | Account Value | Net Amount at Risk | Weighted Average Attained Age | Account Value | Net Amount at Risk | Weighted Average Attained Age |
| | (\$ In Millions) | | | | | |
| GMDB | \$ 10,172 | \$ 151 | 66 | \$ 10,035 | \$ 242 | 66 |
| GMIB Basic | 464 | 10 | 72 | 466 | 21 | 72 |
| GMIB Plus | 1,243 | 455 | 68 | 1,198 | 505 | 68 |
| GMAB | 1,503 | 43 | 63 | 1,553 | 84 | 62 |
| GLWB | 96 | 18 | 74 | 97 | 22 | 74 |

As of June 30, 2023, the GMDB account value above consists of \$1,513 million within the general account and \$8,660 million within separate accounts. As of December 31, 2022, the GMDB account value above consists of \$1,594 million within the general account and \$8,441 million within separate accounts.

9. Reinsurance

No significant changes.

10. Withdrawal characteristics

No significant changes.

11. Debt

No significant changes.

12. Employee benefit plans

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

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

Net periodic cost

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

| | Six Months Ended June 30, | | | |
|---|---------------------------|---------------|-------------------------------|-------------|
| | 2023 | 2022 | 2023 | 2022 |
| | Pension Benefits | | Other Postretirement Benefits | |
| | (In Millions) | | | |
| Service cost | \$ 43 | \$ 48 | \$ 4 | \$ 5 |
| Interest cost | 62 | 43 | 8 | 5 |
| Expected return on plan assets | (84) | (97) | - | - |
| Amortization of unrecognized net actuarial and other losses | 13 | 5 | (4) | (1) |
| Amortization of unrecognized prior service cost | - | - | (3) | (3) |
| Total net periodic cost | <u>\$ 34</u> | <u>\$ (1)</u> | <u>\$ 5</u> | <u>\$ 6</u> |

13. Employee compensation plans

No significant changes.

14. Surplus notes

No significant changes.

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 six months ended June 30, 2023 and 2022. Accordingly, the Company has excluded these non-cash activities from the Interim Consolidated Statutory Statements of Cash Flows for the six months ended June 30, 2023 and 2022.

| | Six Months Ended | |
|--|------------------|--------|
| | June 30, | |
| | 2023 | 2022 |
| | (In Millions) | |
| Bond conversions and refinancing | \$ 208 | \$ 294 |
| Stock conversions | 173 | 7 |
| Bonds transferred to partnerships & LLCs | 122 | - |
| Change in market value of corporate owned life insurance asset | 99 | (47) |
| Net investment income payment-in-kind bonds | 8 | 5 |
| Transfer of mortgage loans to bonds | 3 | - |
| Partnership conversions | - | 5 |

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 2022 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.

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.

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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.

The long-term impact of the COVID-19 pandemic is dependent on numerous factors including, but not limited to, the length and severity of the pandemic, the efficacy and rate of vaccine adoption and therapeutics, the responses to the pandemic taken by governments and private sector businesses, and the impacts on MassMutual's policyholders, employees and counterparties. At its height, the pandemic led to significant economic disruption, including significant volatility in the U.S. and international markets, which had an adverse effect on MassMutual's business. The extent to which the COVID-19 pandemic continues to impact MassMutual's business will depend on future developments which are highly uncertain, including the emergence of future variants of COVID-19 and the efficacy of vaccines in the broader population (including with respect to future variants).

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.

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.

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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.

17. Related party transactions

In May 2023, MassMutual made capital contributions of \$25 million to ITPS Holding LLC.

In March 2023, MassMutual made capital contributions of \$88 million to MassMutual Mortgage Lending LLC, \$50 million to MMIH Bond Holdings LLC, and \$13 million to MML CM LLC.

In February 2023, MassMutual made capital contributions of \$45 million to ITPS Holding LLC.

18. Subsequent events

Management of the Company has evaluated subsequent events through August 14, 2023, the date the financial statements were available to be issued to state regulators and subsequently on the Company's website. No events have occurred subsequent to the date of the financial statements, except for:

On July 5, 2023, the Company recaptured approximately \$16 million of statutory reserves reinsured on a yearly renewable term (YRT) basis for certain closed blocks of long term care business and reinsured on a coinsurance basis a portion of this product resulting in ceding approximately \$680 million statutory reserves to a different reinsurer. The recapture settlement of \$17 million relieved the reinsurer of all obligations under the YRT agreement and resulted in an offset to premiums and disability benefits. As part of the coinsurance transaction, the Company transferred \$644 million of premium to the reinsurer and received \$4 million of expense allowance.

On July 19, 2023, MassMutual issued a \$300 million funding agreement with a floating rate based on the Secured Overnight Financing Rate plus 0.87% and a 3-year maturity.

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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 |
| GMIB | Guaranteed minimum income benefits |
| Glidepath | Glidepath Holdings Inc. |
| GLWB | Guaranteed lifetime withdrawal benefits |
| IMR | Interest maintenance reserve |
| 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 |
| 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 |