MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY

STATUTORY FINANCIAL STATEMENTS

As of December 31, 2024 and 2023 and
for the years ended December 31, 2024, 2023 and 2022

Table of Contents

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
STATUTORY STATEMENTS OF FINANCIAL POSITION

	December 31, 2024	December 31, 2023
	(In Millions)	
Assets:		
Bonds	$ 163,629	$ 144,433
Preferred stocks	1,019	446
Common stocks – subsidiaries and affiliates	25,840	25,496
Common stocks – unaffiliated	1,198	1,623
Mortgage loans	23,692	24,021
Policy loans	17,658	15,897
Real estate	323	329
Partnerships and limited liability companies	14,747	12,907
Derivatives	24,220	20,740
Cash, cash equivalents and short-term investments	6,004	11,134
Other invested assets	3,515	2,401
Total invested assets	281,845	259,427
Investment income due and accrued	5,347	5,236
Federal income taxes	552	280
Net deferred income taxes	1,857	1,660
Other than invested assets	6,334	5,670
Total assets excluding separate accounts	295,935	272,273
Separate account assets	49,251	52,593
Total assets	$ 345,186	$ 324,866
Liabilities and Surplus:		
Policyholders' reserves	$ 178,258	$ 167,250
Liabilities for deposit-type contracts	21,228	19,645
Contract claims and other benefits	595	714
Policyholders' dividends	2,533	2,150
General expenses due or accrued	917	1,049
Asset valuation reserve	5,952	5,989
Repurchase agreements	3,408	3,219
Debt	250	50
Collateral	1,915	2,073
Derivatives	16,774	13,734
Funds held under coinsurance	29,625	22,520
Other liabilities	6,741	5,141
Total liabilities excluding separate accounts	268,196	243,534
Separate account liabilities	49,108	52,455
Total liabilities	317,304	295,989
Surplus	27,882	28,877
Total liabilities and surplus	$ 345,186	$ 324,866

See accompanying notes to statutory financial statements

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
STATUTORY STATEMENTS OF OPERATIONS

	Years Ended December 31, 2024	2023	2022
	(In Millions)		
Revenue:			
Premium income	$ 21,198	$ 25,490	$ 23,524
Net investment income	11,661	11,043	9,302
Fees and other income	1,258	1,028	1,139
Total revenue	34,117	37,561	33,965
Benefits, expenses and other deductions:			
Policyholders' benefits	16,945	17,369	16,937
Change in policyholders' reserves	9,047	12,273	10,278
General insurance expenses	2,337	2,333	2,191
Commissions	1,435	1,423	1,324
State taxes, licenses and fees	325	329	310
Other deductions	1,070	1,122	677
Total benefits and expenses	31,159	34,849	31,717
Net gain from operations before dividends and federal income taxes	2,958	2,712	2,248
Dividends to policyholders	2,501	2,131	1,906
Net gain from operations before federal income taxes	457	581	342
Federal income tax (benefit) expense	(293)	116	(64)
Net gain from operations	750	465	406
Net realized capital (losses) gains	(801)	(490)	326
(Net loss) income	$ (51)	$ (25)	$ 732

See accompanying notes to statutory financial statements

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
STATUTORY STATEMENTS OF CHANGE IN SURPLUS

	Years Ended December 31,		
	2024	2023	2022
	(In Millions)		
Surplus, beginning of year	$ 28,877	$ 27,941	$ 26,979
Net (decrease) increase due to:			
(Net loss) income	(51)	(25)	732
Change in net unrealized capital (losses) gains, net of tax	(194)	8	871
Change in net unrealized foreign exchange capital (losses) gains, net of tax	(261)	376	(1,739)
Change in other net deferred income taxes	244	462	662
Change in nonadmitted assets	(191)	365	(563)
Change in asset valuation reserve	37	(315)	740
Change in reserve valuation basis	—	—	(12)
Change in surplus notes	(50)	(149)	413
Change in minimum pension liability	39	(7)	40
Prior period adjustments	(328)	173	(44)
Other	(240)	48	(138)
Net (decrease) increase	(995)	936	962
Surplus, end of year	$ 27,882	$ 28,877	$ 27,941

See accompanying notes to statutory financial statements

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY
STATUTORY STATEMENTS OF CASH FLOWS

	Years Ended December 31,		
	2024	2023	2022
	(In Millions)		
Cash from operations:			
Premium and other income collected	$ 22,405	$ 26,418	$ 24,719
Net investment income	10,079	12,269	8,172
Benefit payments	(16,553)	(17,077)	(16,698)
Net transfers from separate accounts	1,943	1,611	4,947
Commissions and other expenses	(5,132)	(5,208)	(5,292)
Dividends paid to policyholders	(2,118)	(1,908)	(1,806)
Federal and foreign income taxes paid	82	58	5
Net cash from operations	10,706	16,163	14,047
Cash from investments:			
Proceeds from investments sold, matured or repaid:			
Bonds	40,246	23,801	28,498
Preferred and common stocks – unaffiliated	251	290	422
Common stocks – affiliated	191	105	72
Mortgage loans	4,545	3,621	3,784
Real estate	(21)	5	177
Partnerships and limited liability companies	2,740	1,830	2,910
Derivatives	(533)	(214)	(384)
Other	(1,093)	(518)	(655)
Total investment proceeds	46,326	28,920	34,824
Cost of investments acquired:			
Bonds	(60,110)	(32,278)	(43,003)
Preferred and common stocks – unaffiliated	(1,069)	(316)	(572)
Common stocks – affiliated	(177)	(256)	(624)
Mortgage loans	(4,667)	(2,896)	(2,095)
Real estate	(3)	(8)	(13)
Partnerships and limited liability companies	(3,231)	(2,988)	(3,932)
Derivatives	248	—	(267)
Other	441	153	11
Total investments acquired	(68,568)	(38,589)	(50,495)
Net (increase) decrease in policy loans	(1,762)	1,158	(935)
Net cash used in investing activities	(24,004)	(8,511)	(16,606)
Cash from financing and miscellaneous sources:			
Net deposits on deposit-type contracts	1,219	1,238	806
Change in surplus notes	(50)	(150)	413
Change in repurchase agreements	195	171	241
Change in collateral	(114)	(2,024)	(2,089)
Other cash provided (used)	6,918	(1,321)	2,813
Net cash from (used in) financing and miscellaneous sources	8,168	(2,086)	2,184
Net change in cash, cash equivalents and short-term investments	(5,130)	5,566	(375)
Cash, cash equivalents and short-term investments:			
Beginning of year	11,134	5,568	5,943
End of year	$ 6,004	$ 11,134	5,568

See accompanying notes to statutory financial statements

1. *Nature of operations*

Massachusetts Mutual Life Insurance Company (MassMutual or the Company), a mutual life insurance company domiciled in the Commonwealth of Massachusetts, and its domestic life insurance subsidiaries provide individual and group life insurance, disability income 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 affiliated distribution channel, MassMutual Strategic Distributors (MMSD), Institutional Solutions (IS) and Worksite distribution channels.

The affiliated distribution channel is a sales force of financial professionals that operate in the U.S. The affiliated distribution channel sells life insurance, annuities, hybrid life and long term care insurance (LTC) and DI. The Company's MMSD channel sells life insurance, DI, annuity, and hybrid life and LTC solutions through a network of third-party distribution partners. 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 insurance, group critical illness insurance, group accident insurance and DI, through the workplace.

2. *Summary of significant accounting policies*

a. Basis of presentation

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

Statutory accounting practices are different in some respects from financial statements prepared in accordance with U.S. generally accepted accounting principles (U.S. GAAP). The more significant differences between statutory accounting practices and U.S. GAAP are as follows:

Invested assets

- Bonds are generally carried at amortized cost, whereas U.S. GAAP reports bonds at fair value for bonds available for sale and trading or at amortized cost for bonds held to maturity
- Changes in the fair value of derivative financial instruments are recorded as changes in surplus, whereas U.S. GAAP generally reports these changes in revenue unless deemed an effective hedge
- Interest rate and credit default swaps associated with replicated synthetic investment transactions are carried at amortized cost, whereas U.S. GAAP would carry them at fair value
- Embedded derivatives are recorded as part of the underlying contract, whereas U.S. GAAP would identify and bifurcate certain embedded derivatives from the host contract or security and account for them separately at fair value
- Income recognition on partnerships and limited liability companies, which are accounted for under the equity method, is limited to the amount of cash distribution, whereas U.S. GAAP is without limitation
- Certain majority-owned subsidiaries and variable interest entities are accounted for using the equity method, whereas U.S. GAAP would consolidate these entities
- Financial assets including mortgage and other commercial loans, equipment loans, held-to-maturity debt securities, and trade, lease, reinsurance and other receivables are accounted for using the other-than-temporary impairments(s) (OTTI) model described in Note 2dd, whereas U.S. GAAP would use the current expected credit loss impairment model for these financial assets carried at amortized cost.

Policyholders' liabilities

- Statutory policy reserves are generally based upon prescribed methods, such as the Commissioners' Reserve Valuation Method, Commissioners' Annuity Reserve Valuation Method or net level premium method, and prescribed statutory mortality, morbidity and interest assumptions at the time of issuance, whereas U.S. GAAP policy reserves would generally be based upon the net level premium method or the estimated gross margin method with estimates, at time of issuance, of future mortality, morbidity, persistency and interest
- Liabilities for policyholders' reserves, unearned premium, and unpaid claims are presented net of reinsurance ceded, whereas U.S. GAAP would present the liabilities on a direct basis and report an asset for the amounts recoverable or due from reinsurers
- Payments received for universal and variable life insurance products, certain variable and fixed deferred annuities and group annuity contracts are reported as premium income and corresponding change in reserves, whereas U.S. GAAP would treat these payments as deposits to policyholders' account balances

General insurance expenses and commissions

- Certain acquisition costs, such as commissions and other variable costs, directly related to successfully acquiring new business are charged to current operations as incurred, whereas U.S. GAAP generally would capitalize these expenses and amortize them based on profit emergence over the expected life of the policies or over the premium payment period

Net realized capital (losses) gains

- After-tax realized capital (losses) gains that result from changes in the overall level of interest rates for all types of fixed-income investments and interest-related hedging activities are deferred into the interest maintenance reserve (IMR) and amortized into revenue, whereas U.S. GAAP reports these gains and losses as revenue

Surplus

- Changes in the balances of deferred income taxes, which provide for book versus tax temporary differences, are subject to limitation and are recorded in surplus, whereas U.S. GAAP would generally include the change in deferred taxes in net income without limitation
- Assets are reported at admitted asset value and assets designated as nonadmitted are excluded through a charge against surplus, whereas U.S. GAAP recognizes all assets, net of any valuation allowances
- An asset valuation reserve (AVR) is reported as a contingency reserve to stabilize surplus against fluctuations in the statement value of real estate, partnerships and limited liability companies and certain common stocks as well as credit-related changes in the value of bonds, mortgage loans and certain derivatives, whereas U.S. GAAP does not record this reserve
- Changes to the mortgage loan valuation allowance are recognized in net unrealized capital gains (losses), net of tax, in the Statutory Statements of Changes in Surplus, whereas U.S. GAAP follows the current expected credit losses model
- The overfunded status of pension and other postretirement plans, which is the excess of the fair value of the plan assets over the projected benefit obligation, is a nonadmitted asset for statutory accounting whereas U.S. GAAP recognizes the overfunded status as an asset
- Surplus notes issued by the Company are reported in surplus, whereas U.S. GAAP reports these notes as liabilities
- Statutory Statements of Changes in Surplus includes net income, change in net unrealized capital gains (losses), change in net unrealized foreign exchange capital gains (losses), change in other net deferred income taxes, change in nonadmitted assets, change in AVR, prior period adjustments and change in minimum pension liability, whereas U.S. GAAP presents net income as retained earnings and net unrealized capital gains (losses), change in net unrealized foreign exchange capital gains (losses), change in minimum pension liability as other comprehensive income

- The change in the fair value for unaffiliated common stock is recorded in surplus, whereas the change in the fair value for ownership interests in an entity not accounted for under the equity method or consolidated are recorded in revenue for U.S. GAAP

Other

- Assets and liabilities associated with certain group annuity and variable universal life contracts, which do not pass-through all investment experience to contract holders, are maintained in separate accounts and are presented on a single line in the statutory financial statements, whereas U.S. GAAP reports these contracts as general investments and liabilities of the Company

The preparation of financial statements requires management to make estimates and assumptions that impact the reported amounts of assets and liabilities, the disclosure of assets and liabilities as of the date of these statutory financial statements and the reported amounts of revenues and expenses during the reporting periods. The most significant estimates and assumptions include those used in determining the carrying values of investments including the amount of mortgage loan investment valuation reserves, other-than-temporary impairment, the value of the investment in MassMutual Holding LLC (MMHLLC), the liabilities for policyholders' reserves, the determination of admissible deferred tax assets (DTA), the liability for taxes and the liability for litigation or other contingencies. Future events including, but not limited to, changes in the level of mortality, morbidity, interest rates, persistency, asset valuations and defaults could cause results to differ from the estimates used in these statutory financial statements. Although some variability is inherent in these estimates, management believes the amounts presented are appropriate.

Certain prior year amounts within these financial statements have been reclassified to conform to the current year presentation.

b. Corrections of errors and reclassifications

For the years ended December 31, 2024 and 2023 corrections of prior years' errors were recorded in surplus, net of tax:

	Years Ended December 31, 2024 and 2023 Increase (Decrease) to:					
	Prior Years' Net Income		Current Year Surplus		Asset or Liability Balances	
	2024	2023	2024	2023	2024	2023
	(In Millions)					
Bonds	$ (82)	$ —	$ (82)	$ —	$ (82)	$ —
Common stocks - subsidiaries and affiliates	(1)	19	(1)	19	(1)	19
Partnerships and limited liability companies	(3)	15	(3)	15	(3)	15
Derivative assets	—	—	—	(125)	—	(125)
Cash, cash equivalents and short-term investments	16	—	16	—	16	—
Other invested assets	—	22	—	22	—	22
Investment income due and accrued	(156)	230	(156)	230	(156)	230
Policyholders' reserves	(15)	(143)	(15)	(143)	(15)	143
Derivative liabilities	—	—	—	7	—	(7)
Other liabilities	(87)	30	(87)	30	87	30
Total	$ (328)	$ 173	$ (328)	$ 55		

c. Bonds

Bonds are generally valued at amortized cost using the constant yield interest method with the exception of NAIC Category 6 bonds, which are in or near default, and certain residential mortgage-backed securities (RMBS) and commercial mortgage-backed securities (CMBS), which are rated by outside modelers, which are carried at the lower of amortized cost or fair value. NAIC ratings are applied to bonds and other investments. Categories 1 and 2 are considered investment grade, while Categories 3 through 6 are considered below investment grade. Bonds are recorded on a trade date basis, except for private placement bonds, which are recorded on the funding date.

For loan-backed and structured securities, such as asset-backed securities (ABS), mortgage-backed securities (MBS), including RMBS and CMBS, and structured securities, including collateralized debt obligations (CDOs), amortization or accretion is revalued quarterly based on the current estimated cash flows, using either the prospective or retrospective adjustment methodologies.

Fixed income securities with the highest ratings from a rating agency follow the retrospective method of accounting.

All other fixed income securities, such as floating rate bonds and interest only securities, including those that have been impaired, follow the prospective method of accounting.

The fair value of bonds is based on quoted market prices when available. If quoted market prices are not available, values provided by other third-party organizations are used. If values provided by other third-party organizations are unavailable, fair value is estimated using internal models by discounting expected future cash flows using observable current market rates applicable to yield, credit quality and maturity of the investment or using quoted market values for comparable investments. Internal inputs used in the determination of fair value include estimated prepayment speeds, default rates, discount rates and collateral values, among others. Structure characteristics and cash flow priority are also considered. Fair values resulting from internal models are those expected to be received in an orderly transaction between willing market participants.

Refer to *Note 2dd. "Net realized capital (losses) gains including other-than-temporary impairments and unrealized capital gains (losses)"* for information on the Company’s policy for determining OTTI.

d. Preferred stocks

Preferred stocks in good standing, those that are rated Categories 1 through 3 by the Securities Valuation Office (SVO) of the NAIC, are generally valued at amortized cost. Preferred stocks not in good standing, those that are rated Categories 4 through 6 by the SVO, are valued at the lower of amortized cost or fair value. Fair values are based on quoted market prices, when available. If quoted market prices are not available, values provided by third-party organizations are used. If values provided by third-party organizations are unavailable, fair value is estimated using internal models. These models use inputs not directly observable or correlated with observable market data. Typical inputs integrated into the Company’s internal discounted expected earnings models include, but are not limited to, earnings before interest, taxes, depreciation and amortization estimates. Fair values resulting from internal models are those expected to be received in an orderly transaction between willing market participants.

Refer to *Note 2dd. "Net realized capital (losses) gains including other-than-temporary impairments and unrealized capital gains (losses)"* for information on the Company’s policy for determining OTTI.

e. Common stocks - subsidiaries and affiliates

Common stocks of unconsolidated subsidiaries, primarily 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. GAAP equity value less adjustments for the limited statutory basis of accounting related to foreign insurance subsidiaries and controlled affiliated entities as well as an adjustment of $305 million as of December 31, 2024 for a portion of its noncontrolling interests (NCI). Glidepath is valued on its underlying GAAP equity with adjustment to recognize its investment in MassMutual Ascend Life Insurance Company and other subsidiaries and affiliated entities (MM Ascend) based on MM Ascend's underlying statutory surplus, adjusted for any unamortized goodwill 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.

Refer to *Note 5c. "Common stocks - subsidiaries and affiliates"* for further information on the valuation of MMHLLC.

f. Common stocks - unaffiliated

Unaffiliated common stocks are carried at fair value, which is based on quoted market prices when available. If quoted market prices are not available, values provided by third-party organizations are used. If values from third parties are unavailable, fair values are determined by management using estimates based upon internal models. The Company's internal models include estimates based upon comparable company analysis, review of financial statements, broker quotes and last traded price. Fair values resulting from internal models are those expected to be received in an orderly transaction between willing market participants.

Refer to *Note 2dd. "Net realized capital (losses) gains including other-than-temporary impairments and unrealized capital gains (losses)"* for information on the Company's policy for determining OTTI.

g. Mortgage loans

Mortgage loans are valued at the unpaid principal balance of the loan, net of unamortized premium, discount, mortgage origination fees and valuation allowances. Interest income earned on impaired loans is accrued on the outstanding principal balance of the loan based on the loan's contractual coupon rate. Interest is not accrued for (a) impaired loans more than 60 days past due, (b) delinquent loans more than 90 days past due, or (c) loans that have interest that is not expected to be collected. The Company continually monitors mortgage loans where the accrual of interest has been discontinued, and will resume the accrual of interest on a mortgage loan when the facts and circumstances of the borrower and property indicate that the payments will continue to be received according to the terms of the original or modified mortgage loan agreement.

Refer to *Note 2dd. "Net realized capital (losses) gains including other-than-temporary impairments and unrealized capital gains (losses)"* for information on the Company's policy for determining OTTI.

h. Policy loans

Policy loans are carried at the outstanding loan balance less amounts unsecured by the cash surrender value of the policy and amounts ceded to reinsurers.

i. Real estate

Investment real estate, which the Company has the intent to hold for the production of income, and real estate occupied by the Company are carried at depreciated cost, less encumbrances. Depreciation is calculated using the straight-line method over the estimated useful life of the real estate holding, not to exceed 40 years. Depreciation expense is included in net investment income.

Real estate held for sale is initially carried at the lower of depreciated cost or fair value less estimated selling costs and is no longer depreciated. Adjustments to carrying value, including for further declines in fair value, are recorded in a valuation reserve, which is included in net realized capital (losses) gains.

Fair value is generally estimated using the present value of expected future cash flows discounted at a rate commensurate with the underlying risks, net of encumbrances. The Company also obtains external appraisals for a rotating selection of properties annually. If an external appraisal is not obtained, an internal appraisal is performed.

Refer to *Note 2dd. "Net realized capital (losses) gains including other-than-temporary impairments and unrealized capital gains (losses)"* for information on the Company’s policy for determining OTTI.

j. Partnerships and limited liability companies

Partnerships and limited liability companies, except for partnerships that generate and realize low-income housing tax credits (LIHTCs), are accounted for using the equity method with the change in the equity value of the underlying investment recorded in surplus. Distributions received are recognized as net investment income to the extent the distribution does not exceed previously recorded accumulated undistributed earnings.

Investments in partnerships that generate LIHTCs are carried at amortized cost unless considered impaired. Under the amortized cost method, the excess of the carrying value of the investment over its estimated residual value is amortized into net investment income during the period in which tax benefits are recognized.

The equity method is suspended if the carrying value of the investment is reduced to zero due to losses from the investment. Once the equity method is suspended, losses are not recorded until the investment returns to profitability and the equity method is resumed. However, if the Company has guaranteed obligations of the investment or is otherwise committed to provide further financial support for the investment, losses will continue to be reported up to the amount of those guaranteed obligations or commitments.

Refer to *Note 2dd. "Net realized capital (losses) gains including other-than-temporary impairments and unrealized capital gains (losses)"* for information on the Company’s policy for determining OTTI.

k. Derivatives

Interest rate swaps and credit default swaps associated with replicated assets are valued at amortized cost and all other derivative types are carried at fair value, which is based primarily upon quotations obtained from counterparties and independent sources. These quotations are compared to internally derived prices and a price challenge is lodged with the counterparties and independent sources when a significant difference cannot be explained by appropriate adjustments to the internal model. When quoted market values are not reliable or available, the value is based on an internal valuation process using market observable inputs that other market participants would use. Changes in the fair value of these instruments other than interest rate swaps and credit default swaps associated with replicated synthetic investments are recorded as unrealized capital gains (losses) in surplus. Gains and losses realized on settlement, termination, closing or assignment of contracts are recorded in net realized capital (losses) gains. Amounts receivable and payable are accrued as net investment income.

l. Cash, cash equivalents and short-term investments

Cash and cash equivalents, which are carried at amortized cost, consist of all highly liquid investments purchased with original maturities of three months or less.

Short-term investments, which are carried at amortized cost, consist of short-term bonds, money market mutual funds and all highly liquid investments purchased with maturities of greater than three months and less than or equal to 12 months.

The carrying value reported in the Statutory Statements of Financial Position for cash, cash equivalents and short-term investment instruments approximates the fair value.

m. Investment income due and accrued

Accrued investment income consists primarily of interest and dividends. Interest is recognized on an accrual basis and dividends are recorded as earned on the ex-dividend date.

n. Federal income taxes

Total federal income taxes are based upon the Company's best estimate of its current and deferred tax assets or liabilities. Current tax expense (benefit) is reported in the Statutory Statements of Operations as federal income tax expense (benefit) if resulting from operations and within net realized capital (losses) gains if resulting from invested asset transactions. Changes in the balances of net deferred taxes, which provide for book-to-tax temporary differences, are subject to limitations and are reported within various lines within surplus. Accordingly, the reporting of book-to-tax temporary differences, such as reserves and policy acquisition costs, and of book-to-tax permanent differences, such as tax-exempt interest and tax credits, may result in effective tax rates in the Statutory Statements of Operations that differ from the federal statutory tax rate.

o. Other than invested assets

Other than invested assets primarily includes the Company's investment in corporate-owned life insurance, deferred and uncollected life insurance premium, receivable from subsidiaries and affiliates, reinsurance recoverable, fixed assets and other receivables.

p. Separate accounts

Separate accounts and sub-accounts are segregated funds administered and invested by the Company, the performance of which primarily benefits the policyholders/contract holders with an interest in the separate accounts. Group and individual variable annuity, variable life and other insurance policyholders/contract holders select from among the separate accounts and sub-accounts made available by the Company. The separate accounts and sub-accounts are offered as investment options under certain insurance contracts or policies. The returns produced by separate account assets increase or decrease separate account reserves. Separate account assets consist principally of marketable securities reported at fair value. Except for the Company's seed money, supplemental accounts and certain guaranteed separate accounts issued in Minnesota, separate account assets can only be used to satisfy separate account liabilities and are not available to satisfy the general obligations of the Company. Separate account administrative and investment advisory fees are included in fees and other income.

Assets may be transferred from the general investments of the Company to seed the separate accounts. When assets are transferred, they are transferred at fair market value. Gains related to the transfer are deferred to the extent that the Company maintains a proportionate interest in the separate account. The deferred gain is recognized as the Company's ownership decreases or when the underlying assets are sold. Losses associated with these transfers are recognized immediately.

Separate accounts reflect two categories of risk assumption: nonguaranteed separate accounts for which the policyholder/contract holder assumes the investment risk and guaranteed separate accounts for which the Company contractually guarantees a minimum return, a minimum account value, or both to the policyholder/contract holder. For certain guaranteed separate account products such as interest rate guaranteed products and indexed separate account products, reserve adequacy is performed on a contract-by-contract basis using, as applicable, prescribed interest rates, mortality rates and asset risk deductions. If the outcome from this adequacy analysis produces a deficiency relative to the current account value, a liability is recorded in policyholders' reserves or liabilities for deposit-type contracts in the Statutory Statements of Financial Position with the corresponding change in the liability recorded as change in policyholders' reserves or policyholders' benefits in the Statutory Statements of Operations.

Premium income, benefits and expenses of the separate accounts are included in the Statutory Statements of Operations with the offset recorded in the change in policyholders’ reserves. Investment income, realized capital gains (losses) and unrealized capital gains (losses) on the assets of separate accounts, other than seed money, accrue to policyholders/contract holders and are not recorded in the Statutory Statements of Operations.

q. Nonadmitted assets

Assets designated as nonadmitted by the NAIC primarily include pension plan assets, intangibles, certain electronic data processing equipment, advances and prepayments, certain investments in partnerships and limited liability companies for which qualifying audits are not performed, the amount of deferred tax assets (DTA) (subject to certain limitations) that will not be realized by the end of the third calendar year following the current year end, furniture and equipment, certain other receivables and uncollected premium greater than 90 days past due. Due and accrued income is nonadmitted on: (a) bonds delinquent more than 90 days or where collection of interest is improbable; (b) impaired bonds more than 60 days past due; (c) bonds in default; (d) mortgage loans in default where interest is 180 days past due; (e) rent in arrears for more than 90 days; and (f) policy loan interest due and accrued more than 90 days past due and included in the unpaid balance of the policy loan in excess of the cash surrender value of the underlying contract. Assets that are designated as nonadmitted are excluded from the Statutory Statements of Financial Position through a change in nonadmitted assets on the Statutory Statements of Changes in Surplus.

r. Reinsurance

The Company enters into reinsurance agreements with affiliated and unaffiliated insurers in the normal course of business to limit its insurance risk or to assume business.

Premium income, policyholders’ benefits (including unpaid claims) and policyholders’ reserves are reported net of reinsurance. Premium, benefits and reserves related to reinsured business are accounted for on bases consistent with those used in accounting for the original policies issued and the terms of the reinsurance contracts. The Company records a receivable for reinsured benefits paid, but not yet reimbursed by the reinsurer and reduces policyholders’ reserves for the portion of insurance liabilities that are reinsured. Commissions and expense allowances on reinsurance ceded and modified coinsurance (Modco) reserve adjustments on reinsurance ceded are recorded as revenue. Commissions and expense allowances on Retirement Plan Group reinsurance assumed and Modco reserve adjustments on reinsurance assumed are recorded as an expense.

s. Policyholders' reserves

Policyholders’ reserves are developed by actuarial methods that will provide for the present value of estimated future obligations in excess of estimated future premium on policies in force and are determined based on either statutory prescribed mortality/morbidity tables using specified interest rates and valuation methods, or principles-based reserving under Valuation Manual-20, which considers a wide range of future economic conditions, computed using justified company experience factors, such as mortality, policyholder behavior and expenses.

The Company waives deduction of deferred fractional premium at death and returns any portion of the final premium beyond the date of death. Reserves are computed using continuous functions to reflect these practices.

The Company charges a higher premium on certain contracts that cover substandard mortality risk. For these policies, the reserve calculations are based on a substandard mortality rate, which is a multiple of the standard mortality tables.

Certain variable universal life and universal life contracts include features such as guaranteed minimum death benefits (GMDB) or other guarantees that ensure continued death benefit coverage when the policy would otherwise lapse. The value of the guarantee is only available to the beneficiary in the form of a death benefit. The liability for variable and universal life GMDB and other guarantees is included in policyholders' reserves and the related change in this liability is included in change in policyholders' reserves in the Statutory Statements of Operations.

Certain individual variable annuity and fixed annuity products have a variety of additional guarantees such as GMDB and variable annuity guaranteed living benefits (VAGLB). The primary types of VAGLBs include guaranteed minimum accumulation benefits (GMAB), guaranteed minimum income benefits (GMIB) including GMIB Basic and GMIB Plus and guaranteed lifetime withdrawal benefits (GLWB). In general, these benefit guarantees require the contract owner or policyholder to adhere to a company-approved asset allocation strategy. The liabilities for individual variable annuity GMDB and VAGLB are included in policyholders' reserves in the Statements of Financial Position and the related changes in these liabilities are included in change in policyholders' reserves in the Statutory Statements of Operations.

Separate accounts include certain group annuity contracts used to fund retirement plans that offer a guarantee of a contract holder's principal, which can be withdrawn over a stated period of time. These contracts offer a stated rate of return backed by the Company. Contract payments are not contingent upon the life of the retirement plan participants.

Unpaid claims and claim expense reserves are related to disability and LTC claims. Unpaid disability claim liabilities are projected based on the average of the last three disability payments. LTC unpaid claim liabilities are projected using policy specific daily benefit amounts and aggregate utilization factors. Claim expense reserves are based on an analysis of the unit expenses related to the processing and examination of new and ongoing claims. Interest accrued on reserves is calculated by applying NAIC prescribed interest rates to the average reserves by year incurred.

Tabular interest, tabular reserves, reserves released, and tabular cost for all life and annuity contracts and supplementary contracts involving life contingencies are determined in accordance with NAIC Annual Statement instructions. For tabular interest, whole life and term products use a formula that applies a weighted average interest rate determined from a seriatim valuation file to the mean average reserves. Universal life, variable life, group life, annuity and supplemental contracts use a formula that applies a weighted average credited rate to the mean account value. For contracts without an account value (e.g., a single premium immediate annuity) a weighted average statutory valuation rate is applied to the mean statutory reserve or accepted actuarial methods using applicable interest rates are applied.

All policyholders' reserves and accruals are presented net of reinsurance. Management believes that these liabilities and accruals follow statutory accounting requirements and are sufficient, in conjunction with future revenues, to meet future anticipated obligations of policies and contracts in force.

t. Liabilities for deposit-type contracts

Liabilities for funding agreements, dividend accumulations, premium deposit funds, investment-type contracts such as supplementary contracts not involving life contingencies and certain structured settlement annuities are based on account value or accepted actuarial methods using applicable interest rates.

u. Participating contracts

Participating contracts are those that may be eligible to share in any dividends declared by the Company. Participating contracts issued by the Company represented 52% and 53% of the Company's policyholders' reserves and liabilities for deposit-type contracts as of December 31, 2024 and 2023, respectively.

v. Policyholders' dividends

Dividends expected to be paid to policyholders in the following year are approved annually by MassMutual's Board of Directors and are recorded as an expense in the current year. The allocation of these dividends to policyholders reflects the relative contribution of each group of participating policies to surplus and considers, among other factors, investment returns, mortality and morbidity experience, expenses and taxes. The liability for policyholders' dividends includes the estimated amount of annual dividends and settlement dividends. A settlement dividend is an extra dividend payable at termination of a policy upon maturity, death or surrender.

w. Asset valuation reserve

The Company maintains an AVR that is a contingency reserve to stabilize surplus against fluctuations in the carrying value of common stocks, real estate, partnerships and limited liability companies as well as credit-related changes in the value of bonds, preferred stocks, mortgage loans, and certain derivatives. The AVR is reported as a liability within the Statutory Statements of Financial Position and the change in AVR, net of tax, is reported within the Statutory Statements of Changes in Surplus.

x. Repurchase agreements

Repurchase agreements are contracts under which the Company sells securities and simultaneously agrees to repurchase the same or substantially the same securities. These repurchase agreements are carried at cost and accounted for as collateralized borrowings with the proceeds from the sale of the securities recorded as a liability while the underlying securities continue to be recorded as an investment by the Company. Earnings on these investments are recorded as investment income and the difference between the proceeds and the amount at which the securities will be subsequently reacquired is amortized as interest expense. Repurchase agreements are used as a tool for overall portfolio management to help ensure the Company maintains adequate assets in order to provide yield, spread and duration to support liabilities and other corporate needs.

The Company provides collateral, as dictated by the repurchase agreements, to the counterparty in exchange for a loan. If the fair value of the securities sold becomes less than the loan, the counterparty may require additional collateral.

The carrying value reported in the Statutory Statements of Financial Position for repurchase agreements approximates the fair value.

y. Commercial paper

The Company issues commercial paper (CP) in the form of unsecured notes. Interest on CP is calculated using a 360-day year based on the actual number of days elapsed. Due to the short-term nature of CP, the carrying value approximates fair value.

z. Interest maintenance reserve

The Company maintains an IMR that is used to stabilize net income against fluctuations in interest rates. After-tax realized capital gains (losses), which result from changes in interest rates for all types of fixed-income investments and interest-related derivatives, are deferred into the IMR and amortized into net investment income using the grouped amortization method. In the grouped amortization method, assets are grouped based on years of maturity. IMR is reduced by the amount ceded to reinsurers when entering into in force coinsurance ceding agreements. The IMR is included in other liabilities or, if negative, is included as net negative (Disallowed) IMR for any admitted portion in other than invested assets. Refer to *Note 3. "New accounting standards - Adoption of new accounting standards"* for further information on the adoption of INT 23-O1T - Disallowed IMR. Refer to *Note 7. "Other than invested assets"* for further information on the amount admitted as disallowed IMR.

aa. Employee compensation plans

The Company has a long-term incentive compensation plan, under which certain employees of the Company and its subsidiaries may be issued phantom share-based compensation awards. These awards include Phantom Stock Appreciation Rights (PSARs) and Phantom Restricted Stock (PRS). These awards do not grant an equity or ownership interest in the Company.

PSARs provide the participant with the opportunity to share in the value created in the total enterprise. The PSAR value is the appreciation in the phantom stock price between the grant price and the share price at the time of exercise. Awards can only be settled in cash. PSARs typically cliff vest at the end of three years and expire six years after the date of grant. Vested PSARs may be exercised during quarterly two-week exercise periods prior to expiration. The compensation expense for an individual award is recognized over the service period.

PRS provide the participant with the opportunity to share in the value created in the total enterprise. Participants receive the full phantom share value (grant price plus/minus any change in share price) over the award period. Awards can only be settled in cash. PRS typically vests on a graded basis over five years, one third per year after years three, four and five. On each vesting date, a lump sum cash settlement is paid to the participant based on the number of shares vested multiplied by the most recent phantom stock price. Compensation expense is recognized on the accelerated attribution method. The accelerated attribution method recognizes compensation expense over the vesting period by which each separate payout year is treated as if it were, in substance, a separate award.

All awards granted under the Company's plans are compensatory classified awards. Compensation costs are based on the most recent quarterly calculated intrinsic value of the PSARs (current share price less grant price per share not less than zero) and PRS (current share price per share), considering vesting provisions, net of forfeiture assumptions and are included in the Statutory Statements of Financial Position as a liability in general expenses due or accrued. The compensation expense for an individual award is recognized over the service period. The cumulative compensation expense for all outstanding awards in any period is equal to the change in calculated liability period over period. The requisite service period for the awards is the vesting period.

At the time of death or disability, awards contain vesting conditions, whereby employees' unvested awards immediately vest on an accelerated basis with a one-year exercise period for PSARs, full accelerated vesting and settlement for PRS awards.

At the time of retirement, both PRS and PSAR vest according to the original grant terms.

The phantom share price is determined using the enterprise value of each entity within the organization provided it is within a pre-established range calculated using management basis equity method. If outside the range, the maximum or minimum share price established by the management basis equity method would apply, as appropriate.

bb. Other liabilities

Other liabilities primarily consist of the derivative interest expense liability, remittances and items not allocated, other miscellaneous liabilities, liabilities for employee benefits and accrued separate account transfers.

cc. Premium and related expense recognition

Life insurance premium revenue is generally recognized annually on the anniversary date of the policy. However, premium for flexible products, primarily universal life and variable universal life contracts, is recognized as revenue when received. Annuity premium is recognized as revenue when received. DI and LTC premium is recognized as revenue when due.

Premium revenue is adjusted by the related deferred premium adjustment. Deferred premium adjusts for the overstatement created in the calculation of reserves as the reserve computation assumes the entire year's net premium is collected annually at the beginning of the policy year and does not take into account installment or modal payments.

Commissions and other costs related to issuance of new policies and policy maintenance and settlement costs are charged to current operations when incurred. Surrender fee charges on certain life and annuity products are recorded as a reduction of benefits and expenses.

dd. Net realized capital (losses) gains including other-than-temporary impairments and unrealized capital gains (losses)

Net realized capital (losses) gains, net of taxes, exclude gains (losses) deferred into the IMR and gains (losses) of the separate accounts. Net realized capital (losses) gains, including OTTI, are recognized in net income and are determined using the specific identification method.

Bonds - general

The Company employs a systematic methodology to evaluate OTTI by conducting a quarterly analysis of bonds. OTTI is evaluated in a manner consistent with market participant assumptions. The Company considers the following factors, where applicable depending on the type of securities, in the evaluation of whether a decline in value is other than temporary: (a) the likelihood that the Company will be able to collect all amounts due according to the contractual terms of the debt security; (b) the present value of the expected future cash flows of the security; (c) the characteristics, quality and value of the underlying collateral or issuer securing the position; (d) collateral structure; (e) the length of time and extent to which the fair value has been below amortized cost; (f) the financial condition and near-term prospects of the issuer; (g) adverse conditions related to the security or industry; (h) the rating of the security; (i) the Company's ability and intent to hold the investment for a period of time sufficient to allow for an anticipated recovery to amortized cost; and (j) other qualitative and quantitative factors in determining the existence of OTTI including, but not limited to, unrealized loss trend analysis and significant short-term changes in value.

In addition, if the Company has the intent to sell, or the inability, or lack of intent to retain the investment for a period sufficient to recover the amortized cost basis, an OTTI is recognized as a realized loss equal to the entire difference between the investment's amortized cost basis and its fair value at the balance sheet date.

When a bond is other-than-temporarily impaired, a new cost basis is established.

Bonds – corporate

For corporate securities, if it is determined that a decline in the fair value of a bond is other than temporary, OTTI is recognized as a realized loss equal to the difference between the investment's amortized cost basis and, generally, its fair value at the balance sheet date.

The Company analyzes investments whose fair value is below the cost for impairment. Generally, if the investment experiences significant credit or interest rate related deterioration, the cost of the investment is not recoverable, or the Company intends to sell the investment before anticipated recovery, an OTTI is recognized as realized investment loss.

Bonds - loan-backed and structured securities

For loan-backed and structured securities, if the present value of cash flows expected to be collected is less than the amortized cost basis of the security, an OTTI is recognized as a realized loss equal to the difference between the investment's amortized cost basis and the present value of cash flows expected to be collected. The expected cash flows are discounted at the security's effective interest rate. Internal inputs used in determining the amount of the OTTI on structured securities include collateral performance, prepayment speeds, default rates, and loss severity based on borrower and loan characteristics, as well as deal structure including subordination, over-collateralization and cash flow priority.

ABS and MBS are evaluated for OTTI using scenarios and assumptions based on the specifics of each security including collateral type, loan type, vintage and subordination level in the structure. Cash flow estimates are based on these assumptions and inputs obtained from external industry sources along with internal analysis and actual experience. Where applicable, assumptions include prepayment speeds, default rates and loss severity, weighted average maturity and changes in the underlying collateral values.

The Company has a review process for determining if CDOs are at risk for OTTI. For the senior, mezzanine and junior debt tranches, cash flows are modeled using multiple scenarios based on the current ratings and values of the underlying corporate credit risks and incorporating prepayment and default assumptions that vary according to collateral attributes of each CDO. The prepayment and default assumptions are varied within each model based upon rating (base case), historical expectations (default), rating change improvement (optimistic), rating change downgrade (pessimistic) and fair value (market). The default rates produced by these multiple scenarios are assigned an expectation weight according to current market and economic conditions and fed into a final scenario. OTTI is recorded if this final scenario results in the loss of any principal or interest payments due.

For the most subordinated junior CDO tranches, the present value of the projected cash flows in the final scenario is measured using an effective yield. If the current book value of the security is greater than the present value measured using an effective yield, an OTTI is taken in an amount sufficient to produce its effective yield. Certain CDOs cannot be modeled using all of the scenarios because of limitations on the data needed for all scenarios. The cash flows for these CDOs, including foreign currency denominated CDOs, are projected using a customized scenario management believes is reasonable for the applicable collateral pool.

For loan-backed and structured securities, any difference between the new amortized cost basis and any increased present value of future cash flows expected to be collected is accreted into net investment income over the expected remaining life of the bond.

Common and preferred stock

The cost basis of common and preferred stocks is adjusted for impairments deemed to be other than temporary. The Company considers the following factors in the evaluation of whether a decline in value is other than temporary: (a) the financial condition and near-term prospects of the issuer; (b) the Company's ability and intent to retain the investment for a period sufficient to allow for a near-term recovery in value; and (c) the period and degree to which the value has been below cost. The Company conducts a quarterly analysis of issuers whose common or preferred stock is not-in-good standing or valued below 80% of cost. The Company also considers other qualitative and quantitative factors in determining the existence of OTTI including, but not limited to, unrealized loss trend analysis and significant short-term changes in value.

Mortgage loans

The Company performs internal reviews at least annually to determine if individual mortgage loans are performing or nonperforming. The fair values of performing mortgage loans are estimated by discounting expected future cash flows using current interest rates for similar loans with similar credit risk. For nonperforming loans, the fair value is the estimated collateral value of the underlying real estate. If foreclosure is probable, the Company will obtain an external appraisal.

Mortgage loans are considered to be impaired when, based upon current available information and events, it is probable that the Company will be unable to collect all amounts of principal and interest due according to the contractual terms of the mortgage loan agreement. A valuation allowance is recorded on a loan-by-loan basis in net unrealized capital losses for the excess of the carrying value of the mortgage loan over the fair value of its underlying collateral. Such information or events could include property performance, capital budgets, future lease roll, a property inspection as well as payment trends. Collectability and estimated decreases in collateral values are also assessed on a loan-by-loan basis considering all events and conditions relevant to the loan. This evaluation is inherently subjective as it requires estimates that are susceptible to significant revisions as more information becomes available, as changes occur in the market or as negotiations with the borrowing entity evolve. If there is a change in the fair value of the underlying collateral or the estimated loss on the loan, the valuation allowance is adjusted accordingly. An OTTI occurs upon the realization of a credit loss, typically through foreclosure or after a decision is made to accept a discounted payoff, and is recognized in realized capital losses. The previously recorded valuation allowance is reversed from unrealized capital losses. When an OTTI is recorded, a new cost basis is established reflecting estimated value of the collateral.

Real estate

For real estate held for the production of income, depreciated cost is adjusted for impairments whenever events or changes in circumstances indicate the carrying amount of the asset may not be recoverable, with the impairment being included in realized capital losses. An impairment is recorded when the property's estimated future net operating cash flows over ten years, undiscounted and without interest charges, is less than book value.

Adjustments to the carrying value of real estate held for sale are recorded in a valuation reserve as realized capital losses when the fair value less estimated selling costs is less than the carrying value.

Partnerships and limited liability companies

When it is probable that the Company will be unable to recover the outstanding carrying value of an investment based on undiscounted cash flows, or there is evidence indicating an inability of the investee to sustain earnings to justify the carrying value of the investment, OTTI is recognized in realized capital losses reflecting the excess of the carrying value over the estimated fair value of the investment. The estimated fair values of limited partnership interests are generally based on the Company's share of the net asset value (NAV) as provided in the financial statements of the investees. In certain circumstances, management may adjust the NAV by a premium or discount when it has sufficient evidence to support applying such adjustments.

For determining impairments in partnerships that generate LIHTCs, the Company uses the present value of all future benefits, the majority of which are tax credits, discounted at a risk-free rate for future benefits of ten or more years and compares the results to its current book value. Impairments are recognized in realized capital losses reflecting the excess of the carrying value over the estimated fair value of the investment.

Unrealized capital gains (losses)

Unrealized capital gains (losses) include changes in the fair value of derivatives, excluding interest rate swaps and credit default index swaps associated with replicated assets; currency translation adjustments on foreign-denominated bonds; changes in the fair value of unaffiliated common stocks; changes in the fair value of bonds and preferred stocks that are carried at fair value; and changes in the inflation adjustments on U.S Treasury inflation-indexed securities. Changes in the Company's equity investments in partnerships and limited liability companies, including the earnings as reported on the financial statements, earnings recorded as accumulated undistributed earnings, foreign exchange asset valuation and mark-to-market on operating assets, and certain subsidiaries and affiliates are also reported as changes in unrealized capital gains (losses). Unrealized capital gains (losses) are recorded as a change in net unrealized capital gains (losses), net of tax, within the Statutory Statements of Changes in Surplus.

3. New accounting standards

Adoption of new accounting standards

In August 2023, the NAIC adopted INT 23-01T — Disallowed IMR ("INT 23-01T"). INT 23-01T provides optional, limited-term guidance for the assessment of disallowed IMR for up to 10% of adjusted general account capital and surplus. An insurer's capital and surplus must first be adjusted to exclude certain "soft assets" including net positive goodwill, electronic data processing equipment and operating system software, net deferred tax assets and admitted disallowed IMR. An insurer will only be able to admit the negative IMR if the insurer's risk-based capital is over 300% authorized control level after adjusting to remove the assets described above.

As adopted, negative IMR may be admitted first in the insurer's general account and then, if all disallowed IMR in the general account is admitted and the percentage limit is not reached, to the separate account proportionately between insulated and noninsulated accounts. If the insurer can demonstrate historical practice in which acquired gains from derivatives were also reversed to IMR (as liabilities) and amortized, there is no exclusion for derivatives losses. INT 23-01T was adopted by the Company as of September 30, 2023 and will be effective through December 31, 2025. To the extent the Company's IMR balance is a net negative, the effects of INT 23-01T will be reflected in the Company's financial position, results of operations, and financial statement disclosures. The Company has adopted this guidance and the adoption resulted in an admitted disallowed IMR of $1,112 million for MassMutual.

In March 2023, the NAIC adopted modifications to SSAP No. 34 – Investment Income Due and Accrued, effective December 31, 2023. The modifications require additional disclosures and data capture related to gross, non-admitted and admitted amounts for interest income due and accrued, deferred interest, and paid-in-kind (PIK) interest. In August 2023, the NAIC adopted revisions to further clarify the PIK interest disclosure in SSAP No. 34, effective December 31, 2023. The revisions clarify that decreasing amounts to principal balances are first applied to any PIK interest included in the principal balance. The original principal would not be reduced until the PIK interest had been fully eliminated from the balance. The revisions also provide a practical expedient for determining the PIK interest in the cumulative balance by subtracting the original principal/ par value from the current principal/ par value, with the resulting PIK interest not to go less than zero. The modifications did not have a material effect on the Company's financial statements.

In December 2023, the NAIC adopted revisions, effective January 1, 2024, to avoid allocating realized gains or losses from bond sales to the IMR when sold before a rating downgrade. Revisions were also made to avoid allocating realized gains or losses from mortgage loan sales when there is a credit loss allowance, where payments are not 90 days past due. Revisions were also made to update guidance on changes in credit ratings used to allocate credit or interest rate related gains or losses, requiring identification of realized losses from acute credit events to be allocated to AVR. The modifications did not have a material effect on the Company's financial statements.

In March 2024, the NAIC adopted revisions to the requirements of audit and admissibility in SSAP No. 97 – Investments in Subsidiary, Controlled and Affiliated Entities, effective March 16, 2024, to better align with the guidance on the look-through methodology. The revisions allow for admitting audited investments in entities owned by unaudited downstream noninsurance holding company SCA entity. The modifications did not have a material effect on the Company’s financial statements.

Future adoption of new accounting standards

In August 2023, the NAIC adopted revisions to clarify and incorporate a new bond definition within disclosures SSAP No. 26 – Bonds, SSAP No. 43 – Asset-Backed Securities, and other related SSAPs, which will become effective January 1, 2025. The revisions were issued in connection with its principle-based bond definition project, “the Bond Project”.

The Bond Project began in October 2020 through the development of a principle-based bond definition to be used for all securities in determining whether they qualify for reporting on the statutory annual statement Schedule D. Within the new bond definition, bonds are classified as an “issuer credit obligation” or an “asset-backed security.”

An “issuer credit obligation” is defined as a bond where repayment is supported by the general creditworthiness of an operating entity, and an “asset-backed security” is defined as a bond issued by an entity created for the primary purpose of raising capital through debt backed by financial assets. The revisions to SSAP No. 26 reflect the principle-based bond definition, and SSAP No. 43 provides accounting and reporting guidance for investments that qualify as asset-backed securities under the new bond definition. Upon adoption, investments that do not qualify as bonds will not be permitted to be reported as bonds on Schedule D, Part 1 thereafter as there will be no grandfathering for existing investments that do not qualify under the revised SSAPs. The Company is currently assessing the impacts of the adopted SSAP No. 26, SSAP No. 43 and other related SSAPs in relation to the financial statements.

In March 2024, the NAIC adopted revisions to SSAP No. 21 - Other Admitted Assets, effective January 1, 2025, clarifying that residuals follow the effective yield approach with a cap and providing an election for the cost recovery method. The modifications are not expected to have a material effect on the Company’s financial statements. The Company will elect the effective yield method using the allowable earned yield, capped by the amount of cash distributions received. The Company is assessing the potential impact on the Company’s financial statements.

Effective January 1, 2025, revisions will be made to short-term investments, which include excluding additional investment types from being reported as cash equivalents or short-term investments regardless of maturity date of the investment at the date of acquisition. Investments will be eliminated from being reported as cash equivalents or short-term investments unless they would qualify under SSAP No. 26 – Bonds as an issuer credit obligation. Such investments will then only qualify as a cash equivalent or short-term investment if they have a maturity date within 3-months (cash equivalents) or 12-months (short-term) from the date of acquisition or meet the specifics requirements for money market mutual funds or cash pooling arrangement. The Company is assessing the potential impact on the Company’s financial statements.

The NAIC adopted revisions to various SSAPs at the Spring 2024 National Meeting for investments in tax credits and acquired tax credits in response to the comments received, as well as updated annual statement reporting categories for tax credit investment risk-based capital. These revisions are in addition to the previous ones, which include broad criteria to scope in various tax credit programs, including solar programs and state specific programs. Proportional amortization will be the measurement approach as with existing low-income housing tax credits, which means recording amortization of the investment in the partnership through net investment income and use of the tax credits in the appropriate tax line. The adopted revisions will be effective on January 1, 2025. The Company is assessing the potential impact on the Company’s financial statements.

4. *Fair value of financial instruments*

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

	December 31, 2024				
	Carrying Value	Fair Value	Level 1	Level 2	Level 3
	(In Millions)				
Financial assets:					
Bonds:					
U. S. government and agencies	$ 5,604	$ 4,968	$ —	$ 4,968	$ —
All other governments	979	809	—	801	8
States, territories and possessions	157	146	—	146	—
Political subdivisions	276	265	—	265	—
Special revenue	3,402	3,321	—	3,285	36
Industrial and miscellaneous	139,384	130,914	725	65,638	64,551
Hybrid securities	1,019	1,041	—	1,041	—
Parent, subsidiaries and affiliates	12,808	12,429	—	3,489	8,940
Preferred stocks	1,019	1,145	187	3	955
Common stocks - subsidiaries and affiliates	150	150	16	—	134
Common stocks - unaffiliated	1,198	1,198	292	—	906
Mortgage loans - commercial	16,962	15,575	—	—	15,575
Mortgage loans - residential	6,730	6,570	—	—	6,570
Derivatives:					
Interest rate swaps	20,513	14,364	—	14,364	—
Options	567	566	113	453	—
Currency swaps	2,711	2,662	—	2,662	—
Forward contracts	412	412	—	412	—
Credit default swaps	2	2	—	2	—
Financial Futures	15	15	15	—	—
Cash, cash equivalents and short-term investments	6,004	6,004	572	5,432	—
Separate account assets	49,251	49,251	33,240	14,194	1,817
Financial liabilities:					
GICs	17,955	17,249	—	—	17,249
Group annuity contracts and other deposits	1,714	1,570	—	—	1,570
Individual annuity contracts	29,402	30,328	—	—	30,328
Supplementary contracts	844	845	—	—	845
Repurchase agreements	3,408	3,420	—	3,420	—
Debt	250	250	—	250	—
Derivatives:					
Interest rate swaps	15,665	16,192	—	16,192	—
Options	63	63	63	—	—
Currency swaps	792	735	—	735	—
Forward contracts	67	63	—	63	—
Credit default swaps	175	175	—	175	—
Financial futures	12	12	12	—	—

Common stocks - subsidiaries and affiliates do not include unconsolidated subsidiaries, which had statutory carrying values of $25,690 million.

	December 31, 2023				
	Carrying Value	Fair Value	Level 1	Level 2	Level 3
	(In Millions)				
Financial assets:					
Bonds:					
U. S. government and agencies	$ 5,060	$ 4,744	$ —	$ 4,744	$ —
All other governments	1,242	1,092	—	1,062	30
States, territories and possessions	231	229	—	229	—
Political subdivisions	363	353	—	353	—
Special revenue	4,986	4,975	—	4,938	37
Industrial and miscellaneous	122,035	113,940	66	50,235	63,639
Hybrid securities	686	658	—	658	—
Parent, subsidiaries and affiliates	9,830	9,410	—	1,406	8,004
Preferred stocks	446	470	96	—	374
Common stocks - subsidiaries and affiliates	430	430	253	—	177
Common stocks - unaffiliated	1,623	1,623	666	—	957
Mortgage loans - commercial	19,299	17,885	—	—	17,885
Mortgage loans - residential	4,722	4,449	—	—	4,449
Derivatives:					
Interest rate swaps	17,292	12,277	—	12,277	—
Options	547	547	68	479	—
Currency swaps	2,831	2,831	—	2,831	—
Forward contracts	13	13	—	13	—
Credit default swaps	1	1	—	1	—
Financial Futures	56	56	56	—	—
Cash, cash equivalents and short-term investments	11,134	11,134	782	10,352	—
Separate account assets	52,593	52,593	35,002	15,677	1,914
Financial liabilities:					
GICs	16,207	15,550	—	—	15,550
Group annuity contracts and other deposits	2,053	1,841	—	—	1,841
Individual annuity contracts	25,861	24,495	—	—	24,495
Supplementary contracts	942	943	—	—	943
Repurchase agreements	3,219	3,219	—	3,219	—
Debt	50	50	—	50	—
Derivatives:					
Interest rate swaps	11,922	12,289	—	12,289	—
Options	35	35	35	—	—
Currency swaps	1,294	1,309	—	1,309	—
Forward contracts	301	303	—	303	—
Credit default swaps	153	152	—	152	—
Financial futures	29	29	29	—	—

Common stocks - subsidiaries and affiliates do not include unconsolidated subsidiaries, which had statutory carrying values of $25,066 million.

Fair value is defined as the price that would be received from selling an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. The authoritative guidance for fair value establishes a measurement framework that includes a hierarchy used to classify the inputs used in measuring fair value. The hierarchy prioritizes the inputs to valuation techniques into three levels. Each level reflects a unique description of the inputs that are significant to the fair value measurements. The levels of the fair value hierarchy are as follows:

Level 1 – Observable inputs in the form of quoted prices for identical instruments in active markets.

Level 2 – Observable inputs other than Level 1 prices, such as quoted prices for similar assets or liabilities, quoted prices in markets that are not active or other inputs that are observable or can be derived from observable market data for substantially the full term of the assets or liabilities.

Level 3 – One or more unobservable inputs that are supported by little or no market activity and are significant to the fair value of the assets or liabilities. Level 3 assets and liabilities include financial instruments whose value is determined using internal models, as well as instruments for which the determination of fair value requires significant management judgment or estimation.

When available, the Company generally uses unadjusted quoted market prices from independent sources to determine the fair value of investments and classifies such items within Level 1 of the fair value hierarchy. If quoted prices are not available, prices are derived from observable market data for similar assets in an active market or obtained directly from brokers for identical assets traded in inactive markets. Investments that are priced using these inputs are classified within Level 2 of the fair value hierarchy. When some of the necessary observable inputs are unavailable, fair value is based upon internally developed models. These models use inputs not directly observable or correlated with observable market data. Typical inputs, which are integrated in the Company’s internal discounted cash flow models and discounted earnings models include, but are not limited to, issuer spreads derived from internal credit ratings and benchmark yields such as SOFR, cash flow estimates and earnings before interest, taxes, depreciation and amortization estimates. Investments that are priced with such unobservable inputs are classified within Level 3 of the fair value hierarchy.

The Company reviews the fair value hierarchy classifications at each reporting period. Overall, reclassifications between levels occur when there are changes in the observability of inputs and market activity used in the valuation of a financial asset or liability. Such reclassifications are reported as transfers between levels at the beginning fair value for the reporting period in which the changes occur. Given the types of assets classified as Level 1 (primarily equity securities including mutual fund investments), transfers between Level 1 and Level 2 measurement categories are expected to be infrequent. Transfers into and out of Level 3 are summarized in the schedule of changes in Level 3 assets and liabilities.

The fair value of group annuity contracts and other deposits is determined by multiplying the book value of the contract by an average market value adjustment factor. The market value adjustment factor is directly related to the difference between the book value of client liabilities and the present value of installment payments discounted at current market value yields. The market value yield is measured by the Barclay's Aggregate Bond Index, subject to certain adjustments, and the installment period is equivalent to the duration of the Company’s invested asset portfolio.

The fair value of individual annuity and supplementary contracts is determined using one of several methods based on the specific contract type. For short-term contracts, generally less than 30 days, the fair value is assumed to be the book value. For contracts with longer durations, GICs and investment-type contracts, the fair value is determined by calculating the present value of future cash flows discounted at current market interest rates, the risk-free rate or a current pricing yield curve based on pricing assumptions using assets of a comparable corporate bond quality. Annuities receiving dividends are accumulated at the average minimum guaranteed rate and discounted at the risk-free rate. All others are valued using cash flow projections from the Company's asset/liability management analysis.

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

	December 31, 2024			
	Level 1	Level 2	Level 3	Total
	(In Millions)			
Financial assets:				
Bonds:				
Special revenue	$ —	$ 1	$ —	$ 1
Industrial and miscellaneous	725	111	265	1,101
Preferred stocks	44	—	46	90
Common stocks - subsidiaries and affiliates	16	—	134	150
Common stocks - unaffiliated	293	—	905	1,198
Derivatives:				
Interest rate swaps	—	20,508	—	20,508
Options	114	453	—	567
Currency swaps	—	2,631	—	2,631
Forward contracts	—	412	—	412
Credit default swaps	—	2	—	2
Financial Futures	15	—	—	15
Separate account assets	33,240	14,194	1,817	49,251
Total financial assets carried at fair value	$ 34,447	$ 38,312	$ 3,167	$ 75,926
Financial liabilities:				
Derivatives:				
Interest rate swaps	$ —	$ 15,665	$ —	$ 15,665
Options	63	—	—	63
Currency swaps	—	201	—	201
Forward contracts	—	67	—	67
Credit default swaps	—	175	—	175
Financial futures	12	—	—	12
Total financial liabilities carried at fair value	$ 75	$ 16,108	$ —	$ 16,183

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

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

	December 31, 2023			
	Level 1	Level 2	Level 3	Total
	(In Millions)			
Financial assets:				
Bonds:				
Special revenue	$ —	$ 2	$ —	$ 2
Industrial and miscellaneous	66	107	172	345
Hybrid securities				
Preferred stocks	24	—	63	87
Common stocks - subsidiaries and affiliates	253	—	177	430
Common stocks - unaffiliated	666	—	957	1,623
Derivatives:				
Interest rate swaps	—	17,287	—	17,287
Options	68	479	—	547
Currency swaps	—	2,831	—	2,831
Forward contracts	—	13	—	13
Financial Futures	56	—	—	56
Separate account assets	35,002	15,677	1,914	52,593
Total financial assets carried at fair value	$ 36,135	$ 36,396	$ 3,283	$ 75,814
Financial liabilities:				
Derivatives:				
Interest rate swaps	$ —	$ 11,922	$ —	$ 11,922
Options	35	—	—	35
Currency swaps	—	192	—	192
Forward contracts	—	301	—	301
Credit default swaps	—	153	—	153
Financial futures	29	—	—	29
Total financial liabilities carried at fair value	$ 64	$ 12,568	$ —	$ 12,632

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.

Valuation Techniques and Inputs

The Company determines the fair value of its investments using primarily the market approach or the income approach. The use of quoted prices for identical assets and matrix pricing or other similar techniques are examples of market approaches, while the use of discounted cash flow methodologies is an example of the income approach. The Company attempts to maximize the use of observable inputs and minimize the use of unobservable inputs in selecting whether the market or the income approach is used.

A description of the significant valuation techniques and inputs to the determination of estimated fair value for the more significant asset and liability classes measured at fair value on a recurring basis and categorized within Level 2 and Level 3 of the fair value hierarchy is as follows:

Separate account assets – These assets primarily include bonds (industrial and miscellaneous; U.S. government and agencies), and derivatives. Their fair values are determined as follows:

> *Bonds (Industrial and miscellaneous)* – These securities are principally valued using the market or the income approaches. Level 2 valuations are based primarily on quoted prices in markets that are not active, broker quotes, matrix pricing or other similar techniques that use standard market observable inputs such as benchmark yields, spreads versus benchmark yields, new issuances, issuer ratings, duration, and trades of identical or comparable securities. Privately placed securities are valued using discounted cash flow models using standard market observable inputs and inputs derived from, or corroborated by, market observable data including market yield curve, duration, call provisions, observable prices and spreads for similar publicly traded or privately traded issuances that incorporate the credit quality and industry sector of the issuer. This level also includes securities priced by independent pricing services that use observable inputs. Valuations based on matrix pricing or other similar techniques that utilize significant unobservable inputs or inputs that cannot be derived principally from, or corroborated by, observable market data, including adjustments for illiquidity, delta spread adjustments or spreads to reflect industry trends or specific credit-related issues are classified as Level 3. In addition, inputs including quoted prices for identical or similar securities that are less liquid and based on lower levels of trading activity than securities classified in Level 2 are classified as Level 3.
>
> *Bonds (U.S. government and agencies)* – These securities are principally valued using the market approach. Level 2 valuations are based primarily on quoted prices in markets that are not active, or using matrix pricing or other similar techniques using standard market observable inputs such as the benchmark U.S. Treasury yield curve, the spreads versus the U.S. Treasury yield curve for the identical security and comparable securities that are actively traded.

Derivative assets and liabilities – These financial instruments are primarily valued using the market approach. The estimated fair value of derivatives is based primarily on quotations obtained from counterparties and independent sources, such as quoted market values received from brokers. These quotations are compared to internally derived prices and a price challenge is lodged with the counterparties and an independent source when a significant difference cannot be explained by appropriate adjustments to the internal model. When quoted market values are not reliable or available, the value is based upon an internal valuation process using market observable inputs that other market participants would use. Significant inputs to the valuation of derivative financial instruments include overnight index swaps (OIS) and SOFR basis curves, interest rate volatility, swap yield curve, currency spot rates, cross currency basis curves and dividend yields. Due to the observability of the significant inputs to these fair value measurements, they are classified as Level 2.

The use of different assumptions or valuation methodologies may have a material impact on the estimated fair value amounts. For the periods presented, there were no significant changes to the Company's valuation techniques.

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

	Balance as of 01/01/24	Gains (Losses) in Net Income	Losses (Gains) in Surplus	Purchases	Issuances	Sales	Settlements	Transfers In	Transfers Out	Other	Balance as of 12/31/24
	(In Millions)										
Financial assets:											
Bonds:											
Industrial and miscellaneous	$ 172	$ (130)	$ 9	$ 7	$ 3	$ —	$ (10)	$ —	$ —	$ 214	$ 265
Preferred stocks	63	(9)	8	—	—	—	—	—	—	(16)	46
Common Stocks:											
Subsidiaries and affiliates	177	3	3	415	(259)	66	(346)	—	(156)	231	134
Unaffiliated	957	(6)	136	258	221	(12)	(674)	25	—	—	905
Separate account assets	1,914	83	—	21	—	(196)	(5)	—	—	—	1,817
Total financial assets	$ 3,283	$ (59)	$ 156	$ 701	$ (35)	$ (142)	$ (1,035)	$ 25	$(156)	$ 429	$ 3,167

	Balance as of 01/01/23	Gains (Losses) in Net Income	Losses (Gains) in Surplus	Purchases	Issuances	Sales	Settlements	Transfers In	Transfers Out	Other	Balance as of 12/31/23
	(In Millions)										
Financial assets:											
Bonds:											
Industrial and miscellaneous	$ 220	$ (4)	$ (10)	$ 36	$ 1	$ (2)	$ (13)	$ —	$ —	$ (56)	$ 172
Preferred stocks	47	—	11	3	—	—	—	—	—	2	63
Common Stocks:											
Subsidiaries and affiliates	350	7	(216)	21	20	(47)	—	48	—	(6)	177
Unaffiliated	970	24	(53)	60	26	(29)	(38)	—	—	(3)	957
Separate account assets	1,693	271	—	134	—	(182)	(2)	—	—	—	1,914
Total financial assets	$ 3,280	$ 298	$ (268)	$ 254	$ 47	$ (260)	$ (53)	$ 48	$ —	$ (63)	$ 3,283

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.

a. Bonds

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

	December 31, 2024			
	Carrying Value	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
	(In Millions)			
U.S. government and agencies	$ 5,604	$ 22	$ 658	$ 4,968
All other governments	979	6	176	809
States, territories and possessions	157	—	11	146
Political subdivisions	276	5	16	265
Special revenue	3,402	36	117	3,321
Industrial and miscellaneous	139,384	743	9,213	130,914
Hybrid securities	1,019	44	22	1,041
Parent, subsidiaries and affiliates	12,808	29	408	12,429
Total	$ 163,629	$ 885	$ 10,621	$ 153,893

The December 31, 2024 gross unrealized losses exclude $186 million of losses included in the carrying value. These losses include $183 million from NAIC Class 6 bonds and $3 million from RMBS and 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, 2023			
	Carrying Value	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
	(In Millions)			
U.S. government and agencies	$ 5,060	$ 70	$ 385	$ 4,744
All other governments	1,242	13	163	1,092
States, territories and possessions	231	4	6	229
Political subdivisions	363	7	17	353
Special revenue	4,986	113	125	4,975
Industrial and miscellaneous	122,035	823	8,918	113,940
Hybrid securities	686	18	46	658
Parent, subsidiaries and affiliates	9,830	20	439	9,410
Total	$ 144,433	$ 1,068	$ 10,099	$ 135,401

The December 31, 2023 gross unrealized losses exclude $127 million of losses included in the carrying value. These losses include $126 million from NAIC Class 6 bonds and $1 million from RMBS and CMBS whose ratings were obtained from third-party modelers. These losses were primarily included in industrial and miscellaneous or parent, subsidiaries and affiliates.

The quality of the bond portfolio is determined by the use of SVO ratings and the equivalent rating agency designations, except for RMBS and CMBS that use third-party modelers. The following sets forth the NAIC class ratings for the bond portfolio including RMBS and CMBS:

		December 31,			
		2024		2023	
NAIC Class	Equivalent Rating Agency Designation	Carrying Value	% of Total	Carrying Value	% of Total
		(In Millions)			
1	Aaa/Aa/A	$ 95,519	59 %	$ 81,184	56 %
2	Baa	60,140	37	53,888	37
3	Ba	3,324	2	3,617	3
4	B	2,227	1	2,842	2
5	Caa and lower	1,862	1	2,512	2
6	In or near default	557	—	390	—
	Total	$ 163,629	100 %	$ 144,433	100 %

The following summarizes NAIC ratings for RMBS and CMBS investments subject to NAIC modeling:

	December 31,							
	2024				2023			
	RMBS		CMBS		RMBS		CMBS	
NAIC Class	Carrying Value	% of Total	Carrying Value	% of Total	Carrying Value	% of Total	Carrying Value	% of Total
	(In Millions)							
1	$ 614	86 %	$ 2,162	79 %	$ 246	95 %	$ 2,020	75 %
2	91	13	160	6	—	—	237	9
3	4	1	160	6	1	—	155	6
4	1	—	34	1	5	2	143	5
5	1	—	135	5	7	3	63	2
6	—	—	87	3	—	—	72	3
	$ 711	100 %	$ 2738	100 %	$ 259	100 %	$ 2,690	100 %

The following is a summary of the carrying value and fair value of bonds as of December 31, 2024 and 2023 by contractual maturity. Expected maturities may differ from contractual maturities because issuers may have the right to call or prepay obligations with or without prepayment penalties. Securities with more than one maturity date are included in the table using the final maturity date.

	2024		2023	
	Carrying Value	Fair Value	Carrying Value	Fair Value
	(In Millions)			
Due in one year or less	$ 5,558	$ 5,541	$ 8,289	$ 7,949
Due after one year through five years	47,307	46,549	32,923	32,288
Due after five years through ten years	38,692	37,385	38,086	36,551
Due after ten years	72,072	64,417	65,135	58,613
Total	$ 163,629	$ 153,892	$ 144,433	$ 135,401

Sales proceeds and related gross realized capital gains (losses) from bonds were as follows:

	Years Ended December 31,		
	2024	2023	2022
	(In Millions)		
Proceeds from sales	$ 18,349	$ 11,489	$ 16,097
Gross realized capital gains from sales	210	102	143
Gross realized capital losses from sales	(451)	(645)	(624)

The following is a summary of the fair values and gross unrealized losses aggregated by bond category and length of time that the securities were in a continuous unrealized loss position:

	December 31, 2024					
	Less Than 12 Months			12 Months of Longer		
	Fair Value	Unrealized Losses	Number of Issuers	Fair Value	Unrealized Losses	Number of Issuers
	(In Millions)					
U. S. government and agencies	$ 1,240	$ 88	6	$ 2,440	$ 570	13
All other governments	61	2	14	622	174	27
States, territories and possessions	19	—	4	109	11	7
Political subdivisions	36	1	4	143	15	9
Special revenue	377	10	39	1,077	107	119
Industrial and miscellaneous	14,133	249	1,117	52,840	9,150	2,215
Hybrid securities	159	3	14	174	20	23
Parent, subsidiaries and affiliates	1,304	10	12	6,865	398	8
Total	$ 17,329	$ 363	1,210	$ 64,270	$ 10,445	2,421

	December 31, 2023					
	Less Than 12 Months			12 Months of Longer		
	Fair Value	Unrealized Losses	Number of Issuers	Fair Value	Unrealized Losses	Number of Issuers
	(In Millions)					
U. S. government and agencies	$ 576	$ 5	6	$ 2,067	$ 380	13
All other governments	26	—	5	882	163	32
States, territories and possessions	10	—	3	98	6	8
Political subdivisions	13	—	3	176	17	10
Special revenue	331	8	27	1,260	118	163
Industrial and miscellaneous	5,713	264	585	65,698	8,795	2,907
Hybrid securities	49	1	7	230	45	33
Parent, subsidiaries and affiliates	5,042	316	10	2,429	123	21
Total	$ 11,760	$ 594	646	$ 72,840	$ 9,647	3,187

As of December 31, 2024 and 2023, management has not deemed these unrealized losses to be other-than-temporary because the investment’s carrying value is expected to be realized and the Company has the ability and intent not to sell these investments until recovery, which may be at maturity.

As of December 31, 2024, investments in structured and loan-backed securities that had unrealized losses, which were not recognized in earnings, had a fair value of $11,250 million. Securities in an unrealized loss position for less than 12 months had a fair value of $4,249 million and unrealized losses of $42 million. Securities in an unrealized loss position for greater than 12 months had a fair value of $7,001 million and unrealized losses of $887 million. These securities were primarily categorized as industrial and miscellaneous or parent, subsidiaries and affiliates.

As of December 31, 2023, investments in structured and loan-backed securities that had unrealized losses, which were not recognized in earnings, had a fair value of $17,178 million. Securities in an unrealized loss position for less than 12 months had a fair value of $2,151 million and unrealized losses of $48 million. Securities in an unrealized loss position for greater than 12 months had a fair value of $15,027 million and unrealized losses of $1,261 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 years ended December 31, 2024 or 2023 that were reacquired within 30 days of the sale date.

The Company had assets on deposit with government authorities or trustees, as required by law, in the amount of $10 million as of December 31, 2024 and 2023.

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 December 31, 2024, RMBS had a total carrying value of $3,882 million and a fair value of $3,904 million of which approximately 2%, based on carrying value, was classified as Alt-A. Alt-A and subprime RMBS had a total carrying value of $2,246 million and a fair value of $2,268 million. As of December 31, 2023, RMBS had a total carrying value of $3,775 million and a fair value of $3,756 million of which approximately 4%, based on carrying value, was classified as Alt-A. Alt-A and subprime RMBS had a total carrying value of $1,326 million and a fair value of $1,312 million.

During the years ended December 31, 2024, there were no significant credit downgrades for the securities held by the Company that were backed by residential mortgage pools.

Leveraged loan exposure

Leveraged loans are loans extended to companies that already have considerable amounts of debt. The Company reports leveraged loans as bonds. These leveraged loans have interest rates higher than typical loans, reflecting the additional risk of default from issuers with high debt-to-equity ratios.

As of December 31, 2024, total leveraged loans had a carrying value of $3,386 million and a fair value of $3,394 million, of which approximately 45%, based on carrying value, were domestic leveraged loans. As of December 31, 2023, total leveraged loans had a carrying value of $4,708 million and a fair value of $4,690 million, of which approximately 51%, based on carrying value, were domestic leveraged loans.

In 2024, the Company refined its definition of leveraged loans to include commercial loans to high-yield corporations.

Commercial mortgage-backed exposure

The Company holds bonds backed by pools of commercial mortgages. The mortgages in these pools have varying risk characteristics related to underlying collateral type, borrower's risk profile and ability to refinance and the return provided to the borrower from the underlying collateral. These investments had a carrying value of $2,749 million and fair value of $2,449 million as of December 31, 2024 and a carrying value of $2,693 million and fair value of $2,285 million as of December 31, 2023.

b. 5GI Securities

Securities owned by the Company with an NAIC designation of 5GI securities:

	December 31, 2024			December 31, 2023		
	Number of 5GI Securities	Carrying Value	Fair Value	Number of 5GI Securities	Carrying Value	Fair Value
	(In Millions)					
Investments:						
Bonds - amortized cost	242	$ 1,002	$ 987	245	$ 1,458	$ 1,430
Preferred stock - amortized cost	—	—	—	3	1	9
Preferred stock - fair value	2	1	1	1	—	—
Total	244	$ 1,003	$ 988	249	$ 1,459	$ 1,439

c. Preferred stocks

The carrying value and fair value of preferred stocks were as follows:

	December 31, 2024	December 31, 2023
	(In Millions)	
Carrying value	$ 1,019	$ 446
Gross unrealized gains	129	29
Gross unrealized losses	(3)	(5)
Fair value	$ 1,145	$ 470

As of December 31, 2024, investments in preferred stocks in an unrealized loss position included holdings with a fair value of $178 million in 12 issuers, $141 million of which was in an unrealized loss position for more than 12 months. As of December 31, 2023, investments in preferred stocks in an unrealized loss position included holdings with a fair value of $267 million in 19 issuers, $265 million of which was in an unrealized loss position for more than 12 months. Based upon the Company's impairment review process discussed in *Note 2dd. "Net realized capital (losses) gains including other-than-temporary impairments and unrealized capital gains (losses)"* the decline in value of these securities was not considered to be other than temporary as of December 31, 2024 or 2023.

As of December 31, 2024 and 2023, the Company held preferred stocks for which the transfer of ownership was restricted by contractual requirements with carrying values of $96 million and $201 million, respectively.

d. Common stocks – subsidiaries and affiliates

The Company has two primary domestic life insurance subsidiaries, C.M. Life Insurance Company (C.M. Life), which primarily provides fixed and variable annuities and universal life insurance business, and MML Bay State Life Insurance Company (MML Bay State), a subsidiary of C.M. Life, which primarily issues variable life and bank-owned life insurance policies.

Summarized below is certain combined statutory financial information for the unconsolidated domestic life insurance subsidiaries:

	As of and for the Years Ended December 31, 2024	2023	2022
	(In Millions)		
Total Revenue	$ 341	$ 433	$ 577
Net income	9	48	155
Assets	12,451	12,653	12,870
Liabilities	10,531	10,515	11,090
Shareholder's equity	1,920	2,138	1,780

In 2024, C.M. Life paid $190 million in dividends to MassMutual, and did not pay any dividends to MassMutual in 2023.

MassMutual did not make any contributions to C.M. Life in 2024 and 2023.

MMHLLC, a wholly-owned subsidiary of MassMutual, is the parent of subsidiaries that include Barings LLC (Barings) and deals in markets that include retail and institutional asset management entities and registered broker dealers.

The MMHLLC statutory carrying value was $17.2 billion, which included $122 million of nonadmitted asset adjustments as of December 31, 2024 and $17.6 billion as of December 31, 2023, which included $106 million of nonadmitted asset adjustments.

Summarized below is certain U.S. GAAP financial information for MMHLLC:

	As of and for the Years Ended December 31,		
	2024	2023	2022
	(In Billions)		
Total Revenue	$ 5.1	$ 3.4	$ 3.6
Net income	1.2	0.7	0.6
Assets	27.7	27.2	27.2
Liabilities	9.5	9.1	8.2
Member's equity	18.2	18.1	18.9

MMHLLC paid $785 million in dividends to MassMutual for the year ended December 31, 2024, $630 million of which were declared in 2023, and paid $730 million in dividends to MassMutual for the year ended December 31, 2023, $450 million of which were declared in 2022.

MMHLLC declared an additional $570 million in dividends to MassMutual for the year ended December 31, 2024, which will be paid in 2025.

MassMutual contributed capital of $32 million to MMHLLC for the year ended December 31, 2024, and $235 million for the year ended December 31, 2023.

As of December 31, 2024 and 2023 the Glidepath statutory carrying value was $4.7 billion and $3.6 billion, respectively.

Summarized below is certain U.S. GAAP financial information for Glidepath:

	As of and for the Years Ended December 31,	
	2024	2023
	(In Billions)	
Total Revenue	$ 3.0	$ 0.8
Net income	0.3	0.8
Assets	58.6	53.4
Liabilities	55.0	51.5
Shareholder's equity	3.6	1.9

Summarized below is certain U.S. GAAP financial information for MMIH:

	As of and for the Years Ended December 31,		
	2024	2023	2022
	(In Billions)		
Total Revenue	$ 0.5	$ 0.4	$ 0.3
Net income	0.1	0.1	0.1
Assets	10.9	10.1	9.3
Liabilities	9.0	8.2	7.6
Member's equity	1.9	1.9	1.7

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 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.

The Company does not rely on dividends from its subsidiaries to meet its operating cash flow requirements. For the domestic life insurance subsidiaries, substantially all of their statutory shareholder's equity of $1,701 million and $1,905 million as of December 31, 2024 and 2023, respectively, was subject to dividend restrictions imposed by the State of Connecticut.

For further information on related party transactions with subsidiaries and affiliates, see *Note 17. "Related party transactions"*.

e. Common stocks – unaffiliated

The adjusted cost basis and carrying value of unaffiliated common stocks were as follows:

	December 31,	
	2024	2023
	(In Millions)	
Adjusted cost basis	$ 783	$ 1,268
Gross unrealized gains	437	407
Gross unrealized losses	(22)	(52)
Carrying value	$ 1,198	$ 1,623

As of December 31, 2024, investments in unaffiliated common stocks in an unrealized loss position included holdings with a fair value of $41 million in 22 issuers, $18 million of which were in an unrealized loss position for more than 12 months. As of December 31, 2023, investments in unaffiliated common stocks in an unrealized loss position included holdings with a fair value of $308 million in 30 issuers, $289 million of which were in an unrealized loss position for more than 12 months. Based upon the Company's impairment review process discussed in *Note 2dd. "Net realized capital (losses) gains including other-than-temporary impairments and unrealized capital gains (losses)"* the decline in value of these securities was not considered to be other than temporary as of December 31, 2024 or 2023.

As of December 31, 2024 and 2023 the Company held common stocks, for which the transfer of ownership was restricted by contractual requirements, with carrying values of $6 million and $106 million, respectively.

f. 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. The Company's loan agreements with the senior lender contain negotiated provisions that are designed to maximize the Company's influence with the objective of mitigating the Company's risks as the secondary lender for mezzanine loans. Commercial mortgage loans have varying risk characteristics including, among others, the borrower's liquidity, the underlying percentage of completion of a project, the returns generated by the collateral, the refinance risk associated with maturity of the loan and deteriorating collateral value.

Residential mortgage loans are primarily seasoned pools of homogeneous residential mortgage loans some of which are backed by Federal Housing Administration (FHA) and Veterans Administration (VA) guarantees. As of December 31, 2024 and 2023, the Company did not have any direct subprime exposure through the purchases of unsecuritized whole-loan pools.

Geographical concentration is considered prior to the purchase of mortgage loans and residential mortgage loan pools. The mortgage loan portfolio is diverse with no significant collateral concentrations in any particular geographic region as of December 31, 2024 or 2023.

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

	December 31, 2024		December 31, 2023	
	Carrying Value	Fair Value	Carrying Value	Fair Value
	(In Millions)			
Commercial mortgage loans:				
Primary lender	$ 16,854	$ 15,477	$ 19,162	$ 17,766
Mezzanine loans	108	98	137	119
Total commercial mortgage loans	16,962	15,575	19,299	17,885
Residential mortgage loans:				
FHA insured and VA guaranteed	1,599	1,487	1,833	1,699
Other residential loans	5,131	5,083	2,889	2,750
Total residential mortgage loans	6,730	6,570	4,722	4,449
Total mortgage loans	$ 23,692	$ 22,145	$ 24,021	$ 22,334

The loan-to-value ratios by property type of the Company's commercial mortgage loans were as follows:

	December 31, 2024				
	Less Than 81%	81% to 95%	Above 95%	Total	% of Total
	($ In Millions)				
Office	$ 2,865	$ 1,319	$ 1,423	$ 5,607	33 %
Apartments	4,604	409	371	5,384	32
Industrial and other	2,641	24	73	2,738	16
Retail	1,524	145	34	1,703	10
Hotels	1,260	179	90	1,529	9
Total	$ 12,894	$ 2,076	$ 1,991	$ 16,961	100 %

	December 31, 2023				
	Less Than 81%	81% to 95%	Above 95%	Total	% of Total
	($ In Millions)				
Office	$ 4,957	$ 508	$ 1,042	$ 6,507	34 %
Apartments	5,064	417	235	5,716	30
Industrial and other	2,765	25	24	2,814	15
Retail	2,276	—	70	2,346	12
Hotels	1,742	82	92	1,916	10
Total	$ 16,804	$ 1,032	$ 1,463	$ 19,299	100 %

For the years ended December 31, 2024 and 2023, the Company's commercial mortgage loans' loan-to-value ratios below 81% were 76% and 87%, respectively.

The Company uses an internal rating system as its primary method of monitoring credit quality. The following illustrates the Company's mortgage loan portfolio rating, translated into the equivalent rating agency designation:

	December 31, 2024					
	AAA/ AA/A	BBB	BB	B	CCC and Lower	Total
	(In Millions)					
Commercial mortgage loans:						
Primary lender	$ 4,324	$ 8,145	$ 2,718	$ 978	$ 689	$ 16,854
Mezzanine loans	—	72	36	—	—	108
Total commercial mortgage loans	4,324	8,217	2,754	978	689	16,962
Residential mortgage loans:						
FHA insured and VA guaranteed	1,599	—	—	—	—	1,599
Other residential loans	745	4,365	20	1	—	5,131
Total residential mortgage loans	2,344	4,365	20	1	—	6,730
Total mortgage loans	$ 6,668	$ 12,582	$ 2,774	$ 979	$ 689	$ 23,692

	December 31, 2023					
	AAA/ AA/A	BBB	BB	B	CCC and Lower	Total
	(In Millions)					
Commercial mortgage loans:						
Primary lender	$ 6,014	$ 9,680	$ 2,156	$ 875	$ 437	$ 19,162
Mezzanine loans	—	80	57	—	—	137
Total commercial mortgage loans	6,014	9,760	2,213	875	437	19,299
Residential mortgage loans:						
FHA insured and VA guaranteed	1,832	—	—	—	—	1,832
Other residential loans	—	2,759	23	108	—	2,889
Total residential mortgage loans	1,832	2,759	23	108	—	4,722
Total mortgage loans	$ 7,846	$ 12,519	$ 2,236	$ 983	$ 437	$ 24,021

As of December 31, 2024 and 2023 the maximum percentage of any one commercial mortgage loan to the estimated value of secured collateral at the time the loan was originated, exclusive of mezzanine, insured, guaranteed or purchase money mortgages, was 79.75% and 80%, respectively.

The geographic distribution of commercial mortgage loans was as follows:

	December 31, 2024		December 31, 2023	
	Carrying Value	Average Loan-to-Value Ratio	Carrying Value	Average Loan-to-Value Ratio
	($ In Millions)			
California	$ 3,465	83 %	$ 3,904	66 %
Texas	1,852	63 %	1,812	56 %
United Kingdom	1,710	55 %	2,110	51 %
New York	1,565	81 %	1,894	66 %
Illinois	1,033	55 %	1,444	56 %
District of Columbia	875	80 %	929	82 %
Washington	766	62 %	1,018	70 %
All other	5,694	76 %	6,190	72 %
Total commercial mortgage loans	$ 16,960	73 %	$ 19,301	66 %

For the years ended December 31, 2024 and 2023, all other consists of 29 jurisdictions with no individual exposure exceeding $760 million and 30 jurisdictions with no individual exposure exceeding $878 million, respectively.

Interest rates, including fixed and variable, on the Company's portfolio of mortgage loans were:

	Years Ended December 31,			
	2024		2023	
	Low	High	Low	High
Commercial mortgage loans	2.5%	12.2%	1.8%	12.9%
Residential mortgage loans	2.2%	12.2%	2.2%	11.8%
Mezzanine mortgage loans	5.3%	13.7%	5.3%	14.4%

Interest rates, including fixed and variable, on new mortgage loans were:

	Years Ended December 31,			
	2024		2023	
	Low	High	Low	High
Commercial mortgage loans	4.3%	11.3%	4.3 %	11.0 %
Residential mortgage loans	4.1%	11.7%	4.2 %	11.8 %
Mezzanine mortgage loans	— %	— %	5.5 %	8.0 %

As of December 31, 2024, 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 December 31, 2024 and December 31, 2023:

	December 31, 2024				
	Carrying Value	Average Carrying Value	Unpaid Principal Balance	Valuation Allowance	Interest Income
	(In Millions)				
With allowance recorded:					
Commercial mortgage loans:					
Primary lender	$ 88	$ 102	$ 125	$ (35)	$ 4
Total	88	102	125	(35)	4
With no allowance recorded:					
Commercial mortgage loans:					
Primary lender	$ 399	$ 403	$ 552	$ —	$ 3
Total	399	403	552	—	3
Total impaired commercial mortgage loans	$ 487	$ 505	$ 677	$ (35)	$ 7

	December 31, 2023				
	Carrying Value	Average Carrying Value	Unpaid Principal Balance	Valuation Allowance	Interest Income
	(In Millions)				
With allowance recorded:					
Commercial mortgage loans:					
Primary lender	$ 465	$ 537	$ 624	$ (157)	$ 24
Total	465	537	624	(157)	24
Total impaired commercial mortgage loans	$ 465	$ 537	$ 624	$ (157)	$ 24

The Company did not hold any restructured mortgage loans, mortgage loans with principal or interest past due, or mortgage loans with suspended interest accruals as of December 31, 2024 or 2023. As of December 31, 2024 and 2023 the carrying value of commercial mortgage loans subject to a participant or co-lender mortgage loan agreement was $724 million and $855 million, respectively.

Allowance for credit losses:

	Years Ended December 31,	
	2024	2023
Balance at the beginning of period	$ (157)	$ —
Additions charged to operations	(94)	(171)
Direct write-downs charged against the allowances	—	1
Recoveries of amounts previously charged off	216	13
Balance at the end of the period	$ (35)	$ (157)

g. Real estate

The carrying value of real estate was as follows:

	December 31, 2024	December 31, 2023
	(In Millions)	
Held for the production of income	$ 356	$ 355
Accumulated depreciation	(109)	(94)
Encumbrances	(264)	(285)
Held for the production of income, net	(17)	(24)
Held for sale	76	76
Accumulated depreciation	(74)	(74)
Held for sale, net	2	2
Occupied by the Company	568	566
Accumulated depreciation	(230)	(215)
Occupied by the Company, net	338	351
Total real estate	$ 323	$ 329

Depreciation expense on real estate was $30 million for the year ended December 31, 2024, $31 million for the year ended December 31, 2023 and $36 million for the year ended December 31, 2022.

h. Partnerships and limited liability companies

The carrying value of partnerships and limited liability companies holdings by annual statement category were:

	December 31, 2024	December 31, 2023
	(In Millions)	
Joint venture interests:		
Common stocks - subsidiaries and affiliates	$ 2,189	$ 2,001
Common stocks - unaffiliated	3,268	3,462
Real estate	3,497	2,382
Bonds / preferred stock	959	735
Other	1,716	1,718
Mortgage loans	2,563	2,096
Surplus notes	440	385
LIHTCs	115	128
Total	$ 14,747	$ 12,907

As of December 31, 2024 and 2023, the Company held 14 affiliated partnerships and limited liability companies in a loss position with accumulated losses of $57 million and 13 affiliated partnerships and limited liability companies in a loss position with accumulated losses of $63 million, respectively.

The Company’s unexpired tax credits expire within a range of less than 1 year to 12 years.

As of December 31, 2024 and 2023, the Company recorded tax credits on these investments of $57 million and $55 million, respectively. The minimum holding period required for the Company’s LIHTC investments extends from 1 year to 15 years.

For determining impairments for LIHTC investments, the Company uses the present value of all future benefits, the majority of which are tax credits, discounted at a risk-free rate ranging from 4.2% for future benefits of two years to 4.6% for future benefits of ten or more years, and compares the result to its current carry value. The Company recorded no impairments for the year ended December 31, 2024 and $14 million impairments to LIHTC investments for the year ended December 31, 2023.

i. 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 $33,462 million as of December 31, 2024 and $31,687 million as of December 31, 2023, as defined under statutory accounting practices as the result of pairing of a long derivative contract with cash instruments.

The Company’s derivative strategy employs a variety of derivative financial instruments, including: interest rate, currency, equity, bond, and credit default swaps; options; forward contracts and financial futures. Investment risk is assessed on a portfolio basis and individual derivative financial instruments are not generally designated in hedging relationships; therefore, as allowed by statutory accounting practices, the Company intentionally has not applied hedge accounting.

Interest rate swaps are primarily used to more closely match the cash flows of assets and liabilities. Interest rate swaps are also used to mitigate changes in the value of assets anticipated to be purchased and other anticipated transactions and commitments. The Company uses currency swaps for the purpose of managing currency exchange risks in its assets and liabilities.

The Company does not sell credit default swaps as a participant in the credit insurance market. The Company does, however, use credit default swaps as part of its investment management process. The Company buys credit default swaps as an efficient means to reduce credit exposure to particular issuers or sectors in the Company’s investment portfolio. The Company sells credit default swaps in order to create synthetic investment positions that enhance the return on its investment portfolio by providing comparable exposure to fixed income securities that might not be available in the primary market.

Options grant the purchaser the right to buy or sell a security or enter a derivative transaction at a stated price within a stated period. The Company’s option contracts have terms of up to 45 years. A swaption is an option to enter an interest rate swap to either receive or pay a fixed rate at a future date. The Company purchases these options for the purpose of managing interest rate risks in its assets and liabilities.

The Company adopted a clearly defined hedging strategy (CDHS) to enable the Company to incorporate currently held hedges in risk-based capital (RBC) calculations. The CDHS is used to significantly mitigate the impact that movements in capital markets have on the liabilities associated with annuity guarantees. The hedge portfolio consists mainly of interest rate swaps, equity swaps, interest rate swaptions and equity futures, and provides protection in the stress scenarios under which RBC is calculated. The hedge portfolio has offsetting impacts relative to the total asset requirement for RBC and surplus for GMDB and VAGLB.

The Company utilizes certain other agreements including forward contracts and financial futures. In addition, the Company also uses “to be announced” forward contracts (TBAs) to hedge interest rate risk and participate in the mortgage-backed securities market in an efficient and cost effective way. Typically, the price is agreed upon at contract inception and payment is made at a specified future date. The Company usually does not purchase TBAs with settlement by the first possible delivery date and thus, accounts for these TBAs as derivatives. TBAs that settle on the first possible delivery date are accounted for as bonds. The Company’s futures contracts are exchange traded and have credit risk. Margin requirements are met with the deposit of securities. Futures contracts are generally settled with offsetting transactions. Forward contracts and financial futures are used by the Company to reduce exposures to various risks including interest rates and currency rates.

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 to the counterparties was $441 million as of December 31, 2024, and net collateral pledged by the counterparties was $421 million as of December 31, 2023. In the event of default, the full market value exposure at risk, net of offsets and collateral, was $160 million and $269 million as of December 31, 2024 and 2023, respectively. The statutory net amount at risk, defined as net collateral pledged and statement values excluding accrued interest, was $5,170 million and $5,003 million as of December 31, 2024 and 2023, respectively.

As of December 31, 2024, the company had the right to rehypothecate or repledge securities totaling $1,489 million, pledged by the counterparties, of the $441 million of the net collateral pledged to counterparties. As of December 31, 2023, the company had the right to rehypothecate or repledge securities totaling $1,444 million, pledged by the counterparties, of the $421 million of the net collateral pledged to counterparties. There were no securities rehypothecated to other counterparties as of December 31, 2024 or December 31, 2023.

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

	December 31, 2024				December 31, 2023			
	Assets		Liabilities		Assets		Liabilities	
	Carrying Value	Notional Amount	Carrying Value	Notional Amount	Carrying Value	Notional Amount	Carrying Value	Notional Amount
	(In Millions)							
Interest rate swaps	$ 20,513	$ 173,481	$ 15,665	$ 164,073	$ 17,292	$ 177,596	$ 11,922	$ 128,949
Options	567	11,002	63	242	547	11,727	35	248
Currency swaps	2,711	31,042	792	15,461	2,831	28,593	1,294	14,672
Forward contracts	412	12,503	67	5,519	13	993	301	9,162
Credit default swaps	2	162	175	7,903	1	81	153	7,902
Financial futures	15	567	12	506	56	674	29	257
Total	$ 24,220	$ 228,757	$ 16,774	$ 193,704	$ 20,740	$ 219,664	$ 13,734	$ 161,190

The average fair value of outstanding derivative assets was $22,544 and $22,228 million for the years ended December 31, 2024 and 2023, respectively. The average fair value of outstanding derivative liabilities was $15,554 and $14,607 million for the years ended December 31, 2024 and 2023, respectively.

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

	December 31, 2024	December 31, 2023
	(In Millions)	
Due after one year through five years	$ 8,065	$ 7,983
Total	$ 8,065	$ 7,983

The following presents the Company’s gross notional interest rate swap positions:

	December 31, 2024	December 31, 2023
	(In Millions)	
Open interest rate swaps in a fixed pay position	$ 147,691	$ 130,853
Open interest rate swaps in a fixed receive position	186,865	170,817
Other interest related swaps	2,998	4,875
Total interest rate swaps	$ 337,554	$ 306,545

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:

	Years Ended December 31,					
	2024		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	Net Realized (Losses) Gains on Closed Contracts	Change in Net Unrealized (Losses) Gains on Open Contracts
	(In Millions)					
Interest rate swaps	$ (294)	$ (521)	$ (267)	$ 118	$ (717)	$ 846
Currency swaps	122	(204)	101	(309)	69	2,204
Options	(31)	7	31	(96)	(6)	385
Credit default swaps	(69)	43	(39)	(24)	2	(17)
Forward contracts	(17)	633	(62)	(66)	853	(222)
Financial futures	(55)	(24)	(107)	9	(902)	(15)
Total	$ (344)	$ (66)	$ (343)	$ (368)	$ (702)	$ 3,181

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

	December 31, 2024			December 31, 2023		
	Derivative Assets	Derivative Liabilities	Net	Derivative Assets	Derivative Liabilities	Net
	(In Millions)					
Gross	$ 24,220	$ 16,774	$ 7,446	$ 20,740	$ 13,734	$ 7,006
Due and accrued	1,421	2,515	(1,094)	1,371	2,387	(1,016)
Gross amounts offset	(22,311)	(22,311)	—	(19,063)	(19,063)	—
Net asset	3,330	(3,022)	6,352	3,048	(2,943)	5,990
Collateral posted	(3,366)	(3,807)	441	(3,438)	(3,017)	(421)
Net	$ (36)	$ (6,829)	$ 6,793	$ (390)	$ (5,959)	$ 5,569

j. Repurchase agreements

The Company has entered into repurchase agreements whereby the Company sells securities and simultaneously agrees to repurchase the same or substantially the same securities. These repurchase agreements are accounted for as collateralized borrowings with the proceeds from the sale of the securities recorded as a liability and the underlying securities continue to be recorded as an investment by the Company. Earnings on these investments are recorded as investment income and the difference between the proceeds and the amount at which the securities will be subsequently reacquired is amortized as interest expense. Repurchase agreements are used as a tool for overall portfolio management to help ensure the Company maintains adequate assets in order to provide yield, spread and duration to support liabilities and other corporate needs.

The Company provides collateral, as dictated by the repurchase agreements, to the counterparty in exchange for a loan. If the fair value of the securities sold becomes less than the loan, the counterparty may require additional collateral.

The carrying value, which is at cost, reported in the Company's liabilities as repurchase agreements approximates the fair value.

The following table provides contractual maturity, maximum balance during the year, and ending balance for bilateral repurchase agreements:

	December 31,			
	2024		2023	
	Maximum Balance	Ending Balance	Maximum Balance	Ending Balance
	(In Millions)			
2 Days to 1 Week	$ 425	$ —	$ —	$ —
From 1 Week to 1 Month	1,359	—	596	—
Greater than 1 Month to 3 Months	5,437	2,778	3,247	2,136
Greater than 3 Months to 1 Year	630	630	1,088	1,085
Total	$ 7,851	$ 3,408	$ 4,931	$ 3,221

The company did not have any repurchase agreements where securities sold and/or acquired resulted in default as of December 31, 2024 and 2023.

The following table presents the fair value and amortized cost of securities sold under bilateral repurchase agreement transactions, which were all NAIC rating of 1, for the years ended December 31, 2024 and 2023:

	Maximum Balance	Ending Balance
	(In Millions)	
March 31, 2024		
Fair Value	$ 4,473	$ 3,466
Carrying Value	$ —	$ 3,466
June 30, 2024		
Fair Value	$ 3,532	$ 3,449
Carrying Value	$ —	$ 3,799
September 30, 2024		
Fair Value	$ 3,710	$ 3,671
Carrying Value	$ —	$ 3,816
December 31, 2024		
Fair Value	$ 3,650	$ 3,420
Carrying Value	$ —	$ 3,824
March 31, 2023		
Fair Value	$ 3,054	$ 3,019
Carrying Value	$ —	$ 3,019
June 30, 2023		
Fair Value	$ 3,615	$ 2,910
Carrying Value	$ —	$ 2,910
September 30, 2023		
Fair Value	$ 3,563	$ 3,563
Carrying Value	$ —	$ 3,563
December 31, 2023		
Fair Value	$ 3,563	$ 3,221
Carrying Value	$ —	$ 3,221

The following table presents the cash collateral and the fair value of security collateral, which were all NAIC rating of 1, received in the bilateral repurchase agreement transactions for the years ended December 31, 2024 and 2023:

	Maximum Balance		Ending Balance	
	Cash	Securities	Cash	Securities
	(In Millions)			
March 31, 2024	$ 96	$ 3,530	$ 16	$ 3,487
June 30, 2024	$ 3,741	$ 14	$ 3,431	$ —
September 30, 2024	$ 5,658	$ 13	$ 3,622	$ —
December 31, 2024	$ 5,897	$ 1	$ 3,357	$ 1
March 31, 2023	$ 130	$ 3,066	$ 19	$ 3,022
June 30, 2023	$ 89	$ 3,031	$ 4	$ 2,918
September 30, 2023	$ 110	$ 3,247	$ 110	$ 2,717
December 31, 2023	$ 137	$ 3,230	$ 1	$ 3,230

The following table presents collateral received, aggregate allocation of the collateral by the remaining contractual maturity of the repurchase agreements for the years ended December 31, 2024 and 2023:

	Overnight and Continuous	30 Days or Less	31 to 90 Days	> 90days
	(In Millions)			
Maximum Balance				
March 31, 2024	$ —	$ —	$ 1,626	$ 1,880
June 30, 2024	$ —	$ 14	$ 1,551	$ 1,927
September 30, 2024	$ —	$ 789	$ 2,164	$ 213
December 31, 2024	$ —	$ 223	$ 3,031	$ 485
March 31, 2023	$ —	$ 259	$ 2,787	$ —
June 30, 2023	$ —	$ 92	$ 2,925	$ —
September 30, 2023	$ —	$ —	$ 3,086	$ —
December 31, 2023	$ —	$ 134	$ 2,716	$ 250
Ending Balance				
March 31, 2024	$ —	$ —	$ 1,626	$ 1,880
June 30, 2024	$ —	$ 14	$ 1,551	$ 1,927
September 30, 2024	$ —	$ 789	$ 2,164	$ 213
December 31, 2024	$ —	$ 223	$ 3,031	$ 485
March 31, 2023	$ —	$ 259	$ 2,787	$ —
June 30, 2023	$ —	$ 92	$ 2,925	$ —
September 30, 2023	$ —	$ —	$ 3,086	$ —
December 31, 2023	$ —	$ 134	$ 2,716	$ 250

The following table presents cash collateral received that has been reinvested, the total reinvested cash and the aggregate amortized cost and fair value of the invest asset acquired with the cash collateral for the years ended December 31, 2024 and 2023:

	1 to 2 Years		2 to 3 Years		> 3 Years	
	Amortized Cost	Fair Value	Amortized Cost	Fair Value	Amortized Cost	Fair Value
Maximum Balance						
March 31, 2024	$ —	$ —	$ —	$ —	$ —	$ —
June 30, 2024	$ —	$ —	$ 1,125	$ 1,139	$ 2,674	$ 2,310
September 30, 2024	$ —	$ —	$ 1,142	$ 1,183	$ 2,674	$ 2,467
December 31, 2024	$ —	$ —	$ 1,149	$ 1,170	$ 2,256	$ 1,881
March 31, 2023	$ —	$ —	$ —	$ —	$ —	$ —
June 30, 2023	$ —	$ —	$ —	$ —	$ —	$ —
September 30, 2023	$ —	$ —	$ —	$ —	$ —	$ —
December 31, 2023	$ —	$ —	$ —	$ —	$ —	$ —

	1 to 2 Years		2 to 3 Years		> 3 Years	
	Amortized Cost	Fair Value	Amortized Cost	Fair Value	Amortized Cost	Fair Value
Ending Balance						
March 31, 2024	$ —	$ —	$ —	$ —	$ —	$ —
June 30, 2024	$ —	$ —	$ 1,125	$ 1,139	$ 2,674	$ 2,310
September 30, 2024	$ —	$ —	$ 1,142	$ 1,183	$ 2,674	$ 2,467
December 31, 2024	$ —	$ —	$ 1,149	$ 1,170	$ 2,256	$ 1,881
March 31, 2023	$ —	$ —	$ —	$ —	$ —	$ —
June 30, 2023	$ —	$ —	$ —	$ —	$ —	$ —
September 30, 2023	$ —	$ —	$ —	$ —	$ —	$ —
December 31, 2023	$ —	$ —	$ —	$ —	$ —	$ —

To help manage the mismatch of maturity dates between the security lending transactions and the related reinvestment of the collateral received, the Company invests in highly liquid assets.

The following table presents liability recognized to return cash collateral, and the liability recognized to return securities received as collateral as required pursuant to the terms of the secured borrowing transactions for the years ended December 31, 2024 and 2023:

	Maximum Balance		Ending Balance	
	Cash	Securities	Cash	Securities
	(In Millions)			
March 31, 2024	$ 96	$ 3,530	$ 16	$ 3,487
June 30, 2024	$ 3,741	$ 14	$ 3,431	$ —
September 30, 2024	$ 5,658	$ 13	$ 3,622	$ —
December 31, 2024	$ 5,897	$ 1	$ 3,357	$ 1

	Maximum Balance		Ending Balance	
	Cash	Securities	Cash	Securities
	(In Millions)			
March 31, 2023	$ 130	$ 3,066	$ 19	$ 3,022
June 30, 2023	$ 89	$ 3,031	$ 4	$ 2,918
September 30, 2023	$ 110	$ 3,247	$ 110	$ 2,717
December 31, 2023	$ 137	$ 3,230	$ 1	$ 3,230

The company did not have any reverse repurchase transactions accounted for as secured borrowings as of December 31, 2024 and 2023.

The Company did not have any repurchase agreements or reverse repurchase agreements transactions accounted for as a sale as of December 31, 2024 and 2023.

k. Net investment income

Net investment income, including IMR amortization, comprised the following:

	Years Ended December 31,		
	2024	2023	2022
	(In Millions)		
Bonds	$ 8,415	$ 7,275	$ 5,215
Preferred stocks	24	27	22
Common stocks - subsidiaries and affiliates	919	1,115	878
Common stocks - unaffiliated	125	111	102
Mortgage loans	1,145	1,102	1,118
Policy loans	1,062	1,058	1,141
Real estate	80	70	79
Partnerships and limited liability companies	965	957	1,014
Derivatives	(455)	(84)	464
Cash, cash equivalents and short-term investments	345	363	80
Other	264	184	35
Subtotal investment income	12,889	12,178	10,148
Amortization of the IMR	(127)	(51)	(50)
Net gains from separate accounts	3	3	—
Investment expenses	(1,104)	(1,087)	(796)
Net investment income	$ 11,661	$ 11,043	$ 9,302

l. Net realized capital (losses) gains

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

	Years Ended December 31,		
	2024	2023	2022
	(In Millions)		
Bonds	$ (501)	$ (720)	$ (889)
Preferred stocks	16	—	(6)
Common stocks - subsidiaries and affiliates	62	24	(13)
Common stocks - unaffiliated	(44)	15	64
Mortgage loans	(331)	(73)	(41)
Real estate	—	3	127
Partnerships and limited liability companies	(71)	(314)	(355)
Derivatives	(345)	(344)	(701)
Other	12	(7)	(74)
Net realized capital losses before federal and state taxes and deferral to the IMR	(1,202)	(1,416)	(1,888)
Net federal and state tax (expense) benefit	(28)	281	94
Net realized capital losses before deferral to the IMR	(1,230)	(1,135)	(1,794)
Net after tax capital losses deferred to the IMR	429	645	2,120
Net realized capital (losses) gains	$ (801)	$ (490)	$ 326

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

	Years Ended December 31,		
	2024	2023	2022
	(In Millions)		
Bonds	$ (260)	$ (178)	$ (416)
Common stocks - subsidiaries and affiliates	(3)	(1)	—
Common stocks - unaffiliated	(18)	—	(2)
Preferred stock	(9)	—	(6)
Mortgage loans	(216)	(13)	(4)
Partnerships and limited liability companies	(128)	(353)	(183)
Total OTTI	$ (634)	$ (545)	$ (611)

The Company recognized OTTI of $17 million and $15 million for the years ended December 31, 2024 and 2023, respectively, 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.

The Company utilized internally-developed models to determine less than 1% of the $260 million of bond OTTI for the year ended December 31, 2024, less than 1% of the $178 million of bond OTTI for the year ended December 31, 2023 and less than 1% of the $416 million of bond OTTI for the year ended December 31, 2022. The remaining OTTI amounts were determined using external inputs such as publicly observable fair values and credit ratings. Refer to *Note 2dd. "Net realized capital (losses) gains including other-than-temporary impairments and unrealized capital gains (losses)"* for more information on assumptions and inputs used in the Company's OTTI models.

m. Restricted assets

Admitted restricted assets by category:

	December 31, 2024							
	Gross (Admitted and Non-admitted) Restricted						Percentage	
Restricted Asset Category	Total General Account	Total Separate Account Restricted Assets	Total	Total From Prior Year	Increase (Decrease)	Total Admitted Restricted	Gross Admitted and Non-admitted) Restricted to Total Assets	Admitted Restricted to Total Admitted Assets
	(In Millions)							
Subject to repurchase agreements	$ 3,419	$ —	$ 3,419	$ 3,230	$ 189	$ 3,419	0.99 %	0.99 %
Letter stock or securities restricted as to sale - excluding FHLB capital stock	102	—	102	208	(106)	102	0.03 %	0.03 %
FHLB capital stock	99	—	99	99	—	99	0.03 %	0.03 %
On deposit with states	10	—	10	10	—	10	— %	— %
Pledged collateral to FHLB (including assets backing funding agreements)	3,530	—	3,530	2,886	644	3,530	1.02 %	1.02 %
Pledged as collateral not captured in other categories	5,448	—	5,448	4,490	958	5,448	1.57 %	1.58 %
Total restricted assets	$ 12,608	$ —	$ 12,608	$ 10,923	$ 1,685	$ 12,608	3.64 %	3.65 %

	December 31, 2023							
	Gross (Admitted and Non-admitted) Restricted						Percentage	
Restricted Asset Category	Total General Account	Total Separate Account Restricted Assets	Total	Total From Prior Year	Increase (Decrease)	Total Admitted Restricted	Gross Admitted and Non-admitted) Restricted to Total Assets	Admitted Restricted to Total Admitted Assets
	(In Millions)							
Subject to repurchase agreements	$ 3,230	$ —	$ 3,230	$ 3,042	$ 188	$ 3,230	0.99 %	0.99 %
Letter stock or securities restricted as to sale - excluding FHLB capital stock	208	—	208	358	(150)	208	0.06 %	0.06 %
FHLB capital stock	99	—	99	99	—	99	0.03 %	0.03 %
On deposit with states	10	—	10	10	—	10	— %	— %
Pledged collateral to FHLB (including assets backing funding agreements)	2,886	—	2,886	2,477	409	2,886	0.89 %	0.89 %
Pledged as collateral not captured in other categories	4,490	—	4,490	3,280	1,210	4,490	1.38 %	1.38 %
Total restricted assets	$ 10,923	$ —	$ 10,923	$ 9,266	$ 1,657	$ 10,923	3.35 %	3.35 %

6. *Federal income taxes*

On August 16th, 2022, the Inflation Reduction Act (IRA) was signed into law and includes certain corporate income tax provisions. Potential impacts to the Company include the imposition of a corporate alternative minimum tax (CAMT). The CAMT imposes a 15% minimum tax on adjusted financial statement income on applicable corporations that have an average adjusted financial statement income over $1 billion in the prior three-year period. The United States Treasury Department and the Internal Revenue Service released proposed regulations on September 12, 2024. As of the reporting date, the Company is not an applicable corporation and therefore not liable for CAMT in 2024.

The Company provides for DTAs in accordance with statutory accounting practices. All of the companies included in these Consolidated Statutory Financial Statements have met the required threshold to utilize the three-year reversal period and 15% of surplus limitation.

The net DTA or deferred liabilities (DTL) recognized in the Company's assets, liabilities and surplus is as follows:

	December 31, 2024		
	Ordinary	Capital	Total
	(In Millions)		
Gross DTAs	$ 3,954	$ 761	$ 4,715
Statutory valuation allowance adjustment	—	—	—
Adjusted gross DTAs	3,954	761	4,715
DTAs nonadmitted	(238)	—	(238)
Subtotal net admitted DTA	3,716	761	4,477
Total gross DTLs	(1,862)	(758)	(2,620)
Net admitted DTA(L)	$ 1,854	$ 3	$ 1,857

	December 31, 2023		
	Ordinary	Capital	Total
	(In Millions)		
Gross DTAs	$ 3,943	$ 740	$ 4,683
Statutory valuation allowance adjustment	—	—	—
Adjusted gross DTAs	3,943	740	4,683
DTAs nonadmitted	(82)	—	(82)
Subtotal net admitted DTA	3,861	740	4,601
Total gross DTLs	(2,009)	(932)	(2,941)
Net admitted DTA(L)	$ 1,852	$ (192)	$ 1,660

	Change		
	Ordinary	Capital	Total
	(In Millions)		
Gross DTAs	$ 11	$ 21	$ 32
Statutory valuation allowance adjustment	—	—	—
Adjusted gross DTAs	11	21	32
DTAs nonadmitted	(156)	—	(156)
Subtotal net admitted DTA	(145)	21	(124)
Total gross DTLs	147	174	321
Net admitted DTA(L)	$ 2	$ 195	$ 197

The amount of adjusted gross DTA admitted under each component of the guidance and the resulting change by tax character are as follows:

	December 31, 2024		
	Ordinary	Capital	Total
	(In Millions)		
Admitted DTA 3 years:			
Federal income taxes that can be recovered	$ —	$ 29	$ 29
Remaining adjusted gross DTAs expected to be realized within 3 years:			
1. Adjusted gross DTA to be realized	1,774	54	1,828
2. Adjusted gross DTA allowed per limitation threshold	3,849	54	3,903
Lesser of line 1 or 2	1,774	54	1,828
Adjusted gross DTAs offset by existing DTLs	1,942	678	2,620
Total admitted DTA realized within 3 years	$ 3,716	$ 761	$ 4,477

	December 31, 2023		
	Ordinary	Capital	Total
	(In Millions)		
Admitted DTA 3 years:			
Federal income taxes that can be recovered	$ —	$ 90	$ 90
Remaining adjusted gross DTAs expected to be realized within 3 years:			
1. Adjusted gross DTA to be realized	1,570	—	1,570
2. Adjusted gross DTA allowed per limitation threshold	4,081	—	4,081
Lesser of line 1 or 2	1,570	—	1,570
Adjusted gross DTAs offset by existing DTLs	2,291	650	2,941
Total admitted DTA realized within 3 years	$ 3,861	$ 740	$ 4,601

	Change		
	Ordinary	Capital	Total
	(In Millions)		
Admitted DTA 3 years:			
Federal income taxes that can be recovered	$ —	$ (61)	$ (61)
Remaining adjusted gross DTAs expected to be realized within 3 years:			
1. Adjusted gross DTA to be realized	204	54	258
2. Adjusted gross DTA allowed per limitation	(232)	54	(178)
Lesser of line 1 or 2	204	54	258
Adjusted gross DTAs offset by existing DTLs	(349)	28	(321)
Total admitted DTA realized within 3 years	$ (145)	$ 21	$ (124)

The Company's total realization threshold limitations are as follows:

	Years Ended December 31, 2024	Years Ended December 31, 2023
	(In Millions)	
Ratio percentage used to determine recovery period and threshold limitation	883 %	850 %
Amount of adjusted capital and surplus used to determine recovery period and threshold limitation above	$ 26,020	$ 27,207

The ultimate realization of DTAs depends on the generation of future taxable income during the periods in which the temporary differences are deductible. Management considers the scheduled reversal of DTLs, including the impact of available carryback and carryforward periods, projected taxable income and tax-planning strategies in making this assessment. The impact of tax-planning is as follows:

	December 31, 2024		
	Ordinary	Capital	Total
	(Percent)		
Impact of tax-planning strategies:			
Adjusted gross DTAs			
(% of total adjusted gross DTAs)	— %	— %	— %
Net admitted adjusted gross DTAs			
(% of total net admitted adjusted gross DTAs)	72 %	100 %	72 %

	December 31, 2023		
	Ordinary	Capital	Total
	(Percent)		
Impact of tax-planning strategies:			
Adjusted gross DTAs			
(% of total adjusted gross DTAs)	— %	— %	— %
Net admitted adjusted gross DTAs			
(% of total net admitted adjusted gross DTAs)	79 %	— %	79 %

	Change		
	Ordinary	Capital	Total
	(Percent)		
Impact of tax-planning strategies:			
Adjusted gross DTAs			
(% of total adjusted gross DTAs)	— %	— %	— %
Net admitted adjusted gross DTAs			
(% of total net admitted adjusted gross DTAs)	(7)%	100 %	(7)%

There are no reinsurance strategies included in the Company’s tax-planning strategies.

The provision for current tax expense on earnings is as follows:

	Years Ended December 31,		
	2024	2023	2022
	(In Millions)		
Federal income tax expense (benefit) on operating earnings	$ (293)	$ 111	$ (92)
Foreign income tax expense on operating earnings	—	5	28
Total federal and foreign income tax expense (benefit) on operating earnings	(293)	116	(64)
Federal income tax expense (benefit) on net realized capital gains	26	(268)	(106)
Total federal and foreign income tax expense (benefit)	$ (267)	$ (152)	$ (170)

The tax effects of temporary differences that give rise to significant portions of the DTAs and DTLs are as follows:

	December 31, 2024	December 31, 2023	Change
	(In Millions)		
DTAs:			
Ordinary			
Reserve items	$ 1,939	$ 1,779	$ 160
Policy acquisition costs	1,008	931	77
Nonadmitted assets	327	320	7
Policyholders' dividends	266	234	32
Pension and compensation related items	95	73	22
Investment items	244	207	37
Expense items	61	66	(5)
Other	14	333	(319)
Total ordinary DTAs	3,954	3,943	11
Nonadmitted DTAs	238	82	156
Admitted ordinary DTAs	3,716	3,861	(145)
Capital			
Unrealized investment losses	409	434	(25)
Expense items	19	18	1
Investment items	333	288	45
Total capital DTAs	761	740	21
Nonadmitted DTAs	—	—	—
Admitted capital DTAs	761	740	21
Admitted DTAs	4,477	4,601	(124)
DTLs:			
Ordinary			
Reserve items	74	143	(69)
Unrealized investment gains	1,019	1,128	(109)
Deferred and uncollected premium	315	309	6
Pension items	65	64	1
Other	389	365	24
Total ordinary DTLs	1,862	2,009	(147)
Capital			
Unrealized investment gains	756	808	(52)
Investment items	2	124	(122)
Total capital DTLs	758	932	(174)
Total DTLs	2,620	2,941	(321)
Net admitted DTA	$ 1,857	$ 1,660	$ 197

The change in net deferred income taxes comprised the following:

	Years Ended December 31, 2024	2023	2022
	(In Millions)		
Net DTA(L)	$ 353	$ 512	$ 520
Less: Items not recorded in the change in net deferred income taxes:			
Tax-effect of unrealized gains/(losses)	(112)	(38)	105
Tax-effect of changes from investment transfers	3	(12)	37
Change in net deferred income taxes	$ 244	$ 462	$ 662

As of December 31, 2024, the Company had no net operating or capital loss carryforwards to include in deferred income taxes. The Company has $9 million in tax credit carryforwards included in deferred taxes.

The components of federal and foreign income tax are recorded in the Statutory Statements of Operations and the Statutory Statements of Changes in Surplus and are different from those which would be obtained by applying the prevailing federal income tax rate to net gain from operations before federal income taxes. The significant items causing this difference are as follows:

	Years Ended December 31, 2024	2023	2022
	(In Millions)		
Provision computed at federal statutory rate of 21%	$ (157)	$ (175)	$ (325)
Investment items	(248)	(248)	(188)
Nonadmitted assets	(7)	(15)	(10)
Tax credits	(69)	(222)	(293)
Expense items	(72)	(4)	19
Foreign governmental income taxes	1	5	28
Other	41	45	(63)
Total statutory income tax benefit	$ (511)	$ (614)	$ (832)
Federal and foreign income tax benefit	$ (267)	$ (152)	$ (170)
Change in net deferred income taxes	(244)	(462)	(662)
Total statutory income tax benefit	$ (511)	$ (614)	$ (832)

The Company received refunds in the amount of $82 million in 2024, $58 million in 2023 and $5 million in 2022.

The total income taxes available in the current and prior years that will be available for recoupment in the event of future net capital losses totaled $0 million related to 2024, $0 million related to 2023 and $29 million related to 2022.

MassMutual and its eligible U.S. subsidiaries are included in a consolidated U.S. federal income tax return. MassMutual and its eligible U.S. subsidiaries also file income tax returns in various states and foreign jurisdictions. MassMutual and its eligible U.S. subsidiaries and certain affiliates (the Parties) have executed and are subject to a written tax allocation agreement (the Tax Agreement). The Tax Agreement sets forth the manner in which the total combined federal income tax is allocated among the Parties. The Tax Agreement provides MassMutual with the enforceable right to recoup federal income taxes paid in prior years in the event of future net capital losses, which it may incur. Further, the Tax Agreement provides MassMutual with the enforceable right to utilize its net losses carried forward as an offset to future net income subject to federal income taxes. In accordance with the Tax Agreement, future CAMT is outside of the scope of the general tax allocation method and, consequently any future CAMT liability shall be allocated solely to MassMutual.

Companies are generally required to disclose unrecognized tax benefits, which are the tax effect of positions taken on their tax returns that may be challenged by various taxing authorities, in order to provide users of financial statements more information regarding potential liabilities. The Company recognizes tax benefits and related reserves in accordance with existing statutory accounting practices for liabilities, contingencies and impairments of assets.

The following is a reconciliation of the beginning and ending liability for unrecognized tax benefits (in millions):

Balance, January 1, 2024	$	229
Gross change related to positions taken in prior years		—
Gross change related to settlements		—
Gross change related to positions taken in current year		2
Gross change related to lapse of statutes of limitations		—
Balance, December 31, 2024	$	231

Included in the liability for unrecognized tax benefits as of December 31, 2024, are $217 million of tax positions for which the ultimate deductibility is highly certain but for which there is uncertainty about the timing of such deductibility. The liability for the unrecognized tax benefits as of December 31, 2024 includes $9 million of unrecognized tax benefits that, if recognized, would impact the Company's effective tax rate.

The Company recognized an increase of $6 million in accrued interest related to the liability for unrecognized tax benefits as a component of the provision for income taxes. The amount of net interest recognized was $38 million as of December 31, 2024 and $32 million as of December 31, 2023. The Company has no accrued penalties related to the liability for unrecognized tax benefits. In the next year, the Company does not anticipate the total amount of uncertain tax positions to significantly increase or decrease.

The IRS has completed its examination of MassMutual and its subsidiaries for the year 2016 and prior. The IRS completed the examination of the 2017-2018 tax years and is at Appeals for 3 issues. The adjustments resulting from these examinations are not expected to materially affect the position or liquidity of the Company.

As of December 31, 2024 and 2023, the Company did not recognize any protective deposits as admitted assets.

7. Other than invested assets

a. Admitted negative (disallowed) IMR

As of December 31, 2024, the Company had $1,424 million of disallowed IMR in aggregate and in the general account.

As of December 31, 2024, the calculated adjusted general capital and surplus was $24,278 million.

As of December 31, 2024, the percentage of adjusted general capital and surplus for which the admitted disallowed IMR represents was 6%.

The following represents allocated gains (losses) to IMR from derivatives:

	December 31, 2024
	(In Millions)
Unamortized fair value derivative gain	$ 2,839
Unamortized fair value derivative losses	(4,044)
Total allocated net losses to IMR from derivatives	$ (1,205)

When the Company sells bonds and recognizes losses due to interest-rate related factors, and the realized losses are transferred to the IMR, the sales proceeds are generally used for reinvestment as governed by prudent asset liability management (ALM) policies and procedures. Such sales of bonds are intermittently used to meet liquidity needs and managed within the ALM framework.

IMR losses for fixed income related derivatives were in accordance with documented risk management procedures, as well as the Company's derivative use plans, and reflect the same historical treatment of derivative gains reversed to IMR and amortized rather than immediately recognized as realized gain upon termination.

As of the period ended December 31, 2024, the IMR asset admitted under the currently adopted statutory accounting interpretation includes approximately $127 million, net of tax, related to various Funds Withheld (FWH) reinsurance treaties. Included in the FWH assets are reimbursements of capital losses on the invested assets to back the ceded reinsurance liabilities and are recorded as an adjustment to the income statement. Both the IMR and FWH assets are admitted under statutory accounting guidance.

b. Corporate-owned life insurance

MassMutual holds corporate-owned life insurance issued by unaffiliated third-party insurers to cover the lives of certain qualified senior employees. The primary purpose of the program is to offset future employee benefit expenses. MassMutual pays all premiums and is the owner and beneficiary of these policies. MassMutual had recorded cash surrender values of these policies of $3,023 million and $2,825 million as of December 31, 2024 and 2023, respectively.

The cash surrender value is allocated by the following investment categories:

	December 31, 2024	December 31, 2023
Other invested assets	50 %	45 %
Bonds	27	28
Stocks	18	17
Cash and short-term investments	5	7
Real estate	—	3
	100 %	100 %

c. Deferred and uncollected life insurance premium

Deferred and uncollected life insurance premium, net of loading and reinsurance, are included in other than invested assets in the Company's Statutory Statements of Financial Position.

The following summarizes the deferred and uncollected life insurance premium on a gross basis, as well as, net of loading and reinsurance:

	December 31,			
	2024		2023	
	Gross	Net	Gross	Net
	(In Millions)			
Ordinary new business	$ 146	$ 78	$ 154	$ 88
Ordinary renewal	1,317	1,256	1,258	1,220
Group life	10	10	10	10
Total	$ 1,473	$ 1,344	$ 1,422	$ 1,318

Deferred premium is the portion of the annual premium not earned at the reporting date. Loading on deferred premium is an amount obtained by subtracting the valuation net deferred premium from the gross deferred premium and generally includes allowances for acquisition costs and other expenses.

Uncollected premium is gross premium net of reinsurance that is due and unpaid as of the reporting date, net of loading. Net premium is the amount used in the calculation of reserves. The change in deferred and uncollected life insurance premium is included in premium income. The change in loading is included as an expense and is not shown as a reduction to premium income.

Ordinary new business and ordinary renewal business consist of the basic amount of premium required on the underlying life insurance policies.

In certain instances, gross premium is less than net premium according to the standard valuation set by the Division and the Department. The gross premium is less than the net premium needed to establish the reserves because the statutory reserves must use standard conservative valuation mortality tables, while the gross premium calculated in pricing uses mortality tables that reflect both the Company's experience and the transfer of mortality risk to reinsurers. The Company had life insurance in force of $63,447 million and $57,978 million as of December 31, 2024 and 2023, respectively.

8. Policyholders' liabilities

a. Policyholders' reserves

The Company had life insurance in force of $999 billion and $953 billion as of December 31, 2024 and 2023, respectively.

The following summarizes policyholders' reserves, net of reinsurance, and the range of interest rates by type of product:

	December 31,			
	2024		2023	
	Amount	Interest Rates	Amount	Interest Rates
	($ In Millions)			
Individual life	$ 85,406	2.5 % - 6.0 %	$ 80,071	2.5 % - 6.0 %
Group annuities	20,721	1.0 % - 11.8 %	19,737	1.0 % - 11.8 %
Individual universal and variable life	24,871	3.5 % - 6.0 %	25,346	3.5 % - 6.0 %
Individual annuities	38,878	1.0 % - 11.8 %	34,055	1.0 % - 11.8 %
Group life	4,656	3.0 % - 4.0 %	4,178	3.0 % - 4.0 %
Disabled life claim reserves	1,836	3.0 % - 6.0 %	1,856	3.0 % - 6.0 %
Disability active life reserves	1,364	3.0 % - 6.0 %	1,504	3.0 % - 6.0 %
Other	526	2.5 % - 6.0 %	503	2.5 % - 6.0 %
Total	$ 178,258		$ 167,250	

Individual life includes whole life and term insurance. Group life includes corporate-owned life insurance, group universal life and group variable universal life products. Individual annuities include individual annuity contracts, supplementary contracts involving life contingencies and structured settlements. Group annuities include deferred annuities and single premium annuity contracts. Disabled life claim reserves include disability income and LTC contracts and cover the future payments of known claims. Disability active life reserves include disability income and LTC contracts issued. Other is comprised of disability life and accidental death insurance.

b. Liabilities for deposit-type contracts

The following summarizes liabilities for deposit-type contracts and the range of interest rates by type of product:

	December 31,			
	2024		2023	
	Amount	Interest Rates	Amount	Interest Rates
	($ In Millions)			
GICs:				
Note programs	$ 13,986	1.2 % - 9.0 %	$ 12,376	0.6 % - 5.6 %
Federal Home Loan Bank of Boston	2,111	0.8 % - 3.4 %	2,111	0.8 % - 3.4 %
Municipal contracts	1,858	0.0 % - 9.0 %	1,720	0.0 % - 7.2 %
Supplementary contracts	2,825	1.0 % - 5.3 %	2,978	1.0 % - 6.0 %
Dividend accumulations	427	3.5 % - 3.8 %	439	3.0 % - 3.5 %
Other deposits	21	5.0 % - 6.5 %	21	4.0 % - 8.0 %
Total	$ 21,228		$ 19,645	

Note program

Funding agreements are investment contracts sold to domestic and international institutional investors. Funding agreement liabilities are equal to the account value and are established by contract deposits, increased by interest credited and decreased by contract coupon payments and maturities. Contract holders do not have the right to terminate the contract prior to the contractually stated maturity date. The Company may retire funding agreements prior to the contractually-stated maturity date by repurchasing the agreement in the market or, in some cases, by calling the agreement. If this occurs, the difference in value is an adjustment to interest credited to liabilities for deposit-type contracts in the Statutory Statements of Operations. Credited interest rates vary by contract and can be fixed or floating. Agreements do not have put provisions or ratings-based triggers. The liability of non-U.S. dollar denominated funding agreements may increase or decrease due to changes in foreign exchange rates. Currency swaps are employed to eliminate foreign exchange risk from all funding agreements issued to back non-U.S. dollar denominated notes.

Under the note program, MassMutual creates special purpose entities (SPEs), which are investment vehicles or trusts, for the purpose of issuing medium-term notes to investors. Proceeds from the sale of the medium-term notes issued by these SPEs are used to purchase funding agreements from MassMutual. The payment terms of any particular series of notes are matched by the payment terms of the funding agreement securing the series. Notes are currently issued from MassMutual's $16.0 billion Global Medium-Term Note Program.

Federal Home Loan Bank of Boston

MassMutual has funding agreements with Federal Home Loan Bank (FHLB) of Boston in an investment spread strategy, consistent with its other funding agreements. These funding agreements are collateralized by securities with estimated fair values of $1,972 million as of December 31, 2024. MassMutual's borrowing capacity with FHLB of Boston is subject to the lower of the limitation on the pledge of collateral for a loan set forth by law or by MassMutual's internal limit. MassMutual's unused capacity was $1,303 million as of December 31, 2024. As a member of FHLB of Boston, MassMutual held common stock of FHLB of Boston with a statement value of $92 million and $92 million as of December 31, 2024 and 2023, respectively.
Collateral pledged to FHLB:

	December 31, 2024			December 31, 2023		
	Fair Value	Carrying Value	Aggregate Total Borrowing	Fair Value	Carrying Value	Aggregate Total Borrowing
	(In Millions)					
Total collateral pledged	$ 5,071	$ 3,414	$ 2,111	$ 4,060	$ 2,944	$ 2,111
Maximum amount pledged	$ 5,473	$ 3,925	$ 2,111	$ 4,060	$ 2,994	$ 2,111

Municipal contracts

Municipal guaranteed investment contracts (municipal contracts) include contracts that contain terms with above market crediting rates. Liabilities for these contracts includes the municipal contracts' account values, which are established by contract deposits, increased by interest credited (fixed or floating) and decreased by contract coupon payments, additional withdrawals, maturities and amortization of premium. Certain municipal contracts allow additional deposits, subject to restrictions, which are credited based on the rates in the contracts. Contracts have scheduled payment dates and amounts and interest is paid periodically. In addition, certain contracts allow additional withdrawals above and beyond the scheduled payments. These additional withdrawals have certain restrictions on the number per year, minimum dollar amount and are limited to the maximum contract balance. The majority of the municipal contracts allow early contract termination under certain conditions.

Certain municipal contracts contain make-whole provisions, which document the formula for full contract payout. Certain municipal contracts have ratings-based triggers that allow the trustee to declare the entire balance due and payable. Municipal contracts may also have terms that require the Company to post collateral to a third party based on the contract balance in the event of a downgrade in ratings below certain levels under certain circumstances. When the collateral is other than cash, the collateral value is required to be greater than the account balance. The collateral was $153 million and $216 million as of December 31, 2024 and 2023, respectively. The Company employs a rigorous asset/liability management process to help mitigate the economic impacts of various liability risks. By performing asset liability management and performing other risk management activities, the Company believes that these contract provisions do not create an undue level of operating risk to the Company.

Other deposits

Other deposits primarily consist of investment contracts assumed as part of the indemnity reinsurance agreement discussed in *Note 9. "Reinsurance"*. These contracts are used to fund retirement plans. Contract payments are not contingent upon the life of the retirement plan participant.

As of December 31, 2024, the Company's GICs by expected maturity year were as follows (in millions):

2025	$	2,729
2026		3,359
2027		3,904
2028		1,670
2029		1,937
Thereafter		4,357
Total	$	17,956

Most GICs only mature on their contractual maturity date. Actual maturities for municipal contracts may differ from their contractual maturity dates, as these contracts permit early contract termination under certain conditions.

c. Unpaid claims and claim expense reserves

The Company establishes unpaid claims and claim expense reserves to provide for the estimated costs of claims for individual disability and LTC policies. These reserves include estimates for both claims that have been reported and those that have been incurred but not reported, and include estimates of all future expenses associated with the processing and settling of these claims. This estimation process is primarily based on the assumption that experience is an appropriate indicator of future events and involves a variety of actuarial techniques that analyze experience, trends and other relevant factors. The amounts recorded for unpaid claims and claim expense reserves represent the Company's best estimate based upon facts and actuarial guidelines. Accordingly, actual claim payouts may vary from these estimates.

The following summarizes the changes in disabled life and LTC unpaid claims and claim expense reserves:

	December 31, 2024	December 31, 2023
	(In Millions)	
Claim reserves, beginning of year	$ 2,542	$ 2,232
Less: Reinsurance recoverables	651	367
Net claim reserves, beginning of year	1,891	1,865
Claims paid related to:		
Current year	(14)	(14)
Prior years	(343)	(333)
Total claims paid	(357)	(347)
Incurred related to:		
Current year's incurred	326	375
Current year's interest	8	9
Prior year's incurred	(69)	(79)
Prior year's interest	67	68
Total incurred	332	373
Adjustments through surplus	—	—
Net claim reserves, end of year	1,866	1,891
Reinsurance recoverables	742	651
Claim reserves, end of year	$ 2,608	$ 2,542

The changes in reserves for incurred claims related to prior years are generally the result of recent loss development trends. The $69 million decrease in the prior years' incurred claims for 2024 and the $79 million decrease in the prior years' incurred claims for 2023 were generally the result of differences between actual termination experience and statutorily prescribed termination tables. In 2024, claim experience included normal claim volume with higher terminations, resulting in a reduction to the incurred reserve from favorable experience, while 2023 claims incurred was due to maturing LTC business partially offset by a corresponding increase in reinsurance recoverable.

The following reconciles disabled life claim reserves to the net claim reserves at the end of the years presented in the previous table. Disabled life claim reserves are recorded in policyholders' reserves. Accrued claim liabilities are recorded in other liabilities.

	December 31, 2024	December 31, 2023
	(In Millions)	
Disabled life claim reserves	$ 1,836	$ 1,856
Accrued claim liabilities	30	33
Net claim reserves, end of year	$ 1,866	$ 1,889

d. Additional liability for annuity contracts

Certain variable annuity contracts include additional death or other insurance benefit features, such GMDB, GMIB, GMAB and 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, 2023	$	55
Incurred guarantee benefits		2
Paid guarantee benefits		(8)
Liability as of December 31, 2023		49
Incurred guarantee benefits		20
Paid guarantee benefits		(8)
Liability as of December 31, 2024	$	61

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.

	December 31, 2024			December 31, 2023		
	Account Value	Net Amount at Risk	Weighted Average Attained Age	Account Value	Net Amount at Risk	Weighted Average Attained Age
	($ In Millions)					
GMDB	$ 8,161	$ 80	68	$ 8,572	$ 25	66
GMIB Basic	412	3	73	449	7	73
GMIB Plus	1,200	429	69	1,240	448	69
GMAB	1,089	4	64	1,400	20	63
GLWB	82	13	76	94	15	75

As of December 31, 2024, the GMDB account value above consists of $819 million within the general account and $7,342 million within separate accounts that includes $3,807 million of Modco assumed. As of December 31, 2023, the GMDB account value above consists of $1,135 million within the general account and $7,437 million within separate accounts that includes $3,712 million of Modco assumed.

Account values of variable annuity contracts with GMDB, GMIB, GMAB and GLWB are summarized below:

	December 31, 2024			December 31, 2023		
	Separate Account	General Account	Total	Separate Account	General Account	Total
	(In Millions)					
GMDB	$ 7,342	$ 819	$ 8,161	$ 7,437	$ 1,135	$ 8,572
GMIB Basic	403	9	412	434	15	449
GMIB Plus	1,200	—	1,200	1,240	—	1,240
GMAB	1,061	28	1,089	1,368	32	1,400
GLWB	82	—	82	94	—	94

e. Additional liability for individual life contracts

Certain universal life and variable universal life contracts include features such as GMDB or other guarantees that ensure continued death benefit coverage when the policy would otherwise lapse. The value of the guarantee is only available to the beneficiary in the form of a death benefit.

The following presents the changes in the liability, net of reinsurance, for guarantees on universal life and variable universal life type contracts:

	December 31, 2024	December 31, 2023
	(In Millions)	
Beginning balance	$ 5,486	$ 5,154
Net liability increase (decrease)	312	332
Ending balance	$ 5,798	$ 5,486

9. Reinsurance

The Company enters into reinsurance agreements with affiliated and unaffiliated insurers in the normal course of business in order to mitigate the impact of underwriting mortality and morbidity risks or to assume business. Such transfers do not relieve the Company of its primary liability to its customers and, as such, failure of reinsurers to honor their obligations could result in credit losses that could arise if a reinsurer defaults. The Company reduces reinsurance default risk by evaluating the financial condition of reinsurers and monitoring for possible concentrations within the Company’s reinsurers and using trust structures, when appropriate. The Company reinsures a portion of its mortality risk in its life business under either a first dollar quota-share arrangement or an in excess of the retention limit arrangement with reinsurers. The Company also reinsures a portion of its morbidity risk in its disability and LTC business. The amounts reinsured are on a yearly renewable term, coinsurance funds withheld, coinsurance or Modco basis. The Company’s highest retention limit for new issues of life policies ranges from $15 million to $35 million.

Refer to *Note 17. "Related party transactions"* for information about the Company’s affiliated assumed reinsurance transactions.

There are no reinsurance agreements in effect under which the reinsurer may unilaterally cancel any reinsurance for reasons other than for nonpayment of premium or other similar credits. The Company has no reinsurance agreements in effect such that the amount of losses paid or accrued through the statement date may result in a payment to the reinsurer of amounts which, in aggregate and allowing for offset of mutual credits from other reinsurance agreements with the same reinsurer, exceed the total direct premium collected under the reinsured policies.

Reinsurance amounts included in the Statutory Statements of Operations were as follows:

	Years Ended December 31,		
	2024	2023	2022
	(In Millions)		
Direct premium	$ 34,221	$ 34,223	$ 35,530
Premium assumed	1,049	977	1,013
Premium ceded	(14,072)	(9,711)	(13,019)
Total net premium	$ 21,198	$ 25,490	$ 23,524
Ceded reinsurance recoveries	$ 1,925	$ 1,842	$ 1,540
Assumed losses	$ 524	$ 425	$ 330

Reinsurance amounts included in the Statutory Statements of Financial Position were as follows:

	December 31,	
	2024	2023
	(In Millions)	
Reinsurance reserves		
Assumed	$ 5,832	$ 6,476
Ceded	(54,419)	(47,326)
Ceded amounts recoverable	$ 322	$ 324
Benefits payable on assumed business	$ 62	$ 65
Funds held under coinsurance		
Ceded	$ 29,625	$ 22,520

Reinsurance reserves ceded to unaffiliated reinsurers as of December 31, 2024, include $9,206 million associated with life insurance policies, $6,916 million for LTC, $19,985 million for annuity, $13 million for disability and $5 million for group life and health. Reinsurance reserves ceded to unaffiliated reinsurers as of December 31, 2023 include $9,219 million associated with life insurance policies, $6,497 million for LTC, $22,659 million for annuity, $14 million for disability and $6 million for group life and health.

LTC policyholders' deficiency reserves were as follows:

	December 31, 2024		
	Direct	Ceded	Net
	(In Millions)		
LTC premium deficiency reserves, beginning of year	$ 3,800	$ (3,615)	$ 185
Assumption changes	(435)	470	35
LTC premium deficiency reserves, end of year	$ 3,365	$ (3,145)	$ 220

For the year ended December 31, 2024, the Company decreased its gross LTC policyholders' premium deficiency reserve by $435 million primarily 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 unaffiliated reinsurers resulting in the ceded policyholders' premium deficiency reserves decreasing by $470 million. The total net impact of the change is $35 million, which was recorded as an increase to policyholders' liabilities on the Statutory Statements of Financial Position and an increase to change in policyholders' reserves on the Statutory Statements of Operations.

	December 31, 2023		
	Direct	Ceded	Net
	(In Millions)		
LTC premium deficiency reserves, beginning of year	$ 4,390	$ (3,910)	$ 480
Assumption changes	(590)	295	(295)
LTC premium deficiency reserves, end of year	$ 3,800	$ (3,615)	$ 185

For the year ended December 31, 2023, the Company decreased its gross LTC policyholders' premium deficiency reserve by $590 million primarily 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 unaffiliated reinsurers resulting in the ceded policyholders' premium deficiency reserves decreasing by $295 million. The total net impact of the change is $295 million, which was recorded as an increase to policyholders' liabilities on the Statutory Statements of Financial Position and an increase to change in policyholders' reserves on the Statutory Statements of Operations.

As of December 31, 2024, one reinsurer accounted for 26% of the outstanding balance of the reinsurance recoverable and the next largest reinsurer had 24%. The Company continues to monitor its morbidity risk ceded to one reinsurer for its LTC business, in which 79% of the reserves are held in trust.

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 LTC business and reinsured on a coinsurance basis a portion of this product resulting in ceding $692 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 $657 million of premium to the reinsurer.

On October 25, 2024, the Company executed a certain coinsurance treaty amendment to increase quota share reinsurance of certain closed long-term care business by 25%. The Company transferred $357 million of premium to the reinsurer in exchange for ceding $325 million in statutory reserves.

The Company holds invested assets associated with FWH that are managed externally, as of December 31, 2024 and 2023, these assets, at carry value, included:

	December 31,	
	2024	2023
	(In Millions)	
Bonds	$ 21,471	$ 15,215
Preferred stocks	51	79
Mortgage loans	1,556	1,043
Partnerships and LLCs	190	51
Cash, cash equivalents and short-term investments	776	946
Total	$ 24,044	$ 17,334

10. *Withdrawal characteristics*

a. *Annuity actuarial reserves and liabilities for deposit-type contracts*

The withdrawal characteristics of the Company's annuity actuarial reserves and deposit-type contracts as of December 31, 2024 are illustrated below:

Individual annuities

	General Account	Separate Account with Guarantees	Separate Account Non-Guaranteed	Total	% of Total
	(In Millions)				
Subject to discretionary withdrawal:					
With market value adjustment	$ 2,332	$ —	$ —	$ 2,332	4 %
At book value less current surrender charge of 5% or more	41,338	—	—	41,338	63 %
At fair value	—	—	7,806	7,806	12 %
Total with market value adjustment or at fair value	43,670	—	7,806	51,476	79 %
At book value without adjustment (minimal or no charge or adjustment)	4,375	—	—	4,375	7 %
Not subject to discretionary withdrawal	9,288	—	—	9,288	14 %
Total	57,333	—	7,806	65,139	100 %
Reinsurance ceded	18,515	—	—	18,515	
Total, net of reinsurance	$ 38,818	$ —	$ 7,806	$ 46,624	
Amount included in book value moving to at book value without adjustment after statement date	2,058	—	—	2,058	

Group annuities

	General Account	Separate Account with Guarantees	Separate Account Non-Guaranteed	Total	% of Total
	(In Millions)				
Subject to discretionary withdrawal:					
With market value adjustment	$ 11,608	$ —	$ —	$ 11,608	17 %
At fair value	—	9,403	18,973	28,376	43 %
Total with market value adjustment or at fair value	11,608	9,403	18,973	39,984	60 %
At book value without adjustment (minimal or no charge or adjustment)	279	318	—	597	1 %
Not subject to discretionary withdrawal	26,189	—	—	26,189	39 %
Total	38,076	9,721	18,973	66,770	100 %
Reinsurance ceded	17,380	—	—	17,380	
Total, net of reinsurance	$ 20,696	$ 9,721	$ 18,973	$ 49,390	

Deposit-type contracts

	General Account	Separate Account with Guarantees	Separate Account Non-Guaranteed	Total	% of Total
			(In Millions)		
Subject to discretionary withdrawal:					
With market value adjustment	$ 2,166	$ —	$ —	$ 2,166	7 %
At fair value	—	—	8,935	8,935	27 %
Total with market value adjustment or at fair value	2,166	—	8,935	11,101	34 %
At book value without adjustment (minimal or no charge or adjustment)	2,732	—	—	2,732	8 %
Not subject to discretionary withdrawal	18,713	—	—	18,713	58 %
Total	23,611	—	8,935	32,546	100 %
Reinsurance ceded	2,383	—	—	2,383	
Total, net of reinsurance	$ 21,228	$ —	$ 8,935	$ 30,163	

The following is a summary of total annuity actuarial reserves and liabilities for deposit-type contracts as of December 31, 2024 (in millions):

Statutory Statements of Financial Position:	
Policyholders' reserves – group annuities	$ 20,696
Policyholders' reserves – individual annuities	38,818
Liabilities for deposit-type contracts	21,228
Subtotal	80,742
Separate Account Annual Statement:	
Annuities	36,500
Other annuity contract deposit-funds and GICs	8,935
Subtotal	45,435
Total	$ 126,177

b. Analysis of life actuarial reserves by withdrawal characteristics

The withdrawal characteristics of the Company's life actuarial reserves as of December 31, 2024 are illustrated below:

General account

	Account Value	Cash Value	Reserve
	(In Millions)		
Subject to discretionary withdrawal, surrender values, or policy loans:			
Universal life	$ 21,498	$ 21,496	$ 21,551
Universal life with secondary guarantees	1,596	1,433	7,315
Other permanent cash value life insurance	—	85,082	90,020
Variable life	1	1	—
Variable universal life	1,118	1,116	1,173
Not subject to discretionary withdrawal or no cash values:			
Term policies without cash value	—	—	3,023
Accidental death benefits	—	—	3
Disability - active lives	—	—	196
Disability - disabled lives	—	—	323
Miscellaneous reserves	—	—	1,061
Total (gross: direct + assumed)	$ 24,213	$ 109,128	$ 124,665
Reinsurance ceded	4,308	5,141	9,206
Total (net)	$ 19,905	$ 103,987	$ 115,459

Separate account with guarantees

	Account Value	Cash Value	Reserve
	(In Millions)		
Subject to discretionary withdrawal, surrender values, or policy loans:			
Variable universal life	1,554	1,554	1,554
Total (gross: direct + assumed)	$ 1,554	$ 1,554	$ 1,554
Total (net)	$ 1,554	$ 1,554	$ 1,554

Separate account nonguaranteed

	Account Value	Cash Value	Reserve
	(In Millions)		
Subject to discretionary withdrawal, surrender values, or policy loans:			
Variable life	$ 1	$ 1	$ 2
Variable universal life	1,973	1,953	1,959
Total (gross: direct + assumed)	$ 1,974	$ 1,954	$ 1,961
Total (net)	$ 1,974	$ 1,954	$ 1,961

c. Separate accounts

The Company has guaranteed separate accounts classified as the following: nonindexed, which have multiple concurrent guarantees, including a guarantee that applies for as long as the contract is in effect and does not exceed a 4% rate of return. The Company has nonguaranteed separate accounts which are variable accounts where the benefit is determined by the performance and/or market value of the investments held in the separate account with incidental risk, notional expense and minimum death benefit guarantees.

Information regarding the separate accounts of the Company as of and for the year ended December 31, 2024 is as follows:

	Guaranteed			
	Indexed	Nonindexed Less than/ Equal to 4%	Non Guaranteed	Total
	(In Millions)			
Net premium, considerations or deposits for the year ended December 31, 2024	$ —	$ —	$ 4,474	$ 4,474
Reserves at December 31, 2024:				
For accounts with assets at:				
Fair value	$ —	$ 10,038	$ 37,359	$ 47,397
Amortized cost/book value	—	1,554	—	1,554
Subtotal SIA Reserves	—	11,592	37,359	48,951
Nonpolicy liabilities	—	—	157	157
Total Separate Account Liabilities	$ —	$ 11,592	$ 37,516	$ 49,108
Reserves by withdrawal characteristics:				
Subject to discretionary withdrawal:				
At fair value	$ —	$ 10,038	$ 37,359	$ 47,397
At book value without market value adjustment and current surrender charge of less than 5%	—	1,554	—	1,554
Subtotal	—	11,592	37,359	48,951
Nonpolicy liabilities	—	—	157	157
Total Separate Account Liabilities	$ —	$ 11,592	$ 37,516	$ 49,108

As of December 31, 2024, the Company has $6,562 million of AVR related to book value separate accounts.

The following is a reconciliation of amounts reported as transfers (from) to separate accounts in the Summary of Operations of the Company's NAIC Separate Account Annual Statement to the amounts reported as net transfers (from) to separate accounts in change in policyholders' reserves in the accompanying Statutory Statements of Operations:

	Years Ended December 31,		
	2024	2023	2022
	(In Millions)		
From the Separate Account Annual Statement:			
Transfers to separate accounts	$ 1,862	$ 1,935	$ 4,205
Transfers from separate accounts	(10,151)	(9,387)	(14,220)
Subtotal	(8,289)	(7,452)	(10,015)
Reconciling adjustments:			
Miscellaneous	4,816	4,278	3,481
Net deposits on deposit-type liabilities	1,531	1,573	1,939
Net transfers from separate accounts	$ (1,942)	$ (1,601)	$ (4,595)

Net deposits on deposit-type liabilities are not considered premium and therefore are excluded from the Statutory Statements of Operations.

11. Debt

MassMutual issues CP in the form of Notes in minimum denominations of $250 thousand up to a total aggregation of $1,000 million with maturity dates up to a maximum of 270 days from the date of issuance. Noninterest bearing Notes are sold at par less a discount representing an interest factor. Interest bearing Notes are sold at par. The Notes are not redeemable or subject to voluntary prepayments by MassMutual. The Notes have a carrying value and face amount of $250 million as of December 31, 2024 and $50 million as of December 31, 2023. Notes issued in 2024 had interest rates ranging from 4.39% to 5.41% with maturity dates ranging from 1 to 62 days. Interest expense for commercial paper for the years ended December 31, 2024 and 2023, was $20 million and $7 million, respectively.

MassMutual has a $1,500 million five-year credit facility, $1,250 million of undrawn commitment, with a syndicate of lenders that can be used for general corporate purposes and to support CP borrowings. During December 2022, the facility was renewed and the scheduled maturity is December 16, 2027. The facility includes two one-year extension options that may be exercised with proper notification as set forth in the agreement. The facility has an upsize option for an additional $500 million. The terms of the credit facility additionally provide for, among other provisions, covenants pertaining to liens, fundamental changes, transactions with affiliates and adjusted statutory surplus. As of and for the years ended December 31, 2024 and 2023, MassMutual was in compliance with all covenants under the credit facility. For the years ended December 31, 2024 and 2023, there were no draws on the credit facilities. Credit facility fees were less than $1 million for the years ended December 31, 2024 and 2023.

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.

a. Pension plans

The Company sponsors funded and unfunded noncontributory defined benefit pension plans for its eligible employees, agents and retirees.

The funded qualified defined benefit plan generally provides benefits under a cash balance formula based on age, service and salary during the participants' careers. Certain eligible participants may be entitled to benefits under a legacy defined benefit formula. The Company's policy is to fund the qualified pension plan in accordance with the Employee Retirement Income Security Act of 1974. There were no contributions in 2024 and 2023.

The Company has announced there will be no new benefit accruals under the plan after December 31, 2024.

b. Defined contribution plans

The Company sponsors funded qualified defined contribution plans and unfunded nonqualified deferred compensation thrift savings plans for its employees, agents and retirees. Defined contribution plan expense for 2024 and 2023 was $58 million and $56 million, respectively.

c. Other postretirement benefits

The Company provides certain life insurance and health care benefits (other postretirement benefits) for its retired employees and agents, their beneficiaries and covered dependents. MMHLLC has the obligation to pay the Company's other postretirement benefits. The transfer of this obligation to MMHLLC does not relieve the Company of its primary liability. MMHLLC is allocated other postretirement expenses related to interest cost, amortization of actuarial gains (losses) and expected return on plan assets, whereas service cost and prior service cost are recorded by the Company.

Substantially all of the Company's U.S. employees and agents may become eligible to receive other postretirement benefits. These benefits are funded as the benefits are provided to the participants. For eligible employees who retire after 2009, except certain employees who were close to retirement in 2010, the Company's cost is limited to a retiree health reimbursement account (RHRA), which accumulates during an employee's career and can be drawn down by the retiree to purchase coverage outside of the Company or for other health care costs. Retired employees with a RHRA also may choose to purchase coverage through the private retiree exchange.

For other eligible current and future retired employees, and current and future retired agents, the Company provides access to postretirement health care plans through a private retiree exchange. The Company's cost is limited to the fixed annual subsidy provided to retirees through a Health Reimbursement Account each year that the retiree can use to purchase coverage on the exchange or for other health care costs.

Company-paid basic life insurance is provided to retirees who retired before 2010 and certain employees who retire after 2009 but were close to retirement in 2010. Supplemental life insurance is available to certain retirees on a retiree-pay-all basis.

The Company provides retiree life insurance coverage for home office employees who, as of January 1, 2010, were age 50 with at least 10 years of service or had attained 75 points, generally age plus service, with a minimum 10 years of service.

d. Benefit obligations

Accumulated and projected benefit obligations are the present value of pension benefits earned as of a December 31 measurement date (the Measurement Date) based on service and compensation as of that date.

Refer to *Note 12f. "Amounts recognized in the Statutory Statements of Financial Position,"* for details on the funded status of the plans. Accumulated and projected postretirement benefit obligations for other postretirement benefits are the present value of postretirement medical and life insurance benefits earned as of the Measurement Date projected for estimated salary increases to an assumed date with respect to retirement, disability or death.

Actuarial (gains) losses represent the difference between the expected results and the actual results used to determine the projected benefit obligation, accumulated benefit obligation and current year expense. Select assumptions used in this calculation include expected future compensation levels, mortality and expected retirement age.

The following presents the total pension and other postretirement accumulated benefit obligation:

	December 31,			
	2024	2023	2024	2023
	Pension Benefits		Other Postretirement Benefits	
	(In Millions)			
Accumulated benefit obligation	$ 2,570	$ 2,634	$ 307	$ 313

The following sets forth the change in projected benefit obligation of the defined benefit pension and other postretirement plans:

	December 31,			
	2024	2023	2024	2023
	Pension Benefits		Other Postretirement Benefits	
	(In Millions)			
Projected benefit obligation, beginning of year	$ 2,634	$ 2,590	$ 313	$ 315
Service cost	99	86	7	7
Interest cost	123	125	15	15
Actuarial (gains) losses	(5)	21	(1)	(14)
Benefits paid	(150)	(222)	(15)	(14)
Change in discount rate	(138)	34	(12)	4
Change in actuarial assumptions	7	—	—	—
Projected benefit obligation, end of year	$ 2,570	$ 2,634	$ 307	$ 313

The determination of the discount rate is based upon rates commensurate with current yields on high quality corporate bonds as of the Measurement Date. A spot yield curve is developed from this data that is used to determine the present value for the obligation. The projected plan cash flows are discounted to the Measurement Date based on the spot yield curve. A single discount rate is utilized to ensure the present value of the benefits cash flow equals the present value computed using the spot yield curve. A 25-basis point change in the discount rate results in approximately a $53 million change in the projected pension benefit obligation. The methodology includes producing a cash flow of annual accrued benefits. Refer to *Note 12h. "Assumptions"* for details on the discount rate.

e. Plan assets

The assets of the qualified pension plan are invested in a MassMutual group annuity contract and in the MassMutual Pension Plan Trust (Pension Trust). The group annuity contract includes a general investment account (GIA). As of December 31, 2024 and 2023, GIA assets managed by the Company were $143 million and $229 million, respectively. The Company was rated AA+ by Standards and Poor's as of December 31, 2024.

The Company's overall objective is to manage the assets in a liability framework where investments are selected that are expected to have similar changes in fair value as the related liabilities will have upon changes in interest rates. The company invests in a portfolio of both return-seeking and liability-hedging assets, to achieve long-term growth and to insulate the funded position from interest rate volatility.

The target range allocations are based on two broad categories, return-seeking (generally equities and alternative investments) and liability-hedging (generally fixed income). The return-seeking allocation range is 46% to 54% and liability-hedging range is 46% to 54%. Of the return-seeking assets, the range is 35% to 55% global public equity and 45% to 65% alternatives. The pension plan assets invested in the GIA through the unallocated group annuity contract earn a fixed interest. These assets comprised approximately 6% and 9% of the plan assets as of December 31, 2024 and 2023, respectively.

The following presents the change in plan assets:

	December 31,			
	2024	2023	2024	2023
	Pension Benefits		Other Postretirement Benefits	
	(In Millions)			
Plan assets, beginning of year	$ 2,521	$ 2,483	$ 4	$ 2
Actual return on plan assets	73	230	—	—
Employer contributions	26	30	12	14
Benefits paid	(150)	(222)	(15)	(14)
Other	—	—	(1)	2
Plan assets, end of year	$ 2,470	$ 2,521	$ —	$ 4

The GIA is designed to provide stable, long-term investment growth. Investments in the GIA are stated at contract value. Contract value is the amount participants would receive if they were to initiate certain transactions under the terms of the plan. It provides for a stated return on principal invested over a specified period and permits withdrawals at contract value for benefit payments, loans, or transfers.

Investments in the Pension Trust are stated at fair value. Noninterest bearing cash is stated at cost value.

Fair Value Measurements

The Company’s fair value hierarchy is defined in *Note 4. "Fair Value of financial instruments"*.

The following is a description of the valuation methodologies used to measure fair value for the investments in the qualified pension plan.

Cash, cash equivalents and short-term investments: Short-term investments are stated at cost, which is equal to fair value. Foreign currencies are stated at cost and adjusted for foreign currency gains and losses.

Government securities: Marked to market daily based on values provided by third-party vendors or market makers to the extent available or based on model prices. Valuations furnished by a pricing service take into account factors such as institutional-size trading in similar securities, yield, quality, coupon rate, maturity, type of issue, trading characteristics, and other market data and are therefore classified as Level 2.

Bonds: If Level 1 valuations are not available, the fair value is determined using models such as matrix pricing and therefore, is classified as Level 2, which uses quoted market prices of debt securities with similar characteristics. Valued using the closing price reported on the active market on which the individual securities are traded.

Mutual funds: Mutual funds are valued at the daily closing price as reported by the fund. Certain mutual funds held by the plan are registered with the SEC and are required to publish their daily NAV. These mutual funds held by the Plan are deemed to be actively traded and are therefore classified as Level 1. The remaining mutual funds do not publish their daily NAV and are therefore classified as Level 2.

Collective investment trusts: Valued using the NAV per unit. The net asset value per unit of the funds is calculated on each business day by dividing the total value of assets, less liabilities, by the number of units outstanding. Unit issuances and redemptions are based on the net asset value determined at the end of the current day and therefore is classified as NAV practical expedient.

Real estate investment trusts: Real estate investment trusts are valued using the plan's pro-rata interest in the fund and does not have a lock-up period, a funding commitment, or a specific redemption period but are dependent upon the liquidation of underlying assets. Therefore, these investments are classified as NAV practical expedient.
Hedge funds: Hedge funds are based on the plan's pro rata interest in the fund and have a 45-day redemption period and therefore classified as NAV practical expedient.

Limited partnerships – Private equity/venture capital: The plan utilizes the NAV practical expedient to calculate fair value of its investments based on the Plan's pro rata interest in net assets of each underlying partnership. All valuations utilize financial information supplied by the partnership, including income, expenses, gains and losses. The underlying investments are accounted for at fair value as described in the partnership's audited financial statements. These funds can be redeemed periodically with notice that generally ranges from 45 to 90 days. There are no lockups or funding commitments.

Limited partnerships – Real estate: The plan utilizes the NAV practical expedient to calculate fair value of its investments based on the Plan's pro rata interest in net assets of each underlying partnership. All valuations utilize financial information supplied by the partnership, including income, expenses, gains and losses. The underlying investments of the partnership are accounted for at fair value as described in the partnership's audited financial statements. These funds can be redeemed periodically with notice that generally ranges from 45 to 90 days. There are no lockups or funding commitments.

Limited partnerships – Hedge: The Plan utilizes the NAV practical expedient to calculate fair value of its investments based on the Plan's pro rata interest in net assets of each underlying partnership. All valuations utilize financial information supplied by the partnership, including income, expenses, gains and losses. The underlying investments of the partnership are accounted for at fair value as described in the partnership's audited financial statements. The hedge funds can be redeemed semi-annually with 95-days notice. There are no lockups or funding commitments.

Other investments: Investments included in this category include asset backed securities, mortgage backed securities, swaps, derivatives, futures and options. Closing prices are not available on the active market. Fair value is determined using models such as matrix pricing and therefore, these securities are classified as Level 2.

The following tables set forth by level, within the fair value hierarchy, the plan's assets at fair value as of December 31, 2024 and 2023.

	Fair Value as of December 31, 2024				
	Level 1	Level 2	Level 3	NAV Practical Expedient	Total
	(In Millions)				
Cash, cash equivalents, and short-term investments	$ 44	$ —	$ —	$ —	$ 44
Government securities	—	459	—	—	459
Bonds	—	374	—	—	374
Mutual funds	512	—	—	—	512
Real estate investment trusts	—	—	—	47	47
Hedge funds	—	—	—	34	34
Limited partnerships:					
Private equity/venture capital	—	—	—	512	512
Real estate	—	—	—	108	108
Hedge	—	—	—	225	225
Other investments	—	3	—	—	3
Total	$ 556	$ 836	$ —	$ 926	$ 2,318

	Fair Value as of December 31, 2023				
	Level 1	Level 2	Level 3	NAV Practical Expedient	Total
	(In Millions)				
Cash, cash equivalents, and short-term investments	$ 76	$ —	$ —	$ —	$ 76
Government securities	—	486	—	—	486
Bonds	—	371	—	—	371
Mutual funds	471	—	—	—	471
Real estate investment trusts	—	—	—	54	54
Hedge funds	—	—	—	31	31
Limited partnerships:					
Private equity/venture capital	—	—	—	480	480
Real estate	—	—	—	120	120
Hedge	—	—	—	205	205
Other investments	—	12	—	—	12
Total	$ 547	$ 869	$ —	$ 890	$ 2,306

Plan assets measured at contract value and non-interest bearing cash are excluded from the preceding table.

f. Amounts recognized in the Statutory Statements of Financial Position

Unrecognized prior service cost is the adjustment to the projected benefit obligation as a result of plan amendments. It represents the increase or decrease in benefits for service performed in prior periods. For pension benefits, this cost is amortized into net periodic benefit cost over the average remaining service years of active employees at the time of the amendment. For other postretirement benefits, this cost is amortized into net periodic benefit cost over the average remaining lifetime of eligible employees and retirees at the time of the amendment.

Unrecognized net actuarial (gains) losses are variances between assumptions used and actual experience. These assumptions include return on assets, discount rate, demographics and mortality. The unrecognized net actuarial (gains) losses are amortized if they exceed 10% of the projected benefit obligation and are amortized starting in the period after recognition. These are amortized for pension and other postretirement benefits into net periodic benefit cost over the remaining service-years of active employees.

The prepaid pension asset is a cumulative balance of employer contributions made to the plan netted against the plan's accumulated net periodic benefit costs. The prepaid pension asset is a nonadmitted asset.

The accrued benefit cost recognized is the funded status of the plan adjusted for the remaining balance of unrecognized prior service cost, unrecognized net actuarial loss and the nonadmitted prepaid pension asset.

The following sets forth the projected benefit obligation funded status of the plans:

	December 31,			
	2024	2023	2024	2023
	Pension Benefits		Other Postretirement Benefits	
	(In Millions)			
Projected benefit obligation	$ (2,570)	$ (2,634)	$ (307)	$ (313)
Less: plan assets	2,470	2,521	—	4
Projected benefit obligation funded status	$ (100)	$ (113)	$ (307)	$ (309)

The qualified pension plan was overfunded by $307 million and $312 million as of December 31, 2024 and 2023, respectively. The nonqualified pension plans are not funded and have total projected benefit obligations of $407 million and $425 million as of December 31, 2024 and 2023, respectively.

The qualified pension plan nonadmitted pension plan asset was $631 million and $653 million as of December 31, 2024 and 2023, respectively.

The Company intends to fund $56 million in 2025 to meet its expected current obligations under its qualified and nonqualified pension plans and other postretirement benefit plans.

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

	Years Ended December 31,					
	2024	2023	2022	2024	2023	2022
	Pension Benefits			Other Postretirement Benefits		
	(In Millions)					
Service cost	$ 99	$ 86	$ 97	$ 7	$ 7	$ 9
Interest cost	123	125	86	15	15	10
Expected return on plan assets	(171)	(169)	(194)	—	—	—
Amortization of unrecognized losses and (gains)	19	27	9	(10)	(9)	(1)
Amortization of unrecognized prior service benefit	—	—	—	(5)	(5)	(6)
Total net periodic expense	$ 70	$ 69	$ (2)	$ 7	$ 8	$ 12

The expected future pension and other postretirement benefit payments which reflect expected future service are as follows:

	Pension Benefits	Other Postretirement Benefits
	(In Millions)	
2025	$ 205	$ 19
2026	203	20
2027	195	21
2028	194	22
2029	187	22
2030 - 2034	915	114

h. Assumptions

The assumptions the Company used to calculate the benefit obligations and to determine the benefit costs are as follows:

	Years Ended December 31,					
	2024	2023	2022	2024	2023	2022
	Pension Benefits			Other Postretirement Benefits		
	(In Millions)					
Weighted-average assumptions used to determine:						
Benefit obligations:						
Discount rate	5.50 %	4.85 %	5.00 %	5.55 %	4.85 %	5.05 %
Expected rate of compensation increase	3.50 %	3.50 %	3.50 %	3.50 %	3.50 %	3.50 %
Interest Crediting rate	5.00 %	5.00 %	5.00 %	5.55 %	4.85 %	5.05 %
Net periodic benefit cost:						
Discount rate	4.85 %	5.00 %	2.85 %	4.85 %	5.05 %	2.80 %
Expected long-term rate of return on plan assets	7.00 %	7.00 %	6.50 %	3.00 %	3.00 %	3.00 %
Expected rate of compensation increase	3.50 %	3.50 %	3.50 %	3.50 %	3.50 %	3.50 %
Interest Crediting rate	5.00 %	5.00 %	5.00 %	4.85 %	5.05 %	2.80 %

The discount rate used to determine the benefit obligations as of year-end is used to determine the expense in the next fiscal year.

The Company determines its assumptions for the expected rate of return on plan assets for its plans using a "building block" approach, which focuses on ranges of anticipated rates of return for each asset class. A weighted range of nominal rates is determined based on target allocations for each class of asset.

13. Employee compensation plans

The Company has a long-term incentive compensation plan under which certain employees of the Company and its subsidiaries may be issued phantom stock-based compensation awards. These awards include PSARs and PRS. These awards do not grant an equity or ownership interest in the Company.

A summary of the weighted average grant price of PSARs and PRS shares granted, the intrinsic value of PSARs shares exercised, the PRS liabilities paid and the fair value of shares vested during the year is as follows:

	December 31, 2024	December 31, 2023	December 31, 2022
Weighted average grant date fair value:			
PSARs granted during the year	$ 151.50	$ 145.77	$ 243.40
PRS granted during the year	150.96	145.67	238.54
Intrinsic value (in thousands):			
PSARs options exercised	1,986	65,810	135,219
PRS liabilities paid	103,656	45,600	70,029
Fair value of shares vested during the year	99,903	64,779	136,945

A summary of PSARs and PRS shares is as follows:

	PSARs			PRS		
		Weighted Average			Weighted Average	
	Number of Share Units	Price	Remaining Contract Terms	Number of Share Units	Price	Remaining Contract Terms
	(In Thousands)		(In Years)	(In Thousands)		(In Years)
Outstanding as of December 31, 2022	3,394	$ 160.09	4.0	872	$ 151.41	2.4
Granted	2,762	145.77		1,002	145.67	
Exercised	(1,329)	130.59		(252)	116.36	
Forfeited	(788)	239.79		(37)	180.80	
Outstanding as of December 31, 2023	4,039	144.46	4.4	1,585	152.73	2.1
Granted	1,591	151.50		332	150.96	
Exercised	(215)	141.60		(684)	142.11	
Forfeited	(229)	147.01		(85)	160.51	
Outstanding as of December 31, 2024	5,186	146.66	4.0	1,148	157.97	2.8
Exercisable as of December 31, 2024	1,046	$ 141.62	2.2	4	$ 142.60	0.8

The PSARs compensation was an expense of $10 million, $17 million and ($34) million for the years ended December 31, 2024, 2023, and 2022, respectively. The PSARs accrued compensation liability was $1 million and $13 million as of December 31, 2024 and 2023, respectively. There was no unrecognized compensation expense related to nonvested PSAR awards as of December 31, 2024, and the unrecognized compensation expense related to nonvested PSAR awards was $20 million as of December 31, 2023 and $19 million as of December 31, 2022. The weighted average period over which the expense is expected to be recognized is 4.0 years. The PSARs unrecognized compensation expense represents the total intrinsic value of all shares issued if 100% vested at current stock price, minus current compensation liability.

The PRS compensation expense was $39 million, $96 million and $31 million for the years ended December 31, 2024, 2023, and 2022, respectively. The PRS accrued compensation liability was $85 million and $148 million for the year ended December 31, 2024 and 2023, respectively. The unrecognized compensation expense related to nonvested PRS awards was $66 million, $87 million and $56 million as of December 31, 2024, 2023, and 2022, respectively. The weighted average period over which the expense is expected to be recognized is 2.8 years. The PRS unrecognized compensation expense represents the total value of all shares issued if 100% vested at the current stock price, minus current compensation liability.

14. Surplus notes

The following table summarizes the surplus notes issued and outstanding as of December 31, 2024:

Issue Date	Face Amount	Carrying Value	Interest Rate	Maturity Date	Scheduled Interest Payment Dates	Type of Assets Received Upon Issuance
	($ In Millions)					
05/12/03	$ 193	$ 193	5.625%	05/15/33	May 15 & Nov 15	Cash
06/01/09	130	129	8.875%	06/01/39	Jun 1 & Dec 1	Cash
01/17/12	263	263	5.375%	12/01/41	Jun 1 & Dec 1	Cash
04/15/15	258	254	4.500%	04/15/65	Apr 15 & Oct 15	Cash
03/23/17	475	471	4.900%	04/01/77	Apr 1 & Oct 1	Cash
10/11/19	838	603	3.729%	10/15/70	Apr 15 & Oct 15	Cash
04/16/20	700	698	3.375%	04/15/50	Apr 15 & Oct 15	Cash
06/26/20	600	815	5.077%	02/15/69	Feb 15 & Aug 15	Treasury Notes
03/01/21	200	231	5.077%	02/15/69	Feb 15 & Aug 15	Treasury Notes
11/18/21	675	670	3.200%	12/01/61	Jun 1 & Dec 1	Treasury Notes
12/01/22	500	500	5.672%	12/01/52	Jun 1 & Dec 1	Treasury Notes
Total	$ 4,832	$ 4,827				

All payments of interest and principal are subject to the prior approval of the Division. Interest expense is not recorded until approval for payment is received from the Division. As of December 31, 2024, the unapproved interest was $43 million. Through December 31, 2024, MassMutual paid cumulative interest of $2,270 million on surplus notes. Interest of $219 million was approved and paid during the year ended December 31, 2024.

There are no sinking fund requirements for the notes issued in 2003, 2009, 2012, 2015, 2017, 2019, 2020, 2021 or 2022.

These notes are unsecured and subordinate to all present and future indebtedness of MassMutual, all policy claims and all prior claims against MassMutual as provided by the Massachusetts General Laws. The surplus notes are all held by bank custodians for unaffiliated investors. All issuances were approved by the Division. Surplus notes are included in surplus on the Statutory Statements of Financial Position.

15. *Presentation of the Statutory Statements of Cash Flows*

The following table presents those transactions that have affected the Company's recognized assets or liabilities but have not resulted in cash receipts or payments during the years ended December 31, 2024 and 2023. Accordingly, the Company has excluded these non-cash activities from the Statutory Statements of Cash Flows for the years ended December 31, 2024, 2023 and 2022.

	Years Ended December 31,		
	2024	2023	2022
	(In Millions)		
Stock conversions	$ 5,747	$ 202	$ 13
Bond conversions and refinancing	1,815	1,460	1,177
Transfer of affiliated common stocks to partnerships and limited liability companies	1,652	38	—
Change in market value of corporate owned life insurance asset	204	217	(46)
Transfer of mortgage loans to partnerships and limited liability companies	186	—	40
Transfer of partnerships and limited liability companies to partnerships and limited liability companies	76	277	620
Transfer of mortgage loans to bonds	66	132	—
Net investment income payment-in-kind bonds	31	14	12
Transfer of mortgage loans to mortgage loans	17	—	—
Transfer of bonds to partnerships and limited liability companies	—	122	441
Transfer of partnerships and limited liability companies to bonds	—	100	187
Transfer of mortgage loans to short-term investments	—	60	—
Accrued discount on mortgage loans	—	10	—
Transfer of partnerships and limited liability companies to stocks	—	3	—
Transfer of bonds to mortgage loans	—	—	626
Transfer of partnerships and limited liability companies to common stocks - subsidiaries and affiliates	—	—	227
Transfer of common stocks unaffiliated to common stocks - subsidiaries and affiliates	—	—	97
Deferred gain on real estate	—	—	16

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.

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.

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.

Real estate markets are monitored continuously with attention on regional differences in price performance, absorption trends and supply and demand fundamentals that can impact the rate of foreclosures and delinquencies. Public sector strengths and weaknesses, job growth and macro-economic issues are factors that are closely monitored to identify any impact on the Company’s real estate related investments.

The CMBS, RMBS and leveraged loan sectors are sensitive to evolving conditions that can impair the cash flows realized by investors and is subject to uncertainty. Management’s judgment regarding OTTI and estimated fair value depends upon the evolving investment sector and economic conditions. It can also be affected by the market liquidity, a lack of which can make it difficult to obtain accurate market prices for RMBS and other investments, including CMBS and leveraged loans. Any deterioration in economic fundamentals, especially related to the housing sector could affect management’s judgment regarding OTTI.

The Company has investments in structured products exposed primarily to the credit risk of corporate bank loans, corporate bonds or credit default swap contracts referencing corporate credit risk. Most of these structured investments are backed by corporate loans and are commonly known as collateralized loan obligations that are classified as CDO. The portfolios backing these investments are actively managed and diversified by industry and individual issuer concentrations. Due to the complex nature of CDO and the reduced level of transparency to the underlying collateral pools for many market participants, the recovery in CDO valuations generally lags the overall recovery in the underlying assets. Management believes its scenario analysis approach, based primarily on actual collateral data and forward looking assumptions, does capture the credit and most other risks in each pool. However, in a rapidly changing economic environment, the credit and other risks in each collateral pool will be more volatile and actual credit performance of CDO may differ from the Company’s assumptions.

The Company continuously monitors its investments and assesses their liquidity and financial viability; however, the existence of the factors described above, as well as other market factors, could negatively impact the market value of the Company's investments. If the Company sells its investments prior to maturity or market recovery, these investments may yield a return that is less than the Company otherwise would have been able to realize.

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.

Market risk arises within the Company’s employee benefit plans to the extent that the obligations of the plans are not fully matched by assets with determinable cash flows. Pension and postretirement obligations are subject to change due to fluctuations in the discount rates used to measure the liabilities as well as factors such as changes in inflation, salary increases and participants living longer. The risks are that such fluctuations could result in assets that are insufficient over time to cover the level of projected benefit obligations. In addition, increases in inflation and members living longer could increase the pension and postretirement obligations. Management determines the level of this risk using reports prepared by independent actuaries and takes action, where appropriate, in terms of setting investment strategy and determining contribution levels. In the event that the pension obligations arising under the Company’s employee benefit plans exceed the assets set aside to meet the obligations, the Company may be required to make additional contributions or increase its level of contributions to these plans.

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. Leases

The Company leases office space and equipment in the normal course of business under various noncancelable operating lease agreements. Additionally, the Company, as lessee, has entered various sublease agreements with affiliates for office space, such as Barings. Total rental expense on net operating leases, recorded in general insurance expenses, was $77 million and $93 million for the years ended December 31, 2024 and 2023, respectively. Net operating leases are net of sublease receipts of $9 million and $5 million or the years ended December 31, 2024 and 2023, respectively.

For the years ended December 31, 2024 and 2023, the company has not entered into any sale-leaseback transactions with any unrelated parties.

Future minimum commitments for all lease obligations as of December 31, 2024 were as follows:

	Gross	Affiliated Subleases	Nonaffiliated Subleases	Net
	(In Millions)			
2025	$ 83	$ 6	$ 2	$ 75
2026	70	6	2	62
2027	64	6	2	56
2028	59	5	2	52
2029	55	4	2	49
Thereafter	267	16	5	246
Total	$ 598	$ 43	$ 15	$ 540

c. Guaranty funds

The Company is subject to state insurance guaranty fund laws. These laws assess insurance companies' amounts to be used to pay benefits to policyholders and policy claimants of insolvent insurance companies. Many states allow these assessments to be credited against future premium taxes. The Company believes such assessments in excess of amounts accrued will not materially impact its financial position, results of operations or liquidity.

d. Litigation and regulatory matters

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

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

e. Commitments

In the normal course of business, the Company provides specified guarantees and funding to MMHLLC and certain of its subsidiaries. As of December 31, 2024 and 2023, the Company had approximately $800 million of these unsecured funding commitments to its subsidiaries. The unsecured commitments are included in private placements in the table below. As of December 31, 2024 and 2023, the Company had not funded, nor had an outstanding balance due on, these commitments.

In the normal course of business, the Company enters into letter of credit arrangements. The Company had outstanding letter of credit arrangements of approximately $77 million and $77 million as of December 31, 2024 and 2023, respectively. As of December 31, 2024 and 2023, the Company did not have any funding requests attributable to these letter of credit arrangements.

In the normal course of business, the Company enters into commitments to purchase certain investments. The majority of these commitments have funding periods that extend between one and five years. The Company is not required to fund commitments once the commitment period expires.

As of December 31, 2024, the Company had the following outstanding commitments:

	2025	2026	2027	2028	2029	Thereafter	Total
				(In Millions)			
Private placements	$ 492	$ 2,431	$ 3,169	$ 2,165	$ 958	$ 4,947	$ 14,162
Mortgage loans	340	421	206	191	139	78	1,375
Partnerships and limited liability companies	2,412	1,088	1,338	658	930	1,226	7,652
LIHTCs (including equity contributions)	—	1	—	1	1	27	30
Preferred stock	$ 56	$ —	$ —	$ —	$ —	$ 16	$ 72
Total	$ 3,300	$ 3,941	$ 4,713	$ 3,015	$ 2,028	$ 6,294	$ 23,291

In the normal course of business the Company enters into commitments related to property lease arrangements, certain indemnities, investments and other business obligations. As of December 31, 2024 and 2023, the Company had no outstanding obligations attributable to these commitments.

f. Guarantees

In the normal course of business the Company enters into guarantees related to employee and retirement benefits, the maintenance of subsidiary regulatory capital, surplus levels and liquidity sufficient to meet certain obligations, and other property lease arrangements. If the Company were to recognize a liability, the financial statement impact would be to recognize either an expense or an investment in a subsidiary, controlled, or affiliated entity. The Company has no expectations for recoveries from third parties should these guarantees be triggered. As of December 31, 2024 and 2023, the Company had no outstanding obligations to any obligor attributable to these guarantees.

The following details contingent guarantees that are made on behalf of the Company's subsidiaries and affiliates as of December 31, 2024.

Type of guarantee	Nature of guarantee (including term) and events and circumstances that would require the guarantor to perform under guarantee	Carrying amount of liability	Maximum potential amount of future payments (undiscounted) required under the guarantee
Employee and Retirement Benefits	The Company guarantees the payment of certain employee and retirement benefits for its wholly-owned subsidiary Barings, if the subsidiary is unable to pay.	—	The liabilities for these plans of $599 million have been recorded on the subsidiaries' books and represent the Company's maximum obligation.
Capital and Surplus Support of Subsidiaries	Certain guarantees of the Company provide for the maintenance of a subsidiary's regulatory capital, surplus levels and liquidity sufficient to meet certain obligations. These unlimited guarantees are made on behalf of certain wholly-owned subsidiaries. (C.M. Life and MML Bay State).	—	These guarantees are not limited and cannot be estimated.
Other Property Lease Arrangements	The Company guarantees the payment of various lease obligations on behalf of its subsidiaries and affiliates.	—	The future maximum potential obligations are immaterial to the Company.
Real Estate Development Guarantee	The construction lender for an office building in London, UK required a cost overrun guarantee equivalent to 8% of the total budgeted cost (£6 million). The Company will only be responsible for its pro rata share of any cost overruns with a maximum additional commitment of approximately £2 million. This will remain in place until June 2025.	—	£8 million
Deferred Equity Guaranty	The lender for the Kimpton Tryon Park hotel has required a "Deferred Equity Guaranty" in the anticipated amount of $3 million. The Guaranteed Equity Amount is equal to the sum of the remaining costs and expenses necessary to complete a planned renovation project at the hotel, less any amounts over $0.5 million deposited in the FF&E Reserve. The Guaranty will remain in place until the renovation project at the hotel is completed, which is anticipated to occur in April 2025.	—	$3 million
Secure Capital for Variable Annuity Separate Accounts	The Company guarantees the capital contributions required to be made by a variable annuity separate account contract holder in the event the contract holder fails to payoff a subscription line utilized to deploy capital for the separate account.	—	$156 million with the right to increase the line to $345 million.

17. Related party transactions

MassMutual has management and service contracts and cost-sharing arrangements with various subsidiaries and affiliates where MassMutual, for a fee, will furnish a subsidiary or affiliate, as required, operating facilities, human resources, computer software development and managerial services.

MassMutual has agreements with its subsidiaries and affiliates, including MML Investment Advisers LLC, The MassMutual Private Wealth & Trust, FSB, and Baring International Investment Limited, where MassMutual receives revenue for certain recordkeeping and other services that MassMutual provides to customers who select, as investment options, mutual funds managed by these affiliates.

MassMutual has agreements with its subsidiaries, Barings, MML Investment Advisers LLC and MassMutual Intellectual Property LLC, which provide investment advisory services and licensing agreements to MassMutual.

The following table summarizes the transactions between the Company and the related parties:

	Years Ended December 31,		
	2024	2023	2022
	(In Millions)		
Fee income:			
Management and service contracts and cost-sharing arrangements	$ 471	$ 425	$ 366
Investment advisory income	16	16	18
Recordkeeping and other services	12	11	16
Fee expense:			
Investment advisory services	277	221	236
Royalty and licensing fees	83	84	71

The Company reported amounts due from subsidiaries and affiliates of $114 million and $132 million as of December 31, 2024 and 2023, respectively. The Company reported amounts due to subsidiaries and affiliates of $108 million and $39 million as of December 31, 2024 and 2023, respectively. Terms generally require settlement of these amounts within 30 to 90 days.

The Company held debt issued by MMHLLC that amounted to $2,144 million as of December 31, 2024 and $2,144 million as of December 31, 2023. The Company recorded interest income on MMHLLC debt of $168 million in 2024 and $125 million in 2023.

As of December 31, 2024, MMIH provided financing of $7,500 million for MassMutual Asset Finance (MMAF) that can be used to finance ongoing asset purchases. During 2024, MMAF borrowed $2,790 million and repaid $1,806 million under the credit facility. During 2023, MMAF borrowed $2,271 million and repaid $2,203 million under the credit facility. Outstanding borrowings under the facility were $6,035 million as of December 31, 2024 and $4,824 million as of December 31, 2023. Interest for these borrowings was $207 million for the year ended December 31, 2024 and $131 million for the year ended December 31, 2023. The floating rate borrowings bear interest at a spread over the 30-day SOFR. The fixed rate borrowings bear an interest at a spread over average life Treasuries.

Together, MassMutual and C.M. Life, provide a credit facility to Jefferies Finance, LLC (Jefferies) whereby Jefferies borrows cash through short-term approved financings to fund the purchase of loans for securitization. During 2024, there were no borrowings or repayments recorded. During 2023, Jefferies borrowed $79 million and repaid $79 million under the credit facility. As of December 31, 2024, there were no outstanding borrowings under this facility. All outstanding interest due under the facility, as of December 31, 2024, had been paid. The interest of this facility is calculated based on a full pass through of interest accrued on the underlying loans purchased.

Capital Contributions from MassMutual

- $70 million and $92 million to ITPS Holdings LLC in 2024 and 2023, respectively
- $135 million to DPI Acres Capital LLC in 2024
- $300 million to DPI Ares Mortgage Lending LLC in 2024
- $64 million and $96 million to MassMutual Mortgage Lending LLC in 2024 and 2023, respectively
- $27 million to MMV Europe APAC LP in 2024
- $98 million to MM Ascend in 2024
- $15 million to MMV SEA III in 2024
- $14 million to MassMutual International LLC in 2023
- $50 million to MassMutual Investment Holding LLC in 2023
- $18 million to MML CM LLC in 2023

Non-Cash Capital Contributions from MassMutual

- Investments valued at $1.2 billion to MM Vine Street LLC
- Investments valued at $404 million to Stillings Street LLC

Return of Capital to MassMutual

- MMIH paid $50 million in 2024
- MM/Barings Multifamily paid $20 million in 2024
- Glidepath Holdings paid $100 million in 2024
- MM Mortgage Lending paid $10 million in 2024
- Berkshire Way paid $141 million in 2023
- EM Opportunities LLC paid $185 million in 2023

Dividends paid to MassMutual

- MMLIA paid $33 million in 2024
- MM/Barings Multifamily paid $22 million in 2024
- MM Mortgage Lending paid $39 million in 2024
- Insurance Road LLC paid $199 million and $181 million in 2024 and 2023, respectively
- Berkshire Way paid $139 million in 2023
- Glidepath Holdings Inc paid $200 million in 2023
- DPI Acres Capital LLC paid $155 million in 2023

The Company has reinsurance agreements with its subsidiary, C.M. Life, and its indirect subsidiary, MML Bay State, including stop-loss, Modco and yearly renewable term agreements on life insurance and annuity products. The Company also has coinsurance agreements with C.M. Life where the Company assumes substantially all of the premium on certain universal life policies.

As of December 31, 2024, the net reinsurance amounts due to C.M. Life and MML Bay State were $19 million and as of December 31, 2023, the net reinsurance amounts due to C.M. Life and MML Bay State were $29 million. These outstanding balances are due and payable with terms ranging from monthly to annually, depending on the agreement in effect.

The following table summarizes the reinsurance transactions for these reinsurance agreements:

	Years Ended Years Ended December 31,		
	2024	2023	2022
	(In Millions)		
Premium assumed	$ 44	$ 43	$ 44
Modco adjustments, included in fees and other income	28	24	12
Expense allowance on reinsurance assumed, included in commissions	(12)	(13)	(13)
Policyholders' benefits	(110)	(108)	(88)
Experience refunds (paid) received	(2)	1	(1)
Accrual for stop-loss agreement	—	—	(18)

The Company currently has one longevity swap agreement with Rothesay Life Plc on certain inforce annuity products. Under this agreement, the Company is the reinsurer and Rothesay Life Plc is the cedent.

The following summarizes the related party transactions between the Company and Rothesay Life Plc:

	December 31,		
	2024	2023	2022
	(In Millions)		
Premium assumed	$ (351)	$ (248)	$ (203)
Policyholders' benefits	334	235	192

18. *Subsidiaries and affiliated companies*

A summary of ownership and relationship of the Company and its subsidiaries and affiliated companies as of December 31, 2024 is illustrated below. Subsidiaries are wholly owned, except as noted.

Subsidiaries and affiliates of MassMutual
- C.M. Life Insurance Company
- CML Global Capabilities LLC
- MM Global Capabilities I LLC
- MM Global Capabilities II LLC
- MM Global Capabilities III LLC
- MM/Barings Multifamily TEBS 2020 LLC
- Berkshire Way LLC
- MML Special Situations Investor LLC
- Timberland Forest Holding LLC
- Timberland Forest Holding LLC
- Timberland Forest Holding LLC
- MSP-SC, LLC
- Insurance Road LLC
- ITPS Holding LLC
- EM Opportunities LLC
- MassMutual MCAM Insurance Company, Inc.
- MassMutual Ventures US IV GP, LLC
- MassMutual Ventures US IV GP, LLC
- MassMutual Ventures Europe/APAC I GP, LLC

Counterpointe Sustainable Advisors LLC
Jefferies Finance LLC (50% owned by MMLIC)
Glidepath Holdings Inc.
MassMutual Mortgage Lending LLC
MM Copper Hill Road LLC
MMV CTF I GP LLC
MM Direct Private Investments Holding LLC
DPI-ACRES Capital LLC
DPI-ARES Mortgage Lending LLC
MM Investment Holding
MML CM LLC
MML Distributors LLC
MML Distributors LLC
MML Investment Advisers, LLC
MML Strategic Distributors, LLC
MassMutual Private Wealth & Trust, FSB
MML Private Placement Investment Company I, LLC
MML Private Equity Fund Investor LLC
MML Private Equity Fund Investor LLC
MM Private Equity Intercontinental LLC
Pioneers Gate LLC
MassMutual Holding LLC
Amherst Long Term Holdings, LLC
Enroll Confidently, Inc.
MassMutual International LLC
MassMutual External Benefits Group LLC
MM Vine Street LLC
Stillings Street LLC
5301 Wisconsin Avenue Associates, LLC
5301 Wisconsin Avenue GP, LLC

<u>Subsidiaries of C.M. Life Insurance Company</u>
MML Bay State Life Insurance Company
CML Special Situations Investor LLC
CM Life Mortgage Lending LLC
CML Mezzanine Investor III, LLC

<u>Subsidiaries of MML Bay State Life Insurance Company</u>
(No subsidiaries)

<u>MM Global Capabilities I LLC</u>
MassMutual Global Business Services India LLP
MM Global Capabilities (Netherlands) B.V.

<u>Timberland Forest Holding LLC</u>
Lyme Adirondack Forest Company, LLC

Subsidiaries of Insurance Road LLC

MassMutual Trad Private Equity LLC
MassMutual Intellectual Property LLC
Trad Investments I LLC

Subsidiaries of ITPS Holding LLC

HITPS LLC

Subsidiaries of MassMutual Ventures US IV GP, LLC

MassMutual Ventures US IV, L.P.

Subsidiaries of MassMutual Ventures Europe/APAC I GP, LLC

MassMutual Ventures Europe/APAC I GP, L.P.

Subsidiaries of Counterpointe Sustainable Advisors LLC

CSA Intermediate Holdco LLC
CSA Incentive Holdco LLC

Subsidiaries of Jefferies Finance LLC

JFIN GP Adviser LLC
Jefferies MM Lending LLC
Green SPE LLC
Jefferies Credit Partners LLC
Jefferies Private Credit BDC Inc.
JCP Funding 2024 LLC
Jefferies Senior Lending LLC
JFIN Revolver Holdings LLC
JFIN Revolver Holdings II LLC
JFIN Co-Issuer Corporation
JFIN Europe GP, S.a.r.l.
Jefferies Finance Business Credit LLC
JFIN Funding 2021 LLC
JSPCS MM LLC
JFIN LC Fund LLC
JFIN Revolver CLO 2017 Ltd.
JFIN Revolver CLO 2017-III Ltd.
JFIN Revolver CLO 2018 Ltd.
JFIN Revolver CLO 2019 Ltd.
JFIN Revolver CLO 2019-II Ltd.
JFIN Revolver CLO 2020 Ltd.
JFIN Revolver CLO 2021-II Ltd.
JFIN Revolver CLO 2021-V Ltd.
JFIN Revolver CLO 2022-II Ltd.
JFIN Revolver CLO 2022-III Ltd.
JFIN Revolver CLO 2022-IV Ltd.
JFIN Revolver CLO 2024-I Ltd.

JFIN Revolver CLO 2022-IV LLC
JFIN Revolver Fund, L.P.
JFIN Revolver Funding 2021 Ltd.
JFIN Revolver Funding 2021 III Ltd.
JFIN Revolver Funding 2021 IV Ltd.
JFIN Revolver Funding 2022-I Ltd.
JFIN Revolver SPE1 2022 LLC
JFIN Revolver SPE3 2022 LLC
JFIN Revolver SPE4 2022 LLC
JFIN Revolver SPE4 2022 Ltd.
JCP Private Loan Management GP LLC
JF CEI Holdings 1 LLC
Apex Credit Holdings LLC
Tomorrow Parent, LLC
Custom Ecology Holdco, LLC

Subsidiaries of Glidepath Holdings Inc.
MassMutual Ascend Life Insurance Company

Subsidiaries of MMV CTF I GP LLC
MassMutual Ventures Climate Technology Fund I LP

Subsidiaries of MM Direct Private Investments Holding LLC
MM Direct Private Investments UK Limited

Subsidiaries of MM Investment Holding
MMIH Bond Holdings LLC
MassMutual Asset Finance LLC
MassMutual Asset Finance LLC
MML Management Corporation

Subsidiaries of MML CM LLC
Blueprint Income LLC
Flourish Holding Company LLC

Subsidiaries of MassMutual Holding LLC
Fern Street LLC
Low Carbon Energy Holding
Sleeper Street LLC
Haven Life Insurance Agency, LLC
GASL Holdings LLC
Barings Asset-Based Income Fund (US) LP
Barings Perpetual European Direct Lending Fund
Barings Emerging Generation Fund II
Babson Capital Global Special Situation Credit Fund 2

Barings Global Real Assets Fund LP
Barings Global Special Situations Credit Fund 3
MassMutual Assignment Company
MassMutual Capital Partners LLC
Marco Hotel LLC
HB Naples Golf Owner LLC
RB Apartments LLC
Intermodal Holding II LLC
MassMutual Ventures Holding LLC
MM Catalyst Fund LLC
MM Catalyst Fund II LLC
MM Rothesay Holdco US LLC
MML Investors Services, LLC
LifeScore Labs, LLC
MM Asset Management Holding LLC

Subsidiaries of MassMutual International LLC
MassMutual Solutions LLC
Yunfeng Financial Group Limited (24.9% owned by MassMutual International LLC)

Information regarding filings of Subsidiaries and Controlled Affiliates

The following presents certain information regarding the Company's valuation filings for controlled affiliates of the Company:

		As of December 31, 2024						
	CUSIP	Gross Value	Non-admitted	Admitted	Latest Filing	2023 Approved Valuation	Filing Code	Valuation Method Disallowed?
	($ in Millions)							
MassMutual Holding LLC	57543#-11-8	$17,248	$ —	$17,248	9/19/2024	$ 17,592	Sub-2	No
The MassMutual Trust Co, FSB	57631@-10-5	27	—	27	6/26/2024	25	Sub-2	No
MM Investment Holding	G5695@10-8	758	—	758	6/26/2024	687	Sub-2	No
MM Investment Holding	G5695@11-6	1,239	—	1,239	6/26/2024	1,162	Sub-2	No
Glidepath Holdings Inc	37930@-10-5	4,716	—	4,716	11/11/2022	3,643	Sub-2	No
Aggregate Total		$23,988	$ —	$23,988		$ 23,109		

19. Subsequent events

Management of the Company has evaluated subsequent events through March 03, 2025, 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 January 14, 2025, MassMutual issued a $600 million funding agreement with a 4.95% fixed rate and a 5-year maturity.

On February 13, 2025, Barings LLC entered into a definitive agreement to acquire Artemis Real Estate Partners, a US-based real estate debt and equity investment manager with gross assets under management of approximately $11 billion. The total purchase price includes an upfront payment of approximately $392 million and a final payment to be made in 2030 of approximately $208 million. The transaction is subject to customary closing conditions, including regulatory approvals and client consents, and is expected to close on or before March 31, 2025. The acquisition is expected to bolster Barings LLC's position as a key player in the real estate asset management sector. Management is currently evaluating the impact of this acquisition on its statutory financial statements.

20. *Impairment listing for loan-backed and structured securities*

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

Period Ended	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
December 31, 2024	$ 22,493,605	$ —	$ 22,493,605	$ 15,603,907	$ (6,889,698)	$ 15,603,907	$ 14,525,080
September 30, 2024	9,854,964	—	9,854,964	8,633,308	(1,221,656)	8,633,308	8,589,373
June 30, 2024	54,957,279	—	54,957,279	49,033,522	(5,923,757)	49,033,522	36,231,196
March 31, 2024	36,924,401	—	36,924,401	33,979,195	(2,945,206)	33,979,195	33,244,880
December 31, 2023	53,672,524	—	53,672,524	51,118,891	(2,553,633)	51,118,891	42,903,097
September 30, 2023	24,928,010	—	24,928,010	24,065,666	(862,344)	24,065,666	21,743,474
June 30, 2023	16,432,523	—	16,432,523	15,955,963	(476,560)	15,955,963	15,431,923
March 31, 2023	56,797,193	—	56,797,193	45,999,577	(10,797,616)	45,999,577	39,477,567
December 31, 2022	47,152,655	—	47,152,655	42,630,344	(4,522,311)	42,630,344	35,962,545
September 30, 2022	23,315,048	—	23,315,048	22,016,070	(1,298,978)	22,016,070	19,284,696
June 30, 2022	17,306,639	—	17,306,639	15,826,391	(1,480,248)	15,826,391	13,534,918
March 31, 2022	30,135,997	—	30,135,997	23,857,778	(6,278,219)	23,857,778	23,674,371
December 31, 2021	6,658,614	—	6,658,614	6,490,508	(168,106)	6,490,508	6,369,198
September 30, 2021	4,061,382	—	4,061,382	3,955,723	(105,659)	3,955,723	3,595,213
June 30, 2021	11,352,643	—	11,352,643	10,386,581	(966,062)	10,386,581	11,323,900
March 31, 2021	11,247,256	—	11,247,256	5,074,493	(6,172,763)	5,074,493	5,237,174
December 31, 2020	16,071,907	—	16,071,907	14,674,300	(1,397,607)	14,674,300	15,473,517
September 30, 2020	21,375,383	—	21,375,383	19,160,250	(2,215,133)	19,160,250	18,862,027
June 30, 2020	10,180,123	—	10,180,123	8,992,610	(1,187,513)	8,992,610	9,249,851
March 31, 2020	24,799,788	—	24,799,788	20,197,344	(4,602,444)	20,197,344	24,683,947
December 31, 2019	3,992,400	—	3,992,400	3,539,281	(453,119)	3,539,281	3,439,138
September 30, 2019	16,909,029	—	16,909,029	15,191,932	(1,717,097)	15,191,932	14,639,756
June 30, 2019	6,980,030	—	6,980,030	6,187,029	(793,001)	6,187,029	7,133,620
March 31, 2019	7,791,000	—	7,791,000	7,634,637	(156,363)	7,634,637	7,683,021
December 31, 2018	4,550,173	—	4,550,173	3,815,559	(734,614)	3,815,559	4,014,514
September 30, 2018	4,320,826	—	4,320,826	3,663,181	(657,645)	3,663,181	3,687,297
June 30, 2018	634,235	—	634,235	279,221	(355,014)	279,221	386,752
March 31, 2018	645,690	—	645,690	488,181	(157,509)	488,181	448,494
December 31, 2017	3,949,513	—	3,949,513	1,958,759	(1,990,754)	1,958,759	2,023,952
September 30, 2017	4,436,542	—	4,436,542	876,942	(3,559,600)	876,942	4,647,683
June 30, 2017	40,538,551	—	40,538,551	39,808,956	(729,595)	39,808,956	60,990,732
March 31, 2017	41,788,380	—	41,788,380	41,391,889	(396,491)	41,391,889	56,156,936
December 31, 2016	42,175,938	—	42,175,938	42,045,721	(130,217)	42,045,721	54,619,477
September 30, 2016	44,266,478	—	44,266,478	41,890,535	(2,375,943)	41,890,535	61,300,066
June 30, 2016	49,097,217	—	49,097,217	48,202,703	(894,514)	48,202,703	63,207,410
March 31, 2016	57,985,071	—	57,985,071	55,783,979	(2,201,092)	55,783,979	70,578,397
December 31, 2015	4,881,394	—	4,881,394	4,783,194	(98,200)	4,783,194	4,728,736
September 30, 2015	50,531,382	—	50,531,382	45,665,859	(4,865,523)	45,665,859	58,523,652
June 30, 2015	66,924,927	—	66,924,927	65,240,585	(1,684,342)	65,240,585	72,953,475
March 31, 2015	17,856,447	—	17,856,447	17,681,510	(174,937)	17,681,510	17,553,999
December 31, 2014	69,225,743	—	69,225,743	68,301,291	(924,452)	68,301,291	79,410,553
September 30, 2014	645,721	—	645,721	604,437	(41,284)	604,437	627,381
June 30, 2014	57,012,606	—	57,012,606	55,422,168	(1,590,438)	55,422,168	75,253,388
March 31, 2014	91,702,041	—	91,702,041	80,744,074	(10,957,967)	80,744,074	97,672,071

December 31, 2013	113,707,951	—	113,707,951	108,815,640	(4,892,311)	108,815,640	111,783,052
September 30, 2013	81,945,730	—	81,945,730	80,589,482	(1,356,248)	80,589,482	77,049,314
June 30, 2013	147,215,936	—	147,215,936	142,140,572	(5,075,364)	142,140,572	130,973,023
March 31, 2013	194,772,025	—	194,772,025	188,372,089	(6,399,936)	188,372,089	176,678,910
December 31, 2012	378,096,660	—	378,096,660	366,323,110	(11,773,550)	366,323,110	333,086,073
September 30, 2012	816,573,456	—	816,573,456	788,350,823	(28,222,633)	788,350,823	697,683,289
June 30, 2012	912,025,937	—	912,025,937	890,494,221	(21,531,716)	890,494,221	708,872,106
March 31, 2012	1,095,018,529	—	1,095,018,529	1,058,132,041	(36,886,488)	1,058,132,041	841,095,013
December 31, 2011	1,090,904,993	—	1,090,904,993	1,056,761,288	(34,143,705)	1,056,761,288	754,310,838
September 30, 2011	762,320,632	—	762,320,632	738,510,048	(23,810,584)	738,510,048	546,494,232
June 30, 2011	1,130,732,656	—	1,130,732,656	1,078,535,670	(52,196,986)	1,078,535,670	839,143,290
March 31, 2011	1,097,705,351	—	1,097,705,351	1,068,852,204	(28,853,147)	1,068,852,204	816,688,348
December 31, 2010	968,742,508	—	968,742,508	950,111,417	(18,631,091)	950,111,417	708,895,637
September 30, 2010	915,728,030	—	915,728,030	889,896,058	(25,831,972)	889,896,058	673,462,493
June 30, 2010	1,362,887,892	—	1,362,887,892	1,335,628,212	(27,259,680)	1,335,628,212	975,241,506
March 31, 2010	1,471,905,696	—	1,471,905,696	1,391,337,543	(80,568,153)	1,391,337,543	1,015,645,802
December 31, 2009	1,349,124,214	—	1,349,124,214	1,290,817,168	(58,307,046)	1,290,817,168	852,088,739
September 30, 2009	2,953,442,689	(106,853,708)	2,846,588,981	2,700,948,264	(145,640,717)	2,700,948,264	1,692,409,640
Totals		$ (106,853,708)			$ (711,086,551)		

The following is the impairment listing for loan-backed and structured securities for the three months ended December 31, 2024:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
62878HAA9	$ 16,430,622	$ —	$ 16,430,622	$ 10,631,579	$ (5,799,043)	$ 10,631,579	$ 10,631,579
61757MAB4	2,209,786	—	2,209,786	1,691,934	(517,852)	1,691,934	1,464,726
07384YPP5	204,939	—	204,939	12,170	(192,769)	12,170	12,962
124860CB1	8,675	—	8,675	3,325	(5,350)	3,325	2,451
22541N5E5	112,716	—	112,716	92,571	(20,145)	92,571	82,219
22541NUB3	72,527	—	72,527	26,613	(45,914)	26,613	52,715
22943HAD8	2,537,360	—	2,537,360	2,311,617	(225,743)	2,311,617	1,570,185
86360UAF3	878,760	—	878,760	803,253	(75,507)	803,253	678,097
92990GAE3	38,220	—	38,220	30,845	(7,375)	30,845	30,146
Totals	$ 22,493,605	$ —	$ 22,493,605	$ 15,603,907	$ (6,889,698)	$ 15,603,907	$ 14,525,080

The following is the impairment listing for loan-backed and structured securities for the three months ended September 30, 2024:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
12624SAE9	$ 283,581	$ —	$ 283,581	$ 107,645	$ (175,936)	$ 107,645	$ 124,189
040104RV5	1,316,794	—	1,316,794	1,183,932	(132,862)	1,183,932	1,356,076
040104TF8	38,801	—	38,801	34,441	(4,360)	34,441	32,572
040104TG6	427,234	—	427,234	339,199	(88,035)	339,199	421,680
04012XAC9	122,612	—	122,612	118,150	(4,462)	118,150	113,225
05535DCF9	1,602,815	—	1,602,815	1,326,621	(276,194)	1,326,621	1,789,110
17311YAC7	1,083,765	—	1,083,765	1,024,522	(59,243)	1,024,522	1,075,634
30247DAD3	485,685	—	485,685	469,281	(16,404)	469,281	463,552
61750FAE0	350,661	—	350,661	324,286	(26,375)	324,286	337,048
86359DXD4	137,432	—	137,432	130,525	(6,907)	130,525	143,263
86363HAB8	31,160	—	31,160	30,449	(711)	30,449	26,908
22540VG71	30,645	—	30,645	29,526	(1,119)	29,526	31,168
22541NUB3	113,852	—	113,852	80,381	(33,471)	80,381	68,940
22943HAD8	2,950,342	—	2,950,342	2,566,001	(384,341)	2,566,001	1,826,541
32053LAA0	16,437	—	16,437	15,758	(679)	15,758	15,626
45660LW96	648,429	—	648,429	648,386	(43)	648,386	562,907
761118RJ9	65,906	—	65,906	59,640	(6,266)	59,640	57,523
85554NAG5	47,438	—	47,438	44,025	(3,413)	44,025	41,374
466247UG6	101,373	—	101,373	100,540	(833)	100,540	102,039
Totals	$ 9,854,962	$ —	$ 9,854,962	$ 8,633,308	$ (1,221,654)	$ 8,633,308	$ 8,589,375

The following is the impairment listing for loan-backed and structured securities for the three months ended June 30, 2024:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
00256DAB8	$ 2,293,480	$ —	$ 2,293,480	$ 1,123,558	$ (1,169,922)	$ 1,123,558	$ 1,133,931
62878HAA9	22,229,665	—	22,229,665	19,330,143	(2,899,522)	19,330,143	10,631,579
46639YAX5	4,840,606	—	4,840,606	4,356,606	(484,000)	4,356,606	2,182,538
040104RV5	1,374,485	—	1,374,485	1,317,092	(57,393)	1,317,092	1,289,098
040104TF8	40,063	—	40,063	38,577	(1,486)	38,577	31,948
04012XAC9	125,717	—	125,717	121,053	(4,664)	121,053	109,385
12479DAC2	1,568,478	—	1,568,478	1,507,516	(60,962)	1,507,516	1,260,108
1248MGAJ3	39,339	—	39,339	36,493	(2,846)	36,493	31,938
17311YAC7	1,130,510	—	1,130,510	1,068,361	(62,149)	1,068,361	1,058,184
24763LFY1	79,137	—	79,137	56,898	(22,239)	56,898	80,148
30247DAD3	503,737	—	503,737	488,694	(15,043)	488,694	456,193
40431KAE0	1,951,281	—	1,951,281	1,905,908	(45,373)	1,905,908	1,943,159
46629NAC7	31,407	—	31,407	30,431	(976)	30,431	25,499
46630KAA4	143,450	—	143,450	141,586	(1,864)	141,586	140,735
617463AA2	7,597	—	7,597	7,322	(275)	7,322	6,323
61750FAE0	369,653	—	369,653	350,312	(19,341)	350,312	329,593
61750MAB1	2,958	—	2,958	2,835	(123)	2,835	2,781
61755AAB2	2,454	—	2,454	2,359	(95)	2,359	2,428
86359DXD4	142,667	—	142,667	137,350	(5,317)	137,350	145,141
86363HAB8	32,111	—	32,111	31,169	(942)	31,169	26,424
92926SAB2	392	—	392	351	(41)	351	364
93934XAB9	115,953	—	115,953	101,026	(14,927)	101,026	112,047
05535DAN4	445,322	—	445,322	440,021	(5,301)	440,021	485,938
18974BAA7	118,366	—	118,366	118,173	(193)	118,173	118,788
22540VG71	32,306	—	32,306	32,221	(85)	32,221	32,311
22541NUB3	121,803	—	121,803	119,790	(2,013)	119,790	55,976
22943HAD8	3,037,380	—	3,037,380	2,969,818	(67,562)	2,969,818	1,824,526
251510FB4	991,980	—	991,980	977,715	(14,265)	977,715	949,619
251513AQ0	38,093	—	38,093	37,966	(127)	37,966	35,832
32053LAA0	16,926	—	16,926	16,894	(32)	16,894	15,685
45254TRX4	52,515	—	52,515	52,231	(284)	52,231	50,916
45660LW96	660,160	—	660,160	653,133	(7,027)	653,133	545,339
45660LYW3	681,953	—	681,953	671,659	(10,294)	671,659	610,731
75115DAH8	3,134	—	3,134	2,919	(215)	2,919	2,655
761118FM5	1,360,921	—	1,360,921	1,317,414	(43,507)	1,317,414	1,331,404
761118RJ9	68,124	—	68,124	66,151	(1,973)	66,151	57,214
86358HHX0	135,467	—	135,467	88,953	(46,514)	88,953	71,879
86359BLQ2	646,438	—	646,438	619,933	(26,505)	619,933	466,829
92925VAM2	129,124	—	129,124	81,086	(48,038)	81,086	122,377
45660N5H4	1,036,870	—	1,036,870	974,290	(62,580)	974,290	1,002,198
61915RBB1	1,435,288	—	1,435,288	1,426,877	(8,411)	1,426,877	1,296,802
92922FWU8	335,190	—	335,190	333,499	(1,691)	333,499	328,225
17309FAE8	60,256	—	60,256	53,623	(6,633)	53,623	69,177
32051DCJ9	24,293	—	24,293	24,274	(19)	24,274	23,660
362334CN2	7,052	—	7,052	7,052	—	7,052	6,748
362341VU0	1,258,267	—	1,258,267	1,249,922	(8,345)	1,249,922	1,118,645
36298XAB8	4,703,619	—	4,703,619	4,033,800	(669,819)	4,033,800	4,079,741
466247UG6	103,056	—	103,056	101,640	(1,416)	101,640	101,176
59024WAB3	106,858		106,858	90,598	(16,260)	90,598	112,505
86359DME4	321,381	—	321,381	316,230	(5,151)	316,230	314,754
Totals	$ 54,957,282	$ —	$ 54,957,282	$ 49,033,522	$ (5,923,760)	$ 49,033,522	$ 36,231,194

The following is the impairment listing for loan-backed and structured securities for the three months ended March 31, 2024:

CUSIP	Amortized Cost before Cumulative Adjustment	Cumulative Adjustment	Amortized Cost before OTTI	Projected Cash Flow	Recognized OTTI	Amortized Cost after OTTI	Fair Value
12624SAE9	$ 2,480,393	$ —	$ 2,480,393	$ 56,686	$ (2,423,707)	$ 56,686	$ 241,500
040104RV5	1,372,644	—	1,372,644	1,353,068	(19,576)	1,353,068	1,287,522

040104TF8	40,362	—	40,362	39,469	(893)	39,469	32,106
040104TG6	408,732	—	408,732	408,732	—	408,732	415,551
04012XAC9	124,521	—	124,521	124,515	(6)	124,515	106,576
12479DAC2	1,571,594	—	1,571,594	1,571,482	(112)	1,571,482	1,282,896
1248MGAJ3	39,783	—	39,783	39,439	(344)	39,439	33,515
17311YAC7	1,170,871	—	1,170,871	1,116,200	(54,671)	1,116,200	1,101,339
30247DAD3	510,622	—	510,622	505,931	(4,691)	505,931	473,455
35729RAE6	3,439,174	—	3,439,174	3,413,826	(25,348)	3,413,826	3,125,685
46629NAC7	31,443	—	31,443	31,252	(191)	31,252	25,667
46630KAA4	144,821	—	144,821	144,182	(639)	144,182	141,222
617463AA2	8,108	—	8,108	7,554	(554)	7,554	6,470
61749BAB9	58,393	—	58,393	58,386	(7)	58,386	62,224
61750FAE0	377,655	—	377,655	367,352	(10,303)	367,352	338,847
61750MAB1	3,228	—	3,228	2,932	(296)	2,932	2,831
617526AE8	161,089	—	161,089	160,981	(108)	160,981	184,441
61757MAB4	2,216,577	—	2,216,577	2,159,573	(57,004)	2,159,573	1,598,436
86359DXD4	149,656	—	149,656	142,761	(6,895)	142,761	149,311
93934XAB9	117,534	—	117,534	116,301	(1,233)	116,301	115,601
05535DAN4	508,829	—	508,829	467,091	(41,738)	467,091	482,546
07387AFX8	46,064	—	46,064	46,059	(5)	46,059	48,686
12667GKG7	41,516	—	41,516	40,855	(661)	40,855	41,704
12669E6K7	203,472	—	203,472	170,046	(33,426)	170,046	211,716
17025RAA3	216,726	—	216,726	186,092	(30,634)	186,092	236,121
18974BAA7	125,342	—	125,342	120,261	(5,081)	120,261	120,791
18974BAN9	63,192	—	63,192	59,615	(3,577)	59,615	63,277
22540VG71	33,573	—	33,573	33,122	(451)	33,122	33,174
22943HAD8	3,148,442	—	3,148,442	3,060,640	(87,802)	3,060,640	1,848,458
23321P6A1	1,123,431	—	1,123,431	1,114,640	(8,791)	1,114,640	1,207,067
251513AQ0	38,189	—	38,189	38,155	(34)	38,155	36,248
32053LAA0	17,947	—	17,947	17,219	(728)	17,219	15,858
45254TRX4	54,912	—	54,912	53,392	(1,520)	53,392	52,178
466247XE8	516,447	—	516,447	508,389	(8,058)	508,389	461,123
589929X29	311,818	—	311,818	309,770	(2,048)	309,770	315,074
61915RBZ8	160,029	—	160,029	160,028	(1)	160,028	139,745
65535VRK6	438,977	—	438,977	425,951	(13,026)	425,951	439,052
761118RJ9	72,483	—	72,483	70,209	(2,274)	70,209	59,726
86358HHX0	148,713	—	148,713	94,224	(54,489)	94,224	73,108
92978EAA2	73,009	—	73,009	73,005	(4)	73,005	69,366
23332UCM4	18,388	—	18,388	18,314	(74)	18,314	17,838
86360UAF3	894,861	—	894,861	894,830	(31)	894,830	697,974
92922FWU8	342,798	—	342,798	338,495	(4,303)	338,495	331,458
05949CCB0	27,131	—	27,131	27,127	(4)	27,127	28,180
12669GTE1	4,186	—	4,186	3,956	(230)	3,956	3,825
32051DCJ9	26,983	—	26,983	26,968	(15)	26,968	26,248
362341VU0	1,271,263	—	1,271,263	1,269,383	(1,880)	1,269,383	1,176,122
576433NH5	286,355	—	286,355	253,071	(33,284)	253,071	199,571
57645LAA2	9,040,600		9,040,600	9,037,867	(2,733)	9,037,867	10,546,925
86359DMC8	3,241,522	—	3,241,522	3,239,802	(1,720)	3,239,802	3,536,527
Totals	$ 36,924,398	$ —	$ 36,924,398	$ 33,979,198	$ (2,945,200)	$ 33,979,198	$ 33,244,881