

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY

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INDEX FRONTIER 5 PLUS ANNUITY With Death Benefit Return of Premium Guarantee PROSPECTUS DATED MAY 1, 2025

The Index Frontier 5 PlusSM annuity is an Individual Index-linked Modified Single Premium Deferred Annuity contract issued by MassMutual Ascend Life Insurance Company ("MassMutual Ascend Life" or the "Company"). It provides that we will pay the Annuity Payout Benefit to you in exchange for your Purchase Payments. It also provides a Death Benefit that will never be less than the Death Benefit Return of Premium Guarantee.

The Contract is a modified single premium deferred annuity. This means we will accept Purchase Payments only during the Purchase Payment period, which ends two months after your Contract Effective Date.

A glossary of defined terms used herein can be found in the Special Terms section starting on page 4 of this prospectus.

The Contract is a complex investment and involves risk, including potential loss of principal and prior earnings. The Contract offers you the opportunity to allocate Purchase Payments to Crediting Strategies for one-year or five-year Terms. The Crediting Strategies include Indexed Strategies and a Declared Rate Strategy. This Contract does not directly participate in any equity, debt, or other investments. **See "Appendix A: Investment Options Available Under the Contract" for additional information about each Crediting Strategy.**

Indexed Strategies. Indexed Strategies provide returns at the end of a 1-year or 5-year period (Term) based, in part, on the rise or fall of an Index, which may be a market index, such as the S&P 500 Index, or the share price of an exchange-traded fund, such as an iShares ETF, by comparing the change in the Index value from the first day of the Term to the last day of the Term.

Each Indexed Strategy provides limited protection from negative Index returns through a Negative Return Factor. At the end of a Term:

- for a 10% Buffer Strategy, you could lose up to 90% of your original principal and prior earnings;
- for a 20% Buffer Strategy, you could lose up to 80% of your original principal and prior earnings; and
- for a -10% Floor Strategy, you could lose up to 10% of your original principal and prior earnings.

Positive Return Factors may limit the amount you can earn on an Indexed Strategy. Positive return factors can change from one Term to the next, subject to the following minimum rates: The Cap for a Term will never be lower than 1%, the Upside Participation Rate for a Term will never be lower than 5%, and the Trigger Rate for a Term will never be lower than 1%.

We may stop offering any Indexed Strategy at the end of a Term; however, we will always offer the S&P 500 1-year -10% Floor with Cap Indexed Strategy.

Daily Value Percentage. If before the end of a Term you take a withdrawal, Surrender or annuitize the Contract, elect a Performance Lock, or a Death Benefit becomes payable, the value of an Indexed Strategy is determined using the Daily Value Percentage. The Floor or Buffer do not apply to the Daily Value Percentage, and the value of an Indexed Strategy based on the Daily Value Percentage may experience losses that exceed the Floor, or that do not receive the benefit of the Buffer.

In extreme circumstances, an Indexed Strategy could have no value before the end of a Term due to the Daily Value Percentage, meaning that you would lose 100% of your principal and prior earnings.

Declared Rate Strategy. The Declared Rate Strategy earns interest during a Term at a fixed rate we set before that Term begins. Each Term of a Declared Rate Strategy is one year long. The fixed interest rate varies from Term to Term but will never be less than the guaranteed minimum interest rate set out in the Declared Rate Strategy endorsement included in your Contract.

The Contract is not a short-term investment. The Contract and its Crediting Strategies are not appropriate for investors who plan to take withdrawals (including automated withdrawals and required minimum distributions) during the first five Contract Years or who plan to take withdrawals from Crediting Strategies before the end of a Term. Withdrawals could result in Early Withdrawal Charges and negative Daily Value Percentage adjustments. Withdrawals could result in taxes, and if you are under age 59½, a penalty tax.

If a Contract is purchased as a Tax-Qualified Contract, such as an Individual Retirement Annuity ("IRA"), it does not provide tax deferral benefits beyond those already provided under the Internal Revenue Code. Amounts withdrawn from the Contract may be taxable, and, if you are under age 59½, amounts you withdraw from the Contract may also be subject to a 10% federal tax, in addition to any other state and federal income tax payable. Investors should consult with their tax advisor for more information.

If you are a new investor in the Contract, you may cancel your Contract within 20 days after you receive it. If you purchase a Contract to replace an existing annuity contract or insurance policy, you have 30 days to cancel the Contract. The right to cancel period may be longer in some states. Upon cancellation, in most states you will receive a full refund of the amount you paid for the Contract. In some

states, you will receive your total Account Value as calculated using the Daily Value Percentage, plus fees and charges, which may be more or less than the amount you paid for the Contract. The right to cancel is described more fully in the Right to Cancel section of this prospectus. You should review this prospectus, or consult with your investment professional, for additional information about the specific cancellation terms that apply.

All guarantees under the Contract are the obligations of MassMutual Ascend Life and are subject to the credit worthiness and claims-paying ability of MassMutual Ascend Life.

The Contract is not insured by the FDIC (Federal Deposit Insurance Corporation) or the NCUSIF (National Credit Union Share Insurance Fund). Although the Contract may be sold through relationships with banks or other financial institutions, the Contract is not a deposit or obligation of, or guaranteed by, such institutions or any federal regulatory agency.

NEITHER THE SECURITIES AND EXCHANGE COMMISSION NOR ANY STATE SECURITIES COMMISSION HAS APPROVED OR DISAPPROVED THESE SECURITIES OR PASSED UPON THE ADEQUACY OF THIS PROSPECTUS. ANY REPRESENTATION TO THE CONTRARY IS A CRIMINAL OFFENSE.

Additional Information about certain investment products, including index-linked annuities, has been prepared by the Securities and Exchange Commission and is available at [Investor.gov](https://www.investor.gov).

This prospectus is not an offering in any state, country, or jurisdiction in which we are not authorized to sell the Contract.

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SPECIAL TERMS

In this prospectus, the following capitalized terms have the meanings set out below.

ACCOUNT VALUE. For each day, the Account Value is the sum of the current values of each Crediting Strategy, plus the current value of the Purchase Payment Account, if any.

ANNUITANT. The natural person or persons on whose life the Annuity Payout Benefit is based.

ANNUITY PAYOUT BENEFIT. A series of periodic payments made under a Payout Option. The terms and conditions are described in the Annuity Payout Benefit section of this prospectus.

ANNUITY PAYOUT INITIATION DATE. The first day of the first payment interval for which payment of an Annuity Payout Benefit is to be made. This is the date we apply your Account Value to the Annuity Payout Benefit and calculate the payment amount.

BENEFICIARY. A person entitled to receive all or part of a Death Benefit that is to be paid under the Contract on account of a death before the Annuity Payout Initiation Date.

BUFFER. For an Indexed Strategy with a Buffer (a "Buffer Strategy"), the Buffer is the decrease in the value of an Index for a Term that is disregarded when determining the loss for the Term. The Buffer is also used to determine the strike price of the out-of-the-money put option that is part of the Daily Value Percentage calculation before the end of the Term. For each Term of the Buffer Strategy that we currently offer with this Contract, the Buffer is either 10% or 20%. In the future, we may offer a new Buffer Strategy with more or less protection against loss than a 10% or 20% Buffer, but we will not offer a new Buffer Strategy with less protection against loss than a 5% Buffer.

CAP. For an Indexed Strategy with a Cap (a "Cap Strategy"), the Cap is the maximum positive Index change over the course of the Term (measured at the start and end of the Term) that is taken into account to determine the Strategy value at the end of the Term. The Cap is also used to determine the strike price of the out-of-the-money call option that is part of the Daily Value Percentage calculation for that Strategy before the end of the Term. We post on our website (www.massmutualascend.com/index-frontier-5-plus) the Cap for each Term of a Cap Strategy at least 10 days before the next Term starts. The Cap for a Term will never be less than 1%.

CONTRACT. The annuity contract (including applicable endorsements and riders) that is a legally binding agreement between you and MassMutual Ascend Life. In this prospectus, "Contracts" refers to all Index Frontier 5 Plus Annuity contracts.

CONTRACT ANNIVERSARY. The date in each year that is the anniversary of the Contract Effective Date. That date is set out in the Contract Specifications of your Contract.

CONTRACT EFFECTIVE DATE. The date as of which the initial Purchase Payment is applied to the Contract. That date is set out in the Contract Specifications of your Contract.

CONTRACT SPECIFICATIONS. The section of your Contract that contains details unique to your Contract.

CONTRACT YEAR. A 12-month period that starts on the Contract Effective Date or on a Contract Anniversary.

CREDITING STRATEGY (STRATEGY). A specified method by which declared interest is set or values are calculated. Each Indexed Strategy and Declared Rate Strategy is a Crediting Strategy. The Crediting Strategies that are currently available are set out in "Appendix A: Investment Options Available Under the Contract".

DAILY VALUE PERCENTAGE. The Daily Value Percentage is used to determine the value of an Indexed Strategy before the end of a Term. The calculation of Strategy value using the Daily Value Percentage is relevant only if amounts allocated to an Indexed Strategy are not held to the end of the Term because you take a withdrawal, Surrender or annuitize the Contract, elect a Performance Lock, or a Death Benefit becomes payable. A negative Daily Value Percentage adjustment could result in significant loss, even if the Index is performing positively. For each day of a Term of an Indexed Strategy before the final Market Day of the Term, the Daily Value Percentage is equal to: (1) the Net Option Price for that day; minus (2) the Residual Option Cost for that day; and minus (3) the Trading Cost for that day.

See the next section (Special Terms Related to Daily Value Percentage) for the definitions of Residual Option Cost, Net Option Price, and Trading Cost.

DEATH BENEFIT. An amount that becomes payable if you die before the Annuity Payout Initiation Date and before the date that the Contract is Surrendered. The terms and conditions are described in the Death Benefit section of this prospectus.

DECLARED RATE. A fixed interest rate set by us for a Term of the Declared Rate Strategy. The Declared Rate varies from Term to Term but will be at least equal to the minimum interest required for fixed annuity contracts on the Contract Effective Date under the Standard Nonforfeiture Law of the state in which your Contract is issued, and will never be less than the guaranteed minimum interest rate from 0.15% to 3.0% set out in the Declared Rate Strategy endorsement included in your Contract. At least 10 days before the next Term starts, we will post the Declared Rate for that next Term on our website (www.massmutualascend.com/index-frontier-5-plus).

EARLY WITHDRAWAL CHARGE. A charge deducted from the Account Value of your Contract if, during the first five Contract Years, you Surrender your Contract or you take a withdrawal (including systematic withdrawals and required minimum distributions) in excess of the Free Withdrawal

Allowance. The Early Withdrawal Charge does not apply to a withdrawal that qualifies for the Free Withdrawal Allowance or the amount, if any, that qualifies for another waiver. The Early Withdrawal Charge does not apply to an Annuity Payout Benefit or Death Benefit.

FLOOR. For an Indexed Strategy with a Floor (a "Floor Strategy"), the Floor is the maximum decrease in the value of an Index for a Term that is taken into account when determining the loss for the Term. The Floor is also used to determine the strike price of the out-of-the-money put option that is part of the Daily Value Percentage calculation before the end of the Term. For each Term of a Floor Strategy that we currently offer with this Contract, the Floor is -10%. In the future, we may offer a new Floor Strategy that offers more or less protection against loss than a -10% Floor but we will not offer a new Floor Strategy that offers less protection against loss than a -20% Floor.

FREE WITHDRAWAL ALLOWANCE. The total amount that may be taken as a withdrawal or Surrendered during a Contract Year without an Early Withdrawal Charge that might otherwise apply. This amount is described in the Free Withdrawal Allowance section of this prospectus.

INDEX. A stock market index or an exchange-traded fund (ETF) used to calculate the value of an Indexed Strategy. The Index at the start of a Term is its level or price at the Market Close on the first day of that Term. If the first day of that Term is not a Market Day, then the Index at the start of a Term is its level or price at the last Market Close before the first day of the Term. The Index at the end of a Term is its level or price at the final Market Close of that Term.

INDEXED STRATEGY. A Crediting Strategy that provides a return based, in part, on the net change in the level or price of an Index for a Term. The Indexed Strategies that are currently available are set out in "**Appendix A: Investment Options Available Under the Contract**".

INVESTMENT BASE. The base amount used to calculate the value of an Indexed Strategy. The Investment Base is the amount applied to an Indexed Strategy at the start of a current Term, adjusted proportionally for any withdrawal during the Term and any related Early Withdrawal Charge. An Investment Base is not used to calculate the value of a Declared Rate Strategy.

MARKET CLOSE. The close of the regular or core trading session on the market used to measure a given Index.

MARKET DAY. Each day that all markets that are used to measure the available Indexes are open for regular trading.

MASSMUTUAL ASCEND LIFE ("WE," "US," "OUR"). MassMutual Ascend Life Insurance Company.

NEGATIVE RETURN FACTOR. The Floor or Buffer used to determine values for an Indexed Strategy at the end of the Term.

OWNER ("YOU," "YOURS"). The person(s) who possesses the ownership rights under the Contract. If there is more than one Owner, each Owner will be a joint owner of the Contract and each reference to Owner means joint owners.

PAYOUT OPTION. The form in which an Annuity Payout Benefit or a Death Benefit may be paid. Standard options are described in the Payout Options section of this prospectus.

PERFORMANCE LOCK. An election available for certain specified Indexed Strategies to lock in the Daily Value Percentage for the remainder of a Term of the Indexed Strategy. A Performance Lock election for a Term is effective on the second Market Close following our receipt of your Request in Good Order. After the second Market Close, the Indexed Strategy value before the end of the Term and the Indexed Strategy value at the end of the Term is equal to the remaining Investment Base increased or decreased by the locked Daily Value Percentage. The locked Daily Value Percentage is the Daily Value Percentage as determined for that second Market Close. The Indexed Strategy value will still change if there is a change in the Investment Base. You can make a Performance Lock election once per Term and only for specific Indexed Strategies.

POSITIVE RETURN FACTOR. The Cap, Upside Participation Rate, or Trigger Rate used to determine values for an Indexed Strategy at the end of the Term.

PROOF OF DEATH. The documentation we require before making payment of a Death Benefit, or any other payment or transfer of ownership rights that depends on the death of a specified person. For these purposes, Proof of death is:

- a certified copy of a death certificate showing the cause and manner of death, or a certified copy of a decree that is made by a court of competent jurisdiction as to the finding of death, or other proof that is satisfactory to us; and
- proof of each claimant's interest in the Death Benefit or other Contract rights; and
- a Request in Good Order from each claimant as to how to pay the Death Benefit.

PURCHASE PAYMENT. An amount received by us for the Contract. This amount is determined after deducting any taxes withheld from the payment and after deducting any fee charged by the person remitting payment.

PURCHASE PAYMENT ACCOUNT. An account where a Purchase Payment is held until it is applied to a Crediting Strategy on a Strategy Application Date.

REQUEST IN GOOD ORDER. An election or a request that is:

- complete and satisfactory to us;
- sent to us on our form or in a manner satisfactory to us, which may, at our discretion, be by telephone or electronic means; and
- received at our administrative office.

An election or a request is complete and satisfactory when we have received: (1) all the information and legal documentation that we require to process the election or the request; and (2) instructions that are sufficiently clear that we do not need to exercise any discretion to process the election or the request. If you have any questions, you should contact us or your registered representative before submitting your election or your request.

STRATEGY APPLICATION DATE. The 6th and 20th days of each month.

SURRENDER. The termination of your Contract in exchange for its Surrender Value.

SURRENDER VALUE. For each day, the Surrender Value is the Account Value on that day minus the Early Withdrawal Charge that would apply on a Surrender of the Contract. The Account Value will reflect the applicable Strategy values as calculated on that day, which will reflect the Daily Value Percentage whenever Surrender Value is measured before the end of a Term.

TAX-QUALIFIED CONTRACT. An annuity contract that is intended to qualify for special tax treatment for retirement savings. If your Contract is a Tax-Qualified Contract, the cover page of your Contract includes information about its tax qualification. If your Contract is not a Tax-Qualified Contract, the cover page of your Contract will identify it as a "Nonqualified Annuity."

TERM. The period for which Contract values are allocated to a given Crediting Strategy, and over which interest or values are calculated. Terms are one year long or five years long. Each Term will start and end on a Strategy Application Date. A new Term will start on the date that the preceding Term ends.

TRIGGER RATE. For an Indexed Strategy with a Trigger Rate (a "Trigger Strategy"), the Trigger Rate is the specified rate that is credited to the Strategy value when the Index change (measured at the start and end of the Term) qualifies for the Trigger Rate. In the case of a Performance Trigger Strategy, the Trigger Rate will be credited when the Index change is zero or positive at the end of the Term. In the case of a Dual Performance Trigger Strategy, the Trigger Rate will be credited if the Index change is zero, positive, or negative up to the Buffer at the end of the Term. The Trigger Rate is also used to determine the binary call option that is part of the Daily Value Percentage calculation for that Strategy before the end of the Term. We post on our website (www.massmutualascend.com/index-frontier-5-plus) the Trigger Rates for each Term of a Trigger Strategy at least 10 days before the next Term starts. The Trigger Rate for a Term will never be less than 1%.

UPSIDE PARTICIPATION RATE. For an Indexed Strategy with an Upside Participation Rate (an "Upside Participation Rate Strategy"), the Upside Participation Rate is your share of any rise in the Index for a Term taken into account to determine the Strategy value at the end of the Term. The Upside Participation Rate is also used to determine the Net Option Price that is part of the Daily Value Percentage calculation before the end of the Term. We post on our website (www.massmutualascend.com/index-frontier-5-plus) the Upside Participation Rate for each Term of an Upside Participation Rate Strategy at least 10 days before the next Term starts. The Upside Participation Rate for a Term will never be less than 5%. For example, if the Index return is 10% and the Upside Participation Rate is 5%, then your Indexed Strategy value will only increase by 0.5% (10% times 5%).

Special Terms Related to Daily Value Percentage

The following special terms are used in the formula used to calculate the Daily Value Percentage used to determine the value of an Indexed Strategy before the final Market Day of a Term.

NET OPTION PRICE. The Net Option Price for a day is calculated as of the Market Close for that day. If the calculation day is not a Market Day, the Net Option Price for that day is calculated as of the most recent Market Close before that day.

- For Buffer Strategies with a Cap, the Net Option Price as of a Market Close is equal to: (1) the ATM Call Option Price calculated as of that Market Close; minus (2) the OTM Call Option Price calculated as of that Market Close; and minus (3) the OTM Put Option Price calculated as of that Market Close.
- For Buffer Strategies with an Upside Participation Rate, the Net Option Price as of a Market Close is equal to: (1) the ATM Call Option Price calculated as of that Market Close multiplied by the Upside Participation Rate; minus (2) the OTM Put Option Price calculated as of that Market Close.
- For Buffer Strategies with a Performance Trigger (other than a Dual Performance Trigger), the Net Option Price as of a Market Close is equal to: (1) the ATM Binary Call Option Price calculated as of the Market Close; minus (2) the OTM Put Option Price calculated as of the Market Close.
- For Buffer Strategies with a Dual Performance Trigger, the Net Option Price as of a Market Close is equal to: (1) the ITM Binary Call Option Price calculated as of the Market Close; minus (2) the OTM Put Option Price calculated as of the Market Close.
- For -10% Floor Strategies with a Cap, the Net Option Price as of a Market Close is equal to: (1) the ATM Call Option Price calculated as of that Market Close; minus (2) the OTM Call Option Price calculated as of that Market Close; minus (3) the ATM Put Option Price calculated as of that Market Close; and plus (4) the OTM Put Option Price calculated as of that Market Close.

The option prices in these formulas reflect the possible future change in the Index over the remainder of the Term. The formulas take into account the applicable Positive Return Factor for the Term, the Negative Return Factor, and the Index change required to qualify for the Trigger Rate.

Each option price is stated as a percentage of the Index calculated as of the most recent Market Close on or before the first day of the Term. The option price is determined using a mathematical model to calculate the price of a hypothetical option.

ATM BINARY CALL OPTION PRICE. The calculated price of a hypothetical at-the-money binary call option (or collection of options) that will pay the holder an amount equal to the Trigger Rate multiplied by the Investment Base if the change in the Index for the Term is zero or is positive.

ATM CALL OPTION PRICE. The calculated price of a hypothetical at-the-money call option. The hypothetical at-the-money call option is one that will pay the holder an amount equal to the percentage rise, if any, in the Index from the last Market Close on or before the start of a Term to the final Market Close of that Term.

ATM PUT OPTION PRICE. The calculated price of a hypothetical at-the-money put option. The hypothetical at-the-money put option is one that will pay the holder an amount equal to the percentage fall, if any, in the Index from the last Market Close on or before the start of a Term to the final Market Close of that Term.

ITM BINARY CALL OPTION PRICE. The calculated price of a hypothetical in-the-money binary call option (or collection of options) that will pay the holder an amount equal to the Trigger Rate multiplied by the Investment Base if the change in the Index for the Term is zero, is positive, or is negative up to the Buffer.

OTM CALL OPTION PRICE. The calculated price of a hypothetical out-of-the-money call option. The hypothetical out-of-the-money call option is one that will pay the holder an amount equal to the percentage rise, if any, in the Index from the last Market Close on or before the start of a Term to the final Market Close of that Term, but only if and to the extent that rise exceeds the Cap for that Term.

OTM PUT OPTION PRICE. The calculated price of a hypothetical out-of-the-money put option. The hypothetical out-of-the-money put option is one that will pay the holder an amount equal to the percentage decrease, if any, in the Index from the last Market Close on or before the start of the Term to the final Market Close of the Term, but only to the extent the percentage decrease exceeds the Buffer or Floor for the Term.

RESIDUAL OPTION COST. The Residual Option Cost (which may be called the Amortized Option Cost in some Contracts) is one part of the formula used to calculate the Daily Value Percentage, which is used to determine the value of an Indexed Strategy each day before the final Market Day of a Term. The Residual Option Cost for a day is calculated as of the last Market Close on or before that day. If the calculation day is not a Market Day, the Residual Option Cost for that day is calculated as of the last market Close before that day. The Residual Option Cost is a percentage equal to: (1) the initial Net Option Price for an Indexed Strategy for the Term; multiplied by (2) the number of days remaining until the final Market Close of that Term divided by 365 days if that Term is one year long or by 1,826 days if that Term is five years long. The initial Net Option Price is the Net Option Price calculated as of the last Market Close on or before the start of the Term.

TRADING COST. The Trading Cost is the estimated cost of selling the hypothetical options before the end of a Term to the extent not already reflected in the option prices. The Trading Cost for a day is a percentage set by us from time to time based on market conditions. The Trading Cost reflects the average market difference between option prices and market bid prices.

OVERVIEW OF THE CONTRACT

Purpose

The MassMutual Ascend Life Index Frontier 5 Plus annuity is an individual modified single premium deferred indexed annuity contract that may help you accumulate retirement savings. The Contract is intended for long-term investment purposes. The Contract is a legal agreement between you as the Owner and MassMutual Ascend Life as the issuing insurance company. In the Contract, you agree to make one or more Purchase Payments to us, and we agree to pay the Annuity Payout Benefit to you. If there is an applicable death before the Annuity Payout Initiation Date, we also agree to pay a Death Benefit that will never be less than the Death Benefit Return of Premium Guarantee. The Contract may be appropriate if you have a long-term investment horizon. It is not intended for people who may need to access invested funds within a short-term timeframe or frequently.

Like all deferred annuities, the Contract has two periods. During the **Accumulation Period** (the period prior to the Annuity Payout Initiation Date), the Contract may accumulate earnings on a tax-deferred basis. During the **Annuity Payout Period** that begins on the Annuity Payout Initiation Date, we will make payments under the applicable Payout Option.

The Contract may not be available in all states, and may vary in your state. See Appendix C for state variations. The Contract may not be available through all selling firms or all financial professionals.

Accumulation Period

During the Accumulation Period, the amounts you contribute can be allocated among any of the then available Crediting Strategies and may accumulate earnings on a tax-deferred basis. **Additional information about each Crediting Strategy is available in “Appendix A: Investment Options Available Under the Contract”.**

Indexed Strategies

The Company will credit gain or loss at the end of the Term to amounts allocated to an Indexed Strategy based, in part, on the performance of the Index. The Owner bears the risk of any gain or loss on amounts allocated to the Indexed Strategies and could lose a significant amount of money if the index declines in value.

The Company limits the negative Index return used in calculating loss for an Indexed Strategy at the end of its Term through the use of one of two Negative Return Factors: a Buffer or a Floor. The Negative Return Factors are generally designed to limit the reduction in the value of the Indexed Strategies at the end of a Term.

- A **Buffer** is the negative Index change to be disregarded when determining Strategy value at the end of the Term. An Indexed Strategy with a 10% Buffer means that your Strategy value will not be affected by the first 10% of any negative Index change, but your Strategy value will decrease by any negative return in excess of -10%. An Indexed Strategy with a 20% Buffer causes the Company to assume the first 20% of any negative Index change, but your Strategy value will decrease by any negative return in excess of -20%. For example, if the Index return over the Term is -18% the value of an Indexed Strategy with a 10% Buffer will decrease by 8% for the Term (the amount that exceeds the Buffer). If the Index return over the Term is -18%, the value of an Indexed Strategy with a 20% Buffer will not change for the Term (there is no amount that exceeds the Buffer).
- A **Floor** is the maximum percentage decrease in your Strategy value at the end of the Term if there is a negative Index change. An Indexed Strategy with a -10% Floor limits the loss from any negative Index change to 10% when determining the Strategy value at the end of the Term. For example, if the Index return over the Term is -18% and the Floor is -10%, the value of an Indexed Strategy with a -10% Floor will decrease by 10% for the Term (the maximum loss allowed under the Floor).

We may stop offering any Indexed Strategy at the end of a Term; however, we will always offer the S&P 500 1-Year -10% Floor with Cap Indexed Strategy.

The Company limits the positive Index return used in calculating gain for an Indexed Strategy at the end of its Term through the use of one of three Positive Return Factors: a Cap, an Upside Participation Rate, or a Trigger Rate. The Positive Return Factors are generally designed to limit the increase in the value of the Indexed Strategies at the end of a Term. **You may earn less than the Index returns with a Cap, an Upside Participation Rate, or a Trigger Rate.**

- A **Cap** is the maximum positive Index change (measured from the beginning of the Term to the end of the Term) taken into account to determine the Strategy value at the end of the Term. For example, if the Index return over the Term is 16%, the value of an Indexed Strategy with a 10% Cap will increase by 10% for the Term (the maximum allowed under the Cap). **For any Cap Strategy, the Cap will vary from Term to Term, but will never be less than 1%.**
- An **Upside Participation Rate** is the portion of any positive Index change (measured from the beginning of the Term to the end of the Term) that is taken into account to determine the Strategy value at the end of the Term. For example, if the Index return over the Term is 16%, at the end of the Term the value of an Indexed Strategy with a 75% Upside Participation Rate will increase by 12% for the Term (75% of the increase in the value of the Index). **For any Upside Participation Rate Strategy, the Upside Participation Rate will vary from Term to Term, but will never be less than 5%.**

- A **Trigger Rate** for a Performance Trigger Strategy is the specified increase in the Strategy value when the Index change is zero or positive at the end of the Term. The Trigger Rate for a Dual Performance Trigger Strategy is the specified increase in the Strategy value when the Index change is zero, positive, or negative up to the Buffer at the end of the Term. For example, if the index return over the Term is 16%, the value of an Indexed Strategy with an 11% Trigger Rate will increase by 11% for the Term (the Trigger Rate). **For any Trigger Strategy, the Trigger Rate will vary from Term to Term, but will never be less than 1%.**

You may earn less than the Index returns with a Cap, an Upside Participation Rate, or a Trigger Rate.

Declared Rate Strategy

Amounts held under the Declared Rate Strategy are credited with interest daily throughout a Term at a rate we set before that Term begins. This means the interest rate for the Declared Rate Strategy may change for each Term. Each Term of the Declared Rate Strategy is one year long. A Declared Rate will never be less than the guaranteed minimum interest rate from 0.15% to 3.0% set out in the Declared Rate Strategy endorsement included in your Contract. The guaranteed minimum interest rate set out in the endorsement will never be less than the minimum interest rate required for fixed annuity contracts on the Contract Effective Date under the Standard Nonforfeiture Law of the state in which your Contract is issued. At least 10 days before the next Term starts, we will post the Declared Rate that will apply to the Declared Rate Strategy for that next Term on our website (www.massmutualascend.com). A Declared Rate Strategy will always be available.

Annuity Payout Period

The Annuity Payout Period begins when you annuitize your Contract effective on the Annuity Payout Initiation Date. When you annuitize your Contract, we promise to pay a stream of Annuity Payout Benefit payments for the duration of the period selected. Once Annuity Payout Benefit payments start, you can no longer Surrender the Contract or take a withdrawal, no Death Benefit will be payable under your Contract, your Beneficiary designations will no longer apply, and the Crediting Strategies will no longer be available. The amount payable after death, if any, is governed by the Payout Option you select.

Contract Features

Annuity Payout Benefit (see “Annuity Payout Benefit” section on page 56 for more details)

When the Contract is annuitized, we promise to pay a stream of Annuity Payout Benefit payments for the duration of the period selected.

Death Benefit (See “Death Benefit” Section on page 57 for more details)

For no additional cost, the Contract includes a Death Benefit Return of Premium Guarantee. If you die before the Annuity Payout Initiation Date and before the Contract is Surrendered, we will pay a Death Benefit equal to the greater of the Account Value determined as of the date that the Death Benefit value is determined or the Death Benefit Return of Premium Guarantee. The Death Benefit Return of Premium Guarantee is equal to your Purchase Payments (the “Purchase Payment base”), reduced proportionally for all withdrawals.

Access to Your Money (See “Cash Benefit” section on page 54 for more details)

You may Surrender your Contract or take a withdrawal from your Contract at any time before the earlier of (1) the Annuity Payout Initiation Date; or (2) a death for which a Death Benefit is payable. The right to Surrender or take a withdrawal may be restricted if your Contract is purchased under an employer plan subject to IRC Section 401 (pension, profit sharing, and 401(k) plans), IRC Section 403(b) (tax-sheltered annuity plans), or IRC Section 457(b) (governmental deferred compensation plans).

During the first five Contract Years, an Early Withdrawal Charge will apply unless (a) your withdrawal qualifies for the Free Withdrawal Allowance or (b) the withdrawal qualifies for a waiver (as explained in the “Early Withdrawal Charge—Early Withdrawal Charge Waiver” section).

The amount paid upon Surrender is the Surrender Value. A withdrawal from a Crediting Strategy will reduce the Account Value by the amount of the withdrawal, including any taxes and any applicable Early Withdrawal Charge. If you Surrender your Contract or take a withdrawal from an Indexed Strategy on a day that is not the end of a Term, the Strategy value will be calculated using the Daily Value Percentage of the Indexed Strategy (or the locked Daily Value Percentage if you have made a Performance Lock election). The Daily Value Percentage could be negative, which could result in significant loss, even if the Index has risen since the start of the Term.

A withdrawal from an Indexed Strategy will reduce the Investment Base and the Death Benefit Return of Premium Guarantee by an amount that is proportional to the reduction in the Strategy value. If the Daily Value Percentage is negative, these proportional reductions could be significantly larger than the dollar amount of the withdrawal. A reduction in the Investment Base for a Term will reduce the gain from any future rise in the Index during that Term.

You may designate the Crediting Strategy or Strategies from which a withdrawal will be taken by a Request in Good Order prior to the date of the withdrawal. If you do not make a designation, we will take the withdrawal in the following order:

- first proportionally from funds, if any, that then qualify for a waiver of the Early Withdrawal Charge pursuant to the provisions of the Crediting Strategy endorsement;
- then from the Purchase Payment Account;

- then proportionally from the Declared Rate Strategies; and
- then proportionally from Indexed Strategies having the shortest Terms (meaning the withdrawal will be taken proportionally from Indexed Strategies with 1-year Terms and then from Indexed Strategies having 5-year Terms).

A withdrawal will reduce the amount payable upon Surrender, applied to the Annuity Payout Benefit, or payable as the Death Benefit.

The amount withdrawn or paid on a Surrender is subject to income tax to the extent that it represents Contract earnings or pre-tax contributions. If received before age 59½, the taxable portion of a withdrawal may also be subject to an additional 10% federal penalty tax.

Free Withdrawal Allowance (See “Free Withdrawal Allowance” section on page 29 for more details)

The Early Withdrawal Charge does not apply to an amount equal to the Free Withdrawal Allowance. For the first Contract Year, the Free Withdrawal Allowance is an amount equal to 10% of the total Purchase Payments received by us. For each subsequent Contract Year, the Free Withdrawal Allowance is equal to 10% of the Account Value as of the most recent Contract Anniversary.

Automated Withdrawals (See “Automated Withdrawals” section on page 55 for more details)

You may elect to withdraw money from your Contract under any automated withdrawal program that we offer. Your Account Value must be at least \$10,000 in order to make an automated withdrawal election. The minimum amount of each automated withdrawal payment is \$100. Automated withdrawals will be taken from the Purchase Payment Account and Crediting Strategies of your Contract in the same order as any other withdrawal. **The Contract is intended for long-term investment purposes and the Contract and its Crediting Strategies may not be appropriate for investors who plan to take withdrawals (including automated withdrawals and required minimum distributions) during the first five Contract Years, because of the assessment of Early Withdrawal Charges, or who plan to take withdrawals during Indexed Strategy Terms, because of the application of the Daily Value Percentage.**

Performance Lock (See “Indexed Strategy Value After Performance Lock Election” section on page 45 for more details)

A Performance Lock allows you to lock in the Daily Value Percentage of an eligible Indexed Strategy for the remainder of a Term. You may make a Performance Lock election for any Term or Terms of the S&P 500 Indexed Strategies (excluding the three Trigger Strategies) and the First Trust Barclays Edge Indexed Strategy.

If you make a Performance Lock election, the Daily Value Percentage will be locked for the balance of the Term. This means that you will experience flat performance through the balance of the Term even if the Net Option Value increases, you will not benefit from the continued decline in the Daily Value Percentage, and your ending Strategy value will not be based on the ending Index value on the last day of the Term. As a result, the locked-in Strategy value could be lower than the value you otherwise would have received at the end of the Term. If the Daily Value Percentage is negative at the time of the Performance Lock election, you could be locking in a loss which could be significant.

A Performance Lock election is not effective until the second Market Close after receipt of your Request in Good Order. **As a result, you will not be able to determine in advance the locked Daily Value Percentage that will apply to the Indexed Strategy at the time you make a Performance Lock election. The Daily Value Percentage at the time the Performance Lock election becomes effective may be higher or lower than it was at the time you submitted your election.**

Terminal Illness and Extended Care Waivers (see “Early Withdrawal Charge Waivers” on page 29 for more details)

In states where permitted, for no additional charge we will waive the Early Withdrawal Charge for all withdrawals and on Surrender of the Contract if the Annuitant or Owner is diagnosed with a terminal illness, as defined by the Waiver, or is confined to a hospital or other long term care facility, and certain other conditions are met. Withdrawals and Surrenders under these waivers may still trigger a Daily Value Percentage adjustment and taxes, and if before age 59½, a penalty tax.

Tax Treatment (see “Federal Tax Considerations” on page 67 for more details)

Your Purchase Payments accumulate value on a tax-deferred basis. Your earnings are not taxed until money is withdrawn from the Contract, such as when you make a withdrawal from or Surrender your Contract, or receive an annuity payment from the Contract, or a death benefit is paid.

Daily Value Percentage Adjustments

Each day before the final Market Day of a Term the value of an Indexed Strategy is equal to the Investment Base increased or decreased by the Daily Value Percentage. Before the end of a Term, if you take a withdrawal, Surrender or annuitize the Contract, elect a Performance Lock, or a Death Benefit becomes payable, the application of the Daily Value Percentage adjustment may cause your losses to exceed the -10% Floor or you will not receive the benefit of the 10% Buffer or 20% Buffer. You could lose a significant amount of money due to a Daily Value Percentage adjustment if amounts are removed from an Indexed Strategy before the end of a Term. **In extreme circumstances, an Indexed Strategy could have no value before the end of a Term due to the Daily Value Percentage, meaning that you would suffer the loss of 100% of your principal and any prior earnings in that Strategy if, before the end of the Term, you were to Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable.**

IMPORTANT INFORMATION YOU SHOULD CONSIDER ABOUT THE CONTRACT

FEES, EXPENSES AND ADJUSTMENTS

Location in Prospectus

Are There Charges or Adjustments for Early Withdrawals?

Yes.

Early Withdrawal Charge. If you withdraw money from or Surrender your Contract within the first 5 Contract Years, you may be assessed an Early Withdrawal Charge of up to 8% of the amount withdrawn or Surrendered. For example, if you make a withdrawal from or Surrender your Contract within the first 5 Contract Years, you could pay an Early Withdrawal Charge of up to \$8,000 on a Contract with an Account Value of \$100,000. This loss will be greater if there is a negative Daily Value Percentage adjustment, you also have to pay taxes and, if before age 59½, you are subject to a penalty tax.

Daily Value Percentage. The Daily Value Percentage is used to determine the value of an Indexed Strategy before the end of a Term. If before the end of a Term you take a withdrawal from an Indexed Strategy, Surrender or annuitize the Contract, elect a Performance Lock, or a Death Benefit becomes payable, the application of the Daily Value Percentage adjustment may result in losses in excess of any Floor or Buffer applicable to the Indexed Strategy. This loss will be greater if you also have to pay an Early Withdrawal Charge, taxes and, if before age 59½, you are subject to a penalty tax. **In extreme circumstances, an Indexed Strategy could have no value before the end of a Term due to the Daily Value Percentage, meaning that you would lose 100% of your principal and prior earnings in that Strategy if, before the end of the Term, you were to Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable. For example, if you allocate \$100,000 to an Indexed Strategy with a 5-year Term and Surrender the Contract before the 5 years have ended, you could lose up to \$100,000 of your investment.**

FEE TABLE

CHARGES AND ADJUSTMENTS

PRINCIPAL RISKS OF INVESTING IN THE CONTRACT

Are There Transaction Charges?

Yes. In addition to Early Withdrawal Fees and the Daily Value Percentage, we reserve the right to charge up to \$30 annually if you elect to receive Automated Withdrawals. We do not currently charge for Automated Withdrawals.

FEE TABLE

CHARGES AND ADJUSTMENTS

Are There Ongoing Fees and Expenses?

Yes.

There is an implicit ongoing fee on Indexed Strategies to the extent that your participation in Index gains is limited by the Company through the use of a Cap, Upside Participation Rate, or Trigger Rate. This means that your returns may be lower than the Index's returns. In return for accepting this limit on Index gains, you will receive some protection from Index losses.

INDEXED STRATEGIES

	<u>RISKS</u>	<u>Location in Prospectus</u>
Is There a Risk of Loss from Poor Performance?	<p>Yes. You can lose money by investing in the Contract including loss of principal and previous earnings.</p> <p>Under the Indexed Strategies, the maximum amount of loss you may experience due to negative Index performance at the end of a Term would be: 90% loss for a 10% Buffer Strategy; 80% loss for a 20% Buffer Strategy; or 10% loss for a -10% Floor Strategy. Losses exceeding these amounts may happen before the end of a Term. We may discontinue offering Indexed Strategies with a Buffer. We will always offer an Indexed Strategy with a -10% Floor.</p>	PRINCIPAL RISKS OF INVESTING IN THE CONTRACT
Is this a Short-Term Investment?	<p>No. The Contract is not a short-term investment and is not appropriate for an investor who needs ready access to cash.</p> <ul style="list-style-type: none"> • Amounts withdrawn from the Contract may result in Early Withdrawal Charges and taxes and, if before age 59 ½, may be subject to a penalty tax. • Amounts removed from an Indexed Strategy before the end of a Term may also result in a negative Daily Value Percentage and loss of positive Index performance. In extreme circumstances, an Indexed Strategy could have no value before the end of a Term due to the Daily Value Percentage, meaning that you would lose 100% of your principal and prior earnings in that Strategy if, before the end of the Term, you were to Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable. • Withdrawals from an Indexed Strategy before the end of a Term will proportionally reduce the Investment Base used to calculate the Strategy value through the end of a Term, and this proportional reduction could be larger than the dollar amount of the withdrawal. • At the end of a Term, ending values of the Strategies for that Term will be reallocated according to your instructions. If you do not send us a reallocation request, your current allocations will automatically continue in the new Term as long as the same Indexed Strategies are available. If an amount cannot be applied to a new Term of that same Indexed Strategy because the Strategy will not be available or because the amount is under the minimum or over the maximum for that Strategy, we will reallocate that amount to another Crediting Strategy as described in the Default Strategy Allocations section of this prospectus. 	<p>PRINCIPAL RISKS OF INVESTING IN THE CONTRACT</p> <p>CHARGES AND ADJUSTMENTS</p> <p>STRATEGY SELECTIONS AT TERM END</p> <p>DEFAULT STRATEGY ALLOCATIONS</p>
What Are the Risks Associated with the Investment Options?	An investment in the Contract is subject to the risk of poor investment performance and can vary depending on the performance of the Indexed Strategies available under the Contract. Each Crediting Strategy will have its own unique risks. You should review the Indexed Strategies before making an investment decision.	<p>PRINCIPAL RISKS OF INVESTING IN THE CONTRACT</p> <p>INDEXED STRATEGIES</p>

RISKS

Location in Prospectus

The Cap, Upside Participation Rate, and Trigger Rate will limit positive Index returns (e.g., limited upside). **You may earn less than the Index returns with a Cap, Upside Participation Rate, or a Trigger Rate.**

- The gain for a Term of an Indexed Strategy with a **Cap** is limited to the Cap. For example, if the Index return over the Term is 16% and the Cap for the Strategy is 10%, the gain for the Term is limited to 10%.
- The gain for a Term of an Indexed Strategy with an **Upside Participation Rate** is limited by the Upside Participation Rate. For example, if the Index return over the Term is 16% and the Upside Participation Rate for the Strategy is 75%, the gain for the Term is limited to 12% (75% of the increase in the value of the Index).
- The gain for a Term of an Indexed Strategy with a **Trigger Rate** is limited to the Trigger Rate. For example, if the Index return over the Term is 16% and the Trigger Rate for the Strategy is 11%, the gain for the Term is limited to 11% (the Trigger Rate).

The Buffer or Floor will limit negative Index returns (e.g., limited protection in the case of market decline). For example:

- The loss for a Term of an Indexed Strategy with a **Buffer** is limited to the portion of the loss which exceeds the Buffer. For example, if the Index return over the Term is -18% and the Buffer is 10%, the loss for the Term is limited to 8% (the amount that exceeds the Buffer).
- The loss for a Term of an Indexed Strategy with a **Floor** is limited to the Floor. For example, if the Index return is -18% and the floor is -10%, the loss for the Term is limited to 10% (the maximum loss under the Floor).

Each Index other than the First Trust Barclays Edge Index is a “price return index,” not a “total return index,” and therefore does not reflect the dividends paid on the securities composing the Index. This will reduce the Index return for those Indices and will cause their Index returns to underperform a direct investment in the securities composing the Index. The First Trust Barclays Edge Index is an “excess return index” that subtracts a risk-free interest rate from the price and dividend return of the securities. It also deducts fees and costs when calculating Index performance, which will also reduce the Index return and cause their Index returns to underperform a direct investment in the securities composing the Index.

What Are the Risks Related to the Insurance Company?

An investment in the Contract is subject to the risks related to the Company. Any obligations (including obligations under the Indexed Strategies and the Declared Rate Strategy), guarantees, or benefits are subject to the claims paying ability of the Company. Additional information about the Company, including its financial strength ratings, is available upon request by calling 1-800-789-6771.

PRINCIPAL RISKS OF INVESTING IN THE CONTRACT

Are There Limits on the Investment Options?	<p style="text-align: center;"><u>RESTRICTIONS</u></p> <p>Yes.</p> <p>Purchase Payments.</p> <ul style="list-style-type: none"> Additional Purchase Payments after the Initial Purchase Payment are only permitted during the Purchase Payment period, which ends two months after the Contract Effective Date. Unless we agree, an additional Purchase Payment cannot be less than the minimum set out in the Contract Specifications section of your Contract, and cannot cause the total Purchase Payments to exceed the maximum set out in the Contract Specifications section of your Contract. <p>Transfers and Reallocations.</p> <ul style="list-style-type: none"> You cannot reallocate your value among Crediting Strategies during a Term. <p>Investment Restrictions.</p> <ul style="list-style-type: none"> The 5-Year Indexed Strategies are only available for a Term that starts in the first Contract Year. <p>Our right to change the Indexed Strategies or Indexes</p> <ul style="list-style-type: none"> In the future, we may offer new Indexed Strategies. Any new Buffer Strategy will offer protection against loss at least equal to a 5% Buffer. Any new Floor Strategy will offer protection against loss at least equal to a -20% Floor. For each future Term, we may modify the Positive Return Factor rate for any Indexed Strategy. At the end of a Term, we may stop offering any Indexed Strategy other than the S&P 500 1-Year -10% Floor with Cap Indexed Strategy, which will always be available. For future Terms, we may impose minimum or maximum allocations on an Indexed Strategy. No minimum or maximum shall apply to the S&P 500 1-Year -10% Floor with Cap Indexed Strategy. We have the right to replace or adjust an Index or rate, or the specified market to measure it, if the external market index or rate stops being published or the publication schedule is changed, the calculation of the external market index or rate is changed significantly, the investment fund terminates or there is a significant change in its investment objectives, strategies, or operations, the investment fund or commodity stops being traded on a specified market or the specified market declines in importance, we lose our license or permission to use the index or rate, we determine that hedging instruments are difficult to acquire or the cost of hedging becomes excessive, or under other circumstances approved by regulators. We may do so at the end of a Term or during a Term. The performance of the new or adjusted Index may not be as good as the performance of the old Index. As a result, funds allocated to an Indexed Strategy may earn a return that is lower than the return they would have earned or experience losses greater than the losses they would have experienced if there had been no replacement or adjustment. <th data-bbox="1122 107 1446 390"> <p><u>Location in Prospectus</u></p> <p>PURCHASING THE CONTRACT</p> <p>INITIAL STRATEGY SELECTIONS</p> <p>DEFAULT STRATEGY ALLOCATIONS</p> <p>INDEX REPLACEMENT</p> </th>	<p><u>Location in Prospectus</u></p> <p>PURCHASING THE CONTRACT</p> <p>INITIAL STRATEGY SELECTIONS</p> <p>DEFAULT STRATEGY ALLOCATIONS</p> <p>INDEX REPLACEMENT</p>
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Are There Restrictions on Contract Benefits?	<p><u>RESTRICTIONS</u></p> <p>Yes.</p> <ul style="list-style-type: none"> • A withdrawal must be at least \$500 and cannot reduce the Account Value to less than the Minimum Required Value set out in the Contract Specifications section of your Contract. • An annuitization cannot occur before the first Contract Anniversary. An annuitization for a fixed period cannot be for less than the Minimum Fixed Period Payout set out in the Contract Specifications section of your Contract. Payment amounts under any option must be at least \$50 or such higher amount as we may set from time to time. • A withdrawal will reduce the amount payable upon Surrender, applied to the Annuity Payout Benefit, or payable as the Death Benefit. In addition, a withdrawal will proportionally reduce the Death Benefit Return of Premium Guarantee, and this proportional reduction could be larger than the dollar amount of the withdrawal. • If you elect a Performance Lock, you will not be able to reallocate the locked value until the end of a Term. • If you elect a Performance Lock for an Indexed Strategy with a 5-year Term, the Term will always end on the next anniversary of the Term start date even if it otherwise would have continued for one or more additional years. 	<p><u>Location in Prospectus</u></p> <p>DEATH BENEFIT</p> <p>ANNUITY PAYOUT BENEFIT</p> <p>INDEXED STRATEGY VALUE AFTER PERFORMANCE LOCK ELECTION</p>
What Are the Contract's Tax Implications?	<p><u>TAXES</u></p> <p>You should consult with a tax professional to determine the tax implications of an investment in and Purchase Payments received under the Contract. There is no additional tax benefit to you if the Contract is purchased through a tax-qualified plan or individual retirement account (IRA). Generally, withdrawals will be subject to ordinary income tax, and if before age 59½, may be subject to a penalty tax.</p>	<p><u>Location in Prospectus</u></p> <p>FEDERAL TAX CONSIDERATIONS</p>
How Are Investment Professionals Compensated?	<p><u>CONFLICTS OF INTEREST</u></p> <p>Some investment professionals may receive compensation for selling the Contract to you. The compensation is typically paid as a commission calculated as a percentage of the Purchase Payments received for a Contract. These investment professionals may have a financial incentive to offer or recommend the Contract over another investment.</p>	<p><u>Location in Prospectus</u></p> <p>DISTRIBUTION OF THE CONTRACTS</p>
Should I Exchange My Contract?	<p>Some investment professionals may have a financial incentive to offer you a new contract in place of the one you already own. You should only exchange your existing contract if you determine, after comparing the features, fees, and risks of both contracts, and any fees or penalties to terminate the existing contract, that it is preferable for you to purchase the new contract rather than continue to own your existing contract.</p>	<p>DISTRIBUTION OF THE CONTRACTS</p>

FEE TABLE

The following tables describe the fees, expenses and adjustments that you will pay when buying, owning, and Surrendering or making withdrawals from a Crediting Strategy or from the Contract. Please refer to the Contract Specifications section of your Contract for information about the specific fees you will pay each year based on the options you have elected.

The first table describes the fees and expenses you will pay at the time that you Surrender or make withdrawals from a Crediting Strategy or from the Contract. State premium taxes may also be deducted.

<u>Transaction Expenses</u>	<u>Maximum</u>
Automated Withdrawals	\$30 annually
Early Withdrawal Charge (as a percentage of amount withdrawn or Surrendered) ⁽¹⁾	8.00%

⁽¹⁾ The Early Withdrawal Charge is calculated as a percentage of the amount withdrawn plus any amount needed to cover the Early Withdrawal Fee. If you Surrender your Contract, the amount subject to the Early Withdrawal Charge is your Account Value. We may waive the Early Withdrawal Charge under certain circumstances. **See the Charges and Adjustments section of this prospectus for more information about the Early Withdrawal Charge and the circumstances in which it may be waived.** The charge decreases to zero after 5 years according to the following schedule:

Contract Year	1	2	3	4	5	6+
Early Withdrawal Charge Rate	8%	7%	6%	5%	4%	0%

The next table describes the adjustments, in addition to any transaction expenses, that apply if all or a portion of the Account Value is removed from an Indexed Strategy before the expiration of Term.

<u>Contract Adjustments</u> ⁽²⁾	
Daily Value Percentage adjustment Maximum Potential Loss (as a percentage of Strategy value at the start of the Term)	100%
⁽²⁾ A Daily Value Percentage adjustment will be applied if you take a withdrawal, Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable before the end of a Term.	

In addition to the fees described above, the Positive Return Factors may limit the amount you can earn on the Indexed Strategies. This means your returns may be lower than the Index’s returns. In return for accepting this limit on Index gains, you will receive some protection from Index losses.

PRINCIPAL RISKS OF INVESTING IN THE CONTRACT

You should understand the risks associated with the Contract before you purchase it. You should carefully consider your income needs and risk tolerance to determine whether the Contract or a particular Crediting Strategy is appropriate for you. The level of risk you bear and your Contract's potential investment performance will differ depending on the Crediting Strategies you choose.

Market Risk

There is a risk of loss of principal and prior earnings due to the negative performance of an Index if you allocate your Account Value to an Indexed Strategy. Such a loss may be significant. **This risk exists because, at the end of that Term, you can lose up to 10% of the money allocated to a -10% Floor Strategy, up to 90% of the money allocated to a 10% Buffer Strategy, or up to 80% of the money allocated to a 20% Buffer Strategy. If you allocate money to one or more Indexed Strategies over multiple Terms, you may lose money each Term, which may result in a cumulative loss of your principal and any prior earnings that is greater than 10% for a -10% Floor Strategy, greater than 90% for a 10% Buffer Strategy, or greater than 80% for a 20% Buffer Strategy.**

The S&P 500 1-Year -10% Floor with Cap Indexed Strategy will always be available. At the end of a Term, we may stop offering any other Indexed Strategy. Consequently, any other Indexed Strategy described in this prospectus may not be available after the end of the initial Term. The S&P 500 5-year 10% Buffer with Upside Participation Rate Indexed Strategy, the S&P 500 5-year 10% Buffer with Cap Indexed Strategy, and the S&P 500 5-year 20% Buffer with Cap Indexed Strategy will only be available for Terms beginning in the first Contract Year. We have the right to replace the Index associated with an Indexed Strategy under certain circumstances.

In the future, we may offer a new Strategy with a Floor that is more or less negative than -10%, or that has a Buffer of more or less than 10%. However, we will not offer a new Buffer Strategy that offers less protection against loss than a 5% Buffer, or a Floor Strategy that offers less protection against loss than a -20% Floor.

The risk of loss of principal will be greater if you allocate money to a Strategy with a lower Floor or less of a Buffer. In the worst-case scenario, we could eliminate all of the current Indexed Strategies other than the S&P 500 1-Year -10% Floor with Cap Indexed Strategy and offer other new Indexed Strategies with more negative Floors or lesser Buffers subject to the limits noted above. In those circumstances, your risk of loss of principal would increase and you may earn a return that is lower than the return your investments would have earned if they had been invested in the other Indexed Strategies that are currently available unless you had already limited your allocation to the S&P 500 1-Year -10% Floor with Cap Indexed Strategy and the Declared Rate Strategy and remain in those Strategies. In addition, a reduction in the number of Indexed Strategies that are available may reduce your opportunity to increase your Contract value. If you choose to Surrender the Contract because of changes in the number and/or type of available Indexed Strategies, your Surrender may be subject to Early Withdrawal Charges, Daily Value Percentage adjustments, and taxes, and if before age 59½, a penalty tax. If you purchase another annuity contract, it may have different features, fees, and risks than this Contract.

Early Withdrawal Risk

Long Term Nature of the Contract

The Contract is a deferred annuity, which means the Annuity Payout Benefit will begin on a future date. The Contract is unsuitable as a short-term savings vehicle. We designed the Contract to be a long-term investment that you can use to help build a retirement nest egg and provide income for retirement. The limitations, adjustments, and charges included in the Contract reflect its long-term nature.

The Contract and its Crediting Strategies may not be appropriate for investors who plan to take withdrawals (including automated withdrawals and required minimum distributions) during the first five Contract Years, because of the assessment of Early Withdrawal Charges, or who plan to take withdrawals during Indexed Strategy Terms, because of the application of the Daily Value Percentage. Withdrawals are also subject to the possibility of adverse tax consequences.

Loss Due to Negative Daily Value Percentage Adjustment

Before the end of the Term, if you were to take a withdrawal, Surrender or annuitize the Contract, elect a Performance Lock, or a Death Benefit becomes payable, the Daily Value Percentage calculation may cause the value of a Strategy to be less than 90% of the money allocated to a -10% Floor Strategy, or less than 10% for money allocated to a 10% Buffer Strategy, or less than 20% for money allocated to a 20% Buffer Strategy. **In extreme circumstances, an Indexed Strategy could have no value before the end of a Term due to the Daily Value Percentage, meaning that you would suffer the loss of 100% of your principal and any prior earnings in a Strategy if, before the end of the Term, you were to Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable.**

Loss of Principal Related to Early Withdrawal Charge

There is also a risk of loss of principal and prior earnings if you Surrender your Contract or take a withdrawal from it during the first five Contract Years and an Early Withdrawal Charge applies. This risk exists for each Crediting Strategy. An Early Withdrawal Charge will reduce the value of the Strategy. This reduction may exceed any prior earnings.

Indexed Strategies Risk

An investment in an Indexed Strategy is not an investment in the Index or in the investments tracked by the Index, and you will not own such investments. Your investment in the Indexed Strategies is subject to the risk of poor performance and can vary depending on the performance of the underlying Indices. Each Indexed Strategy will have its own unique risks, and you should review the available Indexed Strategies carefully before making an investment decision. When you invest in an Indexed Strategy, you will be exposed to certain risks, including the following:

Limits on Positive Index Returns at End of Term

Any increase in the value of an Indexed Strategy at the end of a Term is based on the value of the underlying Index at the final Market Close of the Term. The Cap, Upside Participation Rate, or Trigger Rate limits the positive Index return, if any, that may be credited to your Contract for a given Term.

If the Index rises for the Term, then at the end of the Term the value of an Indexed Strategy with a Cap can never be more than the Investment Base increased by the Cap for that Term even if the Index has risen by more than the Cap.

If the Index rises for the Term, then at the end of the Term the value of an Indexed Strategy with an Upside Participation Rate will be the Investment Base increased by your share of the rise in the Index. Your share of any rise in the Index is equal to the Upside Participation Rate for that Term multiplied by the rise in the Index.

If the Index rises for the Term, then at the end of the Term the value of an Indexed Strategy with a Trigger Rate will be the Investment Base increased by the Trigger Rate for that Term even if the Index has risen by more than the Trigger Rate.

The Cap, Upside Participation Rate, or Trigger Rate may result in you earning less than the Index Return. Due to these limitations, in many cases the return on money allocated to an Indexed Strategy with a Cap, or Trigger Rate will not fully reflect the corresponding rise in the Index for the Term and the return on money allocated to an Indexed Strategy with an Upside Participation Rate that is less than 100% will never reflect the entire corresponding rise in the Index for the Term.

The Cap, Upside Participation Rate, or Trigger Rate declared for a Term is for the entire Term for a particular Indexed Strategy. For 5-year Indexed Strategy, the Cap, Upside Participation Rate, or Trigger Rate applies to the entire Term and is not an annual limit. Indexed Strategies can have different Buffers or Floors, which will impact the Cap, Upside Participation Rate, or Trigger Rate offered on the Indexed Strategies. The Buffer or Floor, as applicable, will never change for a specific Indexed Strategy. If a different Buffer or Floor is introduced, it will be offered on a new Indexed Strategy.

Possibility of Losses Despite Limits on Negative Index Returns

The Buffer or Floor that is applicable to an Indexed Strategy only provides you with limited protection from negative Index performance at the end of a Term. You could lose a significant amount of your principal and/or prior earnings under the Contract despite these limits on negative Index returns.

Under an Indexed Strategy, the maximum amount of loss that you could experience due to negative Index performance at the end of a Term, after taking into account the minimum limits on Index loss currently provided under the Contract, would be up to 10% of the money allocated to a -10% Floor Strategy, 90% of the money allocated to a 10% Buffer Strategy, or 80% of the money allocated to a 20% Buffer Strategy. You could lose a significant amount of money if an Index declines in value. At the end of a Term, we may stop offering any Indexed Strategy in our discretion. In the future, we may offer new Indexed Strategies that have less protection against negative Index performance. However, the S&P 500 1-Year -10% Floor with Cap Indexed Strategy will always be available.

You also bear the risk that continued negative Index returns may result in the loss of Account Value over multiple Terms. Given that the Floor or Buffer (as applicable) applies only to a single Term, if an Indexed Strategy is credited with losses for multiple Terms, the cumulative loss may exceed any single Term's stated limit of the Buffer or Floor. In addition, the limits on downside loss provided by the Floor or Buffer, as applicable, are for the entire Term for a particular Indexed Strategy and are not annual limits.

Before the end of a Term, if you make a withdrawal from an Indexed Strategy, Surrender or annuitize the Contract, elect a Performance Lock, or a Death Benefit becomes payable, you or your beneficiaries (as applicable) will not receive the full protection of the Buffer or Floor in the calculation of the Daily Value Percentage. In order to receive the full protection, the particular transaction must occur on at the Term end date.

Index Changes Over the Course of Term

At the end of a Term, unless you have made a Performance Lock election, we measure the Index change by comparing the Index value at the start of the Term to the Index value at the end day of the Term. This means that if the Index value is lower at the end of the Term, you may experience negative or flat performance even if the Index rose through some, or most, of the Term.

The Contract offers you the opportunity to allocate funds to Indexed Strategies for one year or five-year Terms. For Indexed Strategies with five-year Terms, changes in Strategy value as a direct result of Index performance will only be measured at the start and end of a five-year period and not annually.

Limits on Strategy Value Before End of Term

Before the end of a Term, we calculate the value of an Indexed Strategy using a Daily Value Percentage that is not tied directly to the underlying Index. The purpose of this calculation is to shift any potential investment loss on the Company's general account assets that support the indexed option guarantees from the Company to you when amounts are removed prematurely from an Indexed Strategy. The Daily Value Percentage is applied when you take a withdrawal, Surrender or annuitize your Contract, elect a Performance Lock, or when a Death Benefit becomes payable on a date other than the end of a Term. The Daily Value Percentage includes the prices of hypothetical options. Such option prices will vary from day to day. Any Strategy value calculated using the Daily Value Percentage before the end of a Term will almost always be less, perhaps significantly less, than the value suggested by the rise or fall of the Index. You will bear the risk that the Daily Value Percentage may decrease the Strategy value before the end of a Term. In extreme circumstances, an Indexed Strategy may have no value before the end of a Term, meaning that you would suffer the loss of 100% of your principal and any prior earnings in that Strategy if, before the end of the Term, you were to Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable.

The Daily Value Percentage includes deductions for the Residual Option Cost and the Trading Cost, which means that any Strategy value before the end of a Term will almost always be less, perhaps significantly less, than the value suggested by the rise or fall of the Index. Because the Residual Option Cost is a decreasing value, its negative impact on Strategy values will be more pronounced at the start of a Term than at the end of that Term. In addition, even if the Index rises, the Strategy value may be less than the Investment Base due to these deductions.

The Daily Value Percentage is used to calculate the Strategy values if, before the end of a Term, you were to take a withdrawal, Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable. Accordingly, the Residual Option Cost and Trading Cost will have a negative effect on such values.

For more information on how we determine the prices of hypothetical options, see "Option Prices" in the Contract Adjustments section of the Statement of Additional Information.

No Increases in Value After Performance Lock

If you make a Performance Lock election, the Daily Value Percentage will be locked for the balance of the Term. This means that you will experience flat performance through the balance of the Term even if the Net Option Value increases, you will not benefit from the continued decline in the Residual Option Cost, and your ending Strategy value will not be based on the ending Index value on the last day of the Term.

You may access Daily Value Percentage information for the Indexed Strategies as of the previous day's Market Close by calling 1-800-789-6771 or by accessing your account online at www.massmutualascend.com. Before electing a Performance Lock, you should consult with a financial advisor.

A Performance Lock election is not effective until the second market close after the receipt of your request so you will not be able to determine the Daily Value Percentage that will be locked in. You bear the risk that the Daily Value Percentage that is locked in will be lower than the Daily Value Percentage you last obtained, and lower than the potential Strategy value you would receive at the end of the Term. If you exercise the Performance Lock feature at a time when the Strategy value has declined, you will lock in any loss, which could be significant.

Limits on Reallocations

You can only reallocate money among Crediting Strategies at the end of a Term. If you want to take money out of a Crediting Strategy during a Term, you must Surrender your Contract or take a withdrawal. If you choose to Surrender your Contract or take a withdrawal, your Surrender or withdrawal may be subject to Early Withdrawal Charges, Daily Value Percentage adjustment, taxes, and if before age 59½, a penalty tax. A withdrawal before the end of a Term will proportionally reduce the Investment Base for an Indexed Strategy and the Death Benefit Return of Premium Guarantee, and this proportional reduction could be larger than the dollar amount of the withdrawal.

Effect of Surrenders

If you Surrender your Contract at any time during the first five Contract Years and an Early Withdrawal Charge applies, the amount payable will reflect a deduction for the charge. All or some portion of a withdrawal may be subject to federal and state income taxes and, if taken before age 59½, may be subject to a 10% federal penalty tax. If you Surrender your Contract at the end of a Term, the amount payable will reflect any rise or fall of the applicable Indexes over the Term, applicable Positive Return Factor rates and Negative Return Factor rates, and any Early Withdrawal Charge. If you Surrender your Contract before the end of a Term, the amount payable will reflect the applicable Daily Value Percentage, which could significantly reduce the amount you receive upon Surrender, and any Early Withdrawal Charge.

Effect of All Withdrawals

If you take a withdrawal at any time, we will reduce your Account Value by an amount equal to that withdrawal. If you take a withdrawal during the first five Contract Years and an Early Withdrawal Charge applies, we will also reduce your Account Value by the amount of the Early Withdrawal Charge. A reduction in the Account Value will reduce the amount payable upon Surrender, applied to the Annuity Payout Benefit, or payable as the Death Benefit. In addition, a withdrawal will proportionally reduce the Death Benefit Return of Premium Guarantee and this proportional reduction could be larger than the dollar amount of the withdrawal.

Each withdrawal from an Indexed Strategy, including withdrawals available under the Free Withdrawal Allowance, withdrawals that qualify for a waiver of the Early Withdrawal Charge, withdrawals under an automated withdrawal program and withdrawals to satisfy a required distribution, will reduce the Strategy value by the dollar amount of the withdrawal and any related Early Withdrawal Charge. If taken from an Indexed Strategy before

the end of a Term, the reduction in Strategy value is determined by the Daily Value Percentage on the date of the withdrawal, or on the locked Daily Value Percentage if you have made a Performance Lock election. Unless you have made a Performance Lock election (which, except for withdrawals, freezes the Strategy value until the end of the Term), a withdrawal before the end of the Term should almost always result in a greater reduction in Strategy value than if the withdrawal had happened at the end of the Term under otherwise identical circumstances. The Investment Base used to calculate the Strategy value through the end of that Term will be reduced in proportion to the reduction in the Strategy value. This means the dollar amount of the proportional reduction in the Investment Base will be more, maybe significantly more, than the dollar amount of the withdrawal and the Early Withdrawal Charge if the Strategy value immediately before the withdrawal is less than the Investment Base. A reduction in the Investment Base will limit the effect of any rise or fall in the Index for the remainder of the Term.

All or some portion of a withdrawal may be subject to federal and state income taxes and, if taken before age 59½, may be subject to a 10% federal penalty tax. For a further discussion of the tax treatment of withdrawals and Surrenders, please see the Federal Tax Considerations section on page 67.

Early Withdrawal Charges will reduce Indexed Strategy values and may result in losses that exceed the Floor or reduce the protection of the Buffer.

Timing and Effect of Withdrawals Before End of Term

Before taking a withdrawal, you should consider the dates on which the Term(s) of your Indexed Strategies end relative to the timing of that withdrawal.

- If you take a withdrawal from an Indexed Strategy before the end of a Term, we will immediately reduce the Investment Base for that Indexed Strategy.
- The reduction will be proportional to the reduction in the Strategy value, which means that the proportional reduction in the Investment Base could be larger than the dollar amount of the withdrawal.
- Reductions to the Investment Base will have a negative effect on any increases in the Indexed Strategy value for the remainder of that Term, but will reduce any decreases in the Indexed Strategy value for the remainder of that Term.
- Once the Investment Base for an Indexed Strategy is reduced due to a withdrawal before the end of a Term, it will not increase at any time during the remainder of that Term.

Each withdrawal from an Indexed Strategy before the end of a Term, including withdrawals available under the Free Withdrawal Allowance, withdrawals that qualify for a waiver of the Early Withdrawal Charge, withdrawals under an automated withdrawal program and withdrawals to satisfy a required distribution, will proportionally reduce the Investment Base.

In order for you to avoid the application of the Daily Value Percentage in calculating the value of an Indexed Strategy, you need to schedule withdrawals to coincide with Term end dates. The Contract is intended for long-term investment purposes and the Contract and its Indexed Strategies may not be appropriate for investors who plan to take withdrawals (including automated withdrawals and required minimum distributions) during the first five Contract Years, because of the assessment of Early Withdrawal Charges, or who plan to take withdrawals during Indexed Strategy Terms, because of the application of the Daily Value Percentage adjustment.

No Ability to Determine Contract Values in Advance

We will process any withdrawal request at the first Market Close after receipt of your Request in Good Order. This means you will not be able to determine in advance the amount of the proportional reduction in the Investment Base due to the withdrawal. Likewise, you will not be able to determine in advance the amount payable upon Surrender, to be applied to the Annuity Payout Benefit or payable as the Death Benefit.

A Performance Lock election is effective on the second Market Close after receipt of your Request in Good Order. This means you will not be able to determine in advance the locked Daily Value Percentage that will be applicable to the Indexed Strategy at the time you make a Performance Lock election. The Daily Value Percentage may be higher or lower at the time the Performance Lock election becomes effective than it was when you submitted your Request in Good Order.

Changes in Positive Return Factors and Trading Cost

We set the Positive Return Factor rate (Cap, Upside Participation Rate, or Trigger Rate) for each new Term of an Indexed Strategy. The Positive Return Factor rate for a new Term of an Indexed Strategy may be lower than its Positive Return Factor rate for the current Term. A Cap may be as low as 1%. A Trigger Rate may be as low as 1%. An Upside Participation Rate may be as low as 5%. You risk the possibility that the Positive Return Factor rate for a new Term may be lower than you would find acceptable.

You bear the risk of any negative effect on the Daily Value Percentage and Indexed Strategy values of an increase in the Trading Cost.

Unavailable Indexed Strategies

At the end of a Term, we may stop offering any Indexed Strategy other than the S&P 500 1-Year -10% Floor with Cap Indexed Strategy. Consequently, any other Indexed Strategy you selected may not be available after the end of a Term. In such an event, the Company will amend the prospectus.

The 5-Year Indexed Strategies are not available for Terms beginning after the first Contract Year.

When an Indexed Strategy is unavailable for the next Term, you may choose to reallocate the funds held in that Strategy. At least 30 days before the end of each Term, we will send you a written notice with information about the Indexed Strategies that will be available for the next Term.

We may establish minimum and maximum amounts or percentages that may be applied to a given Indexed Strategy. This means that an Indexed Strategy you selected may not be available after the end of a Term because the amount to be applied to that Strategy is less than the minimum we set for the new Term. Likewise, the amount to be applied to an Indexed Strategy may be limited by the maximum we set for the new Term, and the amount over that maximum would be reallocated. At least 30 days before the end of each Term, we will send you a written notice with information about any maximum or minimum that will apply for the next Term. No minimum or maximum shall apply to the S&P 500 1-year -10% Floor with Cap Indexed Strategy. No minimum shall apply to the Declared Rate Strategy. If funds cannot be applied to a Strategy due to the minimum or maximum we set for the next Term and you do not request a reallocation of those funds, we will apply the funds for the new Term in the same manner as if the given Indexed Strategy were no longer offered.

If at the end of a Term, an amount cannot be applied to a new Term of that same Indexed Strategy because the Strategy will not be available or because the amount is under the minimum or over the maximum for that Strategy, and you do not request a permissible reallocation of that amount, we will reallocate that amount to another Indexed Strategy as described in the Default Strategy Allocations section on page 34. In these cases, any funds that we allocate to the Declared Rate Strategy may earn a return that is lower than the return those funds would have earned if they had been applied to the Indexed Strategy you selected.

If you choose to Surrender the Contract because of changes in the number and/or type of available Indexed Strategies, or because you fail to request a permissible reallocation and you are unhappy with the default allocation, your Surrender may be subject to Daily Value Percentage adjustments, Early Withdrawal Charges, and taxes, and if taken before age 59½, a penalty tax. There may be tax consequences if you Surrender your Contract. You should seek advice on tax questions based on your particular circumstances from a tax advisor.

Replacement of an Index

We may replace or adjust an Index or rate, or the specified market to measure it, if the external market index or rate stops being published or the publication schedule is changed, the calculation of the external market index or rate is changed significantly, the investment fund terminates or there is a significant change in its investment objectives, strategies, or operations, the investment fund or commodity stops being traded on a specified market or the specified market declines in importance, we lose our license or permission to use the index or rate, we determine that hedging instruments are difficult to acquire or the cost of hedging becomes excessive, or under other circumstances approved by regulators. We may do so at the end of a Term or during a Term. If we replace or adjust an Index, we will provide notice to you and amend the prospectus. If we replace or adjust an Index during a Term, we will calculate any rise or fall in the Index using the old Index up until the replacement date. After the replacement or adjustment date, we will calculate any rise or fall in the Index using the new Index, but with a modified start of Term value for the new Index. The modified start of Term value for the new Index will reflect the rise or fall in the Index for the old Index from the start of the Term to the replacement or adjustment date. The performance of the new Index may not be as good as the performance of the old Index. As a result, funds allocated to an Indexed Strategy may earn a return that is lower than the return they would have earned or experience losses greater than the losses they would have experienced if there had been no replacement or adjustment.

Involuntary Termination of Contract

If your Account Value on any anniversary of the initial Strategy Application Date is below the minimum value of \$5,000 for any reason, we may terminate your Contract on that anniversary. If your Contract has Terms that end on the same date because you made only one Purchase Payment, any involuntary termination will occur on that date. If your Contract has Terms that end on different dates because you made more than one Purchase Payment, any involuntary termination will occur on one of those dates, which will be the end of one Term but not the end of the other Terms. In this case, the Surrender Value payable upon termination of your Contract will reflect the Daily Value Percentages used to calculate the values of Indexed Strategies with Terms that are not ending on the termination date. Due to the Positive Return Factors, any positive return may be less than the performance of the S&P 500 Index or a direct investment in the stocks included in the Index.

No Direct Investment in S&P 500 Index

When you allocate money to an Indexed Strategy that uses the S&P 500 Index, you will not be investing in that Index, or in any stock included in that Index. The S&P 500 Index is calculated without taking into account dividends paid on stocks that make up the S&P 500 Index. In addition, because the performance of an S&P 500 Indexed Strategy is linked to the performance of the S&P 500 Index and not the performance of the stocks included in the Index, your return may be less than that of a direct investment in such stocks. In addition, due to the same limitations, your return may be less than that of a direct investment in a fund that tracks the S&P 500 Index. Due to the Positive Return Factors, any positive return may be less than the performance of the S&P 500 Index or a direct investment in the stocks included in the Index.

No Direct Investment in an iShares ETF

When you allocate money to an Indexed Strategy that uses the iShares MSCI EAFE ETF or iShares U.S. Real Estate ETF, you will not be investing in that exchange-traded fund, the securities or other assets held by the fund, in any underlying index tracked by the fund, or in the securities or other assets held by such underlying index. In addition, because the performance of an iShares ETF is linked to the performance of the share price of the ETF, which is determined by trading on the exchange, and not the performance of its investment portfolio, its underlying index or the components of that index, your return may be less than that of a direct investment in the securities or other assets held by the fund or a direct investment in the components of the fund's underlying index. In addition, due to the same limitations, your return may be less than that of a direct investment in the

fund. Due to the Positive Return Factors, any positive return may be less than the performance of the S&P 500 Index or a direct investment in the stocks included in the Index.

No Direct Investment in SPDR Gold Shares ETF

When you allocate money to an Indexed Strategy that uses the SPDR Gold Shares ETF, you will not be investing in that exchange-traded fund or in gold. In addition, because the performance of the SPDR Gold Shares ETF is linked to the performance of the share price of the ETF, which is determined by trading on the exchange, and not the performance of its investment portfolio, its underlying index or the components of that index, your return may be less than that of a direct investment in the securities or other assets held by the fund or a direct investment in the components of the fund's underlying index. In addition, due to the same limitations, your return may be less than that of a direct investment in the fund. Due to the Positive Return Factors, any positive return may be less than the performance of the S&P 500 Index or a direct investment in the stocks included in the Index.

No Direct Investment in First Trust Barclays Edge Index

When you allocate money to an Indexed Strategy that uses the First Trust Barclays Edge Index, you will not be investing in that Index, or in any stock or bonds included in that Index. The First Trust Barclays Edge Index is calculated assuming that dividends paid on stocks that make up the First Trust Barclays Edge Index are reinvested. In addition, because the performance of the First Trust Barclays Edge Indexed Strategy is linked to the performance of the First Trust Barclays Edge Index and not the performance of the stocks and bonds included in the Index, and because the Index is an "excess return index" that subtracts a risk-free interest rate from the price and dividend return of the securities, your return may be less than that of a direct investment in such stocks and bonds. Due to the Positive Return Factors, any positive return may be less than the performance of the S&P 500 Index or a direct investment in the stocks included in the Index.

Divergence of Performance

The performance of an Indexed Strategy will diverge from the performance of the underlying Index because changes in the value of an Indexed Strategy at the end of a Term are subject to Positive Return Factors and Negative Return Factors, or the Index change required to qualify for the Trigger Rate and because changes in the value of an Indexed Strategy before the end of a Term are based on the Daily Value Percentage.

Market Risk Related to Indexes

Money allocated to an Indexed Strategy that uses the S&P 500 Index or the First Trust Barclays Edge Index is subject to the risk that the market value of the underlying securities that comprise the applicable Index may decline over a Term. Likewise, money allocated to an Indexed Strategy that uses the iShares MSCI EAFE ETF, the iShares U.S. Real Estate ETF, or the SPDR Gold Shares ETF is subject to the risk that the fund's share price may decline over a Term. The level of the S&P 500 Index and the First Trust Barclays Edge Index and the share prices of the SPDR Gold Shares ETF, iShares MSCI EAFE ETF and the iShares U.S. Real Estate ETF may be volatile.

Geopolitical conflicts could also create economic disruption, including increased market volatility, and presents economic uncertainty. The full impact and duration of these events are difficult to determine in advance. Any such impact could adversely affect the performance of the securities that comprise the Indexes and may lead to losses on your investment in the Indexed Strategies.

The historical performance of an Index does not guarantee future results.

S&P 500 Index. The S&P 500® Index is designed to reflect the large-cap sector of the U.S. equity market and, due to its composition, it also represents the U.S. equity market in general. Any positive change in the S&P 500 Index over a Term will be lower than the total return on an investment in the stocks that comprise the S&P 500 Index because such total return will reflect dividend payments on those stocks and the S&P 500 Index will not reflect those dividend payments. More information about the S&P 500 Index is set out in the Indexes section of this prospectus.

The S&P 500 Index is subject to multiple principal investment risks, such as those related to its investments in large-capitalization companies. The S&P 500 Index tracks a subset of the U.S. stock market, which could cause the S&P 500 Index to perform differently from the overall stock market. In general, large-capitalization companies may be unable to respond quickly to new competitive challenges and may not be able to attain the high growth rate of successful smaller companies. In addition, the S&P 500 Index may, at times, become focused in stocks of a particular market sector, which would subject the S&P 500 Index to proportionately higher exposure to the risks of that sector.

iShares MSCI EAFE ETF. The iShares MSCI EAFE ETF is an exchange traded fund that seeks to track the investment results of an index composed of large- and mid-capitalization developed market equities, excluding the U.S. and Canada (MSCI EAFE Index). This underlying index includes stocks from Europe, Australasia, and the Far East. It may include large- or mid-capitalization companies. The share price of the iShares MSCI EAFE ETF is tied to the performance of large- and mid-capitalization developed market equities, excluding the U.S. and Canada. The share price may not replicate the performance of the fund, its underlying index, or the components of that index. More information about the iShares MSCI EAFE ETF is set out in the Indexes section of this prospectus. To learn more about the iShares MSCI EAFE ETF, visit [iShares.com](https://www.ishares.com) and search ticker symbol EFA.

The fund is subject to several principal investment risks, such as those related to its investments in large-capitalization and mid-capitalization foreign companies. In general, large-capitalization companies may be unable to respond quickly to new competitive challenges, and may not be able to attain the high growth rate of successful smaller companies. Generally, the securities of mid-capitalization companies may be more volatile and may involve more risk than the securities of larger companies. Mid-capitalization companies are also more likely to fail than larger companies. Securities issued by non-U.S. companies are subject to the risks related to investments in foreign markets (e.g., increased price volatility; changing currency

exchange rates; and greater political, regulatory, and economic uncertainty). Because the fund is an ETF, it is also exposed to the risks associated with the operation of any ETF. The value of its shares, which are valued based on their trading prices in the secondary market, may change rapidly and unpredictably and may trade at premiums or discounts to the fund's net asset value.

The principal investment risks of the fund are described in the fund's prospectus, including the following risks: asset class risk, authorized participant concentration risk, concentration risk, currency risk, cybersecurity risk, equity securities risk, financials sector risk, geographic risk, index-related risk, issuer risk, large-capitalization companies risk, management risk, market risk, market trading risk, mid-capitalization companies risk, national closed market trading risk, non-U.S. securities risk, operational risk, passive investment risk, reliance on trading partners risk, risk of investing in developed countries, risk of investing in Japan, securities lending risk, structural risk, tracking error risk and valuation risk.

iShares U.S. Real Estate ETF. The iShares U.S. Real Estate ETF is an exchange traded fund that seeks to track the investment results of an index composed of U.S. equities in the real estate sector (Dow Jones U.S. Real Estate Index). This underlying index may include large-, mid- or small-capitalization companies. A significant portion of the underlying index is represented by real estate investment trusts (REITs), but the components are likely to change over time. The share price of the iShares U.S. Real Estate ETF is tied to the performance of the real estate sector. The share price may not replicate the performance of the fund, its underlying index, or the components of that index. More information about the iShares U.S. Real Estate ETF is set out in the Indexes section of this prospectus. To learn more about the iShares U.S. Real Estate ETF, visit [iShares.com](https://www.ishares.com) and search ticker symbol IYR.

The fund is subject to several principal investment risks, such as those related to its investments in large-, mid- and small-capitalization U.S. companies in the real estate sector. In general, large-capitalization companies may be unable to respond quickly to new competitive challenges, and may not be able to attain the high growth rate of successful smaller companies. Generally, the securities of smaller companies (including mid- and small-capitalization companies) may be more volatile and may involve more risk than the securities of larger companies. Smaller companies are also more likely to fail than larger companies. Companies that invest in real estate are highly sensitive to the risks of owning real estate, to general and local economic conditions and developments in the real estate market, and to changes in interest rates. Many companies that invest in real estate utilize leverage (and some may be highly leveraged), which increases investment risk, and could potentially magnify the fund's losses. Because the fund is an ETF, it is also exposed to the risks associated with the operation of any ETF. The value of its shares, which are valued based on their trading prices in the secondary market, may change rapidly and unpredictably and may trade at premiums or discounts to the fund's net asset value.

The principal investment risks of the fund are described in the fund's prospectus, including the following risks: asset class risk, authorized participant concentration risk, concentration risk, cybersecurity risk, dividend risk, equity securities risk, index-related risk, issuer risk, large-capitalization companies risk, management risk, market risk, market trading risk, mid-capitalization companies risk, operational risk, passive investment risk, real estate investment risk, risk of investing in the United States, securities lending risk and tracking error risk.

SPDR Gold Shares ETF. The SPDR Gold Shares ETF represents units of beneficial interest in, and ownership of, the SPDR Gold Trust, an exchange traded fund that holds gold bullion. The investment objective of the trust is for the shares to reflect the performance of the price of gold bullion, less the trust's expenses. The shares are designed to mirror as closely as possible the price of gold, and the value of the shares relates directly to the value of the gold held by the trust, less its liabilities. The price of gold has fluctuated widely over the past several years and the shares have experienced significant price fluctuations. The value of the gold held by the trust is determined using the London Bullion Market Association (LBMA) Gold Price PM. The Gold Shares trade on the NYSE Arca under the symbol GLD. For more information, visit www.spdrgoldshares.com.

The fund is subject to several principal investment risks related to the price of gold. The price of gold has fluctuated widely over the past several years and the shares have experienced significant price fluctuations. Several factors may affect the price of gold, including:

- Global gold supply and demand, which is influenced by such factors as gold's uses in jewelry, technology, and industrial applications, purchases made by investors in the form of bars, coins, and other gold products, forward selling by gold producers, purchases made by gold producers to unwind gold hedge positions, central bank purchases and sales, and production and cost levels in major gold producing countries such as China, the United States and Australia;
- Global or regional political, economic, or financial events and situations, especially those unexpected in nature;
- Investors' expectations with respect to the rate of inflation;
- Currency exchange rates;
- Interest rates;
- Investment and trading activities of hedge funds and commodity funds; and
- Other economic variables such as income growth, economic output, and monetary policies.

The principal investment risks of the fund are described in the fund's prospectus, including the following risks: price risk, passive investment risk, trading market risk, risk of loss, damage, theft, or restriction on access, and risks related to the fund's ETF structure.

First Trust Barclays Edge Index. The First Trust Barclays Edge Index is designed to combine capital strength and value equity investment methodologies with a mix of US Treasury futures indexes for the potential to provide stable returns over time. The First Trust Barclays Edge Index consists of an equity component that combines stocks from the Capital Strength Index and the Value Line® Dividend Index. The Capital Strength Index starts with the largest 500 companies in the NASDAQ US benchmark index and then reduces the selection universe by screening for

companies that meet minimum criteria including cash and/or short-term investments on their balance sheets, low debt-to-market cap ratios and attractive return-on-equity. It then selects the top 50 names from this smaller universe based on low historical volatility. The Value Line Dividend Index starts with the universe of stocks published in its The Value Line Investment Survey publication and then selects those with a Value Line® Safety Rank of 1 or 2, with attractive dividends and market cap of one billion dollars or above. It then equally weights all stocks that meet those conditions (generally, around 160-200 stocks). The First Trust Barclays Edge Index then combines the stocks represented in The Capital Strength Index and the Value Line® Dividend Index with an equal-weight assigned to each underlying index and rebalanced back to equal-weight on a monthly basis. Furthermore, since the index is on an excess return basis (i.e., it returns the index performance in excess of risk-free rates), the risk-free return is deducted from the equity underliers. The risk-free rate used in this calculation is the U.S. Fed Funds Rate published by the Federal Reserve of New York (ticker: FEDL01) for each day divided by 360 as outlined in the Index Rulebook. No such adjustment is needed to the US Treasury futures indexes as these securities returns are naturally on an excess return basis.

The Index uses an optimizer to evaluate its exposure to stocks and US Treasury futures indexes on a daily basis to target a 7% volatility level. This volatility control mechanism aims to target or limit the volatility of the index return over time by adjusting the exposure of the index constituents through a rules-based process called mean-variance optimization. The optimizer defines risk using both shorter- and longer-term measures of historical realized volatility. It then seeks to determine the allocations between the equity and US Treasury futures index that produce the highest expected return for the target volatility level, subject to constraints. Depending on the constraints of the optimizer at the time, the Index may or may not allocate to the US Treasury futures indexes. When the volatility measures are low, the index can have exposure greater than 100%. However, the optimizer is constrained such that the exposure can never be greater than 225%. Likewise, when volatility is high, the index exposure can be less than 100%. In addition, the First Trust Barclays Edge Index generally rebalances based on end-of-day values in the event there is a deviation in the index component weights of 10% or more, on an absolute basis, from the previous index rebalance value.

The performance of the First Trust Barclays Edge Index reflects the deduction of operating costs and rebalancing costs from the valuation of the underlying indexes. These costs, deducted as an annualized percentage on a daily basis, are fixed for the underlying indexes. The operating costs for the First Trust Barclays Edge Index range from 0.20% to 0.60%, and the rebalancing costs for the First Trust Barclays Edge Index range from 0.02% to 0.03%. The operating costs represent an estimate of the costs that would be incurred to buy and sell the index components. The rebalancing costs represent an estimate of the costs that would be incurred each time the Index rebalances due to changes in weightings of the Index components. The deduction of these costs occurs at the First Trust Barclays Edge Index level (i.e., the return on the First Trust Barclays Edge Index is reduced based on the applicable operating and rebalancing costs).

The principal risks of the First Trust Barclays Edge Index include:

DEBT SECURITIES RISK. Investments in debt securities subject the holder to the credit risk of the issuer. Credit risk refers to the possibility that the issuer or other obligor of a security will not be able or willing to make payments of interest and principal when due. Generally, the value of debt securities will change inversely with changes in interest rates. To the extent that interest rates rise, certain underlying obligations may be paid off substantially slower than originally anticipated and the value of those securities may fall sharply. During periods of falling interest rates, the income received by a portfolio may decline. If the principal on a debt security is prepaid before expected, the prepayments of principal may have to be reinvested in obligations paying interest at lower rates. Debt securities generally do not trade on a securities exchange making them generally less liquid and more difficult to value than common stock.

EQUITY SECURITIES RISK. Equity securities prices fluctuate for several reasons, including changes in investors' perceptions of the financial condition of an issuer or the general condition of the relevant equity market, such as market volatility, or when political or economic events affecting an issuer occur. Common stock prices may be particularly sensitive to rising interest rates, as the cost of capital rises and borrowing costs increase. Equity securities may decline significantly in price over short or extended periods of time, and such declines may occur in the equity market as a whole, or they may occur in only a particular country, company, industry, or sector of the market.

INFLATION RISK. Inflation risk is the risk that the value of assets or income from investments will be less in the future as inflation decreases the value of money. As inflation increases, the present value of a portfolio's assets and distributions may decline.

INTEREST RATE RISK. Interest rate risk is the risk that the value of the debt securities in an underlying portfolio will decline because of rising market interest rates. Interest rate risk is generally lower for shorter term debt securities and higher for longer-term debt securities. A portfolio may be subject to a greater risk of rising interest rates than would normally be the case due to the current period of historically low rates and the effect of potential government fiscal policy initiatives and resulting market reaction to those initiatives. Higher market interest rates may reduce returns for the First Trust Barclays Edge Index. Duration is a reasonably accurate measure of a debt security's price sensitivity to changes in interest rates and a common measure of interest rate risk. Duration measures a debt security's expected life on a present value basis, taking into account the debt security's yield, interest payments and final maturity. In general, duration represents the expected percentage change in the value of a security for an immediate 1% change in interest rates. For example, the price of a debt security with a three-year duration would be expected to drop by approximately 3% in response to a 1% increase in interest rates. Therefore, prices of debt securities with shorter durations tend to be less sensitive to interest rate changes than debt securities with longer durations. As the value of a debt security changes over time, so will its duration.

MARKET RISK. Securities are subject to market fluctuations caused by such factors as economic, political, regulatory or market developments, changes in interest rates and perceived trends in securities prices. In addition, local, regional, or global events such as war, acts of terrorism, spread of infectious diseases or other public health issues, recessions, or other events could have a significant negative impact on the market and investment portfolios. For example, the coronavirus disease 2019 (COVID-19) global pandemic and the aggressive responses taken by many governments, including closing borders, restricting international and domestic travel, and the imposition of prolonged quarantines or similar

restrictions, had negative impacts, and in many cases severe impacts, on markets worldwide. As this global pandemic illustrated, such events may affect certain geographic regions, countries, sectors, and industries more significantly than others. These events also adversely affect the prices and liquidity of portfolio securities or other instruments and could result in disruptions in the trading markets.

REIT RISK. REITs typically own and operate income-producing real estate, such as residential or commercial buildings, or real-estate related assets, including mortgages. As a result, investments in REITs are subject to the risks associated with investing in real estate, which may include, but are not limited to: fluctuations in the value of underlying properties; defaults by borrowers or tenants; market saturation; changes in general and local operating expenses; and other economic, political or regulatory occurrences affecting companies in the real estate sector. REITs are also subject to the risk that the real estate market may experience an economic downturn generally, which may have a material effect on the real estate in which the REITs invest and their underlying portfolio securities. REITs may have also a relatively small market capitalization which may result in their shares experiencing less market liquidity and greater price volatility than larger companies. Increases in interest rates typically lower the present value of a REIT's future earnings stream, and may make financing property purchases and improvements more costly. Because the market price of REIT stocks may change based upon investors' collective perceptions of future earnings, the value of a portfolio that holds REITs will generally decline when investors anticipate or experience rising interest rates.

U.S. GOVERNMENT SECURITIES RISK. U.S. government securities are subject to interest rate risk but generally do not involve the credit risks associated with investments in other types of debt securities. As a result, the yields available from U.S. government securities are generally lower than the yields available from other debt securities. U.S. government securities are guaranteed only as to the timely payment of interest and the payment of principal when held to maturity. While securities issued or guaranteed by U.S. federal government agencies (such as Ginnie Mae) are backed by the full faith and credit of the U.S. Department of the Treasury, securities issued by government sponsored entities (such as Fannie Mae and Freddie Mac) are solely the obligation of the issuer and generally do not carry any guarantee from the U.S. government.

VOLATILITY CONTROL RISK. Volatility is a measure of the extent of variation in the returns of an asset over a period of time. The Index may reduce its exposure to one or more markets during periods of volatility in order to mitigate volatility in the value of the Index. During times when the Index reduces its market exposure in response to volatility, the Index will not fully participate in the growth in that market. Reducing market exposure during periods of volatility may mitigate the impact of short-term, significant market fluctuations in the Index's return, but may also cause the Index to not fully participate in recoveries in those markets. There is no guarantee that any volatility control methodology will be successful.

Market Risk Related to Option Prices

Before the end of a Term, money allocated to an Indexed Strategy is subject to the risk that changes in the related option prices may have a negative effect on the value of the Indexed Strategy. This risk applies only if you Surrender your Contract or take a withdrawal before the end of a Term.

Performance Lock Risk

If you make a Performance Lock election, you will no longer participate in the positive or negative performance of the Index over the remainder of the Term. This means the value of the Indexed Strategy cannot increase for the remainder of the Term, even if the Index rises over the remainder of the Term.

A Performance Lock election is effective on the second Market Close after receipt of your Request in Good Order. This means you will not be able to determine in advance the gain or loss applicable to the Indexed Strategy when electing a Performance Lock. The gain or loss may be higher or lower at the time the Performance Lock election goes effective than it was when you submitted your Request in Good Order.

Declared Rate Strategy Risk

We set a Declared Rate for each new one-year Term of the Declared Rate Strategy. The Declared Rate will never be less than the guaranteed minimum interest rate from 0.15% to 3.0% set out in the Declared Rate Strategy endorsement included in your Contract. The guaranteed minimum interest rate set out in the endorsement will never be less than the minimum interest rate required for fixed annuity contracts on the Contract Effective Date under the Standard Nonforfeiture Law of the state in which your Contract is issued. You risk the possibility that the Declared Rate for a new Term may be lower than you would find acceptable.

Regulatory Risk

MassMutual Ascend Life is not an investment company. Neither MassMutual Ascend Life nor the separate account that we established in connection with the Contracts is registered as an investment company under the Investment Company Act of 1940. The protections provided to investors by that Act are not applicable to the Contract.

Insurance Company Risk

No company other than MassMutual Ascend Life has any legal responsibility to pay amounts owed under the Contract. You should look to the financial strength of MassMutual Ascend Life for its claims-paying ability.

Our general account assets fund the guarantees provided in the Contracts. The assets are subject to our general business operation liabilities and claims of our creditors and may lose value. We established a non-unitized separate account for the purpose of supporting our obligation to adjust the Indexed Strategy values based on the Daily Value Percentage or rise or fall of the Index. The assets in the non-unitized separate account are not

chargeable with liabilities arising out of any other business that we conduct but may lose value. The non-unitized separate account differs from the unitized separate accounts that support our variable annuity contracts. As a result, unlike the owner of a traditional variable annuity who has a beneficial interest in, and participates in the performance of, the assets of the related unitized separate account, you do not have any interest in or claim on the assets in the non-unitized separate account and you will not participate in any way in the performance of assets held in that account.

Business Disruption and Cybersecurity Risks

We rely heavily on technology, including interconnected computer systems and data storage networks and digital communications, to conduct our business. Because our business is highly dependent upon the effective operation of our computer systems and those of our service providers and other business partners, our business is vulnerable to disruptions from utility outages, and susceptible to operational and information security risks resulting from information systems failure (e.g., hardware and software malfunctions), and cyberattacks. Cyberattacks may be systemic (e.g., affecting the internet, cloud services, or other infrastructure) or targeted (e.g., failures in or breach of our systems or those of third parties on whom we rely, including ransomware and malware attacks). Cybersecurity risks include, among other things, the loss, theft, misuse, corruption, and destruction of data maintained online or digitally, interference with or denial of service, attacks on our websites (or the websites of third parties on whom we rely), other operational disruption and unauthorized release, use or abuse of confidential customer information. The risk of cyberattacks may be higher during periods of geopolitical turmoil. Due to the increasing sophistication of cyberattacks, a cybersecurity breach could occur and persist for an extended period of time without detection. Systems failures and cyberattacks, as well as, any other catastrophic event, including natural and manmade disasters, public health emergencies, pandemic diseases, terrorist attacks, floods or severe storms affecting us, any third-party administrator, intermediaries, and other affiliated or third-party service providers may adversely affect us, our business operations and your Account Value and interfere with our ability to process contract transactions and calculate Account Values. Systems failures and cyberattacks may also interfere with our processing of contract transactions, including the processing of orders from our website, impact our ability to calculate Account Values, cause the release or possible destruction of confidential customer and/or business information, impede order processing or cause other operational issues, subject us and/or our service providers and intermediaries to regulatory fines, litigation and financial losses and/or cause reputational damage. Cybersecurity risks may also impact the issuers of securities of which the Indices are comprised, which may cause the Indices to lose value. The preventative actions we take to reduce the frequency and severity of cybersecurity incidents and protect our computer systems may be insufficient to prevent a cybersecurity breach from impacting our operations or your Account Value. There can be no assurance that we or our service providers and intermediaries will be able to avoid cybersecurity breaches affecting your Contract.

In addition, we are also exposed to risks related to natural and man-made disasters, including, but not limited to, storms, fires, floods, earthquakes, public health crises, malicious acts, and terrorist acts, or any other event, which could adversely affect our ability to conduct business. A natural or man-made disaster, including a pandemic such as COVID-19, could result in our workforce, and/or employees of service providers and/or third-party administrators, being compromised and unable or unwilling to fully perform their responsibilities, which could likewise result in interruptions in our service. This could interfere with our processing of contract transactions, including processing orders from owners, impact our ability to calculate Account Value, or have other adverse impacts on our operations. These events may also negatively affect our service providers and intermediaries, and issuers of securities of which the Indices are comprised, which may cause the Indices to lose value. There can be no assurance that we or our service providers and intermediaries will be able to avoid negative impacts associated with natural and man-made disasters.

BENEFITS AVAILABLE UNDER THE CONTRACT

The following table summarizes the information about the benefits available under the Contract.

Standard Benefits				
Name of Benefit	Purpose	Current Charge	Maximum Charge	Brief Description of Restrictions / Limitations
Death Benefit Return of Premium Guarantee	Pays a Death Benefit Amount of the greater of the Account Value or the Death Benefit Return of Premium Guarantee Amount if the Owner dies during the Accumulation Period	No charge	N/A	<ul style="list-style-type: none"> Only available during Accumulation Period Withdrawals may result in a reduction of the Death Benefit Return of Premium Guarantee that is greater than the amount of the withdrawal If the Death Benefit value becomes payable before the end of a Term, it will be subject to a Daily Value Percentage adjustment, or the locked Daily Value percentage if you have made a Performance Lock election
Free Withdrawal Allowance	Allows owner to withdraw some money from the Contract without an Early Withdrawal Charge	No charge	N/A	<ul style="list-style-type: none"> Only available during Accumulation Period During the first Contract Year, the Free Withdrawal Allowance is 10% of the total Purchase Payments After the first Contract Year, the Free Withdrawal Allowance is 10% of the Account Value as of the most recent Contract Anniversary Withdrawals will reduce the Contract Value and Death Benefit, perhaps significantly Withdrawals from an Indexed Strategy before the end of a Term will trigger a Daily Value Percentage adjustment. Withdrawals may be subject to taxes and penalties
Extended Care Waiver	Surrender or withdrawal may be made without an Early Withdrawal Charge if the Owner is confined to a qualifying licensed hospital or long-term care facility for at least 90 days	No charge	N/A	<ul style="list-style-type: none"> Only available during the Accumulation Period First day of confinement must be after the Contract Effective Date (or for Contracts issued before May 21, 2025, on or after the first Contract Anniversary) The confinement must continue for at least 90 consecutive days after the later of the first contract anniversary or the first date of confinement Surrender or withdrawal must be at least 90 days after first Contract Anniversary Not available in all states
Terminal Illness Waiver	Surrender or withdrawal may be made without an Early Withdrawal Charge or if the Owner is diagnosed with a terminal illness by a physician	No charge	N/A	<ul style="list-style-type: none"> Only available during the Accumulation Period The diagnosis must be rendered after the Contract Effective Date (or for Contracts issued before May 21, 2025, on or after the first Contract Anniversary) Surrender or withdrawal must be on or after first Contract Anniversary The Owner's life expectancy must be less than 12 months from the date of diagnosis Not available in all states
Performance Lock	Permits you to lock in the Daily Value Percentage of an Indexed Strategy before the end of the Term.	No charge	N/A	<ul style="list-style-type: none"> Only available during the Accumulation Period May only be used with S&P 500 Indexed Strategies (excluding the Trigger Strategies) and the First Trust Barclay's Edge Indexed Strategy You may only make a Performance Lock election for an eligible Indexed Strategy once per Term. A Performance Lock for an Indexed Strategy with a 5-year Term will always cause the Term to end on the next anniversary of the Term, regardless of how many years are left in the Term If you elect a Performance Lock, you will not be able to reallocate the locked value until the end of a Term.

Standard Benefits				
Name of Benefit	Purpose	Current Charge	Maximum Charge	Brief Description of Restrictions / Limitations
Automated Withdrawals	Permits automated withdrawals from the Contract	No charge	\$30 annually	<ul style="list-style-type: none"> Only available during the Accumulation Period Automated withdrawals during the first five Contract Years may be subject to an Early Withdrawal Charge Automated withdrawals taken before the end of a Term will be subject to a Daily Value Percentage adjustment Automated withdrawals will reduce the amount available under the Free Withdrawal Allowance Automated withdrawals could result in significant loss due to taxes and reduce your ability to take full advantage of any positive Index performance at the end of a Term Like other withdrawals, automated withdrawals reduce the Death Benefit Return of Premium Guarantee proportionally, and, if taken from an Indexed Strategy before the end of a Term, reduce the Strategy's Investment Base proportionally. The reduction in the Death Benefit Return of Premium Guarantee and Investment Base could be significantly larger than the amount of the withdrawal. You should discuss the impact of taking such withdrawals with your financial professional before electing to do so We may discontinue automated withdrawals at any time

CHARGES AND ADJUSTMENTS

Early Withdrawal Charge

We impose an Early Withdrawal Charge to reimburse us for contract sales expenses, including commissions and other distribution, promotion, and acquisition expenses, and to allow us to invest assets for a longer duration, which supports higher Positive Return Factor rates.

The Early Withdrawal Charge applies if, during the first five Contract Years, you take a withdrawal from your Contract or Surrender it. After that, the Early Withdrawal Charge does not apply.

During the first five Contract Years, unless a waiver applies, the Early Withdrawal Charge applies to each withdrawal, including withdrawals under an automated withdrawal program and withdrawals taken to satisfy a required distribution. The Early Withdrawal Charge does not apply to Death Benefit payments or Annuity Payout Benefit payments.

An Early Withdrawal Charge reduces your Account Value.

The Early Withdrawal Charge is equal to the amount that is subject to the charge multiplied by the Early Withdrawal Charge rate.

- If you take a withdrawal from your Contract, the amount subject to the charge is the amount you withdraw, which includes any amount needed to pay the Early Withdrawal Charge.** This means that at your direction either we will subtract the Early Withdrawal Charge from amount paid to you or we will increase the amount withdrawn as needed to cover the charge.
- If you Surrender your Contract, the amount subject to the charge is your Account Value.
- The amount subject to the charge will not include the Free Withdrawal Allowance or the amount, if any, that qualifies for a waiver as described below.

The Early Withdrawal Charge rate depends on how long you own your Contract. The rate schedule is set out below.

Contract Year	1	2	3	4	5	6+
Early Withdrawal Charge Rate	8%	7%	6%	5%	4%	0%

When you request a withdrawal, you can instruct us to reduce the amount we pay you by the amount of the Early Withdrawal Charge. If you instead instruct us to pay you the specific withdrawal amount, we will reduce your Account Value by both the requested specific withdrawal amount, as well as the amount of the Early Withdrawal Charge. In this case, since you opted not to pay the Early Withdrawal Charge out of your withdrawal proceeds, we treat the Early Withdrawal Charge as an additional requested withdrawal. We will apply the Early Withdrawal Charge rate to both the

specified withdrawal amount, as well as any amounts we withdraw to cover your Early Withdrawal Charges. The Early Withdrawal Charge does not apply to a withdrawal that qualifies for the Free Withdrawal Allowance or the amount, if any, that qualifies for another waiver.

Example for Surrender. You Surrender your Contract in Contract Year 5 when your Account Value is \$100,000. You have already used your Free Withdrawal Allowance for the year and no other exception applies. We take an Early Withdrawal Charge of \$4,000 (\$100,000 x 4%) and you receive \$96,000.

Example for Withdrawal. You request a withdrawal of \$12,000 from your Contract in Contract Year 5 and instruct us to pay you the entire \$12,000. You have already used your Free Withdrawal Allowance for the year and no other exception applies. We use the following formula to calculate the Early Withdrawal Charge.

$$\begin{aligned} & (\text{Requested withdrawal} \times \text{EWC rate}) / (1.00 - \text{EWC rate}) = \text{Early Withdrawal Charge} \\ & (\$12,000 \times 4\%) / (1.00 - 0.04) = \$480 / 0.96 = \$500 \end{aligned}$$

We take the Early Withdrawal Charge of \$500, you receive \$12,000, and your Account Value is reduced by \$12,500.

Note. If the amount subject to the Early Withdrawal Charge included only the amount you withdrew, the charge would have been \$480. Because the amount subject to the Early Withdrawal charge also included the amount needed to pay the charge, the actual charge is \$500.

Free Withdrawal Allowance

The Free Withdrawal Allowance lets you withdraw some money from your Contract without the imposition of the Early Withdrawal Charge. For the first Contract Year, the Free Withdrawal Allowance is an amount equal to 10% of the total Purchase Payments received by us. For each subsequent Contract Year, the Free Withdrawal Allowance is equal to 10% of the Account Value as of the most recent Contract Anniversary. The Free Withdrawal Allowance is non-cumulative and you may not carry over any unused portion to other Contract Years.

For qualified annuities, the Free Withdrawal Allowance will be large enough to cover your required minimum distribution to age 93. However, if you have used your Free Withdrawal Allowance to facilitate a transfer or rollover, then an Early Withdrawal Charge may apply to a required minimum distribution.

Example. Your Account Value as of the end of Contract Year 3 is \$200,000. Your Free Withdrawal Allowance for Contract Year 4 is \$20,000 (10% of \$200,000). If you take a withdrawal of \$50,000 at the beginning of Contract Year 4, the Early Withdrawal Charge will not apply to the first \$20,000 of the withdrawal, but will apply to the remaining \$30,000 plus the amount needed to pay the Early Withdrawal Charge. If you take another withdrawal later in Contract Year 4, the Early Withdrawal Charge applies to the entire withdrawal plus the amount needed to pay the Early Withdrawal Charge.

If you Surrender your Contract during the first five Contract Years, the amount subject to the Early Withdrawal Charge upon Surrender will not include the current or any prior Free Withdrawal Allowance.

Early Withdrawal Charge Waivers

Extended Care Waiver. We will waive the Early Withdrawal Charge that would otherwise apply if you make a Request in Good Order and:

- your Contract includes the waiver rider for extended care;
- you are confined in a long-term care facility or hospital and the confinement is prescribed by a physician and is medically necessary;
- the first day of the confinement is after the Contract Effective Date (or for Contracts issued before May 21, 2025, on or after the first Contract Anniversary); and
- the Surrender or withdrawal occurs at least 90 days after the first Contract Anniversary; and
- the confinement has continued for a period of at least 90 consecutive days.

You must provide us with satisfactory proof that you meet these conditions before the date of the withdrawal or Surrender. There is no charge for this rider, but it may not be available in all states. You do not need to take any action to add this waiver rider.

Terminal Illness Waiver. We will waive the Early Withdrawal Charge that would otherwise apply if you make a Request in Good Order and:

- your Contract includes the waiver rider for terminal illness;
- you are diagnosed with a terminal illness by a physician and, as a result of the terminal illness, you have a life expectancy of less than 12 months from the date of diagnosis;
- the diagnosis is rendered by a physician after the Contract Effective Date (or for Contracts issued before May 21, 2025, on or after the first Contract Anniversary); and
- the Surrender or withdrawal occurs on or after the first Contract Anniversary.

You must provide us with satisfactory proof that you meet these conditions before the date of the withdrawal or Surrender. There is no charge for this rider, but it may not be available in all states. You do not need to take any action to add this waiver rider.

State Limitations. In some states, our ability to waive fees or charges may be limited by applicable laws, regulations, or administrative positions. See “Appendix C: State Variations” for information about availability in your state.

Automated Withdrawal Program Charges

Currently, we do not charge a fee to participate in an automated withdrawal program. However, we reserve the right to impose an annual fee in such amount as we may then determine to be reasonable for participation in the automated withdrawal program. If imposed, the fee will not exceed \$30 annually.

Premium and Other Taxes

We reserve the right to deduct from the Purchase Payment or Account Value any taxes relating to the Contract paid by us to any government entity (including, but not limited to, premium taxes, additional taxes, and maintenance taxes on insurers, Federal, state and local withholding of income, estate, inheritance, or other taxes required by law from annuity Purchase Payments, and any new or increased taxes on insurers or annuity Purchase Payments that may be enacted into law).

Currently some state governments impose premium taxes, additional taxes, and maintenance taxes on insurers based on annuity Purchase Payments received or applied to an annuity payout benefit. These taxes currently range from zero to 3.5% depending upon the jurisdiction and the tax qualification of the Contract. A federal premium tax has been proposed but not enacted. We may deduct any such premium or other taxes from the Purchase Payments or the Account Value at the time that the tax is imposed. We may also deduct any such tax not previously deducted from the Annuity Payout value or Death Benefit value.

We reserve the right to deduct from the Contract for any income taxes that we incur because of the Contract. At the present time, however, we are not incurring any such income tax or making any such deductions.

Daily Value Percentage Adjustment

Each day before the final Market Day of a Term, the value of an Indexed Strategy is the Investment Base increased or decreased by the Daily Value Percentage. If, before the final Market Day of a Term, you take a withdrawal, Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable, we will apply a Daily Value Percentage adjustment to determine the value of an Indexed Strategy before the end of a Term, and, if you have elected a Performance Lock, to determine the value of an Indexed Strategy for the balance of a Term. The purpose of this calculation is to shift any potential investment loss on the Company's general account assets that support the indexed option guarantees from the Company to you when amounts are removed prematurely from an Indexed Strategy. The Daily Value Percentage includes the prices of hypothetical options and is calculated by subtracting the Residual Option Cost and Trading Cost from the Net Option Price. The Residual Option Cost and Trading Cost are charges for unwinding the investment before the end of a Term. These charges reduce the Indexed Strategy value which means that any Indexed Strategy value before the end of a Term will almost always be less, perhaps significantly less, than the value suggested by the rise or fall of the Index. Because the Residual Option Cost is a decreasing value, its negative impact on Strategy values will be more pronounced at the start of a Term than at the end of that Term. In addition, even if the Index rises, the Strategy value may be less than the Investment Base due to these deductions. A negative Daily Value Percentage adjustment could result in significant loss, even if the Index is performing positively. Before the end of a Term, if you take a withdrawal, Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable, the reduction in Indexed Strategy value due to the Residual Option Cost and Trading Cost may cause a loss to exceed the -10% Floor or 50% Downside Participation Rate, and may eliminate the benefit of the 10% Buffer or 20% Buffer. The Residual Option Cost and Trading Cost are determined each time the Daily Value Percentage is calculated or when a Performance Lock election is made. **As a result, in extreme circumstances, an Indexed Strategy may have no value before the end of a Term due to the Daily Value Percentage, meaning that you would suffer the loss of 100% of your principal and any prior earnings in that Strategy if, before the end of the Term, you were to Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable. For more information on the Residual Option Cost and Trading Cost, please see the “Indexed Strategy Value Before End of Term” section beginning on page 44.**

You may access Daily Value Percentage information for the Indexed Strategies as of the previous day's Market Close by calling 1-800-789-6771 or by accessing your account online at www.massmutualascend.com. This value can fluctuate daily, and the current value quoted may differ from the actual value calculated at the time of adjustment.

See “Contract Adjustments” in the Statement of Additional Information for more details, including examples illustrating the operation of the Daily Value Percentage adjustment.

PURCHASING THE CONTRACT

You may purchase a Contract only through a registered representative of a broker-dealer that has a selling agreement with our affiliated underwriter, MM Ascend Life Investor Services, LLC.

Any Owner or Annuitant must be age 80 or younger on the Contract Effective Date. To determine eligibility, we will use the person's age on his/her last birthday. We may make exceptions with respect to the maximum issue age in our discretion.

The Contract is not available in all states. To find out if it is available in the state where you live, ask your registered representative. The Contract may not be available for purchase during certain periods. There are a number of reasons why the Contract periodically may not be available, including that we may want to limit the volume of sales of the Contract. You may wish to speak to your registered representative about how this may affect your purchase. For example, in order to purchase the Contract, you may be required to submit your application prior to a specific date. In that case, if there is a delay because your application is incomplete or otherwise not in good order, you might not be able to purchase the Contract. Your broker-dealer may impose conditions on the purchase of the Contract, such as a lower maximum issue age, than we or other selling firms impose. In addition, Selling Broker-Dealers may not make certain indexed strategies available. If you have any questions, you should contact your Selling Agent or his or her Selling Broker Dealer. We reserve the right to reject any application at our discretion. We also reserve the right to discontinue the sale of the Contracts at any time.

Purchase Payments

The Contract is a modified single premium annuity contract. This means you may make one or more Purchase Payments during the Purchase Payment period. The Purchase Payment period begins on the Contract Effective Date. It will end two months after the Contract Effective Date.

The initial Purchase Payment must be at least \$25,000. Unless we agree, each additional Purchase Payment must be at least \$10,000. You will need our prior approval if you want to make total Purchase Payments of more than \$1,000,000.

We must receive your initial Purchase Payment on or before the Contract Effective Date. We must receive each additional Purchase Payment on or before the last day of the Purchase Payment period. We will not accept any Purchase Payment that we receive after the date that the Contract is cancelled or Surrendered, or after a death for which a Death Benefit is payable. We deem Purchase Payments mailed to our post office box at P.O. Box 5423, Cincinnati OH 45201-5423, as received by us at our administrative office when the Purchase Payment or the paperwork reaches the applicable processing department located at 191 Rosa Parks Street, Cincinnati OH 45202.

We reserve the right to refuse a Purchase Payment made in the form of a personal check in excess of \$100,000. We may accept a Purchase Payment over \$100,000 made in other forms, such as EFT/wire transfers, or certified checks or other checks written by financial institutions. We will not accept a Purchase Payment(s) made with cash, money orders, or traveler's checks.

Exchanges, Transfers, or Rollovers

If you own an annuity or tax-qualified account, you may be able to exchange it for an Index Frontier 5 Plus annuity, directly transfer it to an Index Frontier 5 Plus annuity, or roll it over to an Index Frontier 5 Plus annuity without paying taxes. Before you do, compare the benefits, features, and costs of each annuity or account. You may pay an early withdrawal charge under the old annuity or account. You may pay an early withdrawal charge if you later take withdrawals from your Index Frontier 5 Plus annuity. Please note that some financial professionals may have a financial incentive to offer this Contract in place of the one the investor already owns. Ask your registered representative whether an exchange, transfer, or rollover would be advantageous, based on the features, benefits, and charges of the Index Frontier 5 Plus annuity.

If you purchase your Contract with an exchange, transfer, or rollover, a delay in processing the exchange, transfer, or rollover may delay the issuance of your new Contract or prevent the application of additional Purchase Payments to your new Contract.

You should only exchange your existing contract for this Contract if you determine after comparing the features, fees, and risks of both contracts that it is preferable for you to purchase this Contract rather than continuing to own your existing contract.

Application of Purchase Payments

Each Purchase Payment will be held in the Purchase Payment Account until it is applied to a Crediting Strategy on a Strategy Application Date pursuant to your instructions. On each Strategy Application Date, we will apply the then current balance of the Purchase Payment Account to the Crediting Strategies you selected.

We will credit interest daily on amounts held in the Purchase Payment Account at the annual effective rate set out in your Contract. This rate will be at least 0.15%.

In most states, we are required to give back your Purchase Payment(s) if you decide to cancel your Contract during the free look period. If we are required by law to refund your Purchase Payment(s), we reserve the right to hold your Purchase Payment(s) in the Purchase Payment Account until the first Strategy Application Date on or after the end of the free look period. For those States, if you cancel your Contract before that Strategy Application Date, we will refund your Purchase Payment(s) but you will forfeit any interest credited to the Purchase Payment Account or other increase in Account Value.

Purchase Payment Account Value

On any day, the value of the Purchase Payment Account is equal to:

- Purchase Payments received by us plus interest earned daily; minus

- the premium tax or other tax that may apply to the Purchase Payments; and minus
- each withdrawal and related Early Withdrawal Charge taken from the Purchase Payment Account since the last Strategy Application Date.

Unforeseen Processing Delays

We are exposed to risks related to natural and man-made disasters and catastrophes, such as (but not limited to) storms, fires, floods, earthquakes, public health crises, malicious acts, and terrorist acts, any of which could adversely affect our ability to conduct business. A natural or man-made disaster or catastrophe, including a pandemic (such as the COVID-19 pandemic), could affect the ability or willingness of our employees or the employees of our service providers to perform their job responsibilities. While many of our employees and the employees of our service providers are able to work remotely, those remote work arrangements may result in our business operations being less efficient than under normal circumstances and could lead to delays in our processing of contract-related transactions, including orders from contract owners. Catastrophic events may negatively affect the computer and other systems on which we rely, impact our ability to calculate values under your Contract, or have other possible negative impacts. There can be no assurance that our service providers will be able to successfully avoid negative impacts associated with natural and man-made disasters and catastrophes.

A processing delay will not affect the effective date as of which we process transactions, including orders from contract owners, the date that a Term begins or ends, or the values used to process the transaction.

Right to Cancel (Free Look)

If you change your mind about owning the Contract, you may cancel it within 20 days after you receive it. If you purchase this Contract to replace an existing annuity contract or life insurance policy, you have 30 days after you receive it. This is known as a “free look.” The right to cancel period may be longer in some states.

To cancel your Contract, you must submit your request to cancel to the producer who sold it or send it to us at P.O. Box 5423, Cincinnati, OH 45201-5423. If sent to us by mail, it is effective on the date postmarked with proper address and postage paid. Your request to cancel must be in writing and signed by you.

If you cancel your Contract, you will receive a refund. The amount of the refund will depend on when you purchased your Contract and where you live. When you cancel the Contract within this free look period, we will not assess an Early Withdrawal Charge on the amount to be refunded. There may be tax consequences if you cancel the Contract. You should seek advice on tax questions based on your particular circumstances from a tax advisor.

Refund Amount if your Contract Effective Date is on or after May 21, 2025

If you cancel your Contract, you will receive a refund equal to your Purchase Payment(s), but you will forfeit any interest credited to the Purchase Payment Account or other increase in the Account Value. We reserve the right to hold your Purchase Payment(s) in the Purchase Payment Account until the first Strategy Application Date on or after the end of the free look period.

“**Appendix C: State Variations**” contains a summary of the state law provisions related to the free look period and the required refund amount that apply in certain states for Contracts with a Contract Effective date on or after May 21, 2025.

Refund Amount if your Contract Effective Date is before May 21, 2025

- If you cancel your Contract and you live in a state where we are required to refund your Purchase Payment(s), you will receive a refund equal to your Purchase Payment(s), but you will forfeit any interest credited to the Purchase Payment Account or other increase in the Account Value. We reserve the right to hold your Purchase Payment(s) in the Purchase Payment Account until the first Strategy Application Date on or after the end of the free look period.
- If you cancel your Contract and you live in a state where we are required to refund the Account Value of your Contract, you will receive the Account Value on the day that we receive your cancellation Request in Good Order. If the Account Value includes the value of an Indexed Strategy, that Strategy value will reflect the applicable Daily Value Percentage. The amount you receive may be more or less than your Purchase Payment(s) depending upon any interest credited to the Purchase Payment Account and the value of your Crediting Strategies. This means that you bear the risk of any decline in the Account Value of your Contract before we receive your cancellation request.

Unless required by state law, we do not refund any Early Withdrawal Charges assessed during the free look period that relate to a withdrawal taken before you cancel the Contract.

“**Appendix C: State Variations**” contains a summary of the state law provisions related to the free look period and the required refund amount that apply in certain states for Contracts with a Contract Effective Date before May 21, 2025.

INITIAL STRATEGY SELECTIONS

You make your initial selection of Crediting Strategies in your purchase application. Your initial selection is set out in the Contract Specifications section of your Contract.

Your initial selection will also apply to each subsequent Purchase Payment. If you wish to change your selection for a specific Purchase Payment, we must receive a Request in Good Order that identifies the Crediting Strategies you are selecting for that Purchase Payment before the Strategy Application Date that applies to that Purchase Payment.

When you select a Crediting Strategy, you must also indicate the percentage of the Purchase Payment that you wish to allocate to that Crediting Strategy. All allocations must be in whole percentages that total 100%. We reserve the right to round amounts up or down to make whole percentages, and to reduce or increase amounts proportionally in order to total 100%.

Currently there are no limitations on the amounts that may be applied to a Crediting Strategy.

The S&P 500 5-year 10% Buffer with Upside Participation Rate Indexed Strategy, the S&P 500 5-year 10% Buffer with Cap Indexed Strategy, and the S&P 500 5-year 20% Buffer with Cap Indexed Strategy are only available for Terms that begin in the first Contract Year.

We may establish minimum and maximum amounts or percentages that may be applied to a given Crediting Strategy for any future Term in our discretion. We will notify you of any such minimum or maximum. No minimum or maximum amounts or percentages shall apply to the S&P 500 1-Year -10% Floor with Cap Indexed Strategy. Selling Broker-Dealers may separately establish minimum and maximum amounts or percentages that they will allow to be allocated to a given Crediting Strategy for the initial Terms, and they may choose not to discuss or offer certain strategies for the initial Terms. We may limit the availability of a Strategy for a Term that would extend beyond the Annuity Payout Initiation Date. All Strategies may not be available in all states.

STRATEGY SELECTIONS AT TERM END

At the end of a Term, you may choose to reallocate your money among the Indexed Strategies and the Declared Rate Strategy or you may choose to take no action. If you do not send us a reallocation request, your current allocations will automatically continue in the new Term as long as the same Crediting Strategies are available.

Reallocations

At the end of a Term, you may reallocate the ending values of the Crediting Strategies for that Term among the available Strategies. You can only reallocate amounts from one Crediting Strategy to another at the end of the Term for which such amount is being held. You cannot make a reallocation at any other time.

We will send you written notice at least 30 days before the end of a Term to provide you with the opportunity to make a reallocation. We must receive your Request in Good Order for a reallocation before the last Market Close of the Term. For example, if the end of a Term falls on a weekend, we must receive your request by the last Market Close before that weekend.

Reallocations must be in whole percentages that total 100%. We reserve the right to round amounts up or down to make whole percentages, and to reduce or increase amounts proportionally in order to total 100%.

Any reallocation or continuing allocation will be subject to Strategy availability, minimums, and maximums. Currently there are no limitations on the amounts that may be applied to any single Crediting Strategy. We may establish minimum and maximum amounts or percentages that may be applied to a given Crediting Strategy for any future Term in our discretion. We will notify you of any such minimum or maximum.

The new Term of each Strategy is subject to the Declared Rate or the Positive Return Factor rate in effect for that Strategy for that new Term. For example, the Upside Participation Rate for an Indexed Strategy for a new Term may be different than the Upside Participation Rate for that Indexed Strategy for the Term that is ending. The applicable Negative Return Factor rate will not change from Term to Term.

Continuing Allocations

You do not need to take any action if you want to continue your current allocations and all of your strategies are available for the next Term. If you do not send us a reallocation request, then we will automatically apply the ending value of each Crediting Strategy to a new Term of that same Strategy.

Availability of Strategies

We will send you a written notice at least 30 days before the end of each Term with information about the Strategies that will be available for the next Term. At least 10 days before the next Term starts, we will post the Declared Rate and the Positive Return Factor rates that will apply for the next Term on our website (www.massmutualascend.com/index-frontier-5-plus).

The S&P 500 1-year -10% Floor with Cap Indexed Strategy and a Declared Rate Strategy will always be available. We are not obligated to offer any one particular Declared Rate Strategy or any other particular Indexed Strategy. At the end of a Term, we can add or stop offering any other Crediting Strategy at our discretion. We reserve the right to limit the availability of a Strategy for a Term that would extend beyond the Annuity Payout Initiation Date. All Crediting Strategies may not be available in all states.

If we intend to add or stop offering a Crediting Strategy at the end of a Term, we will send you a notification at least 30 days before the end of the Term to provide you with the opportunity to make a reallocation. If funds are held in a Crediting Strategy that will no longer be available after the end of a Term, the funds will remain in that Strategy until the end of that Term.

Unavailable Strategies

Other than the S&P 500 1-year -10% Floor with Cap Indexed Strategy or a Declared Rate Strategy, a Crediting Strategy may be unavailable for the next Term because we are no longer offering that Strategy, or we have set a minimum or maximum for that Strategy. No minimum or maximum shall apply to the S&P 500 1-Year -10% Floor with Cap Indexed Strategy.

When a Crediting Strategy is unavailable for the next Term, you may choose to reallocate the funds held in that Strategy.

If a Crediting Strategy is not available, and either you have not reallocated the funds or the amount allocated to it is under the minimum or over the maximum for that Strategy, then the amount that cannot be allocated to it for the new Term will be reallocated as described in the Default Strategy Allocations section below.

Surrender or Withdrawal at Term End

At the end of a Term, you may choose to Surrender your Contract or to take a withdrawal from your Contract. You may do so for any reason, including dissatisfaction with the available Crediting Strategies. An Early Withdrawal Charge may apply. In addition, there may be tax consequences if you Surrender your Contract or take a withdrawal. You should seek advice on tax questions based on your particular circumstances from a tax advisor.

Contract values calculated at the end of a Term will reflect the applicable Strategy values and any Early Withdrawal Charge that applies upon Surrender or to your withdrawal. The value of an Indexed Strategy at the end of the Term will not reflect any Daily Value Percentage because it is calculated based on the rise or fall of the applicable Index for the Term.

DEFAULT STRATEGY ALLOCATIONS

The following rules apply to Strategies that have a Term longer than two years:

- At the end of a Term of the S&P 500 5-Year 10% Buffer with Upside Participation Rate Indexed Strategy, if you do not reallocate, we will apply the ending value to a new Term of the S&P 500 1-Year 10% Buffer with Cap Indexed Strategy.
- At the end of a Term of the S&P 500 5-year 10% Buffer with Cap Indexed Strategy, if you do not reallocate, we will apply the ending value to a new Term of the S&P 500 1-year 10% Buffer with Cap Indexed Strategy.
- At the end of a Term of the S&P 500 5-year 20% Buffer with Cap Indexed Strategy, if you do not reallocate, we will apply the ending value to a new Term of the S&P 500 1-Year 20% Buffer with Cap Indexed Strategy.

In all other cases, to the extent an amount cannot be applied to a new Term of that same Indexed Strategy because the Strategy will not be available or because the amount is under the minimum or over the maximum for that Strategy, and you do not reallocate, we will reallocate that amount (in order of priority):

- 1) to another Indexed Strategy as provided in the endorsement to the unavailable Indexed Strategy; or
- 2) to the Declared Rate Strategy.

For example, if you allocate only to a SPDR Gold Shares 1-Year -10% Floor with Cap Indexed Strategy, that Strategy is no longer available, you do not send us a request to reallocate, and no default Indexed Strategy is provided in the SPDR Gold Shares 1-Year -10% Floor with Cap Indexed Strategy endorsement, then we would apply the amount allocated to the Declared Rate Strategy.

If the amount to be applied exceeds the maximum, then only the excess amount will be applied using those rules. For example, if the maximum amount for a Crediting Strategy is \$50,000 and the amount to be applied is \$54,000, then we will apply the excess \$4,000 to another Crediting Strategy using the priority rules set out above.

INDEXED STRATEGIES

The Indexed Strategies provide positive or negative returns that are based, in part, upon changes in the value of an Index. The Indexed Strategies do not earn interest, but the value of each Indexed Strategy is adjusted for gains or losses based on the performance of the Index. An investment in an Indexed Strategy is not an investment in the Index or in any Index fund. **You could lose a significant amount of money if the Index declines in value. If amounts are removed from an Indexed Strategy before the end of the Term, you could lose a significant amount of money due to a negative Daily Value Percentage adjustment.**

Unless you have made a Performance Lock election, any increase or decrease in the value of an Indexed Strategy at the end of a Term is based on the change in the value of the applicable Index since the start of that Term and the applicable Positive Return Factor rate set for that Term and the Negative Return Factor fixed for the Strategy.

Unless you have made a Performance Lock election, any increase or decrease in the value of an Indexed Strategy before the end of a Term is based on the calculated price of hypothetical options related to the possible future change in the applicable Index over the Term, the initial cost of those options, and the trading cost related to those options. The calculated price of those options takes into account the Cap or the Trigger Rate for the Term and the Floor, the Buffer, and the Index change required to qualify for the Trigger Rate.

If you have made a Performance Lock election, then beginning at the second Market Close following receipt of your election and continuing through the end of the Term, any increase or decrease in the value of an Indexed Strategy is locked in based on the Daily Value Percentage which is the calculated price of hypothetical options related to the possible future change in the applicable Index over the Term, the initial cost of those options, and the trading cost related to those options, all as determined at that second Market Close.

Each Indexed Strategy has a Positive Return Factor rate for each Term. We will set a new Positive Return Factor rate for each Indexed Strategy prior to the start of each Term. **The Cap for an Indexed Strategy will never be lower than 1%, the Upside Participation Rate will never be lower than 5%, and the Trigger Rate will never be lower than 1%.**

The applicable Negative Return Factor rate for a Strategy will not change from Term to Term. For each Term of an Indexed Strategy with a Buffer that we currently offer, the Buffer is 10% or 20%. For each Term of the Indexed Strategies with a Floor that we currently offer, the Floor is -10%.

Information regarding the features of each currently offered Indexed Strategy, including (i) its name, (ii) its type, (iii) its Term, (iv) its current Negative Return Factor, (v) its minimum Positive Return Factor rates, and (vi) the availability of Performance Lock is available in an appendix to the prospectus. **See "Appendix A: Investment Options Available Under the Contract".**

Possible Changes in Indexed Strategies

The S&P 500 1-Year -10% Floor with Cap Indexed Strategy will always be available. At the end of a Term, we may stop offering any other Indexed Strategy. Consequently, any other Indexed Strategy listed above may not be available after the end of the initial Term. We have the right to replace the Index associated with an Indexed Strategy under certain circumstances.

In the future, we may offer new Indexed Strategies. Any new Buffer Strategy will offer protection against loss at least equal to a 5% Buffer. Any new Floor Strategy will offer protection against loss at least equal to a -20% Floor.

Indexed Strategies that may be available in the future may earn a return that is lower than the return your investments would have earned if they had been invested in the other Indexed Strategies that are currently available. In addition, any reduction in the available number of Indexed Strategies may reduce your opportunity to increase your Contract value.

Considerations in Choosing an Indexed Strategy

When choosing among Indexed Strategies, you should consider the characteristics and risk profiles of the Indexes, which are discussed in the Indexes section of this prospectus. You should also consider Term lengths. It is generally more difficult to predict Index performance over a longer Term. In addition, you cannot reallocate funds among Strategies before the end of a Term, and the only way to exit a Strategy before the end of a Term is to take a withdrawal or Surrender your Contract.

When choosing among Indexed Strategies that use the same Index, you should also consider how the Positive Return Factors may affect the potential return.

- A Cap Strategy provides you with the opportunity to participate fully in any rise in the Index up to the Cap, but you will not participate in any rise in the Index in excess of the Cap.
- An Upside Participation Rate Strategy provides you with the opportunity to share in any rise in the Index without a Cap, but your share of any rise is limited by the rate at which you participate in the rise and may be less than 100%.
- A Performance Trigger Strategy provides you with the opportunity to receive the Trigger Rate when the change in the Index over the course of a Term is zero or positive, or in the case of the Dual Performance Trigger Strategy, is zero, positive, or negative up to the Buffer. However, you will not participate in any rise in the Index in excess of the Trigger Rate.

If we assume the Upside Participation Rate is less than 100%, here is how the performance will compare for similar Indexed Strategies with a Cap, Upside Participation Rate, and Trigger Rate each with a 10% Buffer.

- In any Term where the rise in the Index is less than the Cap, the Cap Strategy will always perform better than the corresponding Upside Participation Rate Strategy.
- In any Term where the rise in the Index is more than the Cap, but less than the Cap divided by the Upside Participation Rate, the Cap Strategy will always perform better than the corresponding Upside Participation Rate Strategy.

- In any Term where the rise in the Index is more than the Cap and equal to the Cap divided by the Upside Participation Rate, the Cap Strategy and Upside Participation rate Strategy will perform the same.
- In any Term where the rise in the Index is more than the Cap, and is more than the Cap divided by the Upside Participation Rate, the Upside Participation Rate Strategy will always perform better than the Cap Strategy.
- Any increase in the value of a Trigger Strategy will equal the Trigger Rate multiplied by the remaining Investment Base. This means that the performance of a Trigger Strategy will only perform better than other Strategies if the Trigger Rate is higher than the returns of the other Strategies after a Cap or Upside Participation Rate has been applied.
- In any Term where the Index falls by more than 10%, the Cap Strategy, Upside Participation Rate Strategy, or Trigger Strategy will produce the same results at the end of the Term because they have the same 10% Buffer. However, before the end of the Term, due to different option pricing, they may have different Daily Value Percentages and returns.
- In any Term where the Index falls by 10% or less, the Dual Performance Trigger Strategy will perform better than the Cap Strategy, Upside Participation Rate Strategy, and Performance Trigger Strategy because the return of the Dual Performance Trigger Strategy will be positive, in an amount equal to the Trigger Rate, while the Cap Strategy, Upside Participation Rate Strategy, and Performance Trigger Strategy will be zero at the end of the Term because they have the same 10% Buffer.

When choosing among Indexed Strategies that use the same Index, you should also consider how Negative Return Factors may affect your potential risk of loss.

- A Buffer Strategy protects you against losses up to the Buffer amount, but you are subject to any loss in excess of the Buffer.
- A Floor Strategy limits your loss to the Floor amount, and you will be protected against any loss beyond the Floor.

Examples. These examples are intended to help you understand the interplay between Positive Return Factors for Indexed Strategies with similar Terms in different market environments and how this interplay affects the comparative performance of Indexed Strategies that use the same Index. The example assumes that each strategy has downside protection in the form of a 10% Buffer.

Index rise over Term	Return at end of Term				Explanation
	16% Cap	75% Upside Participation Rate	11% Trigger Rate for Performance Trigger Strategy	8% Trigger Rate for Dual Performance Trigger Strategy	
4%	4%	3%	11%	8%	The Cap Strategy has a better return than the Upside Participation Rate Strategy because the 4% rise in the Index is less than the 16% Cap while the Upside Participation Rate captures only 75% of the 4% Index rise. Positive Index changes can only produce positive returns for the Performance Trigger Strategy and the Dual Performance Trigger Strategy that amount to 11% and 8%, respectively.
14%	14%	10.5%	11%	8%	The Cap Strategy has a better return than the Upside Participation Rate Strategy because the 14% rise in the Index is less than the 16% Cap, but more than 10.5% (the 14% rise in the Index multiplied by the 75% Upside Participation Rate). Positive Index changes can only produce positive returns for the Performance Trigger Strategy and the Dual Performance Trigger Strategy that amount to 11% and 8%, respectively.
16%	16%	12%	11%	8%	The Cap Strategy has a better return than the Upside Participation Rate Strategy because the 16% rise in the Index is fully captured by the 16% Cap while the Upside Participation Rate captures only 75% of the 16% Index rise. Positive Index changes can only produce positive returns for the Performance Trigger Strategy and the Dual Performance Trigger Strategy that amount to 11% and 8%, respectively.
20%	16%	15%	11%	8%	The Cap Strategy has a better return than the Upside Participation Rate Strategy because the Cap Strategy caps the 20% Index rise at 16% while the Upside Participation Rate captures only 75% of the 20% Index rise. Positive Index changes can only produce positive returns for the Performance Trigger Strategy and the Dual Performance Trigger Strategy that amount to 11% and 8%, respectively.
0%	0%	0%	11%	8%	Performance Trigger Strategies and Dual Performance Trigger Strategies are the only Indexed Strategies that change in value when the Index change is zero. The Performance Trigger Strategy outperforms the Dual Performance Trigger Strategy in this case because the Trigger Rate is higher for the Performance Trigger Strategy.

Index rise over Term	16% Cap	Return at end of Term			Explanation
		75% Upside Participation Rate	11% Trigger Rate for Performance Trigger Strategy	8% Trigger Rate for Dual Performance Trigger Strategy	
-10%	0%	0%	0%	8%	The Dual Performance Trigger Strategy provides a better return than all the other options because a positive Trigger Rate is credited when Index losses do not exceed the Buffer.
-30%	-20%	-20%	-20%	-20%	All Strategies have the same negative return because the Index loss exceeded the Buffer.

See “Appendix B: Examples of Impact of Withdrawals on Contract Values and Amounts Realized” for more information about the interplay between Positive Return Factors for Indexed Strategies with different Terms in different market environments.

See the "Indexed Strategy Value at End of Term" section below for more examples for each type of Indexed Strategy.

Term

Each Term of an Indexed Strategy will start and end on a Strategy Application Date. Each Term is either one year long or five years long. A new Term will start at the end of the preceding Term. **Gain or Loss for the Term based on the Index change, the Positive Return Factor, and the Negative Return Factor only applies to amounts that remain in an Indexed Strategy until the end of its Term. A Daily Value Percentage adjustment will be applied if, before the end of a Term, you were to take a withdrawal, Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable. See “Indexed Strategy Value Before End of Term” and “Indexed Strategy Value After Performance Lock Election” below.**

If you make only one Purchase Payment or you make all of your Purchase Payments before the initial Strategy Application Date, then each Term of each Indexed Strategy will end on the same date in any given year. If you make a Purchase Payment after the initial Strategy Application Date, then your Purchase Payments will be applied to the Indexed Strategies on different Strategy Application Dates. In this case, an Indexed Strategy may have Terms that end on different dates in any given year.

Examples. These examples show how a Contract with multiple Purchase Payments may have Terms that end on different dates.

- You make your initial Purchase Payment on March 10 and another Purchase Payment on March 17. You allocate both payments to the same Indexed Strategy. The initial Strategy Application Date for both Purchase Payments is March 20. Each Term of that Indexed Strategy will start and end on March 20.
- You make your initial Purchase Payment on May 2 and another Purchase Payment on June 14. You allocate both payments to the same Indexed Strategy. The initial Strategy Application Date for your initial Purchase Payment is May 6. For amounts attributable to your initial Purchase Payment, each Term of that Indexed Strategy will start and end on May 6. The initial Strategy Application Date for your second Purchase Payment is June 20. For amounts attributable to your second Purchase Payment, each Term of that Indexed Strategy will start and end on June 20.

Investment Base

The value of an Indexed Strategy is calculated using the Investment Base. The Investment Base is not your Account Value, Surrender Value, Annuity Payout value, or Death Benefit value, but it is used to calculate those values.

The Investment Base starts with the amount applied to the Strategy at the start of the current Term and is also reduced proportionally for each withdrawal and related Early Withdrawal Charge during the Term.

The reduction in the Investment Base for a withdrawal and the related Early Withdrawal Charge is proportional to the reduction in the value of the Indexed Strategy due to the withdrawal and the Early Withdrawal Charge. For example, if the sum of the withdrawal and related Early Withdrawal Charge is equal to 15% of the Indexed Strategy value immediately before the withdrawal, then the withdrawal will reduce the Investment Base by 15%.

The reduction in the Indexed Strategy value will be based on the Daily Value Percentage of the Indexed Strategy (or the locked Daily Value Percentage if you have made a Performance Lock election). The Daily Value Percentage could be negative, which could result in significant loss, even if the Index has risen since the start of the Term.

- If the Daily Value Percentage is positive and the Strategy value immediately before the withdrawal is greater than the Investment Base, then the reduction in the Investment Base will be less than the withdrawal and the related Early Withdrawal Charge.
- If the Daily Value Percentage is negative and the Strategy value immediately before the withdrawal is less than the Investment Base, then the reduction in the Investment Base will be more than the withdrawal and the related Early Withdrawal Charge.

A reduction in the Investment Base for a Term will reduce the gain or loss from any future changes in the Index during that Term.

Here are the formulas that we use to calculate a reduction in the Investment Base for a withdrawal.

Withdrawal as a percentage of Strategy value = withdrawal and related Early Withdrawal Charge / Strategy value before withdrawal

Reduction in Investment Base = Investment Base before withdrawal x withdrawal as a percentage of Strategy value

Investment Base after withdrawal = Investment Base before withdrawal—reduction in Investment Base

Examples.

You withdraw \$1,000 (including the amount needed to cover Early Withdrawal Charges). On the date of your withdrawal, your Investment Base is \$5,000.

Assume that the Daily Value Percentage is 5% on the withdrawal date.

- The increase in the Strategy value for the Daily Value Percentage is equal to \$250 ($\$5,000 \times 5\%$).
- The Strategy value on the withdrawal date is \$5,250 ($\$5,000 + \250).
- The reduction in the Strategy value on account of the withdrawal is 19.05% ($\$1,000 / \$5,250$).
- The proportional reduction in the Investment Base is \$952 ($\$5,000 \times 19.05\%$).
- The Investment Base after the withdrawal is \$4,048 ($\$5,000 - \952).
- Because the Strategy value on the withdrawal date was more than the Investment Base on that date, the reduction in the Investment Base is only \$952, which is less than the \$1,000 withdrawal.

Assume that the Daily Value Percentage is -10% on the withdrawal date.

- The reduction in the Strategy value for the Daily Value Percentage is equal to \$500 ($\$5,000 \times -10\%$).
- The Strategy value on the withdrawal date is \$4,500 ($\$5,000 - \500).
- The reduction in the Strategy value on account of the withdrawal is 22.22% ($\$1,000 / \$4,500$).
- The proportional reduction in the Investment Base is \$1,111 ($\$5,000 \times 22.22\%$).
- The Investment Base after the withdrawal is \$3,889 ($\$5,000 - \$1,111$).
- Because the Strategy value on the withdrawal date was less than the Investment Base on that date, the reduction in the Investment Base was \$1,111, which is greater than the \$1,000 withdrawal.

Indexed Strategy Value

The value of an Indexed Strategy depends on whether the determination is made at the end of a Term or during a Term, and whether you have made a Performance Lock election.

At the end of a Term, unless you have made a Performance Lock election, the value of an Indexed Strategy is equal to:

- the Investment Base at the end of the Term (after all reductions during the Term); plus
- any increase for a rise in the Index over the course of the Term (measured at the start and end of the Term), or for the Dual Performance Trigger Strategy, any fall in the Index that does not exceed the Buffer, subject to the applicable Positive Return Factor for the Term; or minus
- any decrease for a fall in the Index over the course of the Term (measured at the start and end of the Term) subject to the applicable Negative Return Factor for the Strategy.

See the “Indexed Strategy Value at End of Term” section on page 41 for more information and examples.

On each day before the end of a Term, unless you have made a Performance Lock election, the value of an Indexed Strategy is equal to:

- the Investment Base on that day (after all reductions to date during the Term); plus
- any increase for a positive Daily Value Percentage; or minus
- any decrease for a negative Daily Value Percentage.

See the “Indexed Strategy Value Before End of Term” section on page 44 for more information and examples.

Beginning with the second Market Close after a Performance Lock election and continuing through the end of the Term, the value of an Indexed Strategy subject to that election is equal to:

- the Investment Base on that day; plus
- any increase for a positive Daily Value Percentage, as locked on that second Market Close; or minus
- any decrease for a negative Daily Value Percentage, as locked on that second Market Close.

See the “Indexed Strategy Value After Performance Lock Election” section on page 45 for more information and examples.

Positive Return Factors

We may limit the positive Index return used in calculating gain credited to an Indexed Strategy at the end of its Term through the use of a Cap, an Upside Participation Rate, or a Trigger Rate. The Cap, Upside Participation Rate, or Trigger Rate will vary for each Term. For information about the current Positive Return Factor rates offered for new Contracts, please contact your registered representative or refer to our website (www.massmutualascend.com/index-frontier-5-plus). The Positive Return Factor rates posted on that website address are incorporated by reference into this prospectus. Current Positive Return Factor rates will not change during an Indexed Strategy’s Term.

Cap. The Cap for an Indexed Strategy is the maximum positive Index change over the course of a Term that is taken into account to determine the Strategy value at the end of that Term. For example, if the Index return over the Term is 16% and the Cap is 10%, the Strategy value will increase 10% for the Term. Before the end of a Term, the Cap is reflected in the formulas that we use to calculate the Net Option Price.

- **The Cap will vary among Indexed Strategies.**
- **The Cap for a given Indexed Strategy will vary from Term to Term.**
- **We guarantee that the Cap for a Term of an Indexed Strategy will never be less than 1%.**
- **For each Term, your return on a Cap Strategy may be less than any rise in the Index over that Term.**
- **For each Term, your return on a Cap Strategy may be less than the Cap for that Term.**

Upside Participation Rate. The Upside Participation Rate for an Indexed Strategy is your share of any positive Index change (measured from the beginning of the Term to the end of the Term) that is taken into account to determine the Strategy value at the end of that Term. For example, if the Index return over the Term is 20% and the Upside Participation Rate is 75%, the Strategy value will increase 15% for the Term (75% of the increase in the value of the Index). Before the end of a Term, the Upside Participation Rate is reflected in the formulas that we use to calculate Net Option Price.

- **The Upside Participation Rate will vary among Indexed Strategies.**
- **The Upside Participation Rate for a given Indexed Strategy will vary from Term to Term.**
- **We guarantee that the Upside Participation Rate for a Term of an Indexed Strategy will never be less than 5%.**
- **For each Term, if the Upside Participation Rate is less than 100%, then your return on an Upside Participation Rate Strategy will be less than any rise in the Index over that Term.**

Trigger Rate. The Trigger Rate is the specified rate that is credited to the Strategy value when the Index change (measured at the start and end of the Term) qualifies for the Trigger Rate. In the case of a Performance Trigger Strategy, the Strategy Values will increase by the Trigger Rate for the Term when the Index change is zero or positive at the end of the Term. For example, if the index return over the Term is 8% and the Trigger Rate for a Performance Trigger Strategy is 11%, the Strategy values will increase 11% (the Trigger Rate) for the Term. In the case of a Dual Performance Trigger Strategy, the Strategy values will increase by the Trigger Rate for the Term if the Index change is zero, positive, or negative up to the Buffer at the end of the Term. For example, if the index return over the Term is -5%, the Buffer Rate is -10% and the Trigger Rate for a Dual Performance Trigger Strategy is 10%, the Strategy values will increase 10% (the Trigger Rate) for the Term. Before the end of a Term, the Trigger Rate and the Index change required to qualify for the Trigger Rate are reflected in the formulas that we use to calculate the Net Option Price.

- **The Trigger Rate will vary among Indexed Strategies.**
- **The Trigger Rate for a given Indexed Strategy will vary from Term to Term.**
- **We guarantee that the Trigger Rate for a Term of a Trigger Strategy will never be less than 1%.**
- **For each Term, the Trigger Rate on a Dual Performance Trigger Strategy will be less than the Trigger Rate for that Term on a Performance Trigger Strategy.**

We set each Index’s Positive Return Factor rate at our discretion based on the length of the Term, the cost of hedging, interest rates, the Index change required to qualify for the Trigger Rate, and other market factors. On a non-discriminatory basis, we may also take into account the amount of the Purchase Payments received for a Contract. The Positive Return Factor rates for Contracts with larger Purchase Payments may be higher than the Positive Return Factor rates for Contracts with smaller Purchase Payments. You may obtain information regarding these Positive Return Factors by calling 1-800-789-6771 or on our website (www.massmutualascend.com/index-frontier-5-plus).

Before selecting an Indexed Strategy for investment, you should consider in consultation with your financial professional the limits on Index gains that may be appropriate for you based on your risk tolerance, investment horizon and financial goals. Generally, assuming the same Index and Term length, an Indexed Strategy that provides less potential for Index gains will tend to have more protection from Index losses. Conversely, assuming the same Index and Term length, an Indexed Strategy that provides more potential for Index gains will generally tend to have less protection from Index losses.

Positive Return Factors for Initial Terms. Each Purchase Payment is applied to an initial Term of a Strategy on the first Strategy Application Date on or after the date that the payment is received. The Positive Return Factor rates for each Strategy Application Date may vary. The Positive Return Factor rates for the first Strategy Application Date will be available on our website (www.massmutualascend.com/index-frontier-5-plus) on the date you signed the application (as long as we receive the application for the Contract within eight days after the date you sign it) and before the date of any Purchase Payment to which the Positive Return Factor rates will apply. If we receive the application for the Contract within eight days after the date you sign it, we will guarantee the Positive Return Factor rates in effect on the date you signed the application for three Strategy Application Dates from the date of the application.

If we receive the signed application within eight days after the date you sign it, then for any **1-year Indexed Strategy**:

- For an initial Term starting on the first Strategy Application Date on or after the application date, the Positive Return Factor rate will be the Positive Return Factor rate in effect on the date you signed the application.
- For an initial Term starting on one of the next two Strategy Application Dates, the Positive Return Factor rate will be the higher of the Positive Return Factor rate in effect on the date you signed the application or the Positive Return Factor rate otherwise in effect for that Strategy Application Date.
- For any initial Term starting on a later Strategy Application Date, the Positive Return Factor rate will be the Positive Return Factor rate in effect for that Strategy Application Date.

If we receive the signed application within eight days after the date you sign it, then for any **5-year Indexed Strategy**:

- For an initial Term starting on the first Strategy Application Date on or after the application date or one of the next two Strategy Application Dates, the Upside Participation Rate will be the Upside Participation Rate in effect on the date you signed the application.
- For any initial Term starting on a later Strategy Application Date, the Upside Participation Rate will be the Upside Participation Rate in effect for that Strategy Application Date.

If we receive the signed application more than eight days after the date you sign it, then the guarantee does not apply and the Positive Return Factor rate for each Initial Term will be the Positive Return Factor rate in effect for that Strategy Application Date.

Example 1: You sign an application for a Contract on May 1 and allocate all of your Purchase Payments to the S&P 500 1-year -10% Buffer with Cap Strategy. On the date of the application, the Cap for the first Strategy Application Date (May 6) is 8%. We receive the application and the first Purchase Payment from you on May 8 and the second Purchase Payment from you on May 23. The Cap for the next two Strategy Application Dates is 10% (May 20) and 7% (June 6).

In this case, the initial 1-year Term for the first Purchase Payment would begin on May 20 and would have a 10% Cap (the higher of the May 6 rate or the May 20 rate). The initial 1-year Term for the second Purchase Payment would begin on June 6 and would have an 8% Cap (the higher of the May 6 rate or the June 6 rate).

If we had not received your signed application until May 10 (more than eight days after the date you signed the application), then you would not qualify for the rate guarantee, and the initial 1-year Term for the first Purchase Payment received on May 8 would have a 10% Cap (the May 20 rate effective for Purchase Payments received between May 21 and May 20), and the initial 1-year Term for the second Purchase Payment received on May 23 would have a 7% Cap (the June 6 rate effective for Purchase Payments received between May 21 and June 6).

Example 2: You sign an application for a Contract on May 1 and allocate all of your Purchase Payments to the S&P 500 5-year 10% Buffer with Upside Participation Rate Strategy. On the date of the application, the Upside Participation Rate for the first Strategy Application Date (May 6) is 105%. We receive the application and the first Purchase Payment from you on May 8 and the second Purchase Payment from you on May 23. The Upside Participation Rates for the next two Strategy Application Dates are 110% (May 20) and 95% (June 6).

In this case, the initial 5-year Term for the first Purchase Payment would begin on May 20 and would have a 105% Participation Rate (the May 6 rate), and the initial 5-year Term for the second Purchase Payment would have a 105% Participation Rate (the May 6 rate).

If we had not received your signed application until May 10 (more than eight days after the date you signed the application), then the initial 5-year Term for the first Purchase Payment would have a 110% Participation Rate (the May 20 rate), and the initial 5-year Term for the second Purchase Payment would have a 95% Participation Rate (the June 6 rate).

Positive Return Factors for Subsequent Terms. At least 30 days before the end of each Term, we will send you a written notice with information about the Indexed Strategies that will be available for the next Term, and will indicate the date by which the Positive Return Factor rates will be posted on our website. The Positive Return Factor rates for the next Term will be available on our website (www.massmutualascend.com/index-frontier-5-plus) at least 10 days before the start of the Term. You should consider this information before finalizing your renewal or reallocation decision.

Negative Return Factors

We will limit the negative Index return used in calculating loss charged to an Indexed Strategy at the end of its Term through the use of a Floor or a Buffer.

Floor. The Floor for an Indexed Strategy is the portion of any net fall in the Index for the Term (measured at the start and end of the Term) that is taken into account to determine the Strategy value at the end of that Term. For each Term of each Floor Strategy that we currently offer for this Contract, the Floor is either -10% or 0%. For example, if the Index return is -18% and the floor is -10%, the Strategy values will decrease 10% (the maximum loss under the Floor) for the Term. Before the end of a Term, the Floor is reflected in the formulas that we use to calculate the Net Option Price.

The Floor for an Indexed Strategy that is available on the Contract Effective Date will not change.

In the future, we may offer a new Floor Strategy with a Floor that offers more or less protection against loss than a -10% Floor, but we will not offer a new Floor Strategy that offers less protection against loss than a -20% Floor.

Buffer. The Buffer for an Indexed Strategy is the portion of any net fall in the Index for the Term (measured at the start and end of the Term) that is disregarded when determining the Strategy value at the end of that Term. If the Index return over the Term is -18% and the Buffer is 10%, the Strategy values will decrease 8% (the amount that exceeds the Buffer) for the Term. Before the end of a Term, the Buffer is reflected in the formulas that we use to calculate the Net Option Price.

For each Term of each 10% Buffer Strategy that we currently offer for this Contract, the Buffer is 10%, and for each Term of each 20% Buffer Strategy that we currently offer with this Contract, the Buffer is 20%. The Buffer for an Indexed Strategy that is available on the Contract Effective Date will not change.

In the future, we may offer a new Strategy with a Buffer that offers more or less protection against loss than a 10% Buffer or a 20% Buffer, but we will not offer a new Buffer Strategy that offers less protection against loss than a 5% Buffer.

We set the Floor or Buffer for each Indexed Strategy we offer at our sole discretion. We consider various factors in determining the limit on Index losses, including the cost of our risk management techniques, sales commissions, administrative expenses, regulatory and tax requirements, general economic trends, and competitive factors.

Before selecting an Indexed Strategy for investment, you should consider in consultation with your financial professional the limits on Index losses that may be appropriate for you based on your risk tolerance, investment horizon and financial goals. Generally, assuming the same Index and Term length, an Indexed Strategy that provides more protection from Index losses will tend to have less potential for Index gains. Conversely, assuming the same Index and Term length, an Indexed Strategy that provides less protection from Index losses will generally tend have more potential for Index gains.

INDEXED STRATEGY VALUE AT END OF TERM

On or after the final Market Day of a Term, unless you have made a Performance Lock election, the value of an Indexed Strategy is the Investment Base increased based on the performance of the applicable Index (after application of Positive Return Factors) or decreased for any net fall in the applicable Index (after application of Negative Return Factors) over that Term. If you have made a Performance Lock election, then the normal rules set out in this section do not apply, and the value at the end of a Term is determined as described under Indexed Strategy Value After Performance Lock Election section on page 45.

Any increase or decrease is based on the rise or fall in the applicable Index since the start of that Term. This rise or fall is expressed as a percentage of the Index at the start of the Term. It is measured from the Index at the last Market Close on or before the first day of that Term to the Index at the final Market Close of the Term.

Example. The Index was 1000 at the last Market Close on or before the first day of a Term.

- If the Index at the final Market Close of the Term is 1065, then the Index has risen by 6.5% $((1065 - 1000) / 1000)$.
- If the Index at the final Market Close of the Term is 925, then the Index has fallen by 7.5% $((925 - 1000) / 1000)$.

The following examples illustrate how we calculate Strategy values under each Index crediting methodology assuming hypothetical Index returns and hypothetical limits on Index gains and losses. The examples assume no withdrawals.

Buffer with Upside Participation Rate Strategy

In the absence of a Performance Lock election, here are the formulas that we use to calculate the Strategy value at the end of a Term of a Buffer with Upside Participation Rate Strategy.

Strategy value at end of Term = Investment Base + dollar amount of increase or decrease

Dollar amount of increase or decrease = Investment Base x increase or decrease percentage

Increase percentage = any net rise in the Index for the Term x Upside Participation Rate

Decrease percentage for the Buffer with Upside Participation Rate Strategy = any net fall in the Index for the Term to the extent it is greater than the Buffer

Example. At the beginning of a Term, you allocate \$100,000 to 1-Year 10% Buffer with Upside Participation Rate Strategy and the Upside Participation Rate for the Term is 105%. You do not take any withdrawals during that Term, which means that your Investment Base at the end of that Term is \$100,000. You have not made a Performance Lock election.

	At Final Market Close of Term	At Final Market Close of Term
Assumed Rise or fall in Index	+16%	-16%
Increase or decrease percentage	+16.8% (105% of 16%)	-6% (-16% - -10%)
Dollar amount of increase or decrease	+16,800 (\$100,000 x 16.8%)	-6,000 (\$100,000 x -6%)
Strategy value at end of Term	\$116,800 (\$100,000 + \$16,800)	\$94,000 (\$100,000 - \$6,000)

Buffer with Cap Strategy

In the absence of a Performance Lock election, here are the formulas that we use to calculate the Strategy value at the end of a Term of 10% Buffer with Cap Strategy.

Strategy value at end of Term = Investment Base + dollar amount of increase or decrease

Dollar amount of increase or decrease = Investment Base x increase or decrease percentage

Increase percentage = any net rise in the Index for the Term, but never more than the Cap

Decrease percentage = any net fall in the Index for the Term to the extent it is greater than the Buffer

Example. At the beginning of a Term, you allocate \$100,000 to a 1-Year 10% Buffer with Cap Strategy and the Cap for the Term is 13%. You do not take any withdrawals during that Term, which means that your Investment Base at the end of that Term is \$100,000. You have not made a Performance Lock election.

	At Final Market Close of Term	At Final Market Close of Term
Assumed Rise or fall in Index	+16%	-16%
Increase or decrease percentage	+13% (16% > 13% Cap)	-6% (-16% - -10%)
Dollar amount of increase or decrease	+13,000 (\$100,000 x 13%)	-6,000 (\$100,000 x -6%)
Strategy value at end of Term	\$113,000 (\$100,000 + \$13,000)	\$94,000 (\$100,000 - \$6,000)

Floor with Cap Strategy

In the absence of a Performance Lock election, here are the formulas that we use to calculate the Strategy value at the end of a Term of a Floor with Cap Strategy.

- Strategy value at end of Term = Investment Base + dollar amount of increase or decrease
- Dollar amount of increase or decrease = Investment Base x increase or decrease percentage
- Increase percentage = any net rise in the Index for the Term, but never more than the Cap
- Decrease percentage = any net fall in the Index for the Term, but never more than the Floor

Example. At the beginning of a Term, you allocate \$100,000 to a 1-Year -10% Floor with Cap Strategy and the Cap for the Term is 14%. You do not take any withdrawals during that Term, which means that your Investment Base at the end of that Term is \$100,000. You have not made a Performance Lock election.

	At Final Market Close of Term	At Final Market Close of Term
Assumed Rise or fall in Index	+16%	-16%
Increase or decrease percentage	+14% (16% > 14% Cap)	-10% (-16% < -10%)
Dollar amount of increase or decrease	+14,000 (\$100,000 x 14%)	-10,000 (\$100,000 x -10%)
Strategy value at end of Term	\$114,000 (\$100,000 + \$14,000)	\$90,000 (\$100,000 - \$10,000)

Buffer with Performance Trigger Strategy

Here are the formulas that we use to calculate the Strategy value at the end of a Term of a Buffer with Performance Trigger Strategy.

Strategy value at end of Term = Investment Base + dollar amount of increase or decrease

Dollar amount of increase or decrease = Investment Base x increase or decrease percentage

Increase percentage = the Trigger Rate, applied when Index returns are positive or zero

Decrease percentage = any net fall in the Index for the Term to the extent it is greater than the Buffer

Example. At the beginning of a Term, you allocate \$100,000 to a 1-Year 10% Buffer with Performance Trigger Strategy and the Trigger Rate for the Term is 11%. You do not take any withdrawals during that Term, which means that your Investment Base at the end of that Term is \$100,000.

	At Final Market Close of Term	At Final Market Close of Term	At Final Market Close of Term	At Final Market Close of Term
Assumed Rise or fall in Index	+16%	0%	-6%	-16%
Increase or decrease percentage	+11% (11% Trigger Rate)	+11% (11% Trigger Rate)	0% (-6% > -10%)	-6% (-16% < -10%)
Dollar amount of increase or decrease	+11,000 (\$100,000 x 11%)	+11,000 (\$100,000 x 11%)	0 (\$100,000 x 0%)	-6,000 (\$100,000 x -6%)
Strategy value at end of Term	\$111,000 (\$100,000 + \$11,000)	\$111,000 (\$100,000 + \$11,000)	\$100,000 (\$100,000 - \$0)	\$94,000 (\$100,000 - \$6,000)

Buffer with Dual Performance Trigger Strategy

Here are the formulas that we use to calculate the Strategy value at the end of a Term of a Buffer with Dual Performance Trigger Strategy.

Strategy value at end of Term = Investment Base + dollar amount of increase or decrease

Dollar amount of increase or decrease = Investment Base x increase or decrease percentage

Increase percentage = the Trigger Rate, applied when Index returns are zero, positive, or negative but do not exceed the Buffer

Decrease percentage = any net fall in the Index for the Term to the extent it is greater than the Buffer

Example. At the beginning of a Term, you allocate \$100,000 to a 1-Year 10% Buffer with Dual Performance Trigger Strategy and the Trigger Rate for the Term is 8%. Because this is a Dual Performance Trigger Strategy, the Index change must be zero, positive, or negative up to the 10% Buffer in order to qualify for the Trigger Rate. You do not take any withdrawals during that Term, which means that your Investment Base at the end of that Term is \$100,000.

	At Final Market Close of Term	At Final Market Close of Term	At Final Market Close of Term	At Final Market Close of Term
Assumed Rise or fall in Index	+16%	0%	-6%	-16%
Increase or decrease percentage	+8% (8% Trigger Rate)	+8% (8% Trigger Rate)	+8% (8% Trigger Rate)	-6% (-16% < -10%)
Dollar amount of increase or decrease	+8,000 (\$100,000 x 8%)	+8,000 (\$100,000 x 8%)	+8,000 (\$100,000 x 8%)	-6,000 (\$100,000 x -6%)
Strategy value at end of Term	\$108,000 (\$100,000 + \$8,000)	\$108,000 (\$100,000 + \$8,000)	\$108,000 (\$100,000 + \$8,000)	\$94,000 (\$100,000 - \$6,000)

INDEXED STRATEGY VALUE BEFORE END OF TERM

Before the final Market Day of a Term, unless you have made a Performance Lock election, the value of an Indexed Strategy is the Investment Base increased or decreased by the Daily Value Percentage. If you have made a Performance Lock election, then the normal rules set out in this section do not apply, and the value after the effective date of the Performance Lock election through the end of the Term is determined as described under Indexed Strategy Value After Performance Lock Election section below. **See “Contract Adjustments” in the Statement of Additional Information for more details, including examples illustrating the operation of the Daily Value Percentage adjustment.**

In the absence of a Performance Lock election, here are the formulas that we use to calculate the Strategy value before the end of a Term.

Strategy value before end of Term = Investment Base + dollar amount of increase or decrease

Dollar amount of increase or decrease = Investment Base x Daily Value Percentage

Daily Value Percentage = Net Option Price – Residual Option Cost – Trading Cost

Net Option Price

The Net Option Price is one part of the formula used to calculate Daily Value Percentage. The Net Option Price is based on the calculated prices of hypothetical options that represent the projected changes in the Index over the full Term. The model we use to price those options is described in the Option Prices section of the Statement of Additional Information. **For more information on how the Net Option Price is calculated for each strategy, see “Contract Adjustments” in the Statement of Additional Information.**

Residual Option Cost

The Residual Option Cost is one part of the formula used to calculate Daily Value Percentage. The Residual Option Cost starts with the Net Option Price at the beginning of a Term, which is calculated using the formulas set out above. That Net Option Price is then multiplied by the time remaining in the Term as a percentage of the length of the Term.

The Residual Option Cost as of a Market Close is a percentage equal to: (1) the Net Option Price for the Strategy at the beginning of the Term; multiplied by (2) the number of days remaining until the final Market Close of the Term divided by 365 for a one-year Term or by 1,826 days for a five-year Term.

Trading Cost

The Trading Cost is one part of the formula used to calculate the Daily Value Percentage. The Trading Cost as of a Market Close is the estimated cost of selling the hypothetical options before the end of a Term to the extent not already reflected in the option price. It is a percentage that reflects the average market difference between option bid-ask average prices and option bid prices. We may change the Trading Cost at any time due to changes in option prices.

Maximum Loss Before the End of a Term

If you Surrender your Contract or take a withdrawal before the end of a Term, there is no set maximum loss because the Indexed Strategy value is determined using the Daily Value Percentage. The loss on a Floor Strategy may exceed the Floor, a 10% Buffer Strategy may not receive the benefit of the 10% Buffer, and a 20% Buffer Strategy may not receive the benefit of the 20% Buffer, because the use of the Daily Value Percentage means that the Residual Option Cost and Trading Cost are subtracted from the Strategy value. The Residual Option Cost and Trading Cost are determined each time the Daily Value Percentage is calculated. **As a result, in extreme circumstances, an Indexed Strategy may have no value before the end of a Term, meaning that you would suffer the loss of 100% of your principal and any prior earnings in that Strategy if, before the end of the Term, you were to Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable.**

INDEXED STRATEGY VALUE AFTER PERFORMANCE LOCK ELECTION

Performance Lock is an election to lock in the Daily Value Percentage for the remainder of a Term of an Indexed Strategy. You can make a Performance Lock election for each Term of an S&P 500 Strategy (excluding the three Trigger Strategies) and for each Term of a First Trust Barclays Edge Strategy. Only one performance lock election may be made for a given Term of a Strategy.

You may make a Performance Lock election by a Request in Good Order received prior to the third to last Market Close of a Term. A Performance Lock election for a Term is effective on the second Market Close following our receipt of your Request in Good Order. Once we receive your Request in Good Order, a Performance Lock election for a Term cannot be changed or revoked. You may access Daily Value Percentage information for the Indexed Strategies as of the previous day's Market Close by calling 1-800-789-6771 or by accessing your account online at www.massmutualascend.com.

If you make a Performance Lock election for a Term of a given Strategy, then the normal rules described in the Indexed Strategy Value at End of Term section and the Indexed Strategy Value Before End of Term section do not apply. Instead, beginning with the second Market Close after our receipt of the election, the Strategy value before the end of the Term and the Strategy value at the end of the Term is based on the Daily Value Percentage as locked at that second Market Close. This means that the Daily Value Percentage as of that second Market Close will apply from that date on through the end of the Term.

Because a Performance Lock election is effective on the second Market Close following receipt of the election, you will not be able to determine in advance the locked Daily Value Percentage that will apply to the Indexed Strategy at the time you make a Performance Lock election. The locked Daily Value Percentage could be negative, even if it is positive on the day you request a Performance Lock. The locked Daily Value Percentage could be negative, which could result in significant loss, even if the Index has risen since the start of the Term. When you elect a Performance Lock, your ending Strategy value will not be based on the ending Index value on the last day of the Term, which means you will not benefit from any rise in the Index during the balance of the Term and may earn less than you would have if you had not made a Performance Lock election. If the Daily Value Percentage is negative, you could lock in a loss, and the loss could be significant. Before electing a Performance Lock, you should consult with a financial advisor.

Beginning on that second Market Close and continuing through the end of the Term, the value of an Indexed Strategy is equal to:

- the Investment Base on that day; plus
- any increase for a positive Daily Value Percentage, as locked on that second Market Close; or minus
- any decrease for a negative Daily Value Percentage, as locked on that second Market Close.

A Performance Lock election does not affect the Investment Base. After a Performance Lock election is effective, except for withdrawals and Early Withdrawal Charges, the value of a locked Strategy will not change until the start of the next Term.

If you make a Performance Lock election for a Strategy is permitted under your Contract, and the election takes place before the last year of a 5-year Term, then the Term for that Strategy will end on the next anniversary of the Term start date. If you take no action and do not send us a reallocation request by that anniversary, then:

- We will apply the ending value for the shortened Term of the S&P 500 5-Year 10% Buffer with Upside Participation Rate Indexed Strategy to a new Term of the S&P 500 1-Year 10% Buffer with Cap Indexed Strategy.
- We will apply the ending value for the shortened Term of the S&P 500 5-Year 10% Buffer with Cap Indexed Strategy to a new Term of the S&P 500 1-Year 10% Buffer with Cap Indexed Strategy.
- We will apply the ending value for the shortened Term of the S&P 500 5-Year 20% Buffer with Cap Indexed Strategy to a new Term of the S&P 500 1-Year 20% Buffer with Cap Indexed Strategy.

Performance Lock Examples

Examples. Here are two examples that show how the Performance Lock election works for S&P 500 or First Trust Barclays Edge Strategies. In each example, we assume that Performance Lock election is effective on day 90 of a 1-year Term.

Assumptions

<i>Option Price Assumptions</i>	Price at Start of Term (as a Percentage of Index at Start of Term)	Price on Lock Effective Date (as a Percentage of Index at Start of Term)
ATM Call Option Price	6.00%	7.47%
OTM Call Option Price	1.15%	1.81%
ATM Put Option Price	5.40%	3.36%
OTM Put Option Price	4.50%	2.80%

<i>Strategy Assumptions</i>	
Investment Base for each Strategy at Term end	\$100,000
Cap for one-year Term	11%

Example 1: 10% Buffer with Cap Strategy

Lock effective date ATM Call Option Price – OTM Call Option Price	5.66%	(7.47%-1.81%)
Lock effective date OTM Put Option Price	-2.80%	
Net Option Price on Lock effective date	= 2.86%	
Initial ATM Call Option Price – Initial OTM Call Option Price	4.85%	(6.00%-1.15%)
Initial OTM Put Option Price	- 4.50%	
Net Option Price	= 0.35%	
Amortization Factor for days remaining from Lock effective date to final Market Day of Term	x 75.34%	(275 / 365)
Residual Option Cost on Lock effective date	0.26%	
Net Option Price	2.86%	
Residual Option Cost	-0.26%	
Assumed Trading Cost	- 0.15%	
Locked Daily Value Percentage	= 2.45%	
Dollar amount of increase at Term end	\$2,450	(\$100,000 x 2.45%)
Value of 10% Buffer with Cap Strategy at Term end	\$102,450	(\$100,000 + \$2,450)

Example 2: -10% Floor with Cap Strategy

Lock effective date ATM Call Option Price – OTM Call Option Price	5.66%	(7.47% – 1.81%)
(Lock effective date ATM Put Option Price – OTM Put Option Price)	- 0.56%	(3.36% – 2.80%)
Net Option Price on Lock effective date	= 5.10%	
Initial ATM Call Option Price – Initial OTM Call Option Price	4.85%	(6.00% – 1.15%)
- (Initial ATM Put Option Price – Initial OTM Put Option Price)	- 0.90%	(5.40% - 4.50%)
Net Option Price	= 3.95%	
Amortization Factor for days remaining from Lock effective date to final Market Day of Term	x 75.34%	(275 / 365)
Residual Option Cost on Lock effective date	= 2.98%	
Net Option Price	5.10%	
Residual Option Cost	- 2.98%	
Assumed Trading Cost	- 0.15%	
Locked Daily Value Percentage	= 1.97%	
Dollar amount of increase at Term end	\$1,970	(\$100,000 x 1.970%)
Value of -10% Floor with Cap Strategy at Term end	\$101,970	(\$100,000 + \$1,970)

Examples. Here is an example that shows how the Performance Lock election works with a five-year 10% Buffer with Upside Participation Rate Strategy. In this example, we assume that the Performance Lock election is effective on day 1644 of a five-year Term.

Assumptions for Example 3

	<i>Price at Start of Term (as a Percentage of Index at Start of Term)</i>	<i>Price on Lock Effective Date (as a Percentage of Index at Start of Term)</i>
<i>Option Price Assumptions</i>		
ATM Call Option Price	20.59%	18.04%
OTM Put Option Price	15.47%	16.35%
<i>Strategy Assumptions</i>		
Investment Base for each Strategy at end of Term		\$ 100,000
Upside Participation Rate for five-year Term		130%
Days remaining to last Market Day of five-year Term		182
Trading Cost Assumption	2.03%	

Example 3: 10% Buffer with Upside Participation Rate Indexed Strategy

Lock Effective Date ATM Call Option Price x Upside Participation Rate	23.45%	(130% of 18.04%)
Lock Effective Date OTM Put Option Price	– 16.35%	
Net Option Price on Lock effective date	= 7.10%	
Initial ATM Call Option Price x Upside Participation Rate	26.77%	(130% of 20.59%)
Initial OTM Put Option Price	– 15.47%	
Net Option Price	= 11.30%	
Amortization Factor for days remaining from Lock effective date to final Market Day of Term	<u>x 8.30%</u>	(182 / 2192)
Residual Option Cost on Lock effective date	0.94%	
Net Option Price	7.10%	
Residual Option Cost	– 0.94%	
Assumed Trading Cost	<u>– 2.03%</u>	
Locked Daily Value Percentage	= 4.13%	
Increase as a dollar amount at Term end	\$4,130	(\$100,000 x 4.13%)
Value of 10% Buffer with Upside Participation Rate Strategy at Term end	\$104,130	(\$100,000 + \$4,130)

For additional detailed examples regarding the impact of withdrawals on contract values and amounts realized, please refer to Appendix B.

INDEXES

Any allocation to an Indexed Strategy does not represent an investment in an Index or in any securities or other assets included in an Index.

S&P 500 Index

The S&P 500® Index is designed to reflect the large-cap sector of the U.S. equity market and, due to its composition, it also represents the U.S. equity market in general. It includes 500 leading companies and captures approximately 80% coverage of available market capitalization. The S&P 500 Index does not include dividends declared by any of the companies in this index. Consequently, any positive change in the Index over a Term will be lower than the total return on a direct investment in the stocks that comprise the S&P 500 Index. The S&P 500 Index is a “price return index,” not a “total return index,” and therefore does not reflect dividends paid on the securities composing the Index. This will reduce the Index return and cause the Index to underperform a direct investment in the securities composing the Index.

SPDR Gold Shares ETF

The SPDR Gold Shares ETF represent units of beneficial interest in, and ownership of, the SPDR Gold Trust, an exchange traded fund that holds gold bullion. The investment objective of the trust is for the shares to reflect the performance of the price of gold bullion, less the trust's expenses. The shares are designed to mirror as closely as possible the price of gold, and the value of the shares relates directly to the value of the gold held by the trust, less its liabilities. The value of the gold held by the trust is determined using the London Bullion Market Association (LBMA) Gold Price PM. The SPDR Gold Shares ETF Index deducts fees and costs when calculating Index performance. This will reduce the ETF's return and cause the Index to underperform a direct investment in gold bullion. The Gold Shares trade on the NYSE Arca under the symbol GLD. For more information, visit www.spdrgoldshares.com.

iShares MSCI EAFE ETF

The iShares MSCI EAFE ETF is an exchange traded fund that seeks to track the investment results of an index composed of large- and mid-capitalization developed market equities, excluding the U.S. and Canada (MSCI EAFE Index). This underlying index includes stocks from Europe, Australasia, and the Far East. It may include large- or mid-capitalization companies. The components of the underlying index, and the degree to which these components represent certain industries and/or countries, are likely to change over time. The fund's adviser uses an indexing strategy that involves investing in a representative sample of securities that collectively has an investment profile similar to that of the underlying index. The iShares MSCI EAFE ETF Index deducts fees and costs when calculating Index performance. This will reduce the ETF's return and cause the ETF to underperform a direct investment in the securities composing the ETF.

The fund's shares trade on the NYSE Arca under the symbol EFA.

iShares U.S. Real Estate ETF

The iShares U.S. Real Estate ETF is an exchange traded fund that seeks to track the investment results of an index composed of U.S. equities in the real estate sector (Dow Jones U.S. Real Estate Index). This underlying index may include large-, mid- or small-capitalization companies. A significant portion of the underlying index is represented by real estate investment trusts (REITs), but the components are likely to change over time. The fund's adviser uses an indexing strategy that involves investing in a representative sample of securities that collectively has an investment profile similar to that of the underlying index. The iShares U.S. Real Estate ETF Index deducts fees and costs when calculating Index performance. This will reduce the ETF's return and cause the ETF to underperform a direct investment in the securities composing the ETF.

The fund's shares trade on the NYSE Arca under the symbol IYR.

First Trust Barclays Edge Index

The First Trust Barclays Edge Index is designed to combine capital strength and value equity investment methodologies with a mix of US Treasury futures indexes for the potential to provide stable returns over time. The First Trust Barclays Edge Index consists of an equity component that combines stocks from the Capital Strength Index and the Value Line® Dividend Index. The Capital Strength Index starts with the largest 500 companies in the NASDAQ US benchmark index and then reduces the selection universe by screening for companies that meet minimum criteria including cash and/or short-term investments on their balance sheets, low debt-to-market cap ratios and attractive return-on-equity. It then selects the top 50 names from this smaller universe based on low historical volatility. The Value Line Dividend Index starts with the universe of stocks published in its The Value Line Investment Survey publication and then selects those with a Value Line® Safety Rank of 1 or 2, with attractive dividends and market cap of one billion dollars or above. It then equally weights all stocks that meet those conditions (generally, around 160-200 stocks). The First Trust Barclays Edge Index then combines the stocks represented in The Capital Strength Index and the Value Line Dividend Index with an equal-weight assigned to each underlying index and rebalanced back to equal-weight on a monthly basis. Furthermore, since the index is on an excess return basis (i.e., it returns the index performance in excess of risk-free rates), the risk-free return is deducted from the equity underliers. The risk-free rate used in this calculation is the U.S. Fed Funds Rate published by the Federal Reserve of New York (ticker: FEDL01) for each day divided by 360 as outlined in the Index Rulebook. No such adjustment is needed to the US Treasury futures indexes as these securities returns are naturally on an excess return basis. The First Trust Barclays Edge Index deducts fees and costs when calculating Index performance. This will reduce the Index's return and cause the Index to underperform a direct investment in the securities composing the Index.

The Index uses an optimizer to evaluate its exposure to stocks and US Treasury futures indexes on a daily basis to target a 7% volatility level. This volatility control mechanism aims to target or limit the volatility of the index return over time by adjusting the exposure of the index constituents through a rules-based process called mean-variance optimization. The optimizer defines risk using both shorter- and longer-term measures of historical realized volatility. It then seeks to determine the allocations between the equity and US Treasury futures index that produce the highest expected return for the target volatility level, subject to constraints. Depending on the constraints of the optimizer at the time, the Index may or may not allocate to the US Treasury futures indexes. When the volatility measures are low, the index can have exposure greater than 100%. However, the optimizer is constrained such that the exposure can never be greater than 225%. Likewise, when volatility is high, the index exposure can be less than 100%. In addition, the First Trust Barclays Edge Index generally rebalances based on end-of-day values in the event there is a deviation in the index component weights of 10% or more, on an absolute basis, from the previous index rebalance value.

For more information visit <https://www.ftindexingsolutions.com/>

The performance of the First Trust Barclays Edge Index reflects the deduction of operating costs and rebalancing costs from the valuation of the underlying indexes. These costs, deducted as an annualized percentage on a daily basis, are fixed for the underlying indexes. The operating costs for the First Trust Barclays Edge Index range from 0.20% to 0.60%, and the rebalancing costs for the First Trust Barclays Edge Index range from 0.02% to 0.03%. The operating costs represent an estimate of the costs that would be incurred to buy and sell the index components. The rebalancing costs represent an estimate of the costs that would be incurred each time the Index rebalances due to changes in weightings of the Index components. The deduction of these costs occurs at the First Trust Barclays Edge Index level (i.e., the return on the First Trust Barclays Edge Index is reduced based on the applicable operating and rebalancing costs).

Index Values

For Indexed Strategies that use the S&P 500 Index or the First Trust Barclays Edge Index, the Index is the level of the S&P 500 Index or the First Trust Barclays Edge Index for the applicable Market Close. For Indexed Strategies that use the SPDR Gold Shares ETF, the iShares MSCI EAFE ETF or the iShares U.S. Real Estate ETF, the Index is the applicable exchange-traded fund's share price on the NYSE Arca at the applicable Market Close.

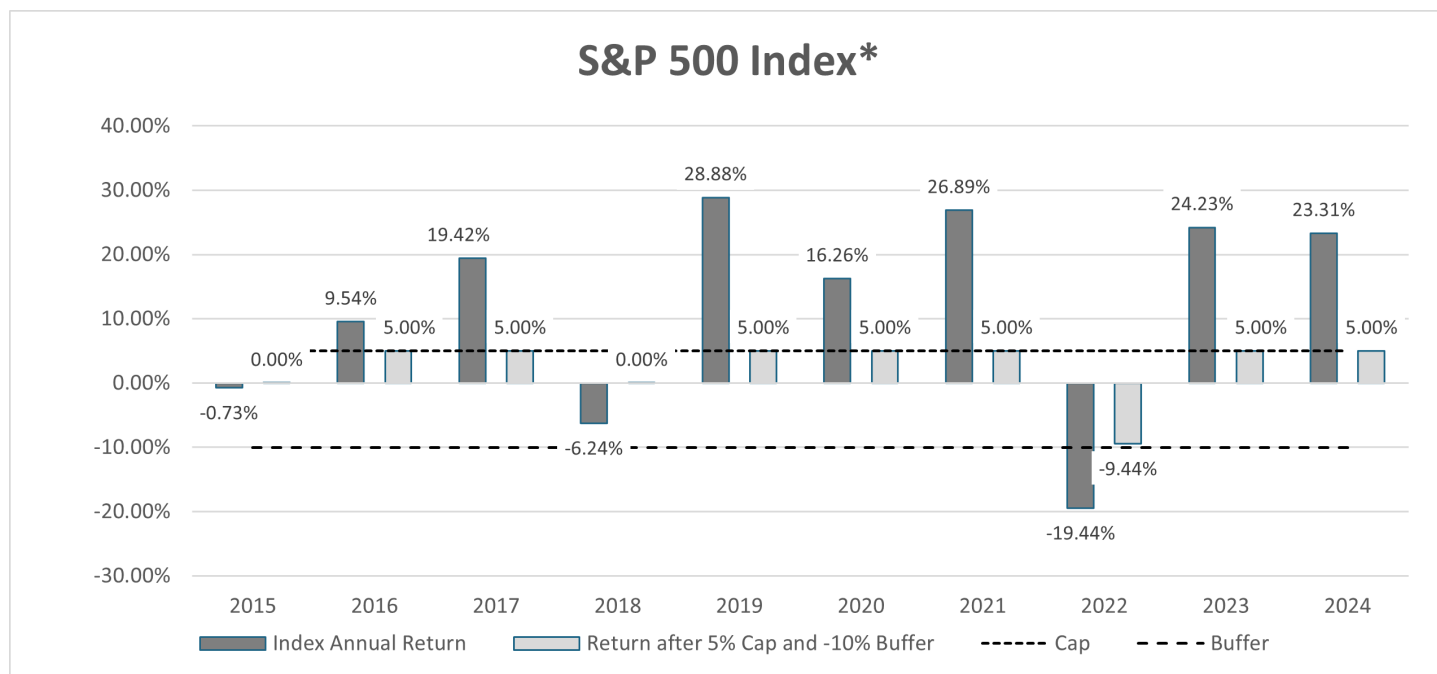
We will use consistent sources to obtain the values of an Index. We currently obtain the values for the S&P 500 Index and the SPDR Gold Shares ETF from S&P Dow Jones Indices LLC, the values for the iShares MSCI EAFE ETF and iShares U.S. Real Estate ETF from BlackRock, Inc., and the values for the First Trust Barclays Edge Index from Bloomberg Index Services Limited. If those sources are no longer available, we will select an alternative published source(s) to obtain such values.

Additional Index information, including disclaimers, may be found in Appendix D.

Historical Index Returns

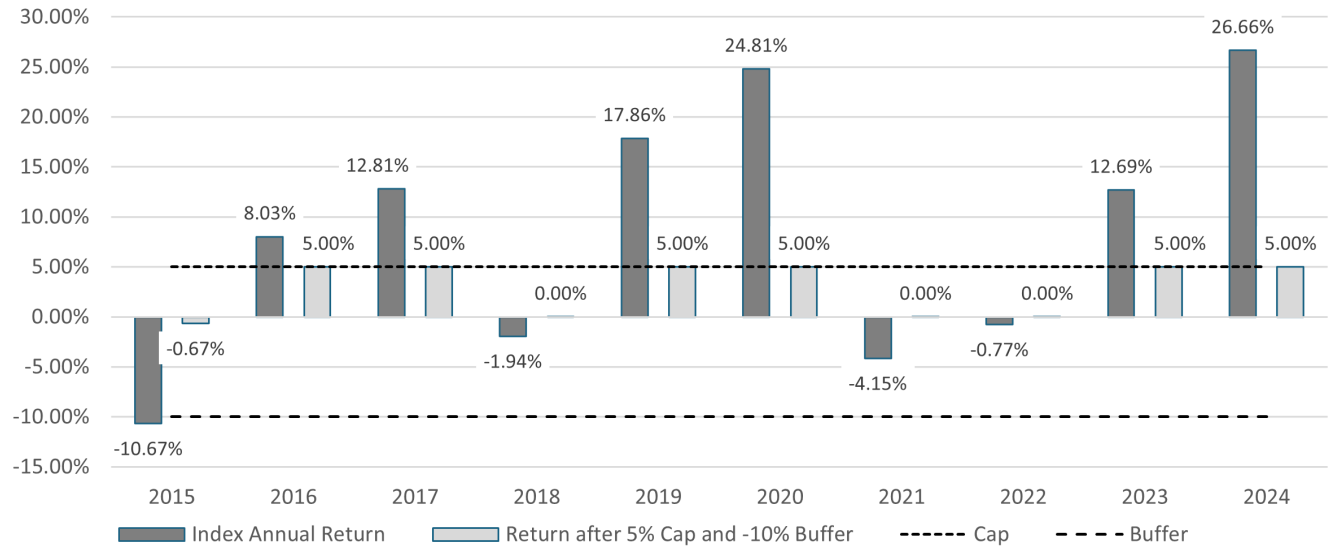
The bar charts shown below provide each Index's annual returns for the last 10 calendar years (or for the life of the Index if less than 10 years), as well as the Index returns after applying a hypothetical 5% cap and a hypothetical -10% buffer. The chart illustrates the variability of the returns from year to year and shows how hypothetical limits on Index gains and losses may affect these returns. Past performance is not necessarily an indication of future performance.

The performance below is NOT the performance of any Indexed Strategy. Your performance under the Contract will differ, perhaps significantly. The performance below may reflect a different return calculation, time period, and Positive Return Factor and Negative Return Factor than the Indexed Strategy does, and does not reflect Contract fees and charges, including Early Withdrawal Charges and the Daily Value Percentage adjustment, which reduce performance.



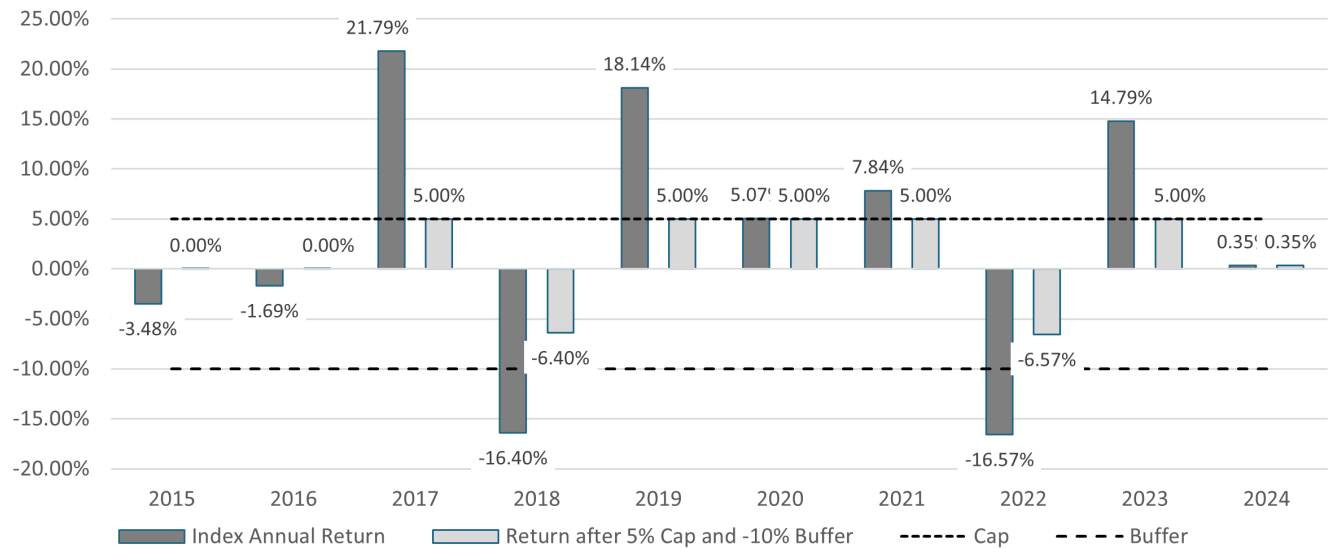
* The S&P 500 Index is a "price return index," not a "total return index," and therefore does not reflect dividends paid on the securities composing the Index. This will reduce the Index return and cause the Index to underperform a direct investment in the securities composing the Index.

SPDR Gold Shares ETF*



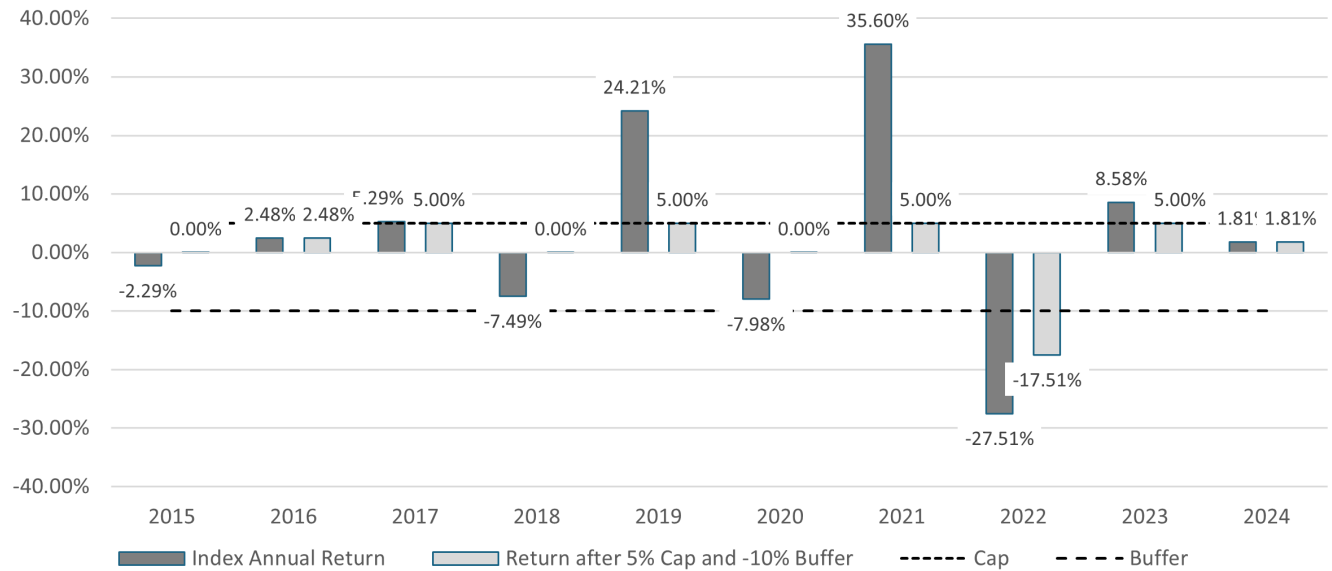
* The SPDR Gold Shares ETF Index deducts fees and costs when calculating Index performance. This will reduce the ETF's return and cause the Index to underperform a direct investment in gold bullion.

iShares MSCI EAFE ETF*



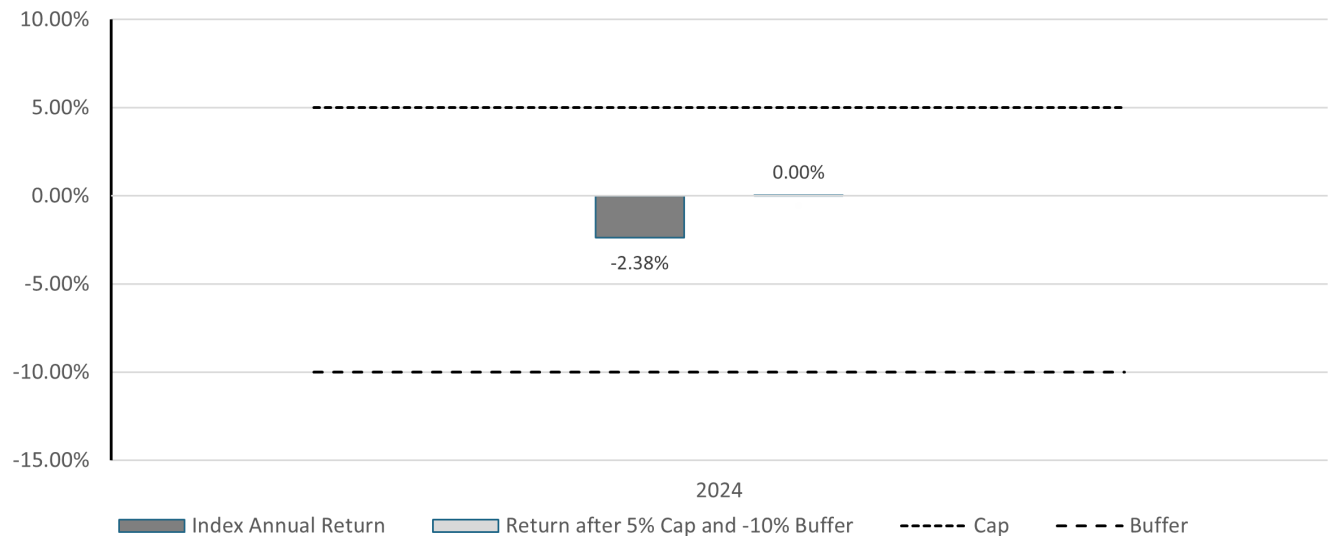
* The iShares MSCI EAFE ETF Index deducts fees and costs when calculating Index performance. This will reduce the ETF's return and cause the Index to underperform a direct investment in the securities composing the Index.

iShares U.S. Real Estate ETF*



* The iShares U.S. Real Estate ETF deducts fees and costs when calculating Index performance. This will reduce the ETF's return and cause the Index to underperform a direct investment in the securities composing the Index.

First Trust Barclays Edge Index*



*The First Trust Barclay's Edge Index is an "excess return index" that subtracts a risk-free interest rate from the price and dividend return of the securities. It also deducts fees and costs when calculating Index performance. This will reduce the Index's return and cause the Index to underperform a direct investment in the securities composing the Index.

Index Replacement

We may replace or adjust an Index or rate, or the specified market to measure it, if the external market index or rate stops being published or the publication schedule is changed, the calculation of the external market index or rate is changed significantly, the investment fund terminates or there is a significant change in its investment objectives, strategies, or operations, the investment fund or commodity stops being traded on a specified market or the specified market declines in importance, we lose our license or permission to use the index or rate, we determine that hedging instruments are difficult to acquire or the cost of hedging becomes excessive, or under other circumstances approved by regulators. We may do so at the end of a Term or during a Term. We will notify you in writing at least 30 days before we replace an Index.

We would attempt to choose a replacement Index that is similar to the old Index. To determine if a new Index is similar, we will consider factors such as asset class, index composition, strategy, or methodology inherent to the index and index liquidity.

If we replace or adjust an Index connected to an Indexed Strategy during a Term, we will calculate the rise and fall in the Index using the old Index up until the replacement date. After the replacement date, we will calculate the rise and fall in the Index using the new Index, but with a modified start of Term value for the new Index. The modified start of Term value for the new index will reflect the rise or fall in the Index for the old Index from the start of the Term to the replacement or adjustment date.

If we replace or adjust an Index, the Positive Return Factor rate for the Term and the Negative Return Factor rate will not change.

Examples. These examples are intended to show how we would calculate the Strategy value on any day during a Term if we have replaced the Index used to calculate Strategy values during the Term. These examples assume: (1) you allocate \$50,000 to an Indexed Strategy with a Cap of 8%; (2) the replacement is made on day 90 of the Term; and (3) no Performance Lock election has been made. To simplify the example, we assume that you take no withdrawals during the Term.

Example 1. This example illustrates a situation where the old Index has risen at the time of its replacement.

Rise or Fall of Index on Replacement Date for Old Index	
Old Index at Term start	1000
Old Index on replacement date	1050
Rise or fall of old Index on replacement date	$(1050 - 1000) / 1000 = 5.00\%$

The 5% rise in the old Index on the replacement date is then used to calculate the modified start of Term value for the new Index.

Modified Start of Term Value for New Index	
Rise in old Index on replacement date	5.00%
New Index on replacement date	1785
Modified start of Term value for new Index	$1785 / (100\% + 5.00\%) = 1700$

The modified start of Term value for the new Index is then used to calculate the Indexed Strategy value on any date after the replacement date, including the value at the Term end.

Indexed Strategy Value at Term End	
Investment Base at Term start	\$50,000
Modified start of Term value for new Index	1700
Value of new Index at Term end	1853
Rise in new Index	$(1853 - 1,700) / 1700 = 9.00\%$
Cap	8.00%
Rise in new Index limited by Cap	8.00%
Increase as a percentage	$8.00\% \times 100\% = 8.00\%$
Dollar amount of increase	$\$50,000 \times 8.00\% = \$4,000$
Strategy value at Term end	$\$50,000 + \$4,000 = \$54,000$

Example 2. This example illustrates a situation where the old Index has fallen at the time of its replacement.

Change in Index on Replacement Date for Old Index	
Old Index at Term start	1000
Old Index on replacement date	950
Change in old Index on replacement date	$(950 - 1000) / 1000 = -5.00\%$

The 5% fall in the old Index on the replacement date is then used to calculate the modified start of Term value for the new Index.

Modified Start of Term Value for New Index	
Change in old Index on replacement date	-5.00%
New Index on replacement date	1786
Modified start of Term value for new Index	$1786 / (100\% - 5.00\%) = 1880$

The modified start of Term value for the new Index is then used to calculate the Indexed Strategy value on any date after the replacement date, including the value at the Term end.

Indexed Strategy Value at Term End	
Investment Base at Term start	\$50,000
Modified start of Term value for new Index	1880
Value of new Index at Term end	1598
Change in new Index	$(1598 - 1800) / 1700 = -15.00\%$
Floor	-10%
Change in new Index limited by Floor	-10.00%
Change as a percentage	$-10.00\% \times 100\% = -10.00\%$
Dollar amount of change	$\$50,000 \times -10.00\% = -\$5,000$
Strategy value at Term end	$\$50,000 - \$5,000 = \$45,000$

DECLARED RATE STRATEGY

The Declared Rate Strategy is credited with interest daily that results in an effective yield equal to the Declared Rate with annual compounding.

Information regarding the features of the Declared Rate Strategy, including its Term and its minimum guaranteed interest rate, is available in an appendix to the prospectus. See “Appendix A: Investment Options Available Under the Contract”.

Declared Rates

We will set the Declared Rate for a Term before that Term starts. It will be guaranteed for the entire Term.

As long as we receive your application for the Contract within eight days after you sign it, the Declared Rate for the Term that begins on the first Strategy Application Date will be available on our website (www.massmutualascend.com/index-frontier-5-plus) on the date you signed the application and before the date of any Purchase Payment to which the Declared Rate will apply. If we receive the application for the Contract within eight days after the date you sign it, we will guarantee the Declared Rate on the date you signed the application for three Strategy Application Dates from the date of the application.

If we receive the signed application within eight days after the date you sign it, then:

- For an initial Term starting on the first Strategy Application Date on or after the application date, the Declared Rate will be the rate in effect on the date you signed the application.
- For an initial Term starting on one of the next two Strategy Application Dates, the Declared Rate will be the higher of the rate in effect on the date you signed the application or the rate otherwise in effect for that Strategy Application Date.
- For any initial Term starting on a later Strategy Application Date, the Declared Rate will be the rate in effect for that Strategy Application Date.

If we receive the signed application more than eight days after the date you sign it, then the guarantee does not apply and the Declared Rate for each Initial Term will be the Declared Rate in effect for that Strategy Application Date.

We may set a different Declared Rate for each subsequent Term. For a Term, different rates may apply with respect to amounts attributable to Purchase Payments received on different dates.

At least 10 days before the next Term starts, we will post the Declared Rate that will apply to the Declared Rate Strategy for that next Term on our website (www.massmutualascend.com/index-frontier-5-plus). You should consider this renewal information before finalizing your renewal or reallocation decision.

In any event, the Declared Rate for a Term will never be less than the guaranteed minimum interest rate from 0.15% to 3.0% set out in the Declared Rate Strategy endorsement included in your Contract. If you purchase a Contract to replace an existing annuity contract or insurance policy, you

have 30 days to cancel the Contract. The right to cancel period may be longer in some states. The guaranteed minimum interest rate set out in the endorsement will never be less than the minimum interest rate required for fixed annuity contracts on the Contract Effective Date under the Standard Nonforfeiture Law of the state in which your Contract is issued.

Term

Each Term of the Declared Rate Strategy is one year long and will start and end on a Strategy Application Date. A new Term will start at the end of the preceding Term.

If you make only one Purchase Payment or you make all of your Purchase Payments before the initial Strategy Application Date, then each Term of the Declared Rate Strategy will end on the same date in any given year. If you make a Purchase Payment after the initial Strategy Application Date, then your Purchase Payments will be applied to the Crediting Strategies on different Strategy Application Dates. In this case, the Declared Rate Strategy will have Terms that end on different dates in any given year.

Declared Rate Strategy Value

The value of the Declared Rate Strategy is equal to:

- the amounts applied to the Strategy at the start of the current Term; minus
- each withdrawal taken from the Strategy during the current Term; plus
- interest that we have credited on the balances in the Strategy for the current Term.

The rise or fall of an Index does not affect the value of the Declared Rate Strategy. A withdrawal from the Declared Rate Strategy reduces the Declared Rate Strategy value by an amount equal to the withdrawal.

ACCESSING YOUR CONTRACT VALUES

Cash Benefit

Surrender

You may Surrender your Contract at any time before the earlier of: (1) the Annuity Payout Initiation Date; or (2) a death for which a Death Benefit is payable. The right to Surrender may be restricted if your Contract is purchased under an employer plan subject to IRC Section 401 (pension, profit sharing, and 401(k) plans), IRC Section 403(b) (tax-sheltered annuity plans), or IRC Section 457(b) (governmental deferred compensation plans).

The amount paid upon Surrender is the Surrender Value. If you Surrender your Contract on a day that is not the end of a Term, the Surrender Value is based on the Daily Value Percentage of each Indexed Strategy (or the locked Daily Value Percentage if you have made a Performance Lock election). The Daily Value Percentage could be negative, which could result in significant loss, even if the Index has risen since the start of the Term.

The amount paid on Surrender is subject to income tax to the extent that it represents Contract earnings or pre-tax contributions. If received before age 59½, the taxable portion of the amount paid on Surrender may also be subject to an additional 10% federal penalty tax.

A Surrender must be made by a Request in Good Order. If you Surrender your Contract, the Contract terminates.

Withdrawals

You may take a withdrawal from your Contract at any time before the earliest of: (1) the Annuity Payout Initiation Date; (2) a death for which a Death Benefit is payable; or (3) the date that this Contract is Surrendered. The right to withdraw may be restricted if your Contract is purchased under an employer plan subject to IRC Section 401 (pension, profit sharing, and 401(k) plans), IRC Section 403(b) (tax-sheltered annuity plans), or IRC Section 457(b) (governmental deferred compensation plans).

A withdrawal must be made by a Request in Good Order. The amount of any withdrawal must be at least \$500. If the withdrawal would reduce the Account Value to less than the minimum value of \$5,000, we will treat the withdrawal request as a request to withdraw the maximum amount that may be taken without reducing your Account Value to less than \$5,000.

We will withdraw funds from your Account Value as of the date on which we receive your Request in Good Order or any later specified effective date. You may designate the Crediting Strategy or Strategies from which a withdrawal will be taken by a Request in Good Order prior to the date of the withdrawal. If you do not make a designation, we will take the withdrawal from the Crediting Strategies in the following order:

- first proportionally from funds, if any, that then qualify for a waiver of the Early Withdrawal Charge pursuant to the provisions of the Crediting Strategy endorsement;
- then from the Purchase Payment Account;
- then proportionally from the Declared Rate Strategies; and

- then proportionally from Indexed Strategies having the shortest Term (meaning the withdrawal will be taken proportionally from Indexed Strategies with 1-year Terms, and then proportionally from Indexed Strategies with 5-year Terms).

Effect of Withdrawals

A withdrawal reduces the Account Value, which in turn reduces the amount payable upon Surrender, applied to the Annuity Payout Benefit, or payable as the Death Benefit. In addition, a withdrawal will proportionally reduce the Death Benefit Return of Premium Guarantee. Please see the example on page 58.

If an Early Withdrawal Charge applies to your withdrawal, your Account Value will be reduced by the amount you receive plus the amount needed to pay the Early Withdrawal Charge.

A withdrawal from an Indexed Strategy other than at the end of a Term will be based on the Daily Value Percentage of the Indexed Strategy (or the locked Daily Value Percentage if you have made a Performance Lock election). The Daily Value Percentage could be negative, which could result in significant loss, even if the Index has risen since the start of the Term. The withdrawal from an Indexed Strategy before the end of a Term will reduce the Investment Base and the Death Benefit Return of Premium Guarantee by an amount that is proportional to the reduction in the Strategy value. If the Daily Value Percentage is negative, these proportional reductions could be significantly larger than the dollar amount of the withdrawal. A reduction in the Investment Base for a Term will reduce the gain from any future rise in the Index during that Term.

The amount withdrawn is subject to income tax to the extent that it represents Contract earnings or pre-tax contributions. If received before age 59½, the taxable portion of a withdrawal may also be subject to an additional 10% federal penalty tax.

Automated Withdrawals

You may elect to withdraw money from your Contract under any automated withdrawal program that we offer. Your Account Value must be at least \$10,000 in order to make an automated withdrawal election. The minimum amount of each automated withdrawal payment is \$100. Automated withdrawals will be taken from the Purchase Payment Account and Crediting Strategies of your Contract in the same order as any other withdrawal.

The Contract is intended for long-term investment purposes and the Contract and its Crediting Strategies may not be appropriate for investors who plan to take withdrawals (including automated withdrawals and required minimum distributions) during the first five Contract Years, because of the assessment of Early Withdrawal Charges, or who plan to take withdrawals during Indexed Strategy Terms, because of the application of the Daily Value Percentage.

Subject to the terms and conditions of the automated withdrawal program, you may begin or discontinue automated withdrawals at any time. You must give us at least 30 days' notice to change any automated withdrawal instructions that are currently in place. Any request to begin, discontinue or change automated withdrawals must be a Request in Good Order. We reserve the right to discontinue offering automated withdrawals at any time.

Currently, we do not charge a fee to participate in an automated withdrawal program. However, we reserve the right to impose an annual fee in such amount as we may then determine to be reasonable for participation in the automated withdrawal program. If imposed, the fee will not exceed \$30 annually.

Before electing an automated withdrawal, you should consult with a financial advisor.

- Automated withdrawals during a Term from an Indexed Strategy will systematically reduce the Investment Base, which will reduce any subsequent increase in the Strategy value due to a positive Daily Value Percentage during that Term or a rise in the applicable Index at the end of that Term. Such reductions could be significant.
- Automated withdrawals will reduce the amount available under the Free Withdrawal Allowance.
- Unless a waiver applies, an Early Withdrawal Charge may apply to an automated withdrawal during the first five Contract Years.
- If taken from an Indexed Strategy before the end of a Term, the value of an Indexed Strategy on an automated withdrawal date will reflect the Daily Value Percentage on that date. Any Strategy value before the end of a Term will almost always be less, perhaps significantly less, than the value suggested by the rise or fall of the Index. In extreme circumstances, an Indexed Strategy may have no value before the end of a Term due to the Daily Value Percentage, meaning that you would suffer the loss of 100% of your principal and any prior earnings in that Strategy if, before the end of the Term, you were to Surrender or annuitize your Contract, elect a Performance Lock, or a Death Benefit becomes payable.
- Automated withdrawals could result in significant loss due to taxes and reduce your ability to take full advantage of any positive Index performance at the end of a Term.

Exchanges, Transfers, and Rollovers

An amount paid on a withdrawal or Surrender may be paid to or for another annuity or tax-qualified account in a tax-free exchange, transfer, or rollover to the extent allowed by federal tax law.

Annuity Payout Benefit

Under the Contract you may receive regular Annuity Payout Benefit payments for the duration of the period that you select. Once Annuity Payout Benefit payments start, you can no longer Surrender the Contract or take a withdrawal, no Death Benefit will be payable under your Contract, your Beneficiary designations will no longer apply, and the Crediting Strategies will no longer be available. The amount payable after death, if any, is governed by the Payout Option you select.

The Annuity Payout Benefit is payable if the Annuity Payout Initiation Date is reached before the earlier of: (1) a death for which a Death Benefit is payable; or (2) the date that this Contract is Surrendered.

Annuity Payout Benefit payments are subject to income tax to the extent that they represent Contract earnings or pre-tax contributions. If received before age 59½, the taxable portion of Annuity Payout Benefits may also be subject to an additional 10% federal penalty tax.

Annuity Payout Initiation Date

The Annuity Payout Initiation Date is the first day of the first payment interval for which payment of the Annuity Payout Benefit is to be made. Annuity Payout Benefit payments are made at the end of each payment interval. This means that for annual payments, the first payment will be made one year after the Annuity Payout Initiation Date.

You may select the Annuity Payout Initiation Date by a Request in Good Order. We must receive your request before the last Market Close on or before the Annuity Payout Initiation Date you selected and at least 30 days before the first Annuity Payout Benefit payment is to be made.

- The earliest Annuity Payout Initiation you may select is the first Contract Anniversary.
- Unless we agree to a later date, the latest Annuity Payout Initiation Date you may select is the Contract Anniversary following your 95th birthday or the 95th birthday of a joint owner, if earlier. If the Owner is not a human being such as a trust or a corporation, then the Annuity Payout Initiation Date may not be later than the Contract Anniversary following the 95th birthday of the eldest Annuitant, unless we agree to a later date.

The earliest permitted date and the latest permitted date for the Annuity Payout Initiation Date are set out in the Contract Specifications section of your Contract. The latest permitted date may change if an Owner changes.

If you do not select an Annuity Payout Initiation Date by the latest permitted date, we may select it for you. We will notify you in writing at least 45 days before the date we select. We will give you an opportunity to select an earlier date.

Annuity Payout Amount

The amount of each payment under the Annuity Payout Benefit is determined on the Annuity Payout Initiation Date based on the Annuity Payout value on that date, the Payout Option that applies, the payment interval, an assumed interest rate, and for life options, the life expectancy of the Annuitant.

The Annuity Payout value is the amount that can be applied to the Annuity Payout Benefit is equal to: (1) the Account Value on the Annuity Payout Initiation Date; minus (2) premium tax or other taxes not previously deducted. If the Annuity Payout value is determined on a date other than the end of the Term, the Annuity Payout value will be based on the Daily Value Percentage or the locked Daily Value Percentage if you have made a Performance Lock election. The Daily Value Percentage could be negative, which could result in significant loss, even if the Index has risen since the start of the Term. Please see the "Indexed Strategy Value Before End of Term" section on page 44 or the "Indexed Strategy Value After Performance Lock Election" on page 45 for more information.

Form of Annuity Payout Benefit

You may elect to have the Annuity Payout Benefit paid in any form of Payout Option that is available under your Contract. The available Payout Options are described in the "Payout Options" section on page 59. You may elect a Payout Option by a Request in Good Order. We must receive your request before the last Market Close on or before the Annuity Payout Initiation Date and at least 30 days before the first Annuity Payout Benefit payment is to be made.

If we have selected the Annuity Payout Initiation Date and you have not elected a Payout Option, the Annuity Payout Benefit is paid in the form of annual payments as a Life Payout with Payments for at Least a Fixed Period. That fixed period will be 10 years or, if fewer, the maximum number of whole years permitted by any tax qualification endorsement.

Payee for Annuity Payout Benefit

Payment of the Annuity Payout Benefit generally is made to the surviving Owner(s) as the payee(s). In place of that, the surviving Owner(s) may elect for payment to be made as a tax-free exchange, transfer, or rollover, or for payment to be made to the Annuitant. That election must be made by a Request in Good Order that we receive at least 30 days before the payment date.

Payments that become due after the death of the payee are made to:

- the surviving Owner(s); or if none
- then to the surviving contingent payee(s) designated by the surviving Owner(s); or if none
- the estate of the last payee who received a payment

The portion of any Annuity Payout Benefit remaining after the death of an Owner or Annuitant must be paid at least as rapidly as payments were being made at the time of such death.

You may designate a contingent payee by a Request in Good Order. If you designate your spouse as a contingent payee and your marriage ends before your death, then we will treat your former spouse as having predeceased you except in the following situations: (1) if a court order provides that the former spouse's rights as a contingent payee are to continue; or (2) if the former spouse remains or becomes an Owner.

Death Benefit

A Death Benefit is payable under your Contract if you die before the Annuity Payout Initiation Date and before the Contract is Surrendered. If your spouse is your sole beneficiary and elects to become a successor owner of the Contract, then no Death Benefit will be payable on account of your death.

When the Owner is a non-natural person, a Death Benefit is payable under the Contract if the Annuitant dies before the Annuity Payout Initiation Date and before the Contract is Surrendered. For this purpose, a non-natural person is a trust, custodial account, corporation, limited liability company, partnership, or other entity.

Only one Death Benefit will be paid under the Contract. If a Death Benefit becomes payable, it will be in place of all other benefits under the Contract, and all other rights under this Contract will terminate except for rights related to the Death Benefit.

A Death Benefit payment is subject to income tax to the extent that it represents Contract earnings or pre-tax contributions.

Death Benefit Payout Date

- If the Death Benefit is to be paid as a lump sum, then it will be paid as soon as practicable after receipt of Proof of Death.
- If the Death Benefit is to be paid under a Payout Option, then we will apply the Death Benefit value to a Payout Option as soon as practicable after receipt of Proof of Death. That application date will be the first day of the first payment interval for which a payment is to be made. Death Benefit payments under a Payout Option are made at the end of each payment interval. This means that, for annual payments, the first payment will be made one year after that application date.

Death Benefit Amount

- If the Death Benefit is paid in a lump sum, then it is equal to the Death Benefit value, increased by any additional post-death interest as required by law.
- If the Death Benefit will be paid as a series of periodic payments under a Payout Option, then the amount of each payment under the Death Benefit is determined on the date that the Death Benefit value is applied to the Payout Option. The amount of each payment will be based on the Death Benefit value (increased by any additional post-death interest as required by law to the date it is applied to the Payout Option), the Payout Option that applies, the payment interval, an assumed interest rate, and for life options, the life expectancy of the Beneficiary.

Death Benefit Value

The Death Benefit value is the greater of:

- the Account Value for the date that the Death Benefit value is determined; or
- the Death Benefit Return of Premium Guarantee.

In either case, the Death Benefit value is reduced by premium tax or other taxes not previously deducted.

If your Contract Effective Date is on or after May 21, 2025, the Death Benefit value is determined as of the date that we receive Proof of Death. Thus, in many cases where there are multiple Beneficiaries, the Death Benefit value is determined only when the last Beneficiary submits the necessary documentation. Until then, the Contract values that remain in the Indexed Strategies will renew into new Terms of the same Strategies if the end of a Term is reached, and the Indexed Strategy values may fluctuate. The risk is borne by the Beneficiaries.

If your Contract Effective Date is before May 21, 2025, the Death Benefit value is determined as of the date that we receive Proof of Death or, if earlier, the first anniversary of death. If all Beneficiaries have not submitted the necessary documentation by the first anniversary of death, then the Death Benefit value as determined on that first anniversary will thereafter earn interest at a fixed rate at least equal to the rate required by state law.

For all Contracts, the Account Value will reflect the applicable Strategy values as calculated on the date the Death Benefit is determined. If the Death Benefit value is determined on a date other than the end of the Term, the Death Benefit value will be based on the Daily Value Percentage, or on the

locked Daily Value Percentage if you have made a Performance Lock election. The Daily Value Percentage could be negative, which could result in significant loss, even if the Index has risen since the start of the Term. Please see the “Indexed Strategy Value Before End of Term” section on page 44 or the “Indexed Strategy Value After Performance Lock Election” on page 45 for more information.

Proof of Death. Before making payment of a Death Benefit, or any other payment or transfer of ownership rights that depends on the death of a specified person, we will require Proof of Death. We may delay making any payment until it is received. For this purpose, proof of death is:

- a certified copy of a death certificate showing the cause and manner of death, or a certified copy of a decree that is made by a court of competent jurisdiction as to the finding of death, or other proof that is satisfactory to us; and
- proof of each claimant’s interest in the Death Benefit or other Contract rights; and
- a Request in Good Order from each claimant as to how to pay the Death Benefit.

Death Benefit Return of Premium Guarantee

The Death Benefit Return of Premium Guarantee is equal to your Purchase Payments (the “Purchase Payment base”), reduced proportionally for all withdrawals, but not including amounts applied to pay Early Withdrawal Charges.

The reduction in your Purchase Payment base for withdrawals will be in the same proportion that your Account Value was reduced on the date of the withdrawal. A proportional reduction in your Purchase Payment base could be larger than the dollar amount of your withdrawal.

Example. Here is an example of how we calculate a proportional reduction of your Purchase Payment base. In this example, we assume you take an \$8,000 withdrawal and the Purchase Payment base is larger than the Account Value at the time of the withdrawal. To simplify the example, we also assume no Early Withdrawal Charge, no premium tax is deducted, and no additional post-death interest is added.

	Before Withdrawal	After Withdrawal	Explanation
Account Value	\$ 100,000	\$ 92,000	Your withdrawal reduces your Account Value by \$8,000 (which is an 8% reduction in your Account Value). $\$8,000 / \$100,000 = 8\%$
Purchase Payment base for Death Benefit	\$ 120,000	\$ 110,400	After the withdrawal, the Purchase Payment base for the Death Benefit is also reduced by 8% or \$9,600. $\$120,000 \times 8\% = \$9,600$

Form of Death Benefit

You may elect to have the Death Benefit paid in one lump sum or in any form of Payout Option that is available under your Contract. The available Payout Options are described in the Payout Options section below. There is no additional charge associated with this election. Any election is subject to the Death Benefit Distribution Rules described below.

If you do not elect a different Payout Option, the Death Benefit is paid in the form of annual payments for a fixed period of two years.

You may make an election by a Request in Good Order. We must receive your request on or before the date of death for which a Death Benefit is payable. If you do not make such an election, the Beneficiary may make that election after the date of death. The Beneficiary’s election must be made by a Request in Good Order that is received by us no later than the date that the Death Benefit value is applied to a Payout Option and at least 30 days before the date of the first payment to be made.

Additional Rules for Payout Options. A Payout Option that is contingent on life is based on the life of the Beneficiary or, in some cases, the life of a person to whom the Beneficiary is obligated. We will pay the Death Benefit as a lump sum rather than as payments under a Payout Option if: (1) the Death Benefit is less than \$2,000; or (2) as of the date that the Death Benefit value is to be applied to a Payout Option, the Death Benefit Distribution Rules do not allow a two-year payout.

Payee of Death Benefit Payments

Death Benefit payments generally are made to the Beneficiary as the payee.

In place of that, the Beneficiary may elect to have payments made:

- as a tax-free exchange, transfer, or rollover to or for an annuity or tax-qualified account as permitted by federal tax law; or
- in cases where the Beneficiary is an estate, trust, custodial account, corporation, limited liability company, partnership, or other entity, to a person to whom the Beneficiary is obligated to make corresponding payments.

Payments that become due after the death of the Beneficiary are made to:

- the contingent payee designated as part of a Death Benefit Payout Option elected by you; or if none
- then to a contingent payee designated by the Beneficiary; or if none
- the estate of the last payee who received a payment.

Such payments are subject to the Death Benefit Distribution Rules described below.

You may designate a contingent payee by a Request in Good Order. A Beneficiary may make or change a payee or contingent payee, except a Beneficiary may not change a designation made as part of a Payout Option election made by you for the Death Benefit. If the Beneficiary designates his or her spouse as a contingent payee and their marriage ends before the Beneficiary's death, then we will treat the former spouse as having predeceased the Beneficiary except to the extent a court order provides that the former spouse's rights as a contingent payee are to continue.

Death Benefit Distribution Rules

The Death Benefit Distribution Rules are summarized below.

- For a Tax Qualified Contract. The Death Benefit must be paid in accordance with the tax qualification endorsement.
- For a Nonqualified Contract. The Death Benefit must be paid either: (1) in full within five years of the date of death; or (2) over the life of the Beneficiary or over a period certain not exceeding the Beneficiary's life expectancy, with payments at least annually, and with the first payment made within one year of the date of death.

Payout Options

The standard Payout Options are described below. The standard Payout Options will always be available, subject to tax law limitations. We will make payments in any other form of Payout Option requested by you that is acceptable to us at the time of any election. More than one Payout Option may be elected if the requirements for each Payout Option elected are satisfied. All elected Payout Options must comply with pertinent laws and regulations.

Payments under each standard Payout Option are made at the end of a payment interval. For example, if the Annuity Payout Initiation Date is October 31, 2029, and you select annual payments, then the first payment will be paid as of October 31, 2030.

Fixed Period Payout

- ***For the Annuity Payout Benefit***

We will make periodic payments to you, or to the Annuitant, if you direct, for the fixed period of time that you select. For a nonqualified contract, fixed periods shorter than 10 years are not available. For a tax-qualified contract, the only fixed period available is 10 years.

- If the payee dies before the end of the fixed period, then we will make periodic payments to the surviving owner(s), or if none, then to the surviving contingent payee(s), or if none, then to the estate of the last payee who received payments.
- In all cases, payments will stop at the end of the fixed period.

- ***For the Death Benefit***

We will make periodic payments to the Beneficiary for the fixed period of time that you or the Beneficiary selects. The fixed period cannot exceed the life expectancy of the Beneficiary. For a tax-qualified contract, the fixed period also cannot exceed 10 years.

- If the Beneficiary dies before the end of the fixed period, then we will make periodic payments to the contingent payee designated as part of any Death Benefit Payout Option that you have elected. If no such contingent payee is surviving, then such payments will be made to a contingent payee designated by the Beneficiary. If there is no contingent payee surviving, then such payments will be made to the estate of the last payee who received payments.
- In all cases, payments will stop at the end of the fixed period.

Life Payout

- ***For the Annuity Payout Benefit***

We will make periodic payments to you, or to the Annuitant, if you direct, for as long as the Annuitant lives. Payments will stop on the death of the Annuitant. This means that, even if we have made only one payment when the Annuitant dies, payments will stop.

If the Annuitant dies after the Annuity Payout Initiation Date but before the first payment, a Life Payout will not provide any benefit at all. In that case, we will reverse the Annuity Benefit Payout election and treat the Contract as if the Annuity Payout Initiation Date had not yet been reached.

- If the Owner is living, this treatment will generally allow the Owner to choose between continuing the Contract as a deferred annuity or electing a new Annuity Payout Initiation Date and another Payout Option.
- If the Annuitant's death before the Annuity Payout Initiation Date would give rise to a Death Benefit, then the Death Benefit will be available.

For a tax-qualified contract, a Life Payout is not available to all Beneficiaries.

- ***For the Death Benefit***

We will make periodic payments to the Beneficiary for as long as the Beneficiary lives. Payments will stop on the death of the Beneficiary. This means that, even if we have made only one payment when the Beneficiary dies, payments will stop. For a tax-qualified contract, a Life Payout is not available to all Beneficiaries.

If the Beneficiary dies after the Death Benefit is applied to the Payout Option but before the first payment, a Life Payout will not provide any benefit at all. In that case, we will reverse the Payout Option election and allow the Beneficiary's estate to choose a new Payout Option or to take the Death Benefit as a lump sum.

Life Payout with Payments for at Least a Fixed Period

- ***For the Annuity Payout Benefit***

We will make periodic payments to you, or to the Annuitant, if you direct, for as long as the Annuitant lives. For a tax-qualified contract, fixed periods longer than 10 years are not available.

- If the Annuitant dies after the end of the fixed period you selected, then payments will stop on the death of the Annuitant.
- If the Annuitant dies before the end of the fixed period you selected, then we will make periodic payments to the surviving owner(s), or if none, then to the surviving contingent payee(s), or if none, then to the estate of the last payee who received payments. In this case, payments will stop at the end of the fixed period you selected.

- ***For the Death Benefit***

We will make periodic payments to the Beneficiary for as long as the Beneficiary lives. The fixed period cannot exceed the life expectancy of the Beneficiary. For a tax-qualified contract, a Life Payout with Payments for at Least a Fixed Period is not available to all Beneficiaries, and the fixed period also cannot exceed 10 years.

- If the Beneficiary dies after the end of the fixed period selected, then payments will stop on the death of the Beneficiary.
- If the Beneficiary dies before the end of the fixed period you or the Beneficiary selected, then we will make periodic payments to the contingent payee designated as part of any Death Benefit Payout Option that you have elected. If no such contingent payee is surviving, then such payments will be made to a contingent payee designated by the Beneficiary. If there is no contingent payee surviving, then such payments will be made to the estate of the last payee who received payments. In this case, payments will stop at the end of the fixed period you or the Beneficiary selected.

Joint and One-Half Survivor Payout

- ***For the Annuity Payout Benefit***

We will make periodic payments to you, or to the primary Annuitant, if you direct, for as long as the primary Annuitant lives.

- If the primary Annuitant dies and the secondary Annuitant does not survive the primary Annuitant, then payments will stop on the death of the primary Annuitant. This means that, even if we have made only one payment when the primary Annuitant dies, payments will stop unless the secondary Annuitant survives.
- If the primary Annuitant dies and the secondary Annuitant is surviving, then we will make one-half of the periodic payment to you, or the secondary Annuitant, if you direct, for the rest of the secondary Annuitant's life. In this case, payments will stop on the death of the secondary Annuitant.

If the Annuitant dies after the Annuity Payout Initiation Date but before the first payment, a Joint and One-Half Survivor Payout will never provide the full payment amount. In that case, if the secondary Annuitant agrees, we will reverse the Annuity Benefit Payout election and treat the Contract as if the Annuity Payout Initiation Date had not been reached.

- If the Owner is living, this treatment will generally allow the Owner to choose between continuing the Contract as a deferred annuity or electing a new Annuity Payout Initiation Date and another Payout Option.

- If the Annuitant's death before the Annuity Benefit Payout Initiation Date would give rise to a Death Benefit, then the Death Benefit will be available.
- **For the Death Benefit**

We will make periodic payments to the Beneficiary for as long as the Beneficiary lives.

- If the Beneficiary dies and the contingent payee does not survive the Beneficiary, then payments will stop on the death of the Beneficiary. This means that, even if we have made only one payment when the Beneficiary dies, payments will stop unless the contingent payee survives.
- If the Beneficiary dies and the contingent payee designated as part of the Death Benefit Payout Option election is surviving, then we will make one-half of the periodic payment to the contingent payee for the rest of the contingent payee's life. In this case, payments will stop on the death of the contingent payee.

If the Beneficiary dies after the Death Benefit is applied to the Payout Option but before the first payment, a Joint and One-Half Survivor Payout will never provide the full payment amount. In that case, if the contingent payee agrees, we will reverse the Payout Option election and allow the Beneficiary's estate to choose a new Payout Option or to take the Death Benefit as a lump sum.

For a tax-qualified Contract, a Joint and One-Half Survivor Payout is only available in certain cases where the Beneficiary is the surviving spouse of the owner.

Payments under a Payout Option

Payments under a Payout Option are calculated and paid as fixed dollar payments. The stream of payments is an obligation of the general account of MassMutual Ascend Life. Fixed dollar payments will remain level for the duration of the payment period. Once payments begin under a Payout Option, the Payout Option may not be changed. Once the Contract value is applied to a Payout Option, the periodic payments cannot be accelerated or converted into a lump sum payment unless we agree.

We will generally use the 2012 Individual Annuity Reserving Table with projection scale G2 for blended lives (60% female/40% male) with interest at 1% per year, compounded annually, to compute all guaranteed Payout Option factors, values, and benefits under the Contract. For purposes of calculating payments based on the age of a person, we will use his or her age as of his or her last birthday.

If your Contract Effective Date is on or after May 21, 2025, payments under a Payout Option for an Annuity Payout Benefit will not be less than those that would be provided by the application of the Surrender Value to purchase a single premium immediate annuity contract at the purchase rate offered by the Company to the same class of annuitant on the Annuity Payout Initiation Date, and payments under a Payout Option for a Death Benefit will not be less than those that would be provided by the application of the Death Benefit to purchase a single premium immediate annuity contract at the purchase rate offered by the Company to the same class of annuitant on the Death Benefit Payout Date.

Considerations in Selecting a Payout Option

Payments under a Payout Option are affected by various factors, including the length of the payment period, the life expectancy of the person on whose life payments are based, and the frequency of the payment interval (monthly, quarterly, semi-annually, or annually).

- Generally, the longer the period over which payments are made or the more frequently the payments are made, the lower the amount of each payment because more payments will be made.
- For Life Payout Options, the longer the life expectancy of the Annuitant or Beneficiary, the lower the amount of each payment because more payments are expected to be paid.

Non-Human Payees under a Payout Option

Except as stated below, the primary payee under a Payout Option must be a human being. All payments during his or her life must be made by check payable to the primary payee or by electronic transfer to a bank account owned by the primary payee.

Exceptions. Below are some exceptions to the general rule that the primary payee must be a human being. We may make other exceptions in our discretion.

- A nonhuman that is the Owner of the Contract may be the primary payee. For example, if the Owner is a trust, that trust may be the primary payee.
- Payments may be made payable to another insurance company or financial institution as a tax-free exchange, transfer, or rollover to or for another annuity or tax-qualified account as allowed by federal tax law.

PROCESSING PURCHASE PAYMENTS AND REQUESTS

Processing Purchase Payments

- If we receive a Purchase Payment on a Market Day before the Market Close, we will apply it to your Contract on that Market Day.
- If we receive a Purchase Payment on a Market Day after the Market Close or on a day that is not a Market Day, then we will apply it to your Contract on the next Market Day.

An amount applied to a Contract will be held in the Purchase Payment Account until it is applied to a Crediting Strategy or Strategies on a Strategy Application Date pursuant to your instructions. We cannot apply an amount held in the Purchase Payment Account to a Crediting Strategy or Strategies if we do not have complete instructions from you.

If you have any questions, you should contact us or your registered representative before sending a Purchase Payment.

Processing Requests

- Requests may be made by mail at P.O. Box 5423, Cincinnati OH 45201-5423.
- Requests by fax may be made at 800-807-9777.
- Requests for reallocations among Crediting Strategies may be made by telephone at 1-800-789-6771 between 8:00 AM and 4:00 PM Eastern Time Monday through Friday. We may also permit reallocation requests to be made at our website (www.massmutualascend.com). Some selling firms may restrict the ability of their registered representatives to convey reallocation requests by telephone or Internet on your behalf.

To obtain one of our forms (for example, a Strategy Selection form or a Withdrawal Request form) or to obtain more information about how to make a request, call us at 1-800-789-6771 or send us a fax at 800-807-9777. You can also request forms or information by mail at MassMutual Ascend Life Insurance Company, P.O. Box 5423, Cincinnati OH 45201-5423. You may also obtain forms on our website (www.massmutualascend.com).

We cannot process a request unless it is a Request in Good Order. A request may be rejected or delayed if it is not a Request in Good Order.

- If we receive a Request in Good Order on a Market Day before the Market Close, we will process it using values determined for the Market Close on that Market Day.
- If we receive a Request in Good Order after the Market Close or on a day that is not a Market Day, then we will treat that request as received at the start of the next Market Day.

If you have any questions, you should contact us or your registered representative before submitting the request.

Exception. If a withdrawal under an automated withdrawal program is scheduled for a date that is not a Market Day, then we will process the withdrawal on the scheduled date using values at the most recent Market Close. For example, if the automated withdrawal is scheduled for a date that falls on Sunday and there was a Market Close at 4:00 PM on the previous Friday, then we will process the withdrawal on Sunday using values determined at 4:00 PM on that Friday.

Market Days and Market Close

A Market Day is each day that all markets that are used to measure available Indexed Strategies are open for regular trading.

- Saturdays, Sundays, holidays, and any other day that the New York Stock Exchange and the NYSE Arca are closed are not Market Days.
- The NYSE and the NYSE Arca observe the following holidays: New Year's Day, Martin Luther King, Jr. Day, Presidents' Day, Good Friday, Memorial Day, Juneteenth, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

A Market Close is the close of the regular or core trading session on the market used to measure a given Indexed Strategy.

- Regular trading hours on the NYSE and core trading sessions on the NYSE Arca usually end at 4:00 PM Eastern Time
- Trading hours on the NYSE and core trading sessions on the NYSE Arca end at 1:00 PM Eastern Time on the day before the Fourth of July and the Friday after Thanksgiving and Christmas Eve.

Regular trading or a core trading session may end at a different time on a Market Day under certain circumstances when and as permitted under applicable rules. Such circumstances generally cannot be predicted in advance.

Specific information about NYSE and NYSE Arca holidays and trading hours in any given calendar year is available at <https://www.nyse.com/markets/hours-calendars>.

Receipt of Purchase Payments, Applications and Requests

For purposes of processing, we deem Purchase Payments and applications, Requests in Good Order, and other instructions (paperwork) mailed to our post office box as received by us at our administrative office when the Purchase Payment or the paperwork reaches the applicable processing department located at 191 Rosa Parks Street, Cincinnati OH 45202.

Risks and Limitations Related to Requests by Telephone or Internet

We will use reasonable procedures such as requiring certain identifying information, tape recording the telephone instructions, and providing written confirmation of the transaction, in order to confirm that instructions communicated by telephone, fax, Internet or other means are genuine. Any telephone, fax or Internet instructions reasonably believed by us to be genuine will be your responsibility, including losses arising from any errors in the communication of instructions. As a result of this policy, you will bear the risk of loss. We are not responsible for the validity of any request or action.

Telephone and computer systems may not always be available. Any telephone or computer system, whether it is yours, your service provider's, your agent's, or ours, can experience outages or slowdowns for a variety of reasons. These outages or slowdowns may delay or prevent our processing of your request. Although we have taken precautions to help our systems handle heavy use, we cannot promise complete reliability under all circumstances. If you experience technical difficulties or problems, you should consider making your request by mail.

If you purchase your contract and subsequently move or travel to a country for which we restrict website access due to Office of Foreign Assets Control (OFAC) sanctions, other US government regulations, or high computer hacker risk, you will only be able to submit transaction requests via telephone, U.S. postal service, or private carriers. The list of countries for which we currently block website access is as follows: Iran, Russia, North Korea, Ukraine, China, Syrian Arab Republic, Tunisia, Belarus, Turkey, South Korea, Venezuela, Palestinian Territory, and Vietnam. We will update this list from time to time, as needed.

Suspension of Payments or Transfers

We may be required to suspend or delay payments, withdrawals, and reallocations when we cannot obtain an Index value because:

- the New York Stock Exchange or NYSE Arca is closed (other than customary weekend and holiday closings);
- trading on the New York Stock Exchange or NYSE Arca is restricted; or
- an emergency exists such that it is not reasonably practicable to determine fairly the value of the Index.

In this case, we will make payments and process withdrawals and reallocations as soon as practicable after we are able to obtain the Index value.

We may suspend or delay payments, withdrawals, and reallocations when we are permitted to do so under a regulatory order. In this case, we will make payments and process withdrawals and reallocations when the order is no longer in effect.

Restrictions on Financial Transactions

Federal laws designed to counter terrorism and prevent money laundering might, in certain circumstances, require us to block an Owner's ability to make certain transactions. This means that we may be required to refuse to accept any request for withdrawals, Surrenders, Annuity Payout Benefit payments or Death Benefit payments, until instructions are received from the appropriate regulator. We may also be required to provide additional information about you and your Contract to government regulators.

OWNER

The Owner possesses all of the ownership rights under a Contract. The Owner is set out in the Contract Specifications section of your Contract or is the person who becomes the Owner under the Change of Owner provision or the Successor Owner provision of your Contract.

During the Accumulation Period, the Owner's rights include making allocations among the Crediting Strategies, taking a withdrawal or Surrender, electing a Payout Option, and designating a Beneficiary. During the Annuity Payout Period, unless released by the Owner, the Owner's rights include receiving Annuity Payout Benefit payments or directing payments to the Annuitant and naming a contingent payee. After a death for which a Death Benefit is payable, the rights of the Owner cease and all rights to the Death Benefit are held by the Beneficiary or Beneficiaries.

Joint Owners

- **For a Nonqualified Contract.** Two persons may jointly own the Contract. In this case, the term "Owner" includes the joint Owner and you must exercise all rights of ownership by joint action.
- **For a Tax Qualified Contract.** No joint owner is permitted.

Change of Owner

- **For a Nonqualified Contract.** You may change the Owner only with our written consent. We may deny consent to a transfer only as stated in the **Limitations on Transfer or Assignment** section. A change of Owner cancels all prior Beneficiary designations. It does not cancel a

designation of an Annuitant or a Payout Option election. We may deny consent to a transfer only as stated in the Limitations on Transfer or Assignment section.

- **For a Tax Qualified Contract.** You cannot change the Owner except to the limited extent permitted by the tax qualification endorsement.

A change of Owner must be made by a Request in Good Order. A change of Owner may have adverse tax consequences. A change of Owner will be subject to any payments we make or actions we take before we receive the Request in Good Order.

Assignment

- **For a Nonqualified Contract.** You may pledge, charge, encumber or assign your interest in this Contract only with our written consent. We may deny consent to an assignment only as stated in the **Limitations on Transfer or Assignment** section. If we grant our consent, you may assign all or any part of your rights under this Contract except your rights to designate or change a Beneficiary or an Annuitant, to change Owners, or to elect a Payout Option.
- **For a Tax Qualified Contract.** You cannot pledge, charge, encumber or in any way assign your interest in this Contract except to the limited extent permitted by the tax qualification endorsement.

An assignment must be requested by a Request in Good Order. We are not responsible for the validity of any assignment. An assignment may have adverse tax consequences. An assignment will be subject to any payments we make or actions we take before we receive the Request in Good Order.

If we have consented to an assignment, the rights of a person holding the assignment, including the right to any payment under this Contract, come before the rights of an Owner, Annuitant, Beneficiary, or other payee. An assignment may be ended only as provided by law.

Limitations on Transfer or Assignment

We may deny your request to change the Owner of the Contract or to assign an interest in or right under it to the extent we determine necessary to comply with federal or state law or regulation that limits the transferability or assignment of the Contract.

Successor Owner

Your spouse becomes the successor owner of the Contract and succeeds to all rights of ownership if all of the following requirements are met:

- a Death Benefit is payable on account of your death;
- you were not a successor owner of the Contract;
- your spouse is the only Beneficiary entitled to the Death Benefit; and
- your spouse elects to become the successor owner.

A successor owner election cancels all prior Beneficiary designations. It does not cancel a designation of an Annuitant or a Payout Option election.

In some states, state law extends this successor owner right to a civil union partner or other person who is not your spouse as defined by federal tax law. In that case, distributions after your death must be made as required by the Death Benefit Distributions Rules described in the Death Benefit section on page 57.

Community Property

If you live in a community property state and have a spouse at any time while you own this Contract, the laws of that state may vary your ownership rights.

ANNUITANT

The Annuitant is a human being on whose life Annuity Payout Benefit payments are based. You may designate up to two Annuitants. The Annuitant is a person named as an Annuitant in the Contract Specifications section of your Contract or is a person who becomes an Annuitant when permitted under the Contract.

- **For a Nonqualified Contract.** The Annuitant cannot be changed at any time that the Contract is owned by a trust, custodial account, corporation, limited liability company, partnership, or other entity. Otherwise, you may change a designation of Annuitant at any time before the Annuity Payout Initiation Date.
- **For a Tax Qualified Contract.** The Annuitant must be the human being covered under the retirement arrangement for whose benefit the Contract is held.

A change of Annuitant must be made by a Request in Good Order. A change of Annuitant does not cancel a designation of a Beneficiary or a Payout Option election.

If an Annuitant dies before the Annuity Payout Initiation Date and no Death Benefit is payable, then in the absence of a new designation, the Annuitant will be:

- the surviving joint Annuitant(s); or if none
- the Owner(s).

BENEFICIARY

A Beneficiary is a person entitled to receive all or part of a Death Benefit that is to be paid under this Contract on account of a death before the Annuity Payout Initiation Date.

- If a Death Benefit becomes payable on account of your death or the death of an Owner or a joint Owner, then any Owner who survives the deceased Owner for at least 30 days is the Beneficiary no matter what other designation you may have made. If an Owner survives for at least 30 days but dies before submitting a Request in Good Order to claim the Death Benefit or to become Successor Owner, then the Beneficiary is that surviving Owner's estate.
- In all other cases, you may designate one or more Beneficiaries as provided in the Designation of Beneficiary provision of the Contract.
- If you do not designate a Beneficiary, or if no designated Beneficiary is surviving, then the Beneficiary is your estate.
- If the sole Beneficiary under the Contract is your spouse and all other requirements for successor ownership are met, then your spouse may become the successor owner of the Contract in lieu of receiving the Death Benefit.

A designation of Beneficiary must be made by a Request in Good Order. For Contracts with a Contract Effective Date before May 21, 2025, we must receive the request on or before the date of death for which a Death Benefit is payable. A designation of Beneficiary will be subject to any payments we make or actions we take before we receive the Request in Good Order

You may designate more than one Beneficiary. If you do, then you may state the share of the Death Benefit payable to each Beneficiary that you have named. You may also state whether each Beneficiary that you have named is primary or contingent.

If you do not state otherwise:

- we will treat a Beneficiary as primary;
- we will pay the Death Benefit in equal shares to those primary Beneficiaries who survive;
- we will pay an amount to a contingent Beneficiary only if there is no primary Beneficiary who survives; and
- if there is no primary Beneficiary who survives, then we will pay the Death Benefit in equal shares to those contingent Beneficiaries who survive.

Survivorship Required

In order to be entitled to receive a Death Benefit, a Beneficiary must survive for at least 30 days after the death for which the Death Benefit is payable.

Termination of Marriage

If you designate your spouse as a Beneficiary and your marriage ends before your death, we will treat your former spouse as having predeceased you unless:

- a court order provides that the former spouse's rights as a beneficiary are to continue; or
- the former spouse remains or becomes an Owner.
- the Beneficiary or Contingent Payee designation was made on a date on which the marriage legally ended or was annulled, or was ratified after that date.

ANNUAL STATEMENT AND CONFIRMATIONS

At least once each Contract Year, we will send you a statement that will show: (1) your Account Value; (2) all transactions regarding your Contract during the year; and (3) any gain or loss for your Contract and/or any other changes in Strategy value credited to your Contract.

We will also send you written confirmations of Purchase Payments, Crediting Strategy allocations and renewals, withdrawals, and other financial transactions under your Contract. Statements and confirmations will be sent to your last known address on our records.

You may request additional status reports from us by a Request in Good Order. The charge for an additional status report shall not exceed \$25. Current information about your Contract is also available at no cost on our website.

You should promptly report any inaccuracy or discrepancy in a statement or confirmation. To report an inaccuracy or discrepancy, contact us at P.O. Box 5423, Cincinnati, OH 45201-5423, or call us at 1-800-789-6771. To protect your rights, you should consider reconfirming any oral communications by sending a written statement to P.O. Box 5423, Cincinnati, OH 45201-5423.

ELECTRONIC DELIVERY

You may elect to receive electronic delivery of the Contract prospectus and other Contract related documents. Contact us at our website at www.Massmutualascend.com for more information and to enroll.

ABANDONED PROPERTY REQUIREMENTS

Every state has unclaimed property laws. These laws generally declare annuity contracts to be abandoned after a period of inactivity of three to five years from: (1) the latest permitted Annuity Payout Initiation Date; or (2) the date of death for which a Death Benefit is due and payable. For example, if the payment of a death benefit is due, but the beneficiary does not come forward to claim the death benefit in a timely manner, the unclaimed property laws will apply.

If a Death Benefit, Annuity Payout Benefit payments or other contract proceeds are unclaimed, we will pay them to the abandoned property division or unclaimed property office of the applicable state. (Escheatment is the formal, legal name for this process.) For example, on an unclaimed Death Benefit, depending on the circumstances, the proceeds are paid: (1) to the state where the beneficiary last resided, as shown on our books and records; (2) to the state where the contract owner last resided, as shown on our books and records; or (3) to Ohio, which is our state of domicile. The state will hold the proceeds without interest until a valid claim is made by the person entitled to the proceeds.

To prevent escheatment of the Death Benefit, Annuity Payout Benefit payments, or other proceeds from your Contract, it is important:

- to update your contact information, such as your address, phone number, and email address, if and as it changes; and
- to update your Beneficiary and other designations, including complete names, complete addresses, phone numbers, and social security numbers, if and as they change.

Please contact us at P.O. Box 5423, Cincinnati, OH 45201-5423, or call us at 1-800-789-6771, to make such updates.

State unclaimed property laws do not apply to annuity contracts that are held under an employer retirement plan that is subject to the Employee Retirement Income Security Act of 1974 (ERISA).

OTHER CONTRACT PROVISIONS

Amendment of the Contract

We reserve the right to amend the Contract to comply with applicable Federal or state laws or regulations. We will notify you in writing of any such amendments.

Misstatement

We may require proof of the age of the Annuitant, Owner and/or the Beneficiary before making any payments under the Contract that are measured by such person's life. If the age of the measuring life has been misstated, the amount payable will be the amount that would have been provided at the correct age. If payments based on the correct age would have been higher, we will pay the unpaid amount with interest. If payments would be lower, we may deduct the overpaid amount with interest, from succeeding payments.

Involuntary Termination

If the Account Value on any anniversary of the initial Strategy Application Date is less than the minimum required value of \$5,000 due to poor market performance or withdrawals from the Contract, we may terminate your Contract on that anniversary.

- If you make only one Purchase Payment, each Term will end on an anniversary of the initial Strategy Application Date. In this case, any involuntary termination will occur on a date that is the end of a Term.
- If you make multiple Purchase Payments, Terms may end on different dates. In this case, any involuntary termination will occur on a date that is the end of a Term, but it will occur before the end of other Terms. In this case, the Surrender Value payable upon termination of your Contract will reflect the Daily Value Percentages used to calculate the value of Indexed Strategies with Terms that are not ending on the termination date.

The examples below show the relationship between the date of an involuntary termination and the end of a Term.

Example A. You make one Purchase Payment that is applied to the Crediting Strategies on June 20, 2025. Terms will start and end on June 20 and the anniversary of the initial Strategy Application Date will be June 20. If your Account Value is less than \$5,000 on June 20, 2027, we may terminate your Contract on that anniversary date.

Example B. You make two Purchase Payments. One Purchase Payment is applied to the Crediting Strategies on May 6, 2025 and the other Purchase Payment is applied to the Crediting Strategies on June 20, 2025. Terms will start and end on May 6 and on June 20. The anniversary of the initial Strategy Application Date will be May 6.

- If your Account Value is less than \$5,000 on June 20, 2027, we may not terminate your Contract because June 20 is not an anniversary of the initial Strategy Application Date.
- If your Account Value is less than \$5,000 on May 6, 2029, we may terminate your Contract on that anniversary date even though the other Term will not end until June 20, 2028.

If we terminate your Contract, we will pay you the Surrender Value determined as of the date that we terminate your Contract. The Surrender Value will reflect the applicable Crediting Strategy values as calculated on the day that we terminate your Contract.

FEDERAL TAX CONSIDERATIONS

This section provides a general description of federal income tax considerations relating to the Contracts. The purchase, holding and transfer of a Contract may have federal estate and gift tax consequences in addition to income tax consequences. Estate and gift taxation is not discussed in this prospectus. State taxation will vary, depending on the state in which you reside, and is not discussed in this prospectus.

The tax information provided in this prospectus is not intended or written to be used as legal or tax advice. It is written solely to provide general information related to the sale and holding of the Contracts. You should seek advice on legal or tax questions based on your particular circumstances from an attorney or tax advisor.

Tax Deferral on Annuities

Internal Revenue Code ("IRC") Section 72 governs taxation of annuities in general. The income earned on a Contract is generally not included in income until it is withdrawn from the Contract. In other words, a Contract is a tax-deferred investment. **The advantages of tax deferral are lost if you Surrender or take withdrawals from the Contract, unless the Surrender or withdrawal is part of a rollover, transfer, or exchange.** Tax deferral is not available for a Contract when an Owner is not a natural person unless the Contract is part of a tax-qualified retirement plan or the Owner is a mere agent for a natural person. For a nonqualified deferred compensation plan, this rule means that the employer as Owner of the Contract will generally be taxed currently on any increase in the Surrender Value, although the plan itself may provide a tax deferral to the participating employee.

Under certain circumstances, based on a rule known as the "Investor Control Doctrine," the IRS has stated that the holder of an annuity contract could be treated as the owner (for tax purposes) of the assets of a separate account that supports the annuity contract. If you were treated as the owner of an interest in the separate account, then you would be taxed on the income, gain, and loss arising out of your interest in the separate account. Although the IRS has not provided definitive guidance on the application of this rule to indexed annuity contracts, we do not believe that this rule applies to the Contract because you have no specific, fractional, or unitized interest in the separate account assets, we are not obligated to invest the separate account in any particular assets, the investment return and market value of the separate account assets is not allocated in an identical manner to any Contract, the Contract values are determined based on gains and losses regardless of the performance of the separate account assets, and the derivatives that we may hold in the separate account are not publicly traded.

Tax-Qualified Retirement Plans

Annuities may also qualify for tax-deferred treatment, or serve as a funding vehicle, under tax-qualified retirement plans that are governed by other IRC provisions. These provisions include IRC Section 401 (pension, profit sharing, and 401(k) plans), IRC Section 403(b) (tax-sheltered annuities), IRC Sections 408 and 408A (individual retirement annuities), and IRC Section 457(b) (governmental deferred compensation plans). Tax-deferral is generally also available under these tax-qualified retirement plans through the use of a trust or custodial account without the use of an annuity.

The tax law rules governing tax-qualified retirement plans and the treatment of amounts held and distributed under such plans are complex. If the Contract is to be used in connection with a tax-qualified retirement plan, including an individual retirement annuity ("IRA") under a Simplified Employee Pension (SEP) Plan, you should seek competent legal and tax advice regarding the suitability of the Contract for your particular situation.

Contributions to a tax-qualified Contract are typically made with pre-tax dollars, while contributions to other Contracts are typically made from after-tax dollars, though there are exceptions in either case. Tax-qualified Contracts may also be subject to restrictions on withdrawals that do not apply to other Contracts. These restrictions may be imposed to meet the requirements of the IRC or of an employer plan.

Following is a brief description of the types of tax-qualified retirement plans for which the Contracts are available.

Individual Retirement Annuities. IRC Sections 219 and 408 permit certain individuals or their employers to contribute to an individual retirement arrangement known as an “Individual Retirement Annuity” or “IRA”. Under applicable limitations, an individual may claim a tax deduction for certain contributions to an IRA. Contributions made to an IRA for an employee under a Simplified Employee Pension (SEP) Plan or Savings Incentive Match Plan for Employees (SIMPLE) established by an employer are not includable in the gross income of the employee until distributed from the IRA. Distributions from an IRA are taxable to the extent that they represent contributions for which a tax deduction was claimed, contributions made under a SEP plan or SIMPLE, or income earned within the IRA.

Roth IRAs. IRC Section 408A permits certain individuals to contribute to a Roth IRA. Contributions to a Roth IRA are not tax deductible. Tax-free distributions of contributions may be made at any time. Distributions of earnings are tax-free following the five-year period beginning with the first year for which a Roth IRA contribution was made if the Owner has attained age 59½, become disabled, or died, or for qualified first-time homebuyer expenses.

Tax-Sheltered Annuities. IRC Section 403(b) of permits public schools and charitable, religious, educational, and scientific organizations described in IRC Section 501(c)(3) to establish “tax-sheltered annuity” or “TSA” plans for their employees. TSA contributions and Contract earnings are generally not included in the gross income of the employee until distributed from the TSA. Amounts attributable to contributions made under a salary reduction agreement cannot be distributed until the employee attains age 59½, severs employment, becomes disabled, incurs a hardship, is eligible for a qualified reservist distribution, or dies. The IRC and the plan may impose additional restrictions on distributions.

Pension, Profit-Sharing, and 401(k) Plans. IRC Section 401 permits employers to establish various types of retirement plans for employees, and permits self-employed individuals to establish such plans for themselves and their employees. These plans may use annuity contracts to fund plan benefits. Generally, contributions are deductible to the employer in the year made, and contributions and earnings are generally not included in the gross income of the employee until distributed from the plan. The IRC and the plan may impose restrictions on distributions. Purchasers of a Contract for use with such plans should seek competent advice regarding the suitability of the Contract under the particular plan.

Governmental Eligible Deferred Compensation Plans. State and local government employers may purchase annuity contracts to fund eligible deferred compensation plans for their employees, as described in IRC Section 457(b). Contributions and earnings are generally not included in the gross income of the employee until the employee receives distributions from the plan. Amounts cannot be distributed until the employee attains age 70 1/2, severs employment, becomes disabled, incurs an unforeseeable emergency, or dies. The plan may impose additional restrictions on distributions.

Roth TSAs, Roth 401(k)s, and Roth 457(b)s. IRC Section 402A permits TSA plans, 401(k) plans, and governmental 457(b) plans to allow participating employees to designate some part or all of their future elective contributions as Roth contributions. Roth contributions to a TSA plan, 401(k) plan, or governmental 457(b) plan are included in the employee’s taxable income as earned. Amounts attributable to Roth TSA, Roth 401(k), or Roth 457(b) contributions must be held in a separate account from amounts attributable to traditional pre-tax TSA, 401(k), or 457(b) contributions. Distributions from a Roth TSA, Roth 401(k), or Roth 457(b) account are considered to come proportionally from contributions and earnings. Distributions attributable to Roth account contributions are tax-free. Distributions attributable to Roth account earnings are tax-free following the five-year period beginning with the first year for which Roth contributions are made to the plan if the employee has attained age 59½, become disabled, or died. A Roth TSA, Roth 401(k), or Roth 457(b) account is subject to the same distribution restrictions that apply to amounts attributable to traditional pre-tax TSA, 401(k), or 457(b) contributions made under a salary reduction agreement. The plan may impose additional restrictions on distributions.

Nonqualified Deferred Compensation Plans

Employers may invest in annuity contracts in connection with unfunded deferred compensation plans for their employees. Such plans may include eligible deferred compensation plans of non-governmental tax-exempt employers, as described in IRC Section 457(b); deferred compensation plans of both governmental and nongovernmental tax-exempt employers that are taxed under IRC Section 457(f) and subject to Section 409A; and nonqualified deferred compensation plans of for-profit employers subject to Section 409A. In most cases, these plans are designed so that amounts credited under the plan will not be includable in the employees’ gross income until paid under the plan. In these situations, the annuity contracts are not plan assets and are subject to the claims of the employer’s general creditors. Whether or not made from the Contract, plan benefit payments are subject to restrictions imposed by the IRC and the plan.

Summary of Income Tax Rules

The following chart summarizes the basic income tax rules governing tax-qualified retirement plans, nonqualified deferred compensation plans, and other non-tax-qualified Contracts.

	Tax-Qualified Contracts and Plans	Nonqualified Deferred Compensation Plans	Other Non-Tax-Qualified Contracts
Plan Types	<ul style="list-style-type: none"> • IRC §408 (IRA, SEP, SIMPLE IRA) • IRC §408A (Roth IRA) • IRC §403(b) (Tax-Sheltered Annuity) • IRC §401 (Pension, Profit-Sharing, 401(k)) • Governmental IRC §457(b) • IRC §402A (Roth TSA, Roth 401(k), or Roth 457(b)) 	<ul style="list-style-type: none"> • IRC §409A • Nongovernmental IRC §457(b) • IRC §457(f) 	<ul style="list-style-type: none"> • IRC §72 only
Who May Purchase a Contract	Eligible employee, employer, or employer plan.	Employer on behalf of eligible employee. Employer generally loses tax-deferred status of Contract itself.	Anyone. Non-natural person will generally lose tax-deferred status.
Contribution Limits	Contributions are limited by IRC and/or plan requirements.		None.
Distribution Restrictions	Distributions from Contract and/or plan may be restricted to meet IRC and/or plan requirements.		None.
Taxation of Withdrawals, Surrenders, and Lump Sum Death Benefit	<p>Generally, 100% of distributions must be included in taxable income. However, the portion that represents an after-tax investment is not taxable. Distributions from Roth IRA are deemed to come first from after-tax contributions. Distributions from other plans are generally deemed to come from income and after-tax investment (if any) on a pro-rata basis. Distributions from §408A Roth IRA or §402A Roth TSA, Roth 401(k), or Roth 457(b) are completely tax free if certain requirements are met.</p> <p>For tax purposes, all IRAs and SEP IRAs of an owner are treated as a single IRA, and all Roth IRAs of an owner are treated as a single Roth IRA.</p>		<p>Generally, distributions must be included in taxable income until all accumulated earnings are paid out. Thereafter, distributions are tax-free return of the original investment. However, distributions are tax-free until any investment made before August 14, 1982 is returned.</p> <p>For tax purposes, all non-tax-qualified annuity contracts issued to the same owner by the same insurer in the same calendar year are treated as one contract.</p>
Taxation of Payout Option Payments (Annuity Benefit or Death Benefit)	A percentage of each payment is tax free equal to the ratio of after-tax investment (if any) to the total expected payments, and the balance is included in taxable income. Once the after-tax investment has been recovered, the full amount of each benefit payment is included in taxable income. Distributions from a Roth IRA, Roth TSA, Roth 401(k), or Roth 457(b) are completely tax free if certain requirements are met.		
Possible Penalty Taxes for Distributions Before Age 59½	Taxable portion of payments made before age 59½ may be subject to 10% penalty tax (or 25% for a SIMPLE IRA during the first two years of participation). Penalty taxes do not apply to payments after the participant's death, or to §457 plans. Other exceptions may apply.	None.	Taxable portion of payments made before age 59½ may be subject to a 10% penalty tax. Penalty taxes do not apply to payments after the Owner's death. Other exceptions may apply.

	Tax-Qualified Contracts and Plans	Nonqualified Deferred Compensation Plans	Other Non-Tax-Qualified Contracts
Assignment/ Transfer of Contract	Assignment and transfer of Ownership generally not permitted.		Generally, deferred earnings taxable to transferor upon transfer or assignment. Gift tax consequences are not discussed herein.
Federal Income Tax Withholding	Eligible rollover distributions from §401, §403(b), and governmental §457(b) plans are subject to 20% mandatory withholding on taxable portion unless direct rollover. For other payments, Payee may generally elect to have taxes withheld or not.	Generally subject to wage withholding.	Generally, Payee may elect to have taxes withheld or not.

Rollovers, Transfers, and Exchanges

Amounts from a tax-qualified Contract may be rolled over, transferred, or exchanged into another tax-qualified account or retirement plan as permitted by the IRC and plan(s). Amounts may be rolled over, transferred, or exchanged into a tax-qualified Contract from another tax-qualified account or retirement plan as permitted by the IRC and plan(s). In most cases, such a rollover, transfer, or exchange is not taxable, unless the rollover of pre-tax amounts is made into a Roth IRA, a Roth TSA, Roth 401(k), or Roth 457(b). Rollovers, transfers, and exchanges are not subject to normal contribution limits. The IRC or plan may require that rollovers be held in a separate Contract from other plan funds.

Amounts from a non-tax-qualified Contract may be transferred to another non-tax-qualified annuity or to a qualified long-term care policy as a tax-free exchange as permitted by the IRC Section 1035. Amounts from another non-tax-qualified annuity or from a life insurance or endowment policy may be transferred to a Contract as a tax-free exchange under IRC Section 1035.

Required Distributions

The Contracts are subject to the required distribution rules of federal tax law. These rules vary based on the tax qualification of the Contract or the plan under which it is issued.

For a tax-qualified Contract other than a Roth IRA, required minimum distributions must generally begin by April 1 following the year the participant attains the applicable RMD age. The applicable RMD age is:

- age 75 if born after December 31, 1959;
- age 73 if born after December 31, 1950, but before January 1, 1960;
- age 72 if born after June 30, 1949, but before January 1, 1951; or
- age 70 1/2 if born before July 1, 1949.

However, for a 403(b) Tax-Sheltered Annuity Plan, a 401 Pension, Profit-Sharing, or 401(k) Plan, or a 457(b) Governmental Deferred Compensation Plan, a participant who is not a 5% owner of the employer may delay required minimum distributions until April 1 following the year in which the participant retires from that employer.

The required minimum distributions during life are calculated based on standard life expectancy tables adopted under federal tax law.

For a Roth IRA or for a Contract that is not tax-qualified, there are no required distributions during life.

A tax-qualified Contract must make required distributions after death. The required distributions vary depending on the type of beneficiary and whether minimum distributions were required during the life of the decedent. Some beneficiaries may take payments over life or life expectancy, and others must receive all benefits within five or ten years after death, and some must take payments over life or life expectancy with a final payment within ten years after the decedent's death. A non-tax-qualified Contract that has begun making payments under a payout option during the Owner's life must make any remaining payments at least as rapidly after death. If payments from a non-tax-qualified Contract have not begun, then the Death Benefit must be paid out in full within five years after death, or must be paid out in substantially equal payments beginning within one year of death over a period not exceeding the life expectancy of the designated beneficiary.

For a traditional IRA, a Roth IRA, or a Contract that is not tax-qualified, a beneficiary who is a surviving spouse may elect out of these requirements, and apply the required distribution rules as if the Contract were his or her own. For this purpose, federal tax law recognizes as married any two people whose marriage is valid in the state in which it was celebrated. A civil union or domestic partnership is not considered a marriage.

The Contract is intended for long-term investment purposes and the Contract and its Crediting Strategies may not be appropriate for investors who plan to take withdrawals (including automated withdrawals and required minimum distributions) during the first five Contract Years or who plan to take withdrawals from Indexed Strategies before the end of a Term.

DISTRIBUTION OF THE CONTRACTS

MM Ascend Life Investor Services, LLC ("MMALIS") is the principal underwriter and distributor of the securities offered through this prospectus. MassMutual Ascend Life and MMALIS are affiliated because MMALIS is a subsidiary of MassMutual Ascend Life. MMALIS also acts as the principal underwriter and distributor of the variable annuity contracts that are issued by one of our subsidiaries.

MMALIS's principal executive offices are located at 191 Rosa Parks Street, Cincinnati, Ohio 45202. MMALIS is registered as a broker-dealer with the Securities and Exchange Commission under the Securities Exchange Act of 1934, as well as the securities regulators in the states in which it operates and registration is required. MMALIS is a member of the Financial Industry Regulatory Authority ("FINRA").

Contracts are sold by licensed insurance agents (the "Selling Agents") in those states where the Contract may be lawfully sold. Such Selling Agents will be appointed agents of MassMutual Ascend Life and will be registered representatives of broker-dealer firms (the "Selling Broker-Dealers") that have entered into selling agreements with us and MMALIS. Selling Broker-Dealers will be registered under the Securities Exchange Act of 1934 and will be members of FINRA.

FINRA provides background information about broker-dealers and their registered representatives through FINRA BrokerCheck. You may contact the FINRA BrokerCheck Hotline at 1-800-289-9999, or log on <http://www.finra.org> to learn more about MMALIS, your Selling Agent, and his or her Selling Broker Dealer.

MMALIS receives no compensation for acting as underwriter of the Contracts; however, MassMutual Ascend Life pays for some of MMALIS's operating and other expenses, including overhead and legal and accounting fees. MassMutual Ascend Life may reimburse MMALIS for certain sales expenses, such as marketing materials and advertising expenses, and other expenses of distributing the Contracts.

MassMutual Ascend Life or MMALIS pay the Selling Broker-Dealers compensation for the promotion and sale of the Contract. The Selling Agents who solicit sales of the Contract typically receive a portion of the compensation paid to the Selling Broker-Dealers in the form of commissions or other compensation, depending on the agreement between the Selling Broker-Dealer and the Selling Agent.

The amount and timing of commissions paid to Selling Broker-Dealers may vary depending on the selling agreement but it will not be more than 9.2% of each Purchase Payment. In most cases, such amounts paid to a Selling Broker-Dealer will be divided between the Selling Agent and the Selling Broker-Dealer. Some Selling Broker-Dealers may elect to receive a lower commission when a Purchase Payment is made, along with annual trail commissions up to 1.5% of Account Value for so long as a contract remains in effect or as agreed in the selling agreement. MassMutual Ascend Life may pay or allow other promotional incentives or payments in the form of cash or other compensation to the extent permitted by FINRA rules and other applicable laws and regulations.

MassMutual Ascend Life also may pay compensation to wholesaling broker-dealers or other firms or intermediaries in return for wholesaling services such as providing marketing and sales support, product training, and administrative services to the Selling Agents of the Selling Broker-Dealers. These allowances may be based on a percentage of a Purchase Payment.

In addition to the compensation described above, MassMutual Ascend Life may make additional cash payments, in certain circumstances referred to as "override" compensations, or reimbursements to Selling Broker-Dealers in recognition of their marketing and distribution, transaction processing and/or administrative services support. These payments are not offered to all Selling Broker-Dealers, and the terms of any particular agreement governing the payments may vary among Selling Broker-Dealers depending on, among other things, the level and type of marketing and distribution support provided. Marketing and distribution support services may include, among other services, placement of MMALIC's products on the Selling Broker-Dealers' preferred or recommended list, increased access to the Selling Broker-Dealers' registered representatives for purposes of promoting sales of MassMutual Ascend Life products, assistance in training and education of the Selling Agents, and opportunities for MMALIC and MMALIS to participate in sales conferences and educational seminars. The payments or reimbursements may be calculated as a percentage of the particular Selling Broker-Dealer's actual or expected aggregate sales of our indexed annuity contracts (including the Contract) and/or may be a fixed dollar amount. Broker-dealers receiving these additional payments may pass on some or all of the payments to the Selling Agents.

You should ask your Selling Agent for further information about the commissions or other compensation that he or she, or the Selling Broker-Dealer for which he or she works, may receive in connection with your purchase of a Contract.

There is no front-end sales load deducted from the Purchase Payment(s) to pay sales commissions. Commissions and other incentives or payments described above are not charged directly to you. We intend to recoup at least a portion of the sales commissions and other sales expenses through fees and charges deducted under the Contract.

MASSMUTUAL ASCEND LIFE

MassMutual Ascend Life is a stock insurance company incorporated in 1961 and continuously engaged in the insurance business since that time. We are domiciled in the state of Ohio and licensed to conduct life insurance business in all states of the United States except New York, and in the District of Columbia and Puerto Rico. Our principal executive offices are located at 191 Rosa Parks Street, Cincinnati, Ohio 45202.

We are a wholly owned subsidiary of Massachusetts Mutual Life Insurance Company (“MassMutual”), a mutual life insurance company. MassMutual and its domestic life insurance subsidiaries provide individual and group life insurance, disability insurance, individual and group annuities and guaranteed interest contracts to individual and institutional customers in all 50 states of the U.S., the District of Columbia and Puerto Rico.

Prior to October 3, 2022, MassMutual Ascend Life’s name was Great American Life Insurance Company (“GALIC”) and MMALIS’ name was Great American Advisors, LLC (“GAA”). On May 28, 2021, American Financial Group, Inc. sold its annuity business consisting of GALIC and its two insurance subsidiaries, Annuity Investors Life Insurance Company and Manhattan National Life Insurance Company, as well as a broker-dealer affiliate, GAA, and insurance distributor, AAG Insurance Agency, Inc. to MassMutual.

Except to a small part of a Contract’s Account Value funded through the Separate Account described below, the Contract guarantees and benefits are paid from our general account (the “General Account”), and such guarantees and benefits are subject to our claims-paying ability and financial strength and may lose value.

The General Account

The General Account holds all our assets other than assets in our insulated separate accounts. We own our General Account assets, and, subject to applicable law, have sole investment discretion over them.

We must invest our assets according to applicable state laws regarding the nature, quality and diversification of investments that may be made by life insurance companies. In general, these laws permit investments, within specified limits and subject to certain qualifications, in Federal, state, and municipal obligations, corporate bonds, preferred and common stocks, real estate mortgages, real estate and certain other investments.

We place a majority of the Purchase Payments made under the Contract in our General Account where we primarily invest the assets in a variety of fixed income securities.

The Separate Account

We place a portion of the Purchase Payments made under the Contract in a non-unitized separate account (the “Separate Account”) that is not registered with the Securities and Exchange Commission. We established and maintain the Separate Account pursuant to the laws of our domiciliary state for the purpose of supporting our obligation to adjust the Indexed Strategy values based on the Daily Value Percentage or rise or fall of the Index. The assets of the Separate Account are held in our name on behalf of the Separate Account and legally belong to us. The assets in the Separate Account are not chargeable with liabilities arising out of any other business that we conduct. We may invest these assets in hedging instruments, including derivative contracts as well as other assets permitted under state law. To support our obligations to adjust the Indexed Strategy values, we may move money between the Separate Account and our General Account. We are not obligated to invest the assets of the Separate Account according to any particular plan except as we may be required to by state insurance laws. Regardless of your Strategy allocations, we do not intend to invest the assets of the Separate Account in the iShares MSCI EAFE exchange traded fund the iShares U.S. Real Estate exchange traded fund, or the SPDR Gold Shares exchange traded fund. We may or may not hold the hypothetical options described in this prospectus in the Separate Account.

Contract owners do not have any interest in or claim on the assets in the Separate Account nor do Contract owners participate in any way in the performance of assets held in the Separate Account.

LEGAL MATTERS

Reliance on Rule 12h-7

MassMutual Ascend Life relies on the exemption provided by Rule 12h-7 under the Securities Exchange Act of the 1934 Act from the requirement to file reports pursuant to Section 15(d) of that Act.

Legal Proceedings

MassMutual Ascend Life and its subsidiaries are involved in litigation from time to time, generally arising in the ordinary course of business. This litigation may include, but is not limited to, general commercial disputes, lawsuits brought by contract owners and policyholders, employment matters, reinsurance collection matters and actions challenging certain business practices of insurance subsidiaries. Also, from time to time, state and federal regulators or other officials conduct formal and informal examinations or undertake other actions dealing with various aspects of the financial services and insurance industries. It is not possible to predict with certainty the ultimate outcome of any pending legal proceeding or regulatory action. However, MassMutual Ascend Life does not believe any such action or proceeding will have a material adverse effect upon its ability to meet its obligations under the Contracts.

Legal Opinion on Contracts

Legal matters in connection with federal laws and regulations affecting the issue and sale of the Contracts described in this prospectus and the organization of MassMutual Ascend Life, its authority to issue such Contracts under Ohio law, and the validity of the forms of the Contracts under Ohio law have been passed on by John P. Gruber, General Counsel of MassMutual Ascend Life.

Securities and Exchange Commission Position on Indemnification

Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers or persons controlling MassMutual Ascend Life pursuant to its articles of incorporation or its code of regulations or pursuant to any insurance coverage or otherwise, MassMutual Ascend Life has been informed that, in the opinion of the Securities and Exchange Commission, such indemnification is against public policy as expressed in the Securities Act of 1933 and is therefore unenforceable.

FINANCIAL STATEMENTS

The consolidated financial statements of MassMutual Ascend Life Insurance Company are included in the Statement of Additional Information. They should be considered only as they relate to our ability to meet our obligations under the Contract. Instructions on how to obtain the Statement of Additional Information are included on the back cover page.

APPENDIX A: INVESTMENT OPTIONS AVAILABLE UNDER THE CONTRACT

The following is a list of Indexed Strategies currently available under the Contract. We may change the features of the Indexed Strategies listed below (including the Index and the current limits on Index gains and losses), offer new Indexed Strategies, and terminate existing Indexed Strategies. We will provide you with written notice before making any changes other than changes to current limits on Index gains. Information about current limits on Index gains is available at www.massmutualascend.com/index-frontier-5-plus. For additional information about the features of the Indexed Strategies, please see the “Indexed Strategies” section in the prospectus.

Note: If amounts are removed from an Indexed Strategy before the end of its Term, we will apply a Daily Value Percentage adjustment. This may result in a significant reduction in your Strategy value that could exceed any protection from Index loss that would be in place if you held the Indexed Strategy until the end of the Term. You may not be able to invest in certain Indexed Strategies, as noted below.

Index	Type of Index	Term	Current Limit on Index Loss (if held until end of Term)	Minimum Limit on Index Gain (for the life of the Indexed Strategy)	Performance Lock
S&P 500®	Market Index	1-year	-10% Floor	1% Cap	Available
S&P 500®	Market Index	1-year	10% Buffer	1% Cap	Available
S&P 500®	Market Index	1-year	10% Buffer	1% Dual Performance Trigger Rate	N/A
S&P 500®	Market Index	1-year	10% Buffer	1% Trigger Rate	N/A
S&P 500®	Market Index	1-year	20% Buffer	1% Trigger Rate	N/A
S&P 500®	Market Index	1-year	20% Buffer	1% Cap	Available
S&P 500® ¹	Market Index	5-year	10% Buffer	1% Cap	Available
S&P 500®	Market Index	5-year	20% Buffer	1% Cap	Available
SPDR Gold Shares ETF	ETF	1-year	-10% Floor	1% Cap	N/A
iShares U.S. Real Estate ETF	ETF	1-year	-10% Floor	1% Cap	N/A
iShares MSCI EAFE ETF	ETF	1-year	-10% Floor	1% Cap	N/A
First Trust Barclays Edge	Market Index	1-year	10% Buffer	1% Cap	Available
S&P 500® ²	Market Index	5-year	10% Buffer	5% Upside Participation Rate	Available

¹ This Strategy is not available for Contracts issued in California or Florida until regulatory approval is received.

² This Strategy is not available for Contracts with a Contract Effective Date after May 20, 2025, except in California and Florida.

The **S&P 500** is a “price return index,” not a “total return index,” and therefore does not reflect dividends paid on the securities composing the Index. This will reduce the Index return and cause the Index to underperform a direct investment in the securities composing the Index.

The **iShares MSCI EAFE ETF** deducts fees and costs when calculating Index performance. This will reduce the ETF’s return and cause the ETF to underperform a direct investment in the securities composing the ETF.

The **iShares US Real Estate ETF** deducts fees and costs when calculating Index performance. This will reduce the ETF’s return and cause the ETF to underperform a direct investment in the securities composing the ETF.

The **SPDR Gold Shares ETF** deducts fees and costs when calculating Index performance. This will reduce the ETF’s return and cause the ETF to underperform a direct investment in gold bullion.

The **First Trust Barclays Edge** is an “excess return index” that subtracts a risk-free interest rate from the price and dividend return of the securities. It also deducts fees and costs when calculating Index performance. This will reduce the Index’s return and cause the Index to underperform a direct investment in the securities composing the Index.

Possible Changes in Indexed Strategies.

The **S&P 500 1-Year -10% Floor with Cap Indexed Strategy** will always be available. At the end of a Term, we may stop offering any other Indexed Strategy. Consequently, any other Indexed Strategy listed above may not be available after the end of the initial Term. We have the right to replace the Index associated with an Indexed Strategy under certain circumstances.

In the future, we may offer new Indexed Strategies. Any new Buffer Strategy will offer protection against loss at least equal to a 5% Buffer. Any new Floor Strategy will offer protection against loss at least equal to a -20% Floor.

Indexed Strategies that may be available in the future may earn a return that is lower than the return your investments would have earned if they had been invested in the other Indexed Strategies that are currently available. In addition, any reduction in the available number of Indexed Strategies may reduce your opportunity to increase your Contract value.

The following lists the Fixed Account Option currently available under the Contract. We may change the features of the Fixed Account Option listed below, offer new Fixed Account Options, and terminate existing Fixed Account Options. We will provide you with written notice before doing so.

<u>Name</u>	<u>Term</u>	<u>Minimum Guaranteed Interest Rate</u>
Declared Rate Strategy	1 year	0.15%

The interest rate for the Declared Rate Strategy Rate will never be less than the guaranteed minimum interest rate from 0.15% to 3.0% set out in the Declared Rate Strategy endorsement included in your Contract. The guaranteed minimum interest rate set out in the endorsement will never be less than the minimum interest rate required for fixed annuity contracts on the Contract Effective Date under the Standard Nonforfeiture Law of the state in which your Contract is issued. For additional information on the Declared Rate Strategy, see the Declared Rate Strategy section in the prospectus.

APPENDIX B: EXAMPLES OF IMPACT OF WITHDRAWALS ON CONTRACT VALUES AND AMOUNTS REALIZED

These examples are intended to illustrate how a withdrawal from an Indexed Strategy before the end of the Term affect Indexed Strategy values and amounts realized at the end of the Term.

Example A: Withdrawal When Index Rising Steadily – Cap and Upside Participation Rate Strategies

This example assumes:

- you allocate \$50,000 to the S&P 500 1-Year 10% Buffer with Cap Strategy and \$50,000 to the S&P 500 1-Year -10% Floor with Cap Strategy; and \$50,000 to the S&P 500 5-Year 10% Buffer with Upside Participation Rate Strategy;
- the Cap for the initial Term of the Buffer Strategy is 18% and the Cap for the initial term of the Floor Strategy is 21.5%;
- the Upside Participation Rate for the Term of the S&P 500 5-Year 10% Buffer with Upside Participation Rate Strategy is 100%;
- the S&P 500 is 1000 on the Term start date;
- you request a \$10,000 withdrawal on Day 146 when the Daily Value Percentage is 4.36% for the S&P 500 1-Year 10% Buffer with Cap Strategy, 3.71% for the S&P 500 1-Year -10% Floor with Cap Strategy and 4.75% for the S&P 500 5-Year Term 10% Buffer with Participation Rate Strategy
- you do not take any other withdrawals during the initial Term;
- the withdrawal is covered by the Free Withdrawal Allowance and therefore no Early Withdrawal Charges apply (If Early Withdrawal Charges did apply, the amounts realized at the end of the Term would be reduced by both the withdrawal and the amount of the Early Withdrawal Charge);
- the S&P 500 is 1130 on the Term end date; and
- you have not made a Performance Lock election.

Please note that even with a rising Index, the Daily Value Percentage may be negative or lower than the Index rise because the Net Option Price is not equal to the current Index price, and because the Daily Value Percentage calculation subtracts the Amortized Option Cost and Trading Cost from the Net Option Price.

Impact of \$10,000 Withdrawal from each Strategy on Day 146 of Term	S&P 500 1-Year 10% Buffer with Cap Strategy	S&P 500 1-Year -10% Floor with Cap Strategy	S&P 500 5-Year 10% Buffer with Upside Participation Rate Strategy
Investment Base at Term Start	\$50,000	\$50,000	\$50,000
Daily Value Percentage on Withdrawal Date	4.36%	3.71%	4.09%
Dollar Amount of Increase on Withdrawal Date	$\$50,000 \times .0436 = \$2,180$	$\$50,000 \times .0371 = \$1,855$	$\$50,000 \times .0409 = \$2,045$
Strategy Value before Withdrawal	$\$50,000 + \$2,180 = \$52,180$	$\$50,000 + \$1,855 = \$51,855$	$\$50,000 + \$2,045 = \$52,045$
Amount Withdrawn*	\$5,016	\$4,984	\$0
Withdrawal as Percentage of Strategy Value	$\$5,016 / \$52,180 = 9.61\%$	$\$4,984 / \$51,855 = 9.61\%$	0.00%
Proportional Reduction in Investment Base	$\$50,000 \times .0961 = \$4,805$	$\$50,000 \times .0961 = \$4,805$	\$0
Investment Base after Withdrawal	$\$50,000 - \$4,805 = \$45,195$	$\$50,000 - \$4,805 = \$45,180$	$= \$50,000 - \$0 = \$50,000$
Value at End of Term			
Investment Base after Withdrawal	\$45,195	\$45,180	\$50,000
Index at Term Start	1000	1000	1000
Index at Term End	1130	1130	1130
Rise in Index	13.00%	13.00%	13.00%
Cap	18.0%	21.5%	n/a
Upside Participation Rate	n/a	n/a	100%
Increase as a Percentage	13.00%	13.00%	13.00%
Dollar Amount of Increase	$\$45,195 \times .1300 = \$5,875$	$\$45,180 \times .1300 = \$5,875$	$= \$50,000 \times .1300 = \$6,500$
Strategy Value at Term End	$\$45,195 + \$5,875 = \$51,070$	$\$45,180 + \$5,875 = \$51,055$	$\$50,000 + \$6,500 = \$56,500$

* Note: The withdrawal is taken proportionally from Indexed Strategies having the shortest Term, based on the ratio of that Strategy's value to the total value of all Indexed Strategies having the same Term length immediately before the withdrawal. This means the withdrawal will be taken proportionally from Indexed Strategies with 1-year Terms and then proportionally from Indexed Strategies with 5-year Terms. In this example, the total value of all Indexed Strategies with 1-year Terms immediately before the withdrawal was \$104,035 (\$52,180 + \$51,855). The S&P 500 1-Year 10% Buffer with Cap Strategy value was 50.16% of that total value ($\$52,180 / \$104,035 = 50.16\%$), so 50.16% of the \$10,000 withdrawal (\$5,016) was taken from it. The S&P 500 with 1-Year -10% Floor with Cap Strategy value was 49.84% of that total value ($\$51,855 / \$104,035 = 49.84\%$), so 49.84% of the \$10,000 withdrawal (\$4,984) was taken from it. A withdrawal would only be taken from the S&P 500 5-Year 10% Buffer with Upside Participation Rate Strategy when no amounts remain in Indexed Strategies with a 1-year Term. For Contracts issued in Missouri, amounts taken from Indexed Strategies will be proportional without regard to Term length.

In this example, you invested \$50,000 in the S&P 500 1-Year 10% Buffer with Cap Strategy, \$50,000 in the S&P 500 1-Year -10% Floor with Cap

Strategy and \$50,000 in the S&P 500 5-Year 10% Buffer with Upside Participation Rate Strategy. At the end of the 1-year Term you realized \$112,140 from the 1-year Strategies (\$10,000 withdrawal plus the Strategy values of \$51,070 and \$51,070 at the end of the 1-year Term). Had no withdrawal occurred, your 1-year Strategy values at the end of the Term would have totaled \$113,000 (\$50,000 plus a 13% increase for the S&P 500 1-Year 10% Buffer with Cap Strategy, and \$50,000 plus a 13% increase for the S&P 500 -10% Floor with Cap Strategy.)

The hypothetical Strategy value for the 1-year Strategies (\$113,000) exceeds the amount realized (\$112,140) because the portion of the Investment Base withdrawn from each Strategy did not earn the index increase (13%) it would have earned if it had been left in the respective Strategy for the entire Term.

At the end of the 5-year Term you realized \$56,500 from the 5-year Strategy, which is the same amount you would have realized had no withdrawal occurred, because no amounts were withdrawn from the 5-year Strategy.

In this example, the two one-year Strategies performed equally because for both Strategies, the rise in the Index was less than the Cap. The higher return for the S&P 500 5-Year 10% Buffer with Upside Participation Rate Strategy, along with the fact that none of the withdrawal was taken from the 5-year Strategy, led to it having a higher Strategy value at the end of a 5-year Term than the other Strategies had at the end of a 1-year Term.

Example B: Withdrawal When Index Rising Steadily – Trigger Strategies

This example assumes:

- you allocate \$50,000 to the S&P 500 1-Year 10% Buffer with Performance Trigger Strategy, and \$50,000 to the S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy;
- the Trigger Rate for the initial Term of the S&P 500 1-Year 10% Buffer with Performance Trigger Strategy is 11%;
- the Trigger Rate for the initial Term of the S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy is 8%;
- the S&P 500 is 1000 on the Term start date;
- you request a \$10,000 withdrawal on Day 146 when the Daily Value Percentage is 4.20% for the S&P 500 1-Year 10% Buffer with Performance Trigger Strategy and 3.77% for the S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy;
- you do not take any other withdrawals during the initial Term;
- the withdrawal is covered by the Free Withdrawal Allowance and therefore no Early Withdrawal Charges apply (If Early Withdrawal Charges did apply, the amounts realized at the end of the Term would be reduced by both the withdrawal and the amount of the Early Withdrawal Charge);
- the S&P 500 is 1130 on the 1-year Term end date; and
- you have not made a Performance Lock election.

Please note that even with a rising Index, the Daily Value Percentage may be negative or lower than the Index rise because the Net Option Price is not equal to the current Index price, and because the Daily Value Percentage calculation subtracts the Amortized Option Cost and Trading Cost from the Net Option Price.

Impact of \$10,000 Withdrawal on Day 146 of Term	S&P 500 1-Year 10% Buffer with Performance Trigger Strategy	S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy
Investment Base at Term Start	\$50,000	\$50,000
Daily Value Percentage on Withdrawal Date	4.20%	3.77%
Dollar Amount of Increase on Withdrawal Date	$\$50,000 \times .0420 = \$2,100$	$\$50,000 \times .0377 = \$1,885$
Strategy Value before Withdrawal	$\$50,000 + \$2,100 = \$52,100$	$\$50,000 + \$1,885 = \$51,885$
Amount Withdrawn*	\$5,010	\$4,990
Withdrawal as Percentage of Strategy Value	$\$5,010 / \$52,100 = 9.62\%$	$\$4,990 / \$51,885 = 9.62\%$
Proportional Reduction in Investment Base	$\$50,000 \times .0962 = \$4,810$	$\$50,000 \times .0962 = \$4,810$
Investment Base after Withdrawal	$\$50,000 - \$4,810 = \$45,190$	$\$50,000 - \$4,810 = \$45,190$
Value at End of Term		
Investment Base after Withdrawal	\$45,190	\$45,190
Index at Term Start	1000	1000
Index at Term End	1130	1130
Rise in Index	13%	13%
Trigger Rate Activated?	Yes	Yes
Trigger Rate	11%	8%
Increase as a Percentage	11.00%	8.00%
Dollar Amount of Increase	$\$45,190 \times .1100 = \$4,971$	$\$45,190 \times .0800 = \$3,615$
Strategy Value at Term End	$\$45,190 + \$4,971 = \$50,161$	$\$45,190 + \$3,615 = \$48,805$

* Note: The withdrawal is taken proportionally from each Indexed Strategy, based on the ratio of that Strategy's value to the total value of all Indexed Strategies immediately before the withdrawal. In this example, the total value of all Indexed Strategies immediately before the withdrawal was \$103,985 (\$52,100 + \$51,885). The S&P 500 1-Year 10% Buffer with Performance Trigger Strategy value was 50.10% of that total value ($\$52,100 / \$103,985 = 50.10\%$), so 50.10% of the \$10,000 withdrawal (\$5,010) was taken from it. The S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy value was 49.90% of that total value ($\$51,885 / \$103,985 = 49.90\%$), so 49.90% of the \$10,000 withdrawal (\$4,990) was taken from it.

In this example, you invested \$50,000 in the S&P 500 1-Year 10% Buffer with Performance Trigger Strategy and \$50,000 in the S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy. At the end of the 1-year Term you realized \$108,966 from the Strategies (\$10,000 withdrawal plus the Strategy values of \$50,161 and \$48,805 at the end of the 1-year Term). Had no withdrawal occurred, your 1-year Strategy values at the end of the Term would have totaled \$109,500 (\$50,000 plus an 11.00% increase for the S&P 500 S&P 500 1-Year 10% Buffer with Performance Trigger Strategy, and \$50,000 plus an 8.00% increase for the S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy.)

The hypothetical Strategy value for the combined Strategies (\$109,500) exceeds the amount realized (\$108,966) because the portion of the Investment Base withdrawn from each Strategy did not earn the index increase (11.00% and 8.00% respectively) it would have earned if it had been left in the respective Strategy for the entire Term.

In this example, the S&P 500 1-Year 10% Buffer with Performance Trigger Strategy performed better than the S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy because the Trigger Rate for the S&P 500 1-Year 10% Buffer with Performance Trigger Strategy was higher than the Trigger Rate for the S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy.

Example C: Withdrawal When Index Falling Steadily – 10% Floor and Buffer Strategies

This example assumes:

- you allocate \$50,000 to the S&P 500 1-Year 10% Buffer with Cap Strategy and \$50,000 to the S&P 500 1-Year -10% Floor with Cap Strategy;
- the S&P 500 is 1000 on the Term start date;
- you request a \$10,000 withdrawal on Day 146 when the Daily Value Percentage is -4.66% for the Buffer Strategy and -5.52% for the Floor Strategy;
- you do not take any other withdrawals during the initial Term;
- the withdrawal is covered by the Free Withdrawal Allowance and therefore no Early Withdrawal Charges apply (If Early Withdrawal Charges did apply, the amounts realized at the end of the Term would be reduced by both the withdrawal and the amount of the Early Withdrawal Charge);
- the S&P 500 is 750 on the Term end date; and
- you have not made a Performance Lock election.

Please note that the Daily Value Percentage may be more negative than the fall in the Index because the Net Option Price is not equal to the current Index price, and because the Daily Value Percentage calculation subtracts the Amortized Option Cost and Trading Cost from the Net Option Price.

Impact of \$10,000 Withdrawal from Each Strategy on Day 146 of Term	S&P 500 1-Year 10% Buffer with Cap Strategy	S&P 500 1-Year -10% Floor with Cap Strategy
Investment Base at Term Start	\$50,000	\$50,000
Daily Value Percentage on Withdrawal Date	-4.66%	-5.52%
Dollar Amount of Decrease on Withdrawal Date	$\$50,000 \times -.0466 = -\$2,330$	$\$50,000 \times -.0552 = -\$2,760$
Strategy Value before Withdrawal	$\$50,000 - \$2,330 = \$47,670$	$\$50,000 - \$2,760 = \$47,240$
Amount Withdrawn*	\$5,023	\$4,977
Withdrawal as Percentage of Strategy Value	$\$5,023 / \$47,670 = 10.54\%$	$\$4,977 / \$47,240 = 10.54\%$
Proportional Reduction in Investment Base	$\$50,000 \times .1054 = \$5,268$	$\$50,000 \times .1054 = \$5,268$
Investment Base after Withdrawal	$\$50,000 - \$5,268 = \$44,732$	$\$50,000 - \$5,268 = \$44,732$
Value at End of Term		
Investment Base after Withdrawal	\$44,732	\$44,732
Index at Term Start	1000	1000
Index at Term End	750	750
Fall in Index	-25%	-25%
Buffer	10%	n/a
Floor	n/a	-10%
Decrease as a Percentage	$25\% - (-10\%) = -15\%$	$\text{Max}(-25\%, -10\%) = -10\%$
Dollar Amount of Decrease	$\$44,732 \times .15 = \$6,710$	$\$44,732 \times .10 = \$4,473$
Strategy Value at Term End	$\$44,732 - \$6,710 = \$38,022$	$\$44,732 - \$4,473 = \$40,259$

*Note: The withdrawal is taken proportionally from each Indexed Strategy, based on the ratio of that Strategy's value to the total value of all Indexed Strategies immediately before the withdrawal. In this example, the total value of all Indexed Strategies immediately before the withdrawal was \$94,910 (\$47,670 + \$47,240). The Buffer Strategy value was 50.23% of that total value (\$47,670 / \$94,910 = 50.23%), so 50.23% of the \$10,000 withdrawal (\$5,023) was taken from it. The Floor Strategy value was 49.77% of that total value (\$47,240 / \$94,910 = 49.77%), so 49.77% of the \$10,000 withdrawal (\$4,977) was taken from it.

In this example, you invested \$50,000 in the Buffer Strategy and \$50,000 in the Floor Strategy and at the end of the Term you realized \$88,281 (\$10,000 withdrawal plus the Strategy values of \$38,022 and \$40,259 at the end of the Term). Had no withdrawal occurred, your Strategy values at the end of the Term would have totaled \$87,500 (\$50,000 minus 15% decrease for the Buffer Strategy and \$50,000 minus 10% decrease for the Floor Strategy).

The amount realized of \$88,281 exceeds this hypothetical combined Strategy value of \$87,500 because the portion of the Investment Base withdrawn from the Buffer and Floor Strategies were not subject to the 10%-15% decrease they would have suffered if they had been left in their respective Strategies for the entire Term.

The Strategy value at Term end is highest for the Floor Strategy (\$40,259) and lowest for the Buffer Strategy (\$38,022). Though the proportionality rules relating to withdrawals keep each Strategy's Investment Base equal to the others after the withdrawals, the different decreases that result from the 25% drop in the Index value (-10% for the Floor Strategy and -15% for the Buffer Strategy) lead to different Strategy values at Term end.

Example D: Withdrawal When Index Falling Steadily – Trigger Strategies

This example assumes:

- you allocate \$50,000 to the S&P 500 1-Year 10% Buffer with Performance Trigger Strategy, and \$50,000 to the S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy;
- the Trigger Rate for the initial Term of the S&P 500 1-Year 10% Buffer with Performance Trigger Strategy is 11%;
- the Trigger Rate for the initial Term of the S&P 500 1-Year 10% Buffer with Performance Trigger Strategy is 8%;
- the S&P 500 is 1000 on the Term start date;
- you request a \$10,000 withdrawal on Day 146 when the Daily Value Percentage is -2.31% for the S&P 500 1-Year 10% Buffer with Performance Trigger Strategy and -0.74% for the S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy;
- you do not take any other withdrawals during the initial Term;
- the withdrawal is covered by the Free Withdrawal Allowance and therefore no Early Withdrawal Charges apply (If Early Withdrawal Charges did apply, the amounts realized at the end of the Term would be reduced by both the withdrawal and the amount of the Early Withdrawal Charge);
- the S&P 500 is 800 on the 1-year Term end date; and
- you have not made a Performance Lock election.

Please note that the Daily Value Percentage may be more negative than the fall in the Index because the Net Option Price is not equal to the current Index price, and because the Daily Value Percentage calculation subtracts the Amortized Option Cost and Trading Cost from the Net Option Price.

Impact of \$10,000 Withdrawal on Day 146 of Term	S&P 500 1-Year 10% Buffer with Performance Trigger Strategy	S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy
Investment Base at Term Start	\$50,000	\$50,000
Daily Value Percentage on Withdrawal Date	-2.31%	-0.74%
Dollar Amount of Decrease on Withdrawal Date	$-(\$50,000 \times -.0231) = \$1,155$	$-(\$50,000 \times -.0074) = \370
Strategy Value before Withdrawal	$\$50,000 - \$1,155 = \$48,845$	$\$50,000 - \$370 = \$49,630$
Amount Withdrawn*	\$4,960	\$5,040
Withdrawal as Percentage of Strategy Value	$\$4,960 / \$48,845 = 10.15\%$	$\$5,040 / \$49,630 = 10.15\%$
Proportional Reduction in Investment Base	$\$50,000 \times .1015 = \$5,075$	$\$50,000 \times .1015 = \$5,075$
Investment Base after Withdrawal	$\$50,000 - \$5,075 = \$44,925$	$\$50,000 - \$5,075 = \$44,925$
Value at End of Term		
Investment Base after Withdrawal	\$44,925	\$44,925
Index at Term Start	1000	1000
Index at Term End	800	800
Fall in Index	20%	20%
Buffer	10%	10%
Decrease as a Percentage	$20\% - 10\% = 10.00\%$	$20\% - 10\% = 10.00\%$
Dollar Amount of Decrease	$\$44,925 \times .1000 = \$4,493$	$\$44,925 \times .1000 = \$4,493$
Strategy Value at Term End	$\$44,925 - \$4,493 = \$40,432$	$\$44,925 - \$4,493 = \$40,432$

* Note: The withdrawal is taken proportionally from each Indexed Strategy, based on the ratio of that Strategy's value to the total value of all Indexed Strategies immediately before the withdrawal. In this example, the total value of all Indexed Strategies immediately before the withdrawal was \$98,475 (\$48,845 + \$49,630). The S&P 500 1-Year 10% Buffer with Performance Trigger Strategy value was 49.60% of that total value (\$48,845 / \$98,475 = 49.60%), so 49.60% of the \$10,000 withdrawal (\$4,960) was taken from it. The S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy value was 50.40% of that total value (\$49,630 / \$98,475 = 49.90%), so 50.40% of the \$10,000 withdrawal (\$5,040) was taken from it.

In this example, you invested \$50,000 in the S&P 500 1-Year 10% Buffer with Performance Trigger Strategy and \$50,000 in the S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy. At the end of the 1-year Term you realized \$90,864 from the Strategies (\$10,000 withdrawal plus the Strategy values of \$40,432 and \$40,432 at the end of the 1-year Term). Had no withdrawal occurred, your 1-year Strategy values at the end of the Term would have totaled \$90,000 (\$50,000 minus a 10.00% decrease for the S&P 500 S&P 500 1-Year 10% Buffer with Performance Trigger Strategy, and \$50,000 minus a 10.00% decrease for the S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy.)

The amount realized at the end of the 1-year Term for the combined Strategies (\$90,060) exceeds the hypothetical Strategy value (\$90,000), because the \$10,000 that was withdrawn was not subject to the full 10% decrease it would have suffered if it had been left in the Strategies for the entire 1-year Term.

In this example, the S&P 500 1-Year 10% Buffer with Performance Trigger Strategy and the S&P 500 1-Year 10% Buffer with Dual Performance Trigger Strategy performed identically because they are based on the same Index and the decrease in that Index was greater than 10%. Therefore, the 10% Buffer came into play for both Strategies.

APPENDIX C: STATE VARIATIONS

This prospectus describes the material features of the Contract. Contracts issued in your state may provide different features and benefits from, and impose different costs than, those described in this prospectus because of state law variations. However, please note that the maximum charge is set forth in this prospectus. If you would like to review a copy of the Contract and any endorsements, contact us at P.O. Box 5423, Cincinnati, OH 45201-5423, visit our website at www.mmascend.com or call us at 1-800-789-6771.

For Contracts with a Contract Effective Date on or after May 21, 2025

The following information is a summary of material state variations as of the date of this prospectus for Contracts issued in the identified state on or after May 21, 2025.

California

Right to Cancel (Free Look): The free look period is 30 days, whether or not you purchase this Contract to replace an existing annuity contract or life insurance policy. If you are under age 60, the amount to be refunded is the Account Value plus Fees/Charges. If you are age 60 or older, the amount to be refunded is the sum of your Purchase Payments.

Change of Beneficiary: Contracts issued in California before regulatory approval is received will continue to be subject to the requirement that a Change of Beneficiary be received prior to the death for which a Death Benefit is payable.

Payout Option Guarantee: The guarantee that payments under a Payout Option for an Annuity Payout Benefit or Death Benefit will not be less than those that would be provided by the application of the Surrender Value or Death Benefit to purchase a single premium immediate annuity contract at the purchase rate offered by the Company will not apply to Contracts issued in California before regulatory approval is received.

Extended Care Waiver: The Waiver of Early Withdrawal Charges for Facility Care or Home Care or Community-Based Services Rider (CA Rider) provides a waiver under an expanded set of circumstances. The waiver will apply if, at the time of a Surrender, or within the immediately preceding 90 days, the following conditions are met: (1) the insured is confined in a facility or is receiving, as prescribed by a physician, registered nurse or licensed social worker, home care or community-based services; (2) the insured's confinement in a facility, the insured's receipt of home care or community-based services, or any combination thereof has continued for a period of at least 90 consecutive days, disregarding any confinement or services provided during the first Contract Year; and (3) the first day of such confinement or services is after the Contract Effective Date. Facility includes a skilled nursing facility, a convalescent nursing home, an extended care facility, a residential care facility or a residential care facility for the elderly. Home care or community-based services includes home health care, adult day care, personal care, homemaker services, hospice services and respite care as defined in the rider. Additional conforming changes have been made including revised and new definitions, and inclusion of a description of circumstances under which the waiver does not apply. The termination provision has been modified to reflect that the rider will not terminate if you transfer an interest in the contract unless the transfer results in the addition of a new insured.

Strategy Availability: The S&P 500 5-Year 10% Buffer with Cap Indexed Strategy will not be available for Contracts issued in California until regulatory approval is received. The S&P 500 5-Year 10% Buffer with Upside Participation Rate Indexed Strategy remains available for Contracts issued in California.

Florida

Right to Cancel (Free Look): The free look period is 21 days. The free look period is 30 days if you purchase this Contract to replace an existing annuity contract or life insurance policy. The amount to be refunded is the Account Value plus Fees/Charges.

Amendment of the Contract: You have the right to reject an endorsement that changes the provisions of this Contract to obtain or retain the intended tax treatment under federal tax law, or to take into account other pertinent laws and governmental regulations and rulings. We will not be responsible for the tax or other consequences of your rejection.

Strategy Availability: The S&P 500 5-Year 10% Buffer with Cap Indexed Strategy will not be available for Contracts issued in Florida until regulatory approval is received. The S&P 500 5-Year 10% Buffer with Upside Participation Rate Indexed Strategy remains available for Contracts issued in Florida.

Massachusetts

Extended Care Waiver: This waiver rider is not available in Massachusetts.

Terminal Illness Waiver: This waiver rider is not available in Massachusetts.

Oregon

Right to Cancel (Free Look): If the Contract is not purchased to replace an existing annuity contract or life insurance policy, the amount to be refunded is the Account Value. If you purchase this Contract to replace an existing annuity contract or life insurance policy and the Contract is cancelled within 21 to 30 days, the amount to be refunded is the Account Value plus Fees/Charges.

South Carolina

Right to Cancel (Free Look): If the Contract is not purchased to replace an existing annuity contract or life insurance policy, the amount to be refunded is the sum of your Purchase Payments. If you purchase this Contract to replace an existing annuity contract or life insurance policy and the Contract is cancelled within 21 to 30 days, the amount to be refunded is the Account Value plus Fees/Charges.

For Contracts with a Contract Effective Date before May 21, 2025

The following information is a summary of material state variations as of the date of this prospectus for Contracts issued in the identified state before May 21, 2025. For all state variations related to the Right to Cancel, please refer to the Right to Cancel (Free Look) Table.

California

Extended Care Waiver: The Waiver of Early Withdrawal Charges for Facility Care or Home Care or Community-Based Services Rider (CA Rider) provides a waiver under an expanded set of circumstances. The waiver will apply if, at the time of a Surrender, or within the immediately preceding 90 days, the following conditions are met: (1) the insured is confined in a facility or is receiving, as prescribed by a physician, registered nurse or licensed social worker, home care or community-based services; (2) the insured's confinement in a facility, the insured's receipt of home care or community-based services, or any combination thereof has continued for a period of at least 90 consecutive days; and (3) the first day of such 90-day period was at least one year after the Contract Effective Date. Facility includes a skilled nursing facility, a convalescent nursing home, or an extended care facility or a residential care facility or a residential care facility for the elderly. Home care or community-based services includes home health care, adult day care, personal care, homemaker services, hospice services and respite care as defined in the rider. Additional conforming changes have been made including revised and new definitions, and inclusion of a description of circumstances under which the waiver does not apply. The termination provision has been modified to reflect that the rider will not terminate if you transfer or assign an interest in the contract to a person or entity other than the insured.

Connecticut

Extended Care Waiver: The conditions under which the waiver applies have been modified. The waiver will apply if at the time of a Surrender or within the immediately preceding 90 days all of the following conditions are met: (1) an insured is confined in a long-term care facility or hospital; and (2) the confinement has continued for a period of at least 90 consecutive days.

Florida

Amendment of the Contract: You have the right to reject an endorsement that changes the provisions of this Contract to obtain or retain the intended tax treatment under federal tax law, or to take into account other pertinent laws and governmental regulations and rulings. We will not be responsible for the tax or other consequences of your rejection.

Illinois

Civil Union Partners: A civil union partner may make a Successor Owner election. However, the Contract must comply with the post-death distribution rules applicable to a non-spouse. The termination of a Civil Union will terminate the designation of the civil union partner as a Beneficiary or payee in the same manner as a divorce.

Terminal Illness Waiver: As a result of the terminal illness, your life expectancy must be less than 24 months from the date of death, rather than less than 12 months.

Kansas

Extended Care Waiver: The conditions under which the waiver applies have been modified. The first day of confinement must be at least 90 days after the contract effective date, rather than one year after the contract effective date.

Terminal Illness Waiver: As a result of the terminal illness, your life expectancy must be less than 24 months from the date of death, rather than less than 12 months. The diagnosis must be rendered 90 days after the contract effective date, rather than one year after the contract effective date.

Massachusetts

Extended Care Waiver: This waiver rider is not available in Massachusetts.

Terminal Illness Waiver: This waiver rider is not available in Massachusetts.

Missouri

Extended Care Waiver: This waiver rider is not available in Missouri.

Montana

Extended Care Waiver: The definition of medically necessary has been modified and refers to the Insured's physician.

Nebraska

Extended Care Waiver: The definition of skilled nursing facility has been modified by adding a licensed practical nurse to the list of persons who may provide nursing services or supervise the provision of nursing services.

New Hampshire

Extended Care Waiver: The definition of skilled nursing facility has been modified by changing the phrase "licensed and operated as a skilled nursing facility" to "operated as a skilled nursing facility."

New Jersey

Civil Union Partners: A civil union partner may make a Successor Owner election. However, the Contract must comply with the post-death distribution rules applicable to a non-spouse. The termination of a Civil Union will terminate the designation of the civil union partner as a Beneficiary or payee in the same manner as a divorce.

Terminal Illness Waiver: The requirement related to the timing of the diagnosis does not apply. But the waiver will not be available until at least one year after the contract effective date.

Ohio

Assignment: Subject to the tax qualifications endorsement, if any, and other Contract limitations, you may assign your rights to designate or change a Beneficiary or an Annuitant, to change Owners, or to elect a Payout Option if you make a specific Request in Good Order.

Pennsylvania

Extended Care Waiver: The conditions under which the waiver is available have been modified. The waiver will apply if at the time of a Surrender or within the immediately preceding 90 days all of the following conditions are met: (1) an insured is confined in one or more long-term care facilities, hospital, or a combination of such; (2) the confinement is prescribed by a physician and is medically necessary; (3) the first day of the confinement is at least one year after the contract effective date; and (4) the confinement has continued for a period of at least 90 consecutive days, or has continued for a total of at least 90 days if each successive confinement occurs within six months of the previous confinement and is for the same related medical cause.

The definition of long-term care facility has been modified. The following facilities have been deleted from the list of facilities excluded from that definition: a facility that primarily treats drug addicts and a facility that is a home for the mentally ill. An exclusion provision has been added to clarify that the waiver will not apply if the insured is confined in a long-term care facility or hospital for the treatment of certain types of drug addiction or mental illnesses.

The definition of hospital has been modified by changing the phrase "it maintains, or has access to, medical, diagnostic, and major surgical facilities" to "it maintains, or has access to, medical and diagnostic facilities."

Terminal Illness Waiver: The diagnosis must be rendered after the Contract Effective Date, rather than one year after the Contract Effective Date. But the waiver will not be available until at least one year after the Contract Effective Date. In addition, the waiver is based on a terminal condition as defined in the rider, rather than a terminal illness.

Texas

Terminal Illness Waiver: The diagnosis must be rendered on or after the Contract Effective Date, rather than one year after the Contract Effective Date.

Payout Options: Payments under a Payout Option are subject to a \$50 minimum.

Amendment of the Contract: You have the right to reject an endorsement that changes the provisions of this Contract to obtain or retain the intended tax treatment under federal tax law, or to take into account other pertinent laws and governmental regulations and rulings. We will not be responsible for the tax or other consequences of your rejection.

Involuntary Termination: Our right to terminate this Contract is not tied to the minimum required value. We have the right to terminate this Contract if the Account Value would provide a benefit of less than \$20 each month at age 70 under a life payout with payments for at least a fixed period of 10 years.

Vermont

Extended Care Waiver: The definition of long-term care facility has been modified. The following facilities have been deleted from the list of excluded facilities: a facility that primarily treats drug addicts, a facility that primarily treats alcoholics, and a facility that is a home for the mentally ill. In addition, the definition of physician has been modified by changing the phrase “a person who is licensed in the United States as a medical doctor or a doctor of osteopathy and who is practicing within the scope of his or her license” to “a person who is licensed in the United States who is providing medical care and treatment when such services are provided within the scope of his or her license and provided pursuant to applicable law.”

Washington

Extended Care Waiver: The waiver is based on confinement to an extended care facility or hospital rather than a long-term care facility or hospital. Definitions are modified to reflect the new terminology, references to “skilled nursing facility” are changed to “nursing facility” and the related definition is modified. In the definition of nursing facility and hospital, a licensed practical nurse is added to the list of persons who may provide nursing services or supervise the provision of nursing services.

Terminal Illness Waiver: As a result of the terminal illness, your life expectancy must be less than 24 months from the date of death, rather than less than 12 months.

Right to Cancel (Free Look) Table for Contracts with a Contract Effective Date before May 21, 2025

State law governs the length of the free look period and the amount of the refund that you will receive. The period and amount may differ if you are replacing a life insurance policy or annuity contract. The table below summarizes the state law provisions.

For Contracts Issued in:	Free Look Period	Refund	Replacement Free Look Period	Replacement Refund
Alabama	20 days	Account Value	30 days	Account Value + Fees/Charges
Alaska	20 days	Account Value + Fees/Charges	30 days	Account Value + Fees/Charges
Arizona	20 days	Account Value + Fees/Charges	30 days	Account Value + Fees/Charges
Arkansas	20 days	Account Value	30 days	Account Value
California	30 days	Account Value + Fees/Charges Note: If owner is age 60 or older, refund amount is Purchase Payments.	30 days	Account Value + Fees/Charges Note: If owner is age 60 or older, refund amount is Purchase Payments.
Colorado	20 days	Account Value	30 days	Account Value + Fees/Charges
Connecticut	20 days	Account Value + Fees/Charges	30 days	Account Value + Fees/Charges
Delaware	20 days	Account Value	30 days	Purchase Payments
District of Columbia	20 days	Account Value	30 days	Account Value
Florida	21 days	Account Value + Fees/Charges	30 days	Account Value + Fees/Charges
Georgia	20 days	Purchase Payments	30 days	Purchase Payments
Hawaii	20 days	Account Value	30 days	Account Value + Fees/Charges
Idaho	20 days	Purchase Payments	30 days	Purchase Payments
Illinois	20 days	Account Value + Fees/Charges	30 days	Account Value + Fees/Charges
Indiana	20 days	Account Value	30 days	Purchase Payments
Iowa	20 days	Account Value	30 days	Account Value + Fees/Charges
Kansas	20 days	Account Value + Fees/Charges	30 days	Account Value + Fees/Charges
Kentucky	20 days	Purchase Payments	30 days	Account Value + Fees/Charges
Louisiana	20 days	Purchase Payments	30 days	Account Value + Fees/Charges
Maine	20 days	Account Value	30 days	Account Value + Fees/Charges
Maryland	20 days	Purchase Payments	30 days	Account Value + Fees/Charges
Massachusetts	20 days	Account Value	30 days	Purchase Payments
Michigan	20 days	Account Value + Fees/Charges	30 days	Account Value + Fees/Charges

For Contracts Issued in:	Free Look Period	Refund	Replacement Free Look Period	Replacement Refund
Minnesota	20 days	Account Value + Fees/Charges	30 days	Purchase Payments
Mississippi	20 days	Account Value	30 days	Account Value + Fees/Charges
Missouri	20 days	Purchase Payments	30 days	Purchase Payments
Montana	20 days	Account Value	30 days	Account Value + Fees/Charges
Nebraska	20 days	Purchase Payments	30 days	Account Value + Fees/Charges
Nevada	20 days	Purchase Payments	30 days	Purchase Payments
New Hampshire	20 days	Purchase Payments	30 days	Account Value + Fees/Charges
New Jersey	20 days	Account Value + Fees/Charges	30 days	Account Value + Fees/Charges
New Mexico	20 days	Account Value	30 days	Account Value + Fees/Charges
North Carolina	20 days	Purchase Payments	30 days	Account Value + Fees/Charges
North Dakota	20 days	Account Value + Fees/Charges	30 days	Account Value + Fees/Charges
Ohio	20 days	Account Value	30 days	Account Value + Fees/Charges
Oklahoma	20 days	Purchase Payments	30 days	Purchase Payments
Oregon	20 days	Account Value	30 days	Account Value + Fees/Charges
Pennsylvania	20 days	Account Value	30 days	Account Value
Rhode Island	20 days	Purchase Payments	30 days	Account Value + Fees/Charges
South Carolina	20 days	Purchase Payments	30 days	Account Value + Fees/Charges
South Dakota	20 days	Account Value + Fees/Charges	30 days	Account Value + Fees/Charges
Tennessee	20 days	Account Value	30 days	Purchase Payments
Texas	20 days	Purchase Payments	30 days	Account Value + Fees/Charges
Utah	20 days	Purchase Payments	30 days	Purchase Payments
Vermont	20 days	Account Value	30 days	Account Value + Fees/Charges
Virginia	20 days	Account Value	30 days	Account Value + Fees/Charges
Washington	20 days	Greater of: (1) Purchase Payments or (2) Account Value minus taxes	30 days	Purchase Payments
West Virginia	20 days	Account Value	30 days	Account Value + Fees/Charges
Wisconsin	30 days	Account Value	30 days	Account Value + Fees/Charges
Wyoming	20 days	Account Value	30 days	Greater of: (1) Purchase Payments or (2) Account Value + Fees/Charges

APPENDIX D: INDEX DISCLOSURES

S&P 500® Index

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SPDR® Gold Shares ETF Index

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First Trust Barclays Edge Index

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Barclays' only relationship with the Issuer in respect of the Indices is the licensing of the Indices, which are administered, compiled, and published by BB PLC in its role as the index sponsor (the '**Index Sponsor**') without regard to the Issuer or MassMutual Ascend Life's products or investors in MassMutual Ascend Life's products. Additionally, MassMutual Ascend Life as issuer or producer of MassMutual Ascend Life's products may for itself execute transaction(s) with Barclays in or relating to the Indices in connection with MassMutual Ascend Life's products. Investors acquire MassMutual Ascend Life's products from MassMutual Ascend Life and investors neither acquire any interest in the Indices nor enter into any relationship of any kind whatsoever with Barclays upon making an investment in MassMutual Ascend Life's products. MassMutual Ascend Life's products are not sponsored, endorsed, sold, or promoted by Barclays and Barclays makes no representation regarding the advisability of MassMutual Ascend Life's products or use of the Indices or any data included therein. Barclays shall not be liable in any way to the Issuer, investors or to other third parties in respect of the use or accuracy of the Indices or any data included therein.

Barclays Index Administration ("**BINDA**"), a distinct function within BB PLC, is responsible for day-to-day governance of BB PLC's activities as Index Sponsor.

To protect the integrity of Barclays' indices, BB PLC has in place a control framework designed to identify and remove and/or mitigate (as appropriate) conflicts of interest. Within the control framework, BINDA has the following specific responsibilities:

- oversight of any third-party index calculation agent;
- acting as approvals body for index lifecycle events (index launch, change and retirement); and
- resolving unforeseen index calculation issues where discretion or interpretation may be required (for example: upon the occurrence of market disruption events).

To promote the independence of BINDA, the function is operationally separate from BB PLC's sales, trading and structuring desks, investment managers, and other business units that have, or may be perceived to have, interests that may conflict with the independence or integrity of Barclays' indices.

Notwithstanding the foregoing, potential conflicts of interest exist as a consequence of BB PLC providing indices alongside its other businesses. Please note the following in relation to Barclays' indices:

- BB PLC may act in multiple capacities with respect to a particular index including, but not limited to, functioning as index sponsor, index administrator, index owner and licensor.
- Sales, trading, or structuring desks in BB PLC may launch products linked to the performance of an index. These products are typically hedged by BB PLC's trading desks. In hedging an index, a trading desk may purchase or sell constituents of that index. These purchases or sales may affect the prices of the index constituents which could in turn affect the level of that index.

- BB PLC may establish investment funds that track an index or otherwise use an index for portfolio or asset allocation decisions.

The Index Sponsor is under no obligation to continue the administration, compilation and publication of the Indices or the level of the Indices. While the Index Sponsor currently employs the methodology ascribed to the Indices (and application of such methodology shall be conclusive and binding), no assurance can be given that market, regulatory, juridical, financial, fiscal or other circumstances (including, but not limited to, any changes to or any suspension or termination of or any other events affecting any constituent within the Index) will not arise that would, in the view of the Index Sponsor, necessitate an adjustment, modification or change of such methodology. In certain circumstances, the Index Sponsor may suspend or terminate the Indices. The Index Sponsor has appointed a third-party agent (the '**Index Calculation Agent**') to calculate and maintain the Indices. While the Index Sponsor is responsible for the operation of the Indices, certain aspects have thus been outsourced to the Index Calculation Agent.

Barclays

1. makes no representation or warranty, express or implied, to the Issuer or any member of the public regarding the advisability of investing in transactions generally or the ability of the Indices to track the performance of any market or underlying assets or data; and
2. has no obligation to take the needs of the Issuer into consideration in administering, compiling, or publishing the Indices.

Barclays has no obligation or liability in connection with administration, marketing, or trading of MassMutual Ascend Life's products.

The licensing agreement between FTIS and BB PLC is solely for the benefit of FTIS and Barclays and not for the benefit of the owners of MassMutual Ascend Life's products, investors or other third parties.

BARCLAYS DOES NOT GUARANTEE, AND SHALL HAVE NO LIABILITY TO THE PURCHASERS AND TRADERS, AS THE CASE MAY BE, OF THE TRANSACTION OR TO THIRD PARTIES FOR THE QUALITY, ACCURACY AND/OR COMPLETENESS OF THE INDICES OR ANY DATA INCLUDED THEREIN OR FOR INTERRUPTIONS IN THE DELIVERY OF THE INDICES. BARCLAYS MAKES NO EXPRESS OR IMPLIED WARRANTIES, AND HEREBY EXPRESSLY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE WITH RESPECT TO THE INDICES INCLUDING, WITHOUT LIMITATION, THE INDICES, OR ANY DATA INCLUDED THEREIN. IN NO EVENT SHALL BARCLAYS HAVE ANY LIABILITY FOR ANY SPECIAL, PUNITIVE, INDIRECT, OR CONSEQUENTIAL DAMAGES, OR ANY LOST PROFITS, EVEN IF NOTIFIED OF THE POSSIBILITY OF SUCH DAMAGES SAVE TO THE EXTENT THAT SUCH EXCLUSION OF LIABILITY IS PROHIBITED BY LAW.

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Our form number for the Contract is ICC24-P1850824NW or P1850822NW. Each endorsement or rider also has a separate form number. The form numbers may vary by state. The Securities and Exchange Commission file number for the Contract is 333-276780.

The Contract does not invest in any equity, debt, or other investments.

The Statement of Additional Information ("SAI"), dated May 1, 2025, includes additional information about the Contract and the Company. The SAI is incorporated by reference into this prospectus. The SAI is available, without charge, upon request. For a free copy, or to request other information about the Contract or make other inquiries, contact us by visiting www.massmutualascend.com/RILAcompliance documents, calling 1-800-789-6771, or in writing at the following address:

MassMutual Ascend Life Insurance Company
Administrative Office: P.O. Box 5423, Cincinnati OH 45201-5423
Policy Administration: 1-800-789-6771

Reports and other information about the Company are available on the SEC's website at <https://www.sec.gov>, and copies of this information may be obtained, upon payment of a duplicating fee, by electronic request at the following email address: publicinfo@sec.gov.

EDGAR Contract Identifier No. C000261642

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY®

INDIVIDUAL INDEX-LINKED MODIFIED SINGLE PREMIUM DEFERRED ANNUITY

INDEX FRONTIER 5 PLUS

STATEMENT OF ADDITIONAL INFORMATION DATED MAY 1, 2025

This Statement of Additional Information supplements the current prospectus for the Index Frontier 5 Plus with Death Benefit Return of Premium Guarantee index-linked annuity contracts (the "Contracts") offered by MassMutual Ascend Life Insurance Company®. This statement of additional information is not a prospectus and should be read only in conjunction with the Prospectus for the Contracts dated May 1, 2025. Terms used in the current prospectuses for the Contracts are incorporated in this Statement of Additional Information and have the same meaning as in the Prospectus.

A copy of a Contract prospectus dated May 1, 2025, as supplemented from time to time, may be obtained without charge by writing to MassMutual Ascend Life Insurance Company, P.O. Box 5423, Cincinnati, Ohio 45201-5423. You may also call us at 1-800-789-6771 or visit us at our website www.massmutualascend.com/RILComplianceDocuments to request a copy.

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MASSMUTUAL ASCEND LIFE INSURANCE COMPANY

General Information and History

MassMutual Ascend Life Insurance Company ("MassMutual Ascend Life") is a stock insurance company incorporated in 1961. We are domiciled in the state of Ohio and have been continuously engaged in the insurance business since that time. We are licensed to conduct life insurance business in all states of the United States except New York, as well as the District of Columbia and Puerto Rico. Our principal executive offices are located at 191 Rosa Parks Street, Cincinnati, Ohio 45202.

We are a wholly-owned subsidiary of Massachusetts Mutual Life Insurance Company ("MassMutual"), a mutual life insurance company. MassMutual and its domestic life insurance subsidiaries provide individual and group life insurance, disability insurance, individual and group annuities and guaranteed interest contracts to individual and institutional customers in all 50 states of the U.S., the District of Columbia and Puerto Rico.

Prior to October 3, 2022, MassMutual Ascend Life's name was Great American Life Insurance Company ("GALIC"). On May 28, 2021, American Financial Group, Inc. sold its annuity business consisting of GALIC and its two insurance subsidiaries, Annuity Investors Life Insurance Company and Manhattan National Life Insurance Company, as well as a broker-dealer affiliate, Great American Advisors, LLC, and insurance distributor, AAG Insurance Agency, Inc. to MassMutual.

The General Account

Our general account (the "General Account") holds all our assets other than assets in our insulated separate accounts. We own our General Account assets, and, subject to applicable law, have sole investment discretion over them. The assets are subject to our general business operation liabilities and claims of our creditors and may lose value. Our General Account assets fund the guarantees provided in the Contracts.

We must invest our assets according to applicable state laws regarding the nature, quality and diversification of investments that may be made by life insurance companies. In general, these laws permit investments, within specified limits and subject to certain qualifications, in Federal, state, and municipal obligations, corporate bonds, preferred and common stocks, real estate mortgages, real estate and certain other investments.

We place a majority of the Purchase Payments made under the Contract in our General Account where we primarily invest the assets in a variety of fixed income securities.

The Separate Account

We place a portion of the Purchase Payments made under the Contract in a non-unitized separate account (the "Separate Account") that is not registered with the Securities and Exchange Commission. We established and maintain the Separate Account pursuant to the laws of our domiciliary state for the purpose of supporting our obligation to adjust the Indexed Strategy values based on the Daily Value Percentage or rise or fall of the Index. The assets of the Separate Account are held in our name on behalf of the Separate Account and legally belong to us. The assets in the Separate Account are not chargeable with liabilities arising out of any other business that we conduct. We may invest these assets in hedging instruments, including derivative contracts as well as other assets permitted under state law. To support our obligations to adjust the Indexed Strategy values, we may move money between the Separate Account and our General Account. We are not obligated to invest the assets of the Separate Account according to any particular plan except as we may be required to by state insurance laws. Regardless of your Strategy allocations, we do not intend to invest the assets of the Separate Account in the iShares MSCI EAFE exchange traded fund, the iShares U.S. Real Estate exchange traded fund, or the SPDR Gold Shares exchange traded fund. We may or may not hold the hypothetical options described in this prospectus in the Separate Account.

Contract owners do not have any interest in or claim on the assets in the Separate Account nor do Contract owners participate in any way in the performance of assets held in the Separate Account.

State Regulations

We are subject to the insurance laws and regulations of all the jurisdictions where we are licensed to operate. The availability of certain Contract rights and provisions depends on state approval and/or filing and review processes in each jurisdiction. Where required by law or regulation, or to meet the requirements for inclusion as an investment option in certain retirement programs, the Contract will be modified accordingly.

SERVICES

Pursuant to a Leased Employee Agreement between MassMutual Ascend Life and Glidepath Holdings, Inc. ("Glidepath"), a wholly-owned a subsidiary of Massachusetts Mutual Life Insurance Company ("MassMutual"), Glidepath furnishes MassMutual Ascend Life with personnel as requested by MassMutual Ascend Life. MassMutual Ascend Life pays for these services on the basis of cost, which must be fair and reasonable. Payments for these services by MassMutual Ascend Life to Glidepath were approximately \$119 million in 2024, \$109 million in 2023 and \$98 million in 2022.

MassMutual Ascend Life and Barings LLC ("Barings"), a subsidiary of MassMutual, are parties to an Investment Services Agreement under which Barings provides investment services to MassMutual Ascend Life in accordance with guidelines. MassMutual Ascend Life pays Barings a fee based on Barings's cost of providing these services.

Pursuant to an Administrative Services Agreement between MassMutual Ascend Life and MassMutual, MassMutual furnishes MassMutual Ascend Life with office, data processing, telecommunications, and administrative and support services, including enterprise risk management services, corporate finance services, actuarial services, legal services, internal audit services, corporate compliance services and procurement services, as agreed upon by the parties. Payments for these services by MassMutual Ascend Life to MassMutual were approximately \$4.3 million in 2024, \$4.4 million in 2023 and \$4.4 million in 2022.

MassMutual Ascend Life and its subsidiaries have entered into an intercompany tax allocation agreement. Pursuant to the agreement, each company's tax expense is determined based upon its inclusion in the consolidated tax return of MassMutual Ascend Life and its includable subsidiaries. Estimated payments are made quarterly during the year. Following year-end, additional settlements are made on the original due date of the return and, when extended, at the time the return is filed. The method of allocation among the companies under the agreement is based upon separate return calculations with current credit for losses to the extent the losses provide a benefit in the consolidated return.

INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The statutory financial statements and financial statement schedules of MassMutual Ascend Life Insurance Company (formerly known as Great American Life Insurance Company) at December 31, 2024, 2023, and 2022, and for each of the years in the three year period ended December 31, 2024, have been included herein in reliance upon the reports of KPMG LLP, independent registered public accounting firm, appearing elsewhere herein, and upon the authority of said firm as experts in accounting and auditing.

The KPMG LLP report dated April 9, 2025 of MassMutual Ascend Life Insurance Company includes explanatory language that states that the financial statements are prepared by MassMutual Ascend Life Insurance Company using statutory accounting practices prescribed or permitted by the Ohio Department of Insurance, which is a basis of accounting other than U.S. generally accepted accounting principles. Accordingly, the KPMG LLP audit report states that the financial statements are not presented fairly in accordance with U.S. generally accepted accounting principles and further states that those statements are presented fairly, in all material respects, in accordance with statutory accounting practices prescribed or permitted by the Ohio Department of Insurance.

The KPMG LLP report dated April 9, 2025 of MassMutual Ascend Life Insurance Company includes an emphasis of matter paragraph that states that MassMutual Ascend Life Insurance Company elected to apply a prescribed practice promulgated under Ohio Administrative Code Section 3901-1-67 ("OAC 3901-1-67") to its derivative instruments hedging indexed products and indexed annuity reserve liabilities. The opinion was not modified with respect to this matter.

DISTRIBUTION OF THE CONTRACTS

The Contracts are offered on a continuous basis. MM Ascend Life Investor Services, LLC ("MMALIS"), formerly known as Great American Advisors, LLC, 191 Rosa Parks Street, Cincinnati, OH 45202, is the principal underwriter for all registered index-linked Contracts of the Company. MMALIS is a wholly owned subsidiary of MassMutual Ascend Life and as a result, is an affiliate of the Company. MassMutual Ascend Life pays for some of MMALIS's operating and other expenses, including overhead, legal, and accounting fees.

Aggregate dollar amounts of underwriting commissions paid to MMALIS in connection with the distribution of registered index-linked contracts totaled \$69,902,131 in 2024, \$69,192,616 in 2023, and \$71,068,762 in 2022, which MMALIS subsequently paid to selling firms in its distribution network. MMALIS did not retain any underwriting commissions in the last three fiscal years.

CONTRACT ADJUSTMENTS

Daily Value Percentage

The Daily Value Percentage is used to determine the value of an Indexed Strategy before the end of a Term. The calculation of Strategy value using the Daily Value Percentage is relevant only if amounts allocated to an Indexed Strategy are not held to the end of the Term due to withdrawals, Surrender of the Contract, annuitization, or if a Death Benefit becomes payable, or if you have made a Performance Lock election. The Daily Value Percentage adjustment may be negative and could result in significant loss, even if the Index is performing positively.

Before the final Market Day of a Term, unless you have made a Performance Lock election, the value of an Indexed Strategy is the Investment Base increased or decreased by the Daily Value Percentage as determined as of the most recent Market Close.

If you have made a Performance Lock election, through the remainder of the Term, the value of an Indexed Strategy is the Investment Base increased or decreased by the Daily Value Percentage as determined as of the second Market Close after receipt of the election.

Here are the formulas that we use to calculate the Strategy value whenever it is based on the Daily Value Percentage:

Strategy value = Investment Base + dollar amount of increase or decrease

Dollar amount of increase or decrease = Investment Base x applicable Daily Value Percentage

Daily Value Percentage = Net Option Price – Residual Option Cost – Trading Cost

Net Option Price

The Net Option Price is one part of the formula used to calculate Daily Value Percentage. The Net Option Price is based on the calculated prices of hypothetical options that represent the projected changes in the Index over the full Term. The hypothetical options taken into account and the formulas used depend on the Negative Return Factors and Positive Return Factors that apply to the Indexed Strategy for the Term. The model we use to price those options is described in the Option Prices section below.

Net Option Price for Buffer with Upside Participation Rate Strategy

For a Buffer with Upside Participation Rate Strategy, two option prices are included in the calculation of the Net Option Price.

- ATM Call Option Price, which represents the possible rise in the Index and is multiplied by the Upside Participation Rate in order to reflect your share in any such rise
- OTM Put Option Price, which is subtracted and represents the possible fall in the Index but only to the extent that such fall exceeds the Buffer.

The Net Option Price as of a Market Close is a percentage equal to: (1) the ATM Call Option Price for the Market Close multiplied by the Upside Participation Rate; minus (2) the OTM Put Option Price for the Market Close

It is important to note that the Net Option Price will almost always be less than any rise in the Index because, when we calculate the Net Option Price, we subtract the OTM Put Option Price, and the OTM Put Option Price is always above zero because it is always possible for the value of due the Index to fall before the end of the Term.

Net Option Price for a Floor with Cap Strategy

For a Floor with Cap Strategy, four option prices are included in the calculation of the Net Option Price.

- ATM Call Option Price, which represents the possible rise in the Index
- OTM Call Option Price, which is subtracted in order to limit any rise in the Index by the Cap
- ATM Put Option Price, which is subtracted to represent the possible fall in the Index; and
- OTM Put Option Price, which is added to limit any fall in the Index to the Floor.

The Net Option Price as of a Market Close is a percentage equal to: (1) the ATM Call Option Price for the Market Close; minus (2) the OTM Call Option Price for the Market Close; minus (3) the ATM Put Option Price for the Market Close; and plus (4) the OTM Put Option Price for the Market Close.

It is important to note that the Net Option Price will almost always be less than any rise in the Index because, when we calculate the Net Option Price, we subtract the amount by which the ATM Put Option Price exceeds the OTM Put Option Price, and the ATM Put Option Price always exceeds the OTM Put Option Price because the ATM Put Option Price represents the constant present potential for a fall in the Index before the end of the Term, while the OTM Put Option Price represents the lesser/included potential for a change in the Index of more than the -10% Floor.

Net Option Price for Buffer with Cap Strategy

For a Buffer with Cap Strategy, three option prices are included in the calculation of the Net Option Price.

- ATM Call Option Price, which represents the possible rise in the Index
- OTM Call Option Price, which is subtracted in order to limit any rise in the Index by the Cap
- OTM Put Option Price, which is subtracted and represents the possible fall in the Index but only to the extent that such fall exceeds the Buffer.

The Net Option Price as of a Market Close is a percentage equal to: (1) the ATM Call Option Price for the Market Close; minus (2) the OTM Call Option Price for the Market Close; and minus (3) the OTM Put Option Price for the Market Close.

It is important to note that the Net Option Price will almost always be less than any rise in the Index because, when we calculate the Net Option Price, we subtract the OTM Put Option Price, and the OTM Put Option Price is always above zero because it is always possible for the value of the Index to fall before the end of the Term.

Net Option Price for Buffer with Performance Trigger Strategy

For a Buffer with Performance Trigger Strategy, two option prices are included in the calculation of the Net Option Price.

- ATM Binary Call Option Price, which represents the possibility of a payment equal to the Trigger Rate if the Index rise will be zero or greater
- OTM Put Option Price, which is subtracted and represents the possible fall in the Index but only to the extent that such fall exceeds the Buffer.

The Net Option Price as of a Market Close is a percentage equal to: (1) the value of the ATM Binary Call Option calculated for the Market Close; minus (2) the value of the OTM Put Option calculated for the Market Close.

It is important to note that the Net Option Price will almost always be less than the Trigger Rate because, when we calculate the Net Option Price, we subtract the OTM Put Option Price, and the OTM Put Option Price is always above zero because it is always possible for the value of the Index to fall before the end of the Term.

Net Option Price for Buffer with Dual Performance Trigger Strategy

For a Buffer with Dual Performance Trigger Strategy, two option prices are included in the calculation of the Net Option Price.

- ITM Binary Call Option Price, which represents the possibility of a payment equal to the Trigger Rate if the change in the Index for the Term will be zero, positive, or negative but not exceeding the Buffer
- OTM Put Option Price, which is subtracted and represents the possible fall in the Index but only to the extent that such fall exceeds the Buffer.

The Net Option Price as of a Market Close is a percentage equal to: (1) the value of the ITM Binary Call Option calculated for the Market Close; minus (2) the value of the OTM Put Option calculated for the Market Close.

It is important to note that the Net Option Price will almost always be less than the Trigger Rate because, when we calculate the Net Option Price, we subtract the OTM Put Option Price, and the OTM Put Option Price is always above zero because it is always possible for a fall in the value of the Index to exceed the Buffer before the end of the Term.

Residual Option Cost

The Residual Option Cost is one part of the formula used to calculate Daily Value Percentage. The Residual Option Cost starts with the Net Option Price at the beginning of a Term, which is calculated using the formulas set out above. That Net Option Price is then multiplied by the time remaining in the Term as a percentage of the length of the Term.

The Residual Option Cost as of a Market Close is a percentage equal to: (1) the Net Option Price for the Strategy at the beginning of the Term; multiplied by (2) the number of days remaining until the final Market Close of the Term divided by 365 for a one-year Term, by 1,096 days if that Term is three years long, or by 2,192 days for a six-year Term.

Trading Cost

The Trading Cost is one part of the formula used to calculate Daily Value Percentage. The Trading Cost as of a Market Close is the estimated cost of selling the hypothetical options before the end of a Term to the extent not already reflected in the option values. It is a percentage that reflects the average market difference between option average bid-ask prices and option bid prices. We may change the Trading Cost at any time due to changes in option prices.

Daily Value Percentage Examples

Examples. Here are two examples that show how the Daily Value Percentage formula works for Indexed Strategies with a 1-year Term. In each example, we calculate the Daily Value Percentage for the Market Close on day 90 of a one-year Term. Before the end of a Term, the Strategy value determined using the Daily Value Percentage will almost always be less than the value suggested on that date by the rise or fall of the Index and the end of Term calculation method.

Assumptions for Examples 1-2

	Price at Start of Term (as a Percentage of Index at Start of Term)	Price at Current Market Close (as a Percentage of Index at Start of Term)
<i>Option Price Assumptions</i>		
ATM Call Option Price	6.00%	7.47%
OTM Call Option Price	1.15%	1.81%
ATM Put Option Price	5.40%	3.36%
OTM Put Option Price	4.50%	2.80%
<i>Strategy Assumptions</i>		
Investment Base for each Strategy		\$ 100,000
Cap		11%
Days remaining to last Market Day of Term		275
Trading Cost Assumption	0.15%	
Index at Start of Term		1000
Index at Current Market Close		1040

Example 1: 10% Buffer with Cap Strategy

Current ATM Call Option Price – Current OTM Call Option Price	5.66%	(7.47% - 1.81%)
Current OTM Put Option Price	<u>- 2.80%</u>	
Net Option Price	= 2.86%	
Initial ATM Call Option Price – Initial OTM Call Option Price	4.85%	(6.00% - 1.15%)
Initial OTM Put Option Price	<u>- 4.50%</u>	
Net Option Price	= 0.35%	
Amortization Factor for days remaining to final Market Day of Term	<u>x 75.34%</u>	(275 / 365)
Residual Option Cost	0.26%	
Net Option Price	2.86%	
Residual Option Cost	<u>- 0.26%</u>	
Assumed Trading Cost	<u>- 0.15%</u>	
Daily Value Percentage	= 2.45%	
Increase as a dollar amount	\$2,450	(\$100,000 x 2.45%)
Value of 10% Buffer with Cap Strategy	\$102,450	(\$100,000 + \$2,450)

In the above example, the Strategy value has increased by 2.45% by day 90 even though the Index has increased by 4% (1000 to 1040) over the same period. This reflects the impact of the method we use to calculate a Strategy value before the end of a Term.

By comparison, if the value of the Strategy on day 90 of the Term were to be determined based the end of Term value calculation method, the Strategy value would reflect the full 4% increase in the Index (\$100,000 + (\$100,000 x 4% increase percentage) = \$104,000) because the increase does not exceed the 11% Cap. **We will always calculate the Strategy value before the end of a Term using the Daily Value Percentage illustrated by the above example and not based on the rise or fall of the Index.**

Example 2: -10% Floor with Cap Strategy

Current ATM Call Option Price – Current OTM Call Option Price	5.66%	(7.47% – 1.81%)
(Current ATM Put Option Price – Current OTM Put Option Price)	-0.56%	(3.36% - 2.80%)
Net Option Price	<u>= 5.10%</u>	
Initial ATM Call Option Price – Initial OTM Call Option Price	4.85%	(6.00% – 1.15%)
- (Initial ATM Put Option Price – Initial OTM Put Option Price)	-0.90%	(5.40% - 4.50%)
Net Option Price	<u>= 3.95%</u>	
X Amortization Factor for days remaining to final Market Day of Term	x 75.34%	(275 / 365)
Residual Option Cost	<u>= 2.98%</u>	
Net Option Price	5.10%	
Residual Option Cost	- 2.98%	
Assumed Trading Cost	- 0.15%	
Daily Value Percentage	<u>= 1.97%</u>	
Dollar amount of increase	\$1,970	(\$100,000 x 1.970%)
Value of -10% Floor with Cap Strategy	\$101,970	(\$100,000 + \$1,970)

In the above example, the Strategy value increased by 1.97% by day 90 even though the Index has increased by 4% (1000 to 1040) over the same period. This reflects the impact of the method we use to calculate a Strategy value before the end of a Term.

By comparison, if the value of the Strategy on day 90 of the Term were to be determined based the end of Term value calculation method, the Strategy value would reflect the full 4% increase in the index (\$100,000 + (\$100,000 x 4% increase percentage) = \$104,000) because the increase does not exceed the 11% Cap. **We will always calculate the Strategy value before the end of a Term using the Daily Value Percentage illustrated by the above example and not based on the rise or fall of the Index.**

Examples. Here is an example that shows how the Daily Value Percentage formula works with a six-year 10% Buffer with Upside Participation Rate Strategy. In this example, we calculate the Daily Value Percentage for the Market Close on day 2010 of a six-year Term. Before the end of a Term, the Strategy value determined using the Daily Value Percentage will almost always be less than the value suggested on that date by the rise or fall of the Index and the end of Term calculation method.

Assumptions for Example 3

	Price at Start of Term (as a Percentage of Index at Start of Term)	Price at Current Market Close (as a Percentage of Index at Start of Term)
<i>Option Price Assumptions</i>		
ATM Call Option Price	23.65%	22.20%
OTM Put Option Price	3.04%	0.01%
<i>Strategy Assumptions</i>		
Investment Base for each Strategy		\$ 100,000
Upside Participation Rate for five-year Term		125%
Days remaining to last Market Day of five-year Term		182
Trading Cost Assumption	0.80%	
Index at Start of Term	1000	
Index at Current Market Close	1200	

Example 3: 10% Buffer with Upside Participation Rate Strategy

Current ATM Call Option Price x Upside Participation Rate	27.75%	(125% of 22.20%)
Current OTM Put Option Price	- 0.01%	
Net Option Price	<u>=27.74%</u>	
Initial ATM Call Option Price x Upside Participation Rate	29.57%	(125% of 23.65%)
Initial OTM Put Option Price	- 3.04%	
Net Option Price	= 26.53%	
Amortization Factor for days remaining to final Market Day of Term	<u>x 9.97%</u>	(182 / 1826)
Amortized Option Cost	2.64%	
Net Option Price	27.74%	
Amortized Option Cost	-2.64%	
Assumed Trading Cost	<u>- 0.80%</u>	
Daily Value Percentage	<u>= 24.30%</u>	
Increase as a dollar amount	\$24,300	(\$100,000 x 24.30%)
Value of 10% Buffer with Upside Participation Rate Strategy	\$124,300	(\$100,000 + \$24,300)

In the above example, the Strategy value increased by 24.30% by day 1,644 even though the Participation Rate of 125% multiplied by the increase in the Index of 20% (1000 to 1200) over the same period equals 25%. This reflects the impact of the method we use to calculate a Strategy value before the end of a Term.

By comparison, if the value of the Strategy on day 1,644 of the Term were to be determined based the end of Term value calculation method, the Strategy value would reflect 125% of the 20% increase in the Index (\$100,000 + (\$100,000 x 25% increase percentage) = \$125,000). **We will always calculate the Strategy value before the end of a Term using the Daily Value Percentage illustrated by the above example and not by the rise or fall of the Index.**

Examples. Here is an example that shows how the Daily Value Percentage formula works with a 10% Buffer with Performance Trigger Strategy. In this example, we calculate the Daily Value Percentage for the Market Close on day 146 of a one-year Term. Before the end of a Term, the Strategy value determined using the Daily Value Percentage will almost always be less than the value suggested on that date by the rise or fall of the Index and the end of Term calculation method.

Assumptions for Example 4

	Price at Start of Term (as a Percentage of Index at Start of Term)	Price at Current Market Close (as a Percentage of Index at Start of Term)
<i>Option Price Assumptions</i>		
ATM Binary Call Option Price	5.97%	2.61%
OTM Put Option Price	1.48%	3.40%
<i>Strategy Assumptions</i>		
Investment Base for each Strategy		\$ 100,000
Trigger Rate		11%
Days remaining to last Market Day of Term		219
Trading Cost Assumption	0.15%	
Index at Start of Term	1000	
Index at Current Market Close	900	

Example 4: 10% Buffer with Performance Trigger Strategy

Current ATM Binary Call Option Price	2.61%	
Current OTM Put Option Price	- 3.40%	
Net Option Price	= -0.79%	
Initial ATM Binary Call Option Price	5.97%	
Initial OTM Put Option Price	- 1.48%	
Net Option Price	= -4.49%	
Amortization Factor for days remaining to final Market Day of Term	X 60%	
Residual Option Cost	2.69%	
Net Option Price	-0.79%	
Residual Option Cost	-2.69%	
Assumed Trading Cost	- 0.15%	
Daily Value Percentage	= -3.63%	
Increase as a dollar amount	-\$3,630	(\$100,000 x (-3.63%))
Value of 10% Buffer with Performance Trigger Strategy	\$96,370	(\$100,000 - \$3,630)

In the above example, the Strategy value decreased by 3.63% by day 146 while the Index has decreased by 10% (1000 to 900) over the same period. This reflects the impact of the method we use to calculate a Strategy value before the end of a Term.

By comparison, if the value of the Strategy on day 146 of the Term were to be determined based the end of Term value calculation method, the Strategy value would reflect a decrease of 0% since the entire 10% decrease in the index is protected by the 10% Buffer. **We will always calculate the Strategy value before the end of a term using the Daily Value Percentage illustrated by the above example and not by the rise or fall of the Index.**

Example. Here is an example that shows how the Daily Value Percentage formula works with a 10% Buffer with Dual Performance Trigger Strategy. In this example, we calculate the Daily Value Percentage for the Market Close on day 146 of a one-year Term. Before the end of a Term, the Strategy value determined using the Daily Value Percentage will almost always be less than the value suggested on that date by the rise or fall of the Index and the end of Term calculation method.

Assumptions for Example 5

	Price at Start of Term (as a Percentage of Index at Start of Term)	Price at Current Market Close (as a Percentage of Index at Start of Term)
<i>Option Price Assumptions</i>		
ITM Binary Call Option Price	6.03%	4.31%
OTM Put Option Price	1.48%	3.40%
<i>Strategy Assumptions</i>		
Investment Base for each Strategy		\$ 100,000
Trigger Rate		8%
Days remaining to last Market Day of Term		219
Trading Cost Assumption	0.15%	
Index at Start of Term	1000	
Index at Current Market Close	900	

Example 5: 10% Buffer with Dual Performance Trigger Strategy

Current ITM Binary Call Option Price	4.31%	
Current OTM Put Option Price	- 3.40%	
Net Option Price	= 0.91%	
Initial ITM Binary Call Option Price	6.03%	
Initial OTM Put Option Price	- 1.48%	
Net Option Price	=4.55%	
Amortization Factor for days remaining to final Market Day of Term	x 60%	
Residual Option Cost	2.73%	
Net Option Price	0.91%	
Residual Option Cost	-2.73%	
Assumed Trading Cost	- 0.15%	
Daily Value Percentage	= -1.97%	
Increase as a dollar amount	-\$1,970	(\$100,000 x (-1.97%))
Value of 10% Buffer with Dual Performance Trigger Strategy	\$98,030	(\$100,000 - \$1,970)

In the above example, the Strategy value decreased by 1.97% by day 146 while the Index value has decreased by 10% (1000 to 900) over the same period. This reflects the impact of the method we use to calculate a Strategy value before the end of a Term.

By comparison, if the value of the Strategy on day 146 of the Term were to be determined based the end of Term value calculation method, the Strategy value would reflect an increase of 8% matching the Trigger Rate (\$100,000 + (\$100,000 x 8% increase percentage) = \$108,000). This is because the decrease in the Index was not more negative than the 10% Buffer. **We will always calculate the Strategy value before the end of a term using the Daily Value Percentage illustrated by the above example and not by the rise or fall of the Index.**

Option Prices

In order to calculate the Daily Value Percentage of an Indexed Strategy, we determine the prices of the hypothetical options using a valuation model. The price of each option is stated as a percentage of the Index for the last Market Close on or before the first day of the Term.

- **ATM Binary Call Option Price (at-the-money binary call option)**

The ATM Binary Call Option Price is the calculated price of a hypothetical at-the-money binary call option (or collection of options) that will pay the holder an amount equal to the Trigger Rate multiplied by the Investment Base if the change in the Index for the Term is zero or is positive.

- **ATM Call Option Price (at-the-money call option)**

The ATM Call Option Price is the calculated price of a hypothetical call option that will pay the holder an amount equal to the percentage rise, if any, in the Index from the last Market Close on or before the start of the Term to the final Market Close of the Term.

- **ATM Put Option Price (at-the-money put option)**

The ATM Put Option Price is the calculated price of a hypothetical put option that will pay the holder an amount equal to the percentage fall, if any, in the Index from the last Market Close on or before the start of the Term to the final Market Close of the Term.

- **ITM Binary Call Option Price (in-the-money binary call option)**

The ITM Binary Call Option Price is the calculated price of a hypothetical in-the-money binary call option (or collection of options) that will pay the holder an amount equal to the Trigger Rate multiplied by the Investment Base if the change in the Index for the Term is zero, is positive, or is negative but does not exceed the Buffer.

- **OTM Call Option Price (out-of-the-money call option)**

The OTM Call Option Price is the calculated price of a hypothetical call option that will pay the holder an amount equal to the percentage rise, if any, in the Index from the last Market Close on or before the start of the Term to the final Market Close of the Term, but only to the extent it exceeds the Cap for the Term.

- **OTM Put Option Price (out-of-the-money put option)**

The OTM Put Option Price is the calculated price of a hypothetical put option that will pay the holder an amount equal to the percentage fall, if any, in the Index from the last Market Close on or before the start of the Term to the final Market Close of the Term, but only to the extent it exceeds the Buffer or Floor for the Term.

Valuation Model

We use a mathematical model to calculate the price of the hypothetical options in our formulas because direct prices of comparable options are generally not available. Options in the marketplace do not directly align with (1) the time remaining in a Term and (2) the strike prices for any of the hypothetical options used in the calculation of the Daily Value Percentage.

Valuation models are widely used for option pricing and the model we use is based on standard methods for valuing derivatives. The methodology used to value these options is determined solely by us and the results of our valuation model may vary, higher or lower, from other estimated valuations or the actual selling price of identical derivatives. Any variance between our valuations and other estimated or actual prices may be different from Indexed Strategy to Indexed Strategy and may also change from day to day. Our valuation model calculates the theoretical price of options using the following inputs: Index levels or prices, expected dividend yield, option strike prices, expected interest rates, time, and implied volatility of option prices. Below is a brief explanation of those model inputs, which we receive from third party vendors.

- **Index Levels or Prices**

The initial Index level or price for a Term is the Index provided to us for the last Market Close on or before the first day of the Term. The current Index level or price is the Index provided to us for the most recent Market Close. We rely on third parties, such as Index providers and financial reporting vendors, to provide us with the current Index level or price for the most recent Market Close.

- **Dividend Yield (Div)**

Dividend Yield is the dividend yield to the end of the Term as of a calculation date where the dividend yield is (1) interpolated from yields or (2) implied from market data as reported by Bloomberg or another market source.

For the S&P 500 Index, the dividend yield will reduce the Index level and the applicable call option prices.

- **Strike Price (K)**

Strike Price is a value that varies for each type of option.

ATM binary call option strike price = Index at the start of the Term

ATM call option strike price = Index at the start of the Term

ATM put option strike price = Index at the start of the Term

ITM binary call option strike price = Index at the start of the Term multiplied by (1 – Buffer). [For example, for a 10% Buffer Strategy, the ITM binary call option strike price is equal to the Index at the start of the Term multiplied by 1 - .10, or .90]

OTM call option strike price = Index at the start of the Term multiplied by (1 + Cap). [For example, if the Cap is 8%, the OTM call option strike price is equal to the Index at the start of the Term multiplied by 1 + .08, or 1.08].

OTM put option strike price = Index at the start of the Term multiplied by (1 – Buffer) for a Buffer Strategy or (1 + Floor) for a Floor Strategy. [For example, for a 10% Buffer Strategy, the OTM put option strike price is equal to the Index at the start of the Term multiplied by 1 - .10, or .90; for a -10% Floor Strategy, the OTM put option strike price is equal to the Index at the start of the Term multiplied by 1 + -.10, or 0.90]

- **Interest Rate (Rate)**

Interest Rate is a rate based on key derivative interest rates obtained from information provided by Bloomberg or another market source. These interest rates are obtained for maturities adjacent to the actual time remaining in the Term on the calculation date. We use interpolation to derive the rate used as our input for the model.

- **Time (T)**

Time is the portion of the Term that remains as measured by the following formula.

Time = number of calendar days from calculation date to end of Term / number of calendar days in Term

- **Implied Volatility (Vol)**

Volatility is the implied volatility of option prices. It is approximated daily using observed option prices as reported by Bloomberg or another market source. For each hypothetical option included in the calculation, we approximate the volatility of option prices by interpolating between (1) implied volatilities for similar options with the closest available time remaining and (2) strike prices.

Implied volatility varies with (1) how much time remains until the end of a Term, which is determined by using an expiration date for the designated option that corresponds to that time remaining and (2) the relationship between the strike price of that

option and the value of the Index at the time of the calculation. This relationship is referred to as the “moneyness” of the option described above, and is calculated as the ratio of current price to strike price.

Direct market data for these inputs is generally not available because options on an Index that actually trade in the market have (1) specific maturity dates that are unlikely to precisely match the end date of a Term and (2) moneyness values that are unlikely to precisely match the moneyness of the designated option that we use in our calculations. Accordingly, we interpolate between the implied volatility quotes that are based on the actual maturities and moneyness values.

FINANCIAL STATEMENTS

The Company's financial statements at December 31, 2024 and 2023, and for each of the three years in the period ended December 31, 2024, are included herein. Our financial statements should be considered only as bearing on our ability to meet our obligations under the Contract.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY

Statutory-Basis Financial Statements

*As of December 31, 2024 and 2023 and for each of the three years
ended December 31, 2024, 2023 and 2022
with Independent Auditors' Report*

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY

Statutory-Basis Financial Statements

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

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KPMG LLP
Suite 3400
312 Walnut Street
Cincinnati, OH 45202

Independent Auditors' Report

The Board of Directors
MassMutual Ascend Life Insurance Company:

Opinions

We have audited the financial statements of MassMutual Ascend Life Insurance Company (the Company), which comprise the balance sheets statutory-basis as of December 31, 2024 and 2023, and the related statements of operations statutory-basis, statements of changes in capital and surplus statutory-basis, and statements of cash flow statutory-basis for each of the years in the three-year period ended December 31, 2024, and the related notes to the financial statements (collectively, financial statements).

Unmodified Opinion on Statutory Basis of Accounting

In our opinion, the accompanying financial statements present fairly, in all material respects, the balance sheets statutory-basis of the Company as of December 31, 2024 and 2023, and the results of its operations and its cash flow for each of the years in the three-year period ended December 31, 2024, in accordance with accounting practices prescribed or permitted by the Ohio Department of Insurance described in Note B.

Adverse Opinion on U.S. Generally Accepted Accounting Principles

In our opinion, because of the significance of the matter discussed in the Basis for Adverse Opinion on U.S. Generally Accepted Accounting Principles section of our report, the financial statements do not present fairly, in accordance with U.S. generally accepted accounting principles, the financial position of the Company as of December 31, 2024 and 2023, or the results of its operations or its cash flows for each of the years in the three-year period ended December 31, 2024.

Basis for Opinions

We conducted our audits in accordance with auditing standards generally accepted in the United States of America (GAAS). Our responsibilities under those standards are further described in the Auditors' Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the Company and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audits. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Basis for Adverse Opinion on U.S. Generally Accepted Accounting Principles

As described in Note B to the financial statements, the financial statements are prepared by the Company using accounting practices prescribed or permitted by the Ohio Department of Insurance, which is a basis of accounting other than U.S. generally accepted accounting principles. Accordingly, the financial statements are not intended to be presented in accordance with U.S. generally accepted accounting principles. The effects on the financial statements of the variances between the statutory accounting practices described in Note B and U.S. generally accepted accounting principles, although not reasonably determinable, are presumed to be material and pervasive.



Emphasis of Matter

As discussed in Note B to the financial statements, the Company elects to apply a prescribed practice promulgated under Ohio Administrative Code Section 3901-1-67 ("OAC 3901-1-67") to its derivative instruments hedging indexed products and indexed annuity reserve liabilities. Our opinions are not modified with respect to this matter.

Responsibilities of Management for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with accounting practices prescribed or permitted by the Ohio Department of Insurance. Management is also responsible for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the Company's ability to continue as a going concern for one year after the date that the financial statements are issued.

Auditors' Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements.

In performing an audit in accordance with GAAS, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control. Accordingly, no such opinion is expressed.
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.
- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the Company's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control related matters that we identified during the audit.



Supplementary Information

Our audits were conducted for the purpose of forming an opinion on the financial statements as a whole. The supplementary information included in the supplemental schedule of selected statutory-basis financial data, supplemental investment disclosures, and supplemental schedule of life and health reinsurance disclosures is presented for purposes of additional analysis and is not a required part of the financial statements but is supplementary information required by the Ohio Department of Insurance. Such information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the financial statements. The information has been subjected to the auditing procedures applied in the audits of the financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the financial statements or to the financial statements themselves, and other additional procedures in accordance with GAAS. In our opinion, the information is fairly stated in all material respects in relation to the financial statements as a whole.

/s/ KPMG LLP

Cincinnati, Ohio
April 9, 2025

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
BALANCE SHEETS
STATUTORY-BASIS
(Dollars in millions, except share data)

	December 31	
	2024	2023
ADMITTED ASSETS		
Cash and invested assets:		
Bonds - at amortized cost (fair value: \$35,872.1 and \$32,911.4)	\$ 37,508.2	\$ 34,972.3
Preferred stocks - (cost: \$288.8 and \$212.2)	297.9	201.0
Common stocks - at fair value (cost: \$193.2 and \$195.6)	296.7	271.2
Investments in affiliates and subsidiaries - at subsidiary capital and surplus (cost: \$243.8 and \$242.8)	482.1	445.2
Mortgage loans	5,123.1	4,256.5
Cash, cash equivalents and short-term investments	3,411.2	2,211.3
Policy loans	27.5	30.0
Derivatives	875.7	771.4
Other invested assets	2,798.2	1,573.2
Total cash and invested assets	50,820.6	44,732.1
Net deferred federal income tax asset	291.7	272.8
Deferred and uncollected premiums	4.5	5.6
Current federal income tax recoverable	51.6	16.0
Investment income due and accrued	535.4	528.5
Company-owned life insurance	229.8	223.1
Admitted disallowed interest maintenance reserve	253.8	271.5
Other admitted assets	208.6	495.8
Total general account admitted assets	52,396.0	46,545.4
Separate account assets	984.2	443.3
Total admitted assets	<u>\$ 53,380.2</u>	<u>\$ 46,988.7</u>
LIABILITIES, CAPITAL AND SURPLUS		
Liabilities:		
Policy benefit reserves	\$ 36,543.3	\$ 30,212.2
Liability for deposit-type contracts	786.6	788.0
Policy and contract claims	161.0	165.3
Asset valuation reserve	636.3	528.4
Funds held under reinsurance treaties	7,290.5	9,968.0
Commissions, general expenses, taxes, licenses and fees due or accrued	66.1	63.3
Payable for securities	584.3	315.1
Collateral	1,564.2	763.9
Derivatives	413.6	528.2
Other liabilities	123.8	162.0
Total general account liabilities	48,169.7	43,494.4
Separate account liabilities	984.2	443.3
Total liabilities	49,153.9	43,937.7
Capital and surplus:		
Common stock - \$7.50 par value; 1,200,000 shares authorized; 223,333 shares issued and outstanding	1.7	1.5
Gross paid-in and contributed surplus	2,148.4	815.2
Unassigned funds	1,822.4	1,962.8
Aggregate write-in for special surplus funds	253.8	271.5
Total capital and surplus	<u>4,226.3</u>	<u>3,051.0</u>
Total liabilities, capital and surplus	<u>\$ 53,380.2</u>	<u>\$ 46,988.7</u>

See accompanying notes to statutory-basis financial statements.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
STATEMENTS OF OPERATIONS
STATUTORY-BASIS
(Dollars in millions)

	Year Ended December 31		
	2024	2023	2022
Premiums and other revenues:			
Premiums and annuity considerations	\$ 8,551.2	\$ 8,506.8	\$ (7,198.3)
Net investment income	2,648.2	1,918.4	1,019.0
Amortization of interest maintenance reserve	(34.9)	10.4	36.4
Commissions and expense allowances and reserve adjustments on reinsurance ceded	(49.1)	70.2	496.8
Charges and fees for deposit-type contracts and miscellaneous income	62.9	59.2	47.8
Total premiums and other revenues	<u>11,178.3</u>	<u>10,565.0</u>	<u>(5,598.3)</u>
Benefits and expenses:			
Policyholders' benefits	837.0	748.1	505.8
Surrender benefits	2,749.2	2,434.7	1,460.5
Change in policy and contract reserves	6,331.1	5,901.8	(8,743.9)
Interest and adjustments on deposit-type contracts	150.8	156.9	142.3
Direct commissions and commissions and expense allowances on reinsurance assumed	464.4	394.2	364.6
General insurance expenses	171.5	169.8	158.7
Insurance taxes, licenses and fees	46.6	12.7	12.2
Net transfers to or (from) separate accounts	521.1	356.8	(22.0)
Other	(0.1)	(0.4)	319.3
Total benefits and expenses	<u>11,271.6</u>	<u>10,174.6</u>	<u>(5,802.5)</u>
(Loss) income from operations before federal income taxes and net realized capital losses	(93.3)	390.4	204.2
Federal income tax expense on operations	<u>(85.7)</u>	<u>(241.8)</u>	<u>(13.6)</u>
(Loss) income from operations before net realized capital gains and losses	(179.0)	148.6	190.6
Net realized capital losses:			
Net realized capital losses before related federal income taxes and transfers to interest maintenance reserve	(145.1)	(531.5)	(12.6)
Federal income tax (expense) benefit on net realized capital gains (losses)	(51.5)	23.4	14.3
Interest maintenance reserve transfers, net of tax	<u>121.7</u>	<u>354.4</u>	<u>(34.3)</u>
Net realized capital losses	<u>(74.9)</u>	<u>(153.7)</u>	<u>(32.6)</u>
Net (loss) income	<u>\$ (253.9)</u>	<u>\$ (5.1)</u>	<u>\$ 158.0</u>

See accompanying notes to statutory-basis financial statements.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
STATEMENTS OF CHANGES IN CAPITAL AND SURPLUS
STATUTORY-BASIS
(Dollars in millions)

	Year Ended December 31		
	2024	2023	2022
Common stock:			
Balance at beginning of year	\$ 1.5	\$ 1.5	\$ 1.5
Transferred from unassigned funds	0.2	-	-
Balance at end of year	<u>\$ 1.7</u>	<u>\$ 1.5</u>	<u>\$ 1.5</u>
Gross paid-in and contributed surplus:			
Balance at beginning of year	\$ 815.2	\$ 815.2	\$ 815.2
Contributions from parent	1,333.2	-	-
Balance at end of year	<u>\$ 2,148.4</u>	<u>\$ 815.2</u>	<u>\$ 815.2</u>
Unassigned funds:			
Balance at end of prior year	\$ 1,962.8	\$ 2,015.9	\$ 2,061.4
Change in reserve on account of change in valuation basis*	-	-	236.2
Cumulative effect of change in accounting principle*	-	-	(454.4)
Adjusted beginning balance	<u>1,962.8</u>	<u>2,015.9</u>	<u>1,843.2</u>
Net (loss) income	(253.9)	(5.1)	158.0
Change in net unrealized gains (losses) on derivatives	428.4	217.1	(204.1)
Change in net unrealized foreign exchange capital (loss) gains	(61.4)	19.9	8.8
Change in net unrealized capital (losses) gains, net of deferred taxes	(46.0)	(51.8)	3.5
Change in net deferred tax asset*	99.9	214.6	(33.1)
Change in nonadmitted assets*	(74.3)	(22.8)	(4.6)
Change in admitted disallowed interest maintenance reserve	17.7	(271.5)	-
Change in asset valuation reserve	(107.9)	48.7	(73.0)
Change in surplus as a result of reinsurance	-	-	317.2
Transferred to common stock	(0.2)	-	-
Dividends to parent	(100.0)	(200.0)	-
Correction of error, net of tax	(42.7)	(2.2)	-
Balance at end of year	<u>\$ 1,822.4</u>	<u>\$ 1,962.8</u>	<u>\$ 2,015.9</u>
Special surplus funds:			
Balance at end of prior year	\$ 271.5	\$ -	\$ -
Change in admitted disallowed interest maintenance reserve	(17.7)	271.5	-
Balance at end of year	<u>\$ 253.8</u>	<u>\$ 271.5</u>	<u>\$ -</u>
Total capital and surplus	<u>\$ 4,226.3</u>	<u>\$ 3,051.0</u>	<u>\$ 2,832.6</u>

* Effective January 1, 2022, the Company elected to apply Ohio Administrative Code 3901-1-67, Alternative Derivative and Reserve Accounting Practices (OAC 3901-1-67) to its derivative instruments hedging fixed-indexed products and fixed-indexed annuity reserve liabilities. At adoption, the decrease in statutory surplus of (\$157.4 million) was comprised of \$236.2 million in change in reserve on account of change in valuation basis, (\$454.4 million) in cumulative effect of change in accounting principle, \$46.2 million in change in net deferred income tax and \$14.6 million in change in nonadmitted assets.

See accompanying notes to statutory-basis financial statements.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
STATEMENTS OF CASH FLOW
STATUTORY-BASIS
(Dollars in millions)

	Year Ended December 31		
	2024	2023	2022
Operations:			
Premiums and annuity considerations	\$ 8,552.6	\$ 8,509.2	\$ 6,877.6
Net investment income	3,208.9	2,279.3	1,244.9
Benefits paid	(3,291.0)	(3,375.1)	(2,266.8)
Commissions, expenses and other deductions	(678.2)	(570.4)	(551.5)
Federal income taxes paid	(172.7)	(144.6)	(103.8)
Other	5.3	119.1	562.2
Net cash provided by operations	7,624.9	6,817.5	5,762.6
Investing activities:			
Sales, maturities or repayments of investments, net:			
Bonds	6,989.8	8,046.0	14,058.5
Stocks	96.4	131.1	18.2
Mortgage loans	1,005.3	715.1	537.0
Other invested assets	173.8	322.1	274.0
Net losses on cash, cash equivalents and short-term investments	(1.1)	-	(0.1)
Miscellaneous proceeds	155.9	56.7	(22.3)
Purchases of investments:			
Bonds	(9,943.1)	(10,104.1)	(16,364.8)
Stocks	(166.8)	(128.7)	(109.2)
Mortgage loans	(1,849.1)	(1,881.1)	(1,107.7)
Other invested assets	(307.9)	(340.0)	(300.9)
Miscellaneous applications	(786.2)	(796.7)	(673.9)
Net decrease in policy loans	2.5	1.5	32.7
Net cash used in investing activities	(4,630.5)	(3,978.1)	(3,658.5)
Financing and miscellaneous activities:			
Cash contribution from parent	98.3	-	-
Net (withdrawals) deposits on deposit-type contracts	(178.5)	(136.5)	50.4
Dividends to parent	(100.0)	(200.0)	-
Other	(1,614.3)	(2,282.8)	(1,172.2)
Net cash used in financing and miscellaneous activities	(1,794.5)	(2,619.3)	(1,121.8)
Net increase in cash and short-term investments	1,199.9	220.1	982.3
Cash and short-term investments at beginning of year	2,211.3	1,991.2	1,008.9
Cash and short-term investments at end of year	\$ 3,411.2	\$ 2,211.3	\$ 1,991.2
Cash flow information for non-cash transactions:			
Other invested assets contribution from parent	\$ 1,234.9	\$ -	\$ -
Bond conversions and refinancing	288.8	255.4	453.1
Transfer preferred stock to bond	11.7	-	-
Net investment income payment-in-kind for bonds	3.9	-	1.1
Common stock conversions	2.8	34.4	0.2
Preferred stock conversions	0.2	0.4	-
Bonds transferred to other invested assets	-	18.6	119.7
Other invested assets transferred to common stocks	-	15.5	-
Common stocks transferred to other invested assets	-	6.4	-
Bonds transferred to mortgage loans	-	-	362.7
Other invested assets transferred to bonds	-	-	17.1

See accompanying notes to statutory-basis financial statements.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS

A. ORGANIZATION AND NATURE OF OPERATIONS

As of May 28, 2021, Great American Life Insurance Company (“GALIC” or “the Company”), a stock life insurance company domiciled in the State of Ohio, is a direct, wholly-owned subsidiary of Glidepath Holdings, Inc. (“Glidepath”), a financial services holding company wholly-owned by Massachusetts Mutual Life Insurance Company (“MassMutual”). Prior to that date, GALIC was a direct wholly-owned subsidiary of Great American Financial Resources, Inc., a financial services holding company wholly-owned by American Financial Group, Inc. In the fourth quarter of 2022 the Company’s name was changed to MassMutual Ascend Life Insurance Company (“MMALIC”). MMALIC predominantly markets traditional fixed, fixed-indexed and registered index-linked annuities (“RILA”) in the retail, financial institutions, broker-dealer and registered investment advisor markets, and maintains pension risk transfer business (“PRT”), which is a run-off block of business. MMALIC also has small blocks of long-term care products (“LTC”), other accident and health business, term and universal life in-force business, much of which is reinsured to third parties and are run-off blocks of business. MMALIC is licensed to write life, annuity and accident & health insurance in forty-nine states, District of Columbia and Puerto Rico (effective February 8, 2024).

B. SIGNIFICANT ACCOUNTING POLICIES

BASIS OF PRESENTATION

The accompanying financial statements have been prepared in conformity with accounting practices prescribed or permitted by the National Association of Insurance Commissioners (“NAIC”) and the Ohio Department of Insurance, which vary in some respects from U.S. generally accepted accounting principles (“GAAP”). Although the differences to GAAP have not been quantified, they are presumed to be material. The more significant of the differences using these statutory policies versus GAAP are as follows:

- (a) annuity receipts are accounted for as revenues versus liabilities for GAAP,
- (b) costs incurred in the acquisition of new business such as commissions, underwriting and policy issuance costs are expensed at the time incurred versus being capitalized for GAAP,
- (c) reserves established for future policy benefits are calculated using more conservative assumptions for mortality and interest rates than would be used under GAAP. Beginning on January 1, 2022, certain indexed annuity reserves are calculated in accordance with a prescribed practice under the Ohio Administrative Code discussed elsewhere in this footnote,
- (d) for statutory reporting, an Interest Maintenance Reserve (“IMR”) is provided whereby portions of certain realized gains and losses from fixed income investments are deferred and amortized into investment income as prescribed by the NAIC,
- (e) investments in bonds considered “available for sale” (as defined under GAAP) are generally recorded at amortized cost versus fair value for GAAP, except those with an NAIC designation of “6,” which are stated at the lower of amortized cost or fair value,
- (f) investments in non-affiliated common stocks are carried at fair value. Redeemable preferred stocks rated RP1 through RP3 are stated at book value. All other redeemable preferred stocks are stated at the lower of book value or fair value. Perpetual preferred stocks are stated at fair value, not to exceed any effective call price. GAAP requires that equity securities are carried at fair value with holding gains and losses reported in realized gains,
- (g) for statutory reporting, surplus notes are carried at book value. Under GAAP, surplus notes are considered investments in bonds “available for sale” recorded at fair value,
- (h) investments in equity securities of wholly-owned subsidiaries are carried at statutory and GAAP equity, in accordance with Statement of Statutory Accounting Principle (“SSAP”) No. 97, *Investments in Subsidiary, Controlled and Affiliated Entities*, versus being consolidated for GAAP,
- (i) for statutory reporting, an Asset Valuation Reserve (“AVR”) is provided under a formula prescribed by the NAIC as a valuation allowance for invested assets, which reclassifies a portion of surplus to liabilities,
- (j) the cost of certain assets designated as “nonadmitted assets” (principally disallowed IMR, advance commissions paid to agents, inventory and prepaid assets on real estate holdings, deferred tax assets (“DTA”) and certain investment income due and accrued in excess of statutory limitations) is charged against surplus,
- (k) policy liabilities and accruals in the statutory-basis balance sheets are reported net of reinsurance credits and recoverable unpaid losses. Under GAAP, balance sheet amounts are reported gross of reinsurance,

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

- (l) commissions allowed by reinsurers on business ceded are reported as income when incurred rather than being deferred and amortized with deferred policy acquisition costs as required under GAAP. Gains on reinsurance transactions are recorded to surplus when incurred rather than being deferred as required under GAAP,
- (m) for statutory reporting, reinsurance agreements are reported in accordance with SSAP No. 61, *Life, Deposit-Type and Accident and Health Reinsurance*; certain reinsurance agreements are accounted for using deposit accounting for GAAP,
- (n) the mark to market on RILA options, forward contracts, currency swaps and interest rate swaps is included as an unrealized gain/(loss) in unassigned surplus versus income for GAAP. Prior to January 1, 2022, fixed-indexed annuity options were carried at fair value and the mark to market was included as an unrealized gain/(loss) in unassigned funds versus income for GAAP,
- (o) the fixed-indexed annuity options are carried at amortized cost versus fair value for GAAP. Prior to January 1, 2022, fixed-indexed annuity options were carried at fair value,
- (p) in accordance with SSAP No. 101, *Income Taxes*, DTAs are limited to: 1) the amount of federal income taxes paid in prior years that can be recovered through loss carrybacks for existing temporary differences that reverse during a timeframe corresponding with Internal Revenue Service (“IRS”) tax loss carryback provisions, not to exceed three years, including amounts established in accordance with the provision of SSAP No. 5, plus 2) for entities who meet the required realization threshold in SSAP No. 101, the lesser of the remaining gross DTAs expected to be realized within three years of the balance sheet date or 15% of capital and surplus excluding any net DTAs, EDP equipment and operating software and any net positive goodwill, plus 3) the amount of remaining gross DTAs that can be offset against existing gross deferred tax liabilities (“DTL”). The remaining DTAs are nonadmitted. Deferred taxes do not include amounts for state taxes. Under GAAP, a DTA is recorded for the amount of gross DTAs expected to be realized in future years, and a valuation allowance is established for DTAs not realizable,
- (q) for statutory reporting, cash, cash equivalents, and short-term investments represent cash balances and investments with initial maturities of one year or less. Under GAAP, cash and cash equivalents include cash balances and investments with initial maturities of three months or less, and negative cash balances are reported as negative assets,
- (r) changes in deferred taxes are recognized in operations under GAAP versus a change in surplus for statutory reporting,
- (s) statutory financial statements are prepared using language and groupings substantially the same as the annual statements of the Company filed with the Ohio Department of Insurance,
- (t) statutory statements of cash flows are presented on the basis prescribed by the NAIC, and
- (u) statutory financial statements do not include accumulated other comprehensive income.

INTEREST RATE RISK

Significant changes in interest rates expose the Company to the risk of not earning income or experiencing losses based on the differences between the interest rates earned on investments and the credited interest rates paid on outstanding fixed annuity contracts and life insurance products with account values. Significant changes in interest rates may affect:

- the unrealized gains and losses in the investment portfolio;
- the book yield of the investment portfolio; and
- the ability of the Company to maintain appropriate interest rate spreads over the fixed rates guaranteed in life and annuity products.

CREDIT RISK

Third party debtors may not pay or perform their obligations. These parties may include the issuers of securities, customers, reinsurers, and other financial intermediaries.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

PRESCRIBED OR PERMITTED PRACTICES

The Ohio Department of Insurance recognizes only statutory accounting practices prescribed or permitted by the State of Ohio for determining and reporting the financial condition and results of operations of an insurance company, for determining its solvency under the Ohio Insurance Law. The NAIC's *Accounting Practices and Procedures Manual* ("NAIC SAP") has been adopted as a component of prescribed or permitted practices by the State of Ohio. The Company has no prescribed practices or permitted practices that would result in differences between NAIC SAP and the State of Ohio with the exception of OAC 3901-1-67.

Effective January 1, 2022, the Company elected to apply OAC 3901-1-67 to its derivative instruments hedging fixed-indexed products and fixed-indexed reserve liabilities. Under OAC 3901-1-67, derivative instruments are carried at amortized cost with the initial hedge cost amortized over the term and asset payoffs realized at the end of the term being reported through net investment income. Additionally, the cash surrender value reserves for fixed-indexed products only reflect index interest credits at the end of the crediting term as compared to partial index interest credits accumulating throughout the crediting term through change in policy and contract reserves.

If the prescribed practices were not applied, the Company's risk-based capital would continue to be above regulatory action levels. A reconciliation of the Company's net (loss) income between NAIC SAP and prescribed practice is shown below:

Net (Loss) Income (<i>in millions</i>)	SSAP #	F/S Page	State of Domicile	Year Ended December 31		
				2024	2023	2022
(1) State basis	XXX	XXX	XXX	\$ (253.9)	\$ (5.1)	\$ 158.0
(2) State prescribed practices that are an increase/(decrease) from NAIC SAP	XXX	XXX	XXX			
OAC 3901-1-67:						
Derivative instruments	86	4	OH	(58.6)	(49.3)	(26.4)
Reserves for fixed indexed annuities	51	4	OH	208.1	306.6	(188.0)
Tax impact	101	4	OH	2.6	0.7	0.4
(3) State permitted practices that are an increase/(decrease) from NAIC SAP	XXX	XXX	XXX	-	-	-
(4) NAIC SAP (1-2-3=4)	XXX	XXX	XXX	<u>\$ (406.0)</u>	<u>\$ (263.1)</u>	<u>\$ 372.0</u>

A reconciliation of the Company's capital and surplus between the NAIC SAP and prescribed practice is shown below:

Capital and Surplus (<i>in millions</i>)	SSAP #	F/S Page	State of Domicile	Year Ended December 31		
				2024	2023	2022
(5) Statutory surplus state basis	XXX	XXX	XXX	\$ 4,226.3	\$ 3,051.0	\$ 2,832.6
(6) State prescribed practices that are an increase/(decrease) from NAIC SAP						
OAC 3901-1-67:						
Derivative instruments	86	2, 4	OH	(604.8)	(525.3)	(39.2)
Reserves for fixed indexed annuities	51	3, 4	OH	562.9	354.8	48.2
Tax impact	101	2, 4	OH	23.8	50.8	13.1
(7) State permitted practices that are an increase/(decrease) from NAIC SAP	XXX	XXX	XXX	-	-	-
(8) NAIC SAP (5-6-7=8)	XXX	XXX	XXX	<u>\$ 4,244.4</u>	<u>\$ 3,170.7</u>	<u>\$ 2,810.5</u>

On February 17, 2022, MMALIC entered into a Funds Withheld Coinsurance agreement effective February 1, 2022, with Martello Re Limited, a Bermuda-domiciled Class E life and annuity reinsurer launched in 2022. MMALIC ceded statutory reserves of approximately \$14.2 billion on a closed block of fixed, fixed-indexed and payout annuity policies, in exchange for a \$320 million ceding commission paid by Martello Re. The transaction resulted in a significant increase to MMALIC's Risk Based Capital ratio. See "Note F - Reinsurance" for additional disclosure.

Preparation of the statutory-basis financial statements requires management to make estimates and assumptions that affect amounts reported in the financial statements and accompanying notes. Such estimates and assumptions could change in the future as more information becomes known, which could impact the amounts reported and disclosed herein.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

INVESTMENTS

Investments are generally stated as follows:

- a) bonds with a NAIC rating 1 through 5 are stated at amortized cost using the interest method; all others are stated at the lower of amortized cost or fair value. For residential mortgage-backed securities ("MBS"), commercial MBS and loan-backed and structured securities ("LBASS"), the NAIC has retained a third-party investment management firm to assist in the determination of the appropriate NAIC designations and Book Adjusted Carrying Values based on not only the probability of loss, but also the severity of loss. Those residential MBS, commercial MBS and LBASS securities that are not modeled but receive a current year NAIC Credit Rating Provider rating equal to NAIC 1 and 2 are stated at amortized cost and NAIC 3-6 are stated at lower of amortized cost or fair value. Dealer modeled prepayment assumptions are used for mortgage-backed and asset-backed securities at the date of purchase to determine effective yields; significant changes in estimated cash flows from the original purchase assumptions are accounted for on a prospective basis,
- b) short-term investments are carried at cost,
- c) redeemable preferred stocks rated RP1 through RP3 are stated at book value. All other redeemable preferred stocks are stated at the lower of book value or fair value. Perpetual preferred stocks are stated at fair value, not to exceed any effective call price,
- d) common stocks are carried at fair value except investments in stocks of unconsolidated subsidiaries and affiliates in which the Company has an interest of 10% or more are carried on the equity basis in accordance with SSAP No. 97,
- e) RILA options, forward contracts, financial futures, currency swaps and interest rate swaps are carried at fair value,
- f) fixed-indexed annuity options are carried at amortized cost. Prior to adoption of OAC 3901-1-67, fixed-indexed annuity options were carried at fair value,
- g) other invested assets include limited partnerships, limited liability companies and surplus notes. Surplus notes are stated at the lower of amortized cost or fair value. Investments in limited partnerships and limited liability companies are accounted for using the equity method,
- h) mortgage loans on real estate are carried at amortized cost less an allowance, and
- i) policy loans are stated at the aggregate unpaid balance.

If it is determined that a decline in fair value of a specific investment is other-than-temporary, an impairment is recognized as a realized capital loss. Investments that are in an unrealized loss position that the Company intends to sell, or does not have the intent and ability to hold until recovery, are written down to fair value. Loan-backed and structured securities (included in bonds) that are in an unrealized loss position that the Company has the intent and ability to hold until recovery, are written down only to the extent the present value of expected future cash flows using the security's effective yield is lower than the amortized cost. All other bonds that are in an unrealized loss position that the Company has the intent and ability to hold until recovery are written down to fair value if declines are credit-related and not written down for interest-related declines. When a decline in the value of a specific investment is considered to be other-than-temporary, a provision for impairment is charged to earnings (included in net realized capital gains (losses)) and the cost basis of that investment is reduced by the amount of the charge.

The Company's derivative strategy employs a variety of derivative financial instruments including interest rate and currency swaps, options, financial futures, and forward contracts. 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. Subsequent to the adoption of OAC on January 1, 2022, options related to fixed-indexed annuities are recorded at amortized cost with amortization and expirations recorded in Net investment income. All other derivative instruments are recorded at fair value with the related changes reported in Unassigned funds and settlements and expirations reported in Net realized capital gains (losses).

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

Counterparties to financial instruments expose the Company to credit-related losses in the event of nonperformance, but the Company does not expect any counterparties to fail to meet their obligations and expects any nonperformance to not have a material impact on the Company's financial statements. The Company receives collateral from certain counterparties to support its purchased equity index call option assets (net of collateral required under put option contracts with the same counterparties).

Investments having maturities of three months or less when purchased are considered to be cash equivalents for purposes of the statutory-basis financial statements. The carrying values of cash and short-term investments approximate their fair values.

Gains or losses on sales of securities are recognized at the time of disposition with the amount of gain or loss determined on the specific identification basis.

The IMR applies to interest-related realized capital gains and losses (net of tax) and is intended to defer realized gains and losses resulting from changes in the general level of interest rates. Gains and losses deferred from realized capital gains and losses are reported in interest maintenance reserve transfers, net of tax on the Statement of Operations. The IMR is amortized into investment income over the approximate remaining life of the investments sold.

The AVR provides for possible credit-related losses on securities and is calculated according to a specified formula as prescribed by the NAIC for the purpose of stabilizing surplus against fluctuations in the fair value of investment securities. Changes in the required reserve balances are made by direct credits or charges to surplus.

During 2024 and 2023, the Company did not reduce the interest rates on any of the outstanding mortgage loans due to credit concerns. Fire insurance, at least equal to the excess of the loan over the maximum loan that would be permitted by law on the land without the buildings, is required on all properties covered by mortgage loans.

Investments in the capital stock of MMALIC's wholly-owned insurance subsidiaries, Annuity Investors Life Insurance Company ("AILIC") and Manhattan National Life Insurance Company ("MNLIC"), are carried at the subsidiary's statutory equity in accordance with SSAP No. 97.

PREMIUMS

Annuity premiums and considerations are recognized as revenue when received. Life and accident and health premiums are recognized as revenue when due and premiums over 90 days past due are nonadmitted and charged against surplus. Additionally, life and accident and health premiums include deferred premiums on in-force business.

SEPARATE ACCOUNT

Separate account assets and liabilities reported in the accompanying statutory-basis balance sheet represent funds that are separately administered to hedge the Company's registered index-linked annuity contracts. Separate account assets are reported at fair value and include equity index call options. Separate account liabilities are reported at fair value and include equity index put options and registered index-linked annuity reserves. The operations of the separate account are not included in the accompanying statutory-basis financial statements.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

POLICY BENEFIT RESERVES

Life, annuity, and accident and health disability benefit reserves are developed by actuarial methods and are determined based on published tables using statutorily specified interest rates and valuation methods that will provide, in the aggregate, reserves that are greater than or equal to the minimum or guaranteed policy cash values or the amounts required by the Ohio Department of Insurance. MMALIC waives deduction of deferred fractional premiums on the death of life and annuity policy insureds and returns any premium beyond the date of death. Surrender values on policies do not exceed the corresponding benefit reserves.

For life insurance policies extra premiums are charged for substandard lives. Additional reserves are established when the results of cash flow testing under various interest rate scenarios indicate the need for such reserves or, where required by the valuation standards, when the net premiums exceed the gross premiums. The net deficiency reserve at December 31, 2024 and December 31, 2023, was \$1.5 million and \$1.7 million, respectively. The net amount of insurance in force for these reserves at December 31, 2024 and December 31, 2023 was approximately \$12.7 million and \$13.9 million, respectively. Much of the deficiency reserve is related to a cash endowment rider.

The valuation mortality table and interest assumptions being used on the vast majority of life policies in force is the 1980 Commissioners Standard Ordinary Table with 2.0% to 6.0% interest. Approximately one-sixth of the future life insurance benefits are based on a net level reserve basis and the remaining are based on a modified reserve basis. The effect of using a modified reserve basis is to partially offset the effect of immediately expensing acquisition costs by providing a reserve increase in the first policy year which is less than the increase in the renewal years.

For life insurance policies the mean reserve method is used to adjust the calculated terminal reserve to the appropriate reserve at December 31. Mean reserves for substandard lives are determined by computing the regular mean reserve for the plan at the rated age and holding, in addition, one-half of the extra premium charge for the year. An asset is recorded for deferred premiums net of loading to adjust the reserve for modal premium payments.

Life insurance deferred and uncollected premiums represent annual or fractional premiums, either due and uncollected or not yet due, whereby policy reserves have been provided on the assumption that the full premium for the current policy year has been collected.

Annuity policy and deposit fund reserves are based on principles underlying the Commissioners Annuity Reserve Valuation Method. Valuation interest rates range from 0.75% to 11.25%. Valuation mortality rates are from the 1971 Individual Annuity Mortality ("IAM") table, the 1983 IAM table, 1994 Group Annuity Mortality table, Annuity 2000 mortality table and the 2012 Individual Annuity Reserving mortality table. Reserves for fixed-indexed annuities are calculated using the market value reserve method as defined in NAIC Actuarial Guideline 35, adjusted in accordance with OAC 3901-1-67. The fixed-indexed reserves will only reflect index interest credits at the end of the crediting term as compared to partially reflecting the index interest credits throughout the crediting term in aggregate reserves for life and accident and health contracts. Prior to 2022, reserves for fixed-indexed annuities were calculated using the market value reserve method as defined in NAIC Actuarial Guideline 35. Reserves for registered index-linked annuities are calculated using the reserve method defined in the Valuation Manual (VM-21), including the use of the Alternative Methodology for calculating the Conditional Tail Expectation Amount. Rates determined by section VM-22 of the Valuation Manual were used for pension risk transfer contracts and single premium immediate annuities with issue years after 2017 and payout annuities issued as an annuitization of a deferred annuity originally issued after 2017.

Tabular interest, tabular less actual reserves released and tabular costs have been determined by formula. Tabular interest on funds not involving life contingencies is calculated as the product of such valuation rate of interest times the mean of the amount of funds subject to such valuation rate of interest held at the beginning and end of the year of valuation.

The nature of significant other reserve changes primarily relates to annuity reserves ceded to both Martello Re Limited and Commonwealth Annuity and Life Insurance Company ("Commonwealth"). The Company has ceded approximately \$12.0 billion and \$15.0 billion of annuity reserves in aggregate to Martello Re Limited and Commonwealth at December 31, 2024 and 2023, respectively.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

The liability for unreported claims is based on actual, recent Company experience of unreported life and annuity claim development. This experience is monitored and the liability is adjusted accordingly each quarter.

The Company is required to perform an annual asset adequacy test of reserves, to determine if they are adequate under moderately adverse conditions. The Appointed Actuary oversees the analysis and determines if and how much additional reserves are required. The additional reserve net of reinsurance was \$150.0 million and \$0.0 million as of December 31, 2024 and 2023, respectively.

FEDERAL INCOME TAXES

Beginning in June of 2021, MMALIC and its subsidiaries entered into a separate intercompany tax allocation agreement (the Tax Agreement). The Tax Agreement sets forth the manner in which the total combined federal income is allocated among the subsidiaries. The Tax Agreement provides MMALIC 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 MMALIC with the enforceable right to utilize its net losses carried forward as an offset to future net income subject to federal income taxes. Estimated payments are made quarterly during the year. Following year-end, additional settlements are made on the original due date of the return and, when extended, at the time the return is filed.

CORRECTION OF ERRORS

For the year ended December 31, 2024 corrections of prior year errors were recorded in surplus, net of tax:

	Year Ended December 31, 2024		
	Increase (Decrease) to:		
	Prior Year	Current Year	Asset or Liability
	Net Income	Surplus	Balances
	2024	2024	2024
Bonds	\$ (0.2)	\$ (0.2)	\$ (0.2)
Common stocks	(0.8)	(0.8)	(0.8)
Mortgage loans	7.0	7.0	7.0
Other invested assets	2.2	2.2	2.2
Accrued investment income	(21.0)	(21.0)	(21.0)
Payable for securities	(45.6)	(45.6)	45.6
Current federal income tax recoverable	11.4	11.4	11.4
Total	<u>\$ (47.0)</u>	<u>\$ (47.0)</u>	

ADOPTION OF NEW ACCOUNTING STANDARDS

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

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

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 \$253.8 million and \$271.5 million at December 31, 2024 and 2023, respectively.

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 impact of PIK in relation to the 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.

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, 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.”

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

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 specific 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.

SUBSEQUENT EVENTS

Management has evaluated all events occurring after December 31, 2024 through the date the financial statements were available to be issued, and determined there were no subsequent events that required either recognition or disclosure in the financial statements.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

C. FAIR VALUE MEASUREMENTS

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Fair value measurements are based upon observable and unobservable inputs. Observable inputs reflect market data obtained from independent sources, while unobservable inputs reflect the Company's view of market assumptions in the absence of observable market information. The Company utilizes valuation techniques that maximize the use of observable inputs and minimize the use of unobservable inputs. In determining fair value, the Company uses various methods, including market, income and cost approaches.

The Company categorizes its financial instruments into a three-level hierarchy based on the priority of the inputs to the valuation technique. The fair value hierarchy gives the highest priority to quoted prices in active markets for identical assets or liabilities (Level 1) and the lowest priority to unobservable inputs (Level 3). If the inputs used to measure fair value fall within different levels of the hierarchy, the category level is based on the lowest priority level input that is significant to the fair value measurement of the instrument in its entirety.

The three levels of the hierarchy are as follows:

Level 1 - Quoted prices for identical assets or liabilities in active markets (markets in which transactions occur with sufficient frequency and volume to provide pricing information on an ongoing basis). MMALIC's Level 1 financial instruments consist primarily of cash, cash equivalents and short-term investments and publicly traded equity securities for which quoted market prices in active markets are available.

Level 2 - Quoted prices for similar instruments in active markets; quoted prices for identical or similar assets or liabilities in inactive markets (markets in which there are few transactions, the prices are not current, price quotations vary substantially over time or among market makers, or in which little information is released publicly); and valuations based on other significant inputs that are observable in active markets. MMALIC's Level 2 financial instruments include fixed maturities, non-affiliated preferred stocks, separate account assets and liabilities and derivative instruments priced using observable inputs. Level 2 inputs include benchmark yields, reported trades, corroborated broker/dealer quotes, issuer spreads and benchmark securities. When non-binding broker quotes can be corroborated by comparison to similar securities priced using observable inputs, they are classified as Level 2.

Level 3 - Valuations derived from market valuation techniques generally consistent with those used to estimate the fair value of Level 2 financial instruments in which one or more significant inputs are unobservable or when the market for a security exhibits significantly less liquidity relative to markets supporting the Level 2 fair value measurements. The unobservable inputs may include management's own assumptions about the assumptions market participants would use based on the best information available in the circumstances. MMALIC's Level 3 is comprised of financial instruments whose fair value is estimated based on non-binding broker quotes or internally developed using significant inputs not based on, or corroborated by, observable market information.

Management is responsible for the valuation process and uses data from outside sources (including nationally recognized pricing services and broker/dealers) in establishing fair value. Valuation techniques utilized by pricing services and prices obtained from external sources are reviewed by internal investment professionals who are familiar with the securities being priced and the markets in which they trade to ensure the fair value determination is representative of an exit price. To validate the appropriateness of the prices obtained, the investment manager considers widely published indices (as benchmarks), recent trades, changes in interest rates, general economic conditions and the credit quality of the specific issuers. In addition, management communicates directly with the pricing service regarding the methods and assumptions used in pricing, including verifying, on a test basis, the inputs used by the service to value specific securities. See "Note D - Investments" for fair value of investment securities.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

C. FAIR VALUE MEASUREMENTS (CONTINUED)

Financial assets and liabilities measured at fair value on a recurring basis categorized into the three-level fair value hierarchy at December 31, 2024 are summarized below (in millions):

Description	Level 1	Level 2	Level 3	Total
Assets:				
Bonds:				
Industrial and miscellaneous	\$ -	\$ 12.2	\$ 22.6	\$ 34.8
Total bonds	<u>-</u>	<u>12.2</u>	<u>22.6</u>	<u>34.8</u>
Non-affiliated preferred stocks	77.9	-	69.5	147.4
Non-affiliated common stocks	138.9	-	157.8	296.7
Currency swaps	-	10.4	-	10.4
Currency forwards	-	23.4	-	23.4
Interest rate swaps	-	160.1	-	160.1
Separate account assets	9.6	974.6	-	984.2
Total assets accounted for at fair value	<u>\$ 226.4</u>	<u>\$ 1,180.7</u>	<u>\$ 249.9</u>	<u>\$ 1,657.0</u>
Liabilities:				
Currency swaps	\$ -	\$ 16.6	\$ -	\$ 16.6
Currency forwards	-	1.9	-	1.9
Interest rate swaps	-	90.5	-	90.5
Separate account liabilities	9.6	974.6	-	984.2
Total liabilities accounted for at fair value	<u>\$ 9.6</u>	<u>\$ 1,083.6</u>	<u>\$ -</u>	<u>\$ 1,093.2</u>

Financial assets and liabilities measured at fair value on a recurring basis categorized into the three-level fair value hierarchy at December 31, 2023 are summarized below (in millions):

Description	Level 1	Level 2	Level 3	Total
Assets:				
Bonds:				
Industrial and miscellaneous	\$ -	\$ 8.0	\$ 6.3	\$ 14.3
Total bonds	<u>-</u>	<u>8.0</u>	<u>6.3</u>	<u>14.3</u>
Non-affiliated preferred stocks	45.2	16.4	67.7	129.3
Non-affiliated common stocks	113.0	-	158.2	271.2
Financial futures	21.0	-	-	21.0
Interest rate swaps	-	26.6	-	26.6
Separate account assets	5.2	438.1	-	443.3
Total assets accounted for at fair value	<u>\$ 184.4</u>	<u>\$ 489.1</u>	<u>\$ 232.2</u>	<u>\$ 905.7</u>
Liabilities:				
Currency swaps	\$ -	\$ 38.8	\$ -	\$ 38.8
Currency forwards	-	5.0	-	5.0
Interest rate swaps	-	66.3	-	66.3
Separate account liabilities	5.2	438.1	-	443.3
Total liabilities accounted for at fair value	<u>\$ 5.2</u>	<u>\$ 548.2</u>	<u>\$ -</u>	<u>\$ 553.4</u>

The Company had no material assets or liabilities measured at fair value on a nonrecurring basis as of December 31, 2024 and 2023.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

C. FAIR VALUE MEASUREMENTS (CONTINUED)

The Company recognizes and records the transfer of securities into and out of Level 3 due to changes in availability of market observable inputs. All transfers are reflected in the tables below at fair values as of the end of the reporting periods (in millions):

	Balance as of 1/1/2024	Gain (Losses) in Net Income	Losses (Gains) in Surplus	Purchases	Issuances	Settlements	Sales	Transfers		Other	Balance as of 12/31/2024
								In	Out		
Financial assets:											
Industrial and miscellaneous	\$ 6.3	\$ -	\$ (10.8)	\$ 3.9	\$ 8.4	\$ (0.7)	\$ -	\$ -	\$ -	\$ 15.5	\$ 22.6
Preferred stocks - unaffiliated	67.7	-	6.0	-	-	-	-	-	-	(4.2)	69.5
Common stocks - unaffiliated	158.2	21.6	(2.3)	-	(7.8)	(38.0)	(0.2)	5.8	-	20.5	157.8
Total financial assets	<u>\$ 232.2</u>	<u>\$ 21.6</u>	<u>\$ (7.1)</u>	<u>\$ 3.9</u>	<u>\$ 0.6</u>	<u>\$ (38.7)</u>	<u>\$ (0.2)</u>	<u>\$ 5.8</u>	<u>\$ -</u>	<u>\$ 31.8</u>	<u>\$ 249.9</u>

	Balance as of 1/1/2023	Gain (Losses) in Net Income	Losses (Gains) in Surplus	Purchases	Issuances	Settlements	Sales	Transfers		Other	Balance as of 12/31/2023
								In	Out		
Financial assets:											
Industrial and miscellaneous	\$ 12.7	\$ 2.7	\$ (6.8)	\$ 0.8	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (3.1)	\$ 6.3
Preferred stocks - unaffiliated	127.3	-	(10.9)	-	0.9	(0.5)	-	-	-	(49.1)	67.7
Common stocks - unaffiliated	139.1	6.1	(15.9)	-	-	(40.7)	(0.3)	-	-	69.9	158.2
Total financial assets	<u>\$ 279.1</u>	<u>\$ 8.8</u>	<u>\$ (33.6)</u>	<u>\$ 0.8</u>	<u>\$ 0.9</u>	<u>\$ (41.2)</u>	<u>\$ (0.3)</u>	<u>\$ -</u>	<u>\$ -</u>	<u>\$ 17.7</u>	<u>\$ 232.2</u>

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

C. FAIR VALUE MEASUREMENTS (CONTINUED)

The following table categorizes all the financial assets and liabilities in the financial statements into the three-level fair value hierarchy at December 31, 2024 (in millions):

Description	Fair Value	Carrying Value	Level 1	Level 2	Level 3
Financial assets:					
Bonds:					
U.S. Government and agencies	\$ 131.2	\$ 168.6	\$ -	\$ 131.2	\$ -
All other governments	13.5	14.8	-	8.9	4.6
States, territories and possessions	151.5	157.5	-	151.5	-
Political subdivisions	217.2	221.8	-	217.2	-
Special revenue	1,625.4	1,759.1	-	1,610.0	15.4
Industrial and miscellaneous	32,774.1	34,216.7	-	23,423.3	9,350.8
Parent, subsidiaries and affiliates	959.2	969.7	-	779.0	180.2
Total bonds	\$ 35,872.1	\$ 37,508.2	\$ -	\$ 26,321.1	\$ 9,551.0
Non-affiliated preferred stocks	353.0	297.9	185.4	-	167.6
Non-affiliated common stocks	296.7	296.7	138.9	-	157.8
Mortgage loans	4,975.8	5,123.1	-	-	4,975.8
Currency forwards	23.4	23.4	-	23.4	-
Fixed-indexed annuity options**	973.4	681.8	403.9	569.5	-
Interest rate swaps	160.1	160.1	-	160.1	-
Currency swaps	10.4	10.4	-	10.4	-
Separate account assets	984.2	984.2	9.6	974.6	-
Cash, cash equivalents and short-term investments	3,411.2	3,411.2	3,411.2	-	-
Policy loans	27.5	27.5	-	-	27.5
Total financial assets	\$ 47,087.8	\$ 48,524.5	\$ 4,149.0	\$ 28,059.1	\$ 14,879.7
Financial liabilities:					
Currency swaps	\$ 16.6	\$ 16.6	\$ -	\$ 16.6	\$ -
Currency forwards	1.9	1.9	-	1.9	-
Interest rate swaps	90.5	90.5	-	90.5	-
Fixed-indexed annuity options**	-	304.6	-	-	-
Separate account liabilities	984.2	984.2	9.6	974.6	-
Total financial liabilities	\$ 1,093.2	\$ 1,397.8	\$ 9.6	\$ 1,083.6	\$ -

*Separate account liabilities incorporates the fair value of the separate account reserve and equity index put options.

**Effective 1/1/2022, Fixed-indexed annuity options are carried at amortized cost per OAC 3901-1-67. Fair Value of options is reported net in the asset section for disclosure.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

C. FAIR VALUE MEASUREMENTS (CONTINUED)

The following table categorizes all the financial assets and liabilities in the financial statements into the three-level fair value hierarchy at December 31, 2023 (in millions):

Description	Fair Value	Carrying Value	Level 1	Level 2	Level 3
Financial assets:					
Bonds:					
U.S. Government and agencies	\$ 156.8	\$ 186.7	\$ -	\$ 156.8	\$ -
All other governments	18.2	19.2	-	18.2	-
States, territories and possessions	175.5	180.4	-	175.5	-
Political subdivisions	228.7	231.5	-	228.7	-
Special revenue	1,800.2	1,920.8	-	1,784.9	15.3
Industrial and miscellaneous	29,809.8	31,688.5	-	21,914.2	7,895.6
Parent, subsidiaries and affiliates	722.2	745.2	-	583.4	138.8
Total bonds	\$ 32,911.4	\$ 34,972.3	\$ -	\$ 24,861.7	\$ 8,049.7
Non-affiliated preferred stocks	217.9	201.0	89.8	16.4	111.7
Non-affiliated common stocks	271.2	271.2	113.0	-	158.2
Mortgage loans	4,053.2	4,256.5	-	-	4,053.2
Fixed-indexed annuity options**	822.9	723.8	317.9	505.0	-
Interest rate swaps	26.6	26.6	-	26.6	-
Financial futures	21.0	21.0	-	21.0	-
Separate account assets	443.3	443.3	5.2	438.1	-
Cash, cash equivalents and short-term investments	2,211.3	2,211.3	2,211.3	-	-
Policy loans	30.0	30.0	-	-	30.0
Total financial assets	\$ 41,008.8	\$ 43,157.0	\$ 2,737.2	\$ 25,868.8	\$ 12,402.8
Financial liabilities:					
Currency swaps	\$ 38.8	\$ 38.8	\$ -	\$ 38.8	\$ -
Currency forwards	5.0	5.0	-	5.0	-
Interest rate swaps	66.3	66.3	-	66.3	-
Fixed-indexed annuity options**	-	418.1	-	-	-
Separate account liabilities	443.3	443.3	5.2	438.1	-
Total financial liabilities	\$ 553.4	\$ 971.5	\$ 5.2	\$ 548.2	\$ -

*Separate account liabilities incorporates the fair value of the separate account reserve and equity index put options.

**Effective 1/1/2022, Fixed-indexed annuity options are carried at amortized cost per OAC 3901-1-67. Fair Value of options is reported net in the asset section for disclosure.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

C. FAIR VALUE MEASUREMENTS (CONTINUED)

FAIR VALUE OF FINANCIAL INSTRUMENTS

The following methods and assumptions were used to estimate the fair values of financial instruments:

Bonds: Fair values for investments in publicly traded bonds are obtained from nationally recognized pricing services. Fair values for privately placed investment grade bonds are obtained from broker quotes or determined internally by security analysts of the Company's affiliated investment portfolio manager.

Non-affiliated preferred and common stock: Fair values of equity securities are generally based on closing prices obtained from the exchanges on which the securities are traded. For the remainder of these securities, fair values are determined by management's internal investment professionals using data from nationally recognized pricing services as well as non-binding broker quotes.

Mortgage Loans: The fair values for the Company's mortgage loans are estimated by discounting the future contractual cash flows using the current rates at which similar loans would be made to borrowers with similar credit ratings.

Derivative instruments: The fair values for MMALIC's derivative instruments are based on settlement values, quoted market prices of comparable instruments, fees currently charged to enter into similar agreements, taking into account the remaining terms of the agreements and the counterparties' credit standing (guarantees, loan commitments), or, if there are no relevant comparables, on pricing models or formulas using current assumptions.

Separate Account: The separate account consists of derivative instruments in both asset and liability positions and registered index-linked annuity reserves. The reserves are set equal to the net fair value of the separate account derivative instruments. The methods and assumptions used for the separate account derivatives and reserves are described in more detail above.

Policy Loans: The Company states policy loans at the aggregate unpaid balance, which approximates fair value.

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 Balance Sheet for cash, cash equivalents and short-term investment instruments approximates the fair value.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS

Bonds at December 31 consisted of the following (in millions):

	2024			
	Carrying Value	Fair Value	Gross Unrealized	
			Gains	Losses
U.S. Government and agencies	\$ 168.6	\$ 131.2	\$ 1.8	\$ 39.2
All other governments	14.8	13.5	-	1.3
States, territories and possessions	157.5	151.5	-	6.0
Political subdivisions	221.8	217.2	2.1	6.7
Special revenue	1,759.1	1,625.4	6.1	139.8
Industrial and miscellaneous	34,216.7	32,774.1	288.7	1,731.3
Parent, subsidiaries and affiliates	969.7	959.2	5.1	15.6
Total bonds	<u>\$ 37,508.2</u>	<u>\$ 35,872.1</u>	<u>\$ 303.8</u>	<u>\$ 1,939.9</u>

The December 31, 2024 gross unrealized losses exclude \$13.8 million of losses included in the carrying value. These losses include \$13.8 million from NAIC Class 6 bonds and were primarily included in industrial and miscellaneous.

Bonds at December 31 consisted of the following (in millions):

	2023			
	Carrying Value	Fair Value	Gross Unrealized	
			Gains	Losses
U.S. Government and agencies	\$ 186.7	\$ 156.8	\$ 3.9	\$ 33.8
All other governments	19.2	18.2	-	1.0
States, territories and possessions	180.4	175.5	0.5	5.4
Political subdivisions	231.5	228.7	3.7	6.5
Special revenue	1,920.8	1,800.2	10.5	131.1
Industrial and miscellaneous	31,688.5	29,809.8	247.6	2,126.3
Parent, subsidiaries and affiliates	745.2	722.2	4.2	27.2
Total bonds	<u>\$ 34,972.3</u>	<u>\$ 32,911.4</u>	<u>\$ 270.4</u>	<u>\$ 2,331.3</u>

The December 31, 2023 gross unrealized losses exclude \$12.8 million of losses included in the carrying value. These losses include \$12.5 million from NAIC Class 6 bonds and \$0.3 million from residential mortgage-backed securities (RMBS) whose ratings were obtained from outside modelers. These losses were primarily included in industrial and miscellaneous.

At December 31, 2024 and 2023, the Company held unrated or less-than-investment grade bonds of \$1,990.2 million and \$2,077.4 million, respectively, with an aggregate fair value of \$1,964.4 million and \$1,950.7 million, respectively. Those holdings amounted to 5.3% and 5.9% of the Company's investments in bonds and approximately 3.7% and 4.4% of the Company's total admitted assets at December 31, 2024 and 2023, respectively. The Company performs periodic evaluations of the relative credit standing of the issuers of these bonds.

Mortgage loans are collateralized by underlying real estate properties, with geographic diversification across the United States. The Company monitors loan-to-value ratios and debt-service coverage ratios in assessing the credit quality of the underlying mortgage loans. There have been no material losses related to commercial mortgage loans historically or in 2024, 2023 or 2022.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

The carrying value and fair value of the Company's mortgage loans at December 31 were as follows (in millions):

	2024		2023	
	Carrying Value	Fair Value	Carrying Value	Fair Value
Commercial mortgage loans:				
Primary lender	\$ 1,711.6	\$ 1,620.4	\$ 1,431.9	\$ 1,343.4
Mezzanine loans	78.2	78.5	47.6	47.6
Total commercial mortgage loans	1,789.8	1,698.9	1,479.5	1,391.0
Residential mortgage loans:				
FHA insured and VA guranteed	374.2	342.7	428.1	393.0
Other residential mortgage loans	2,959.1	2,934.2	2,348.9	2,269.2
Total residential mortgage loans	3,333.3	3,276.9	2,777.0	2,662.2
Total mortgage loans	<u>\$ 5,123.1</u>	<u>\$ 4,975.8</u>	<u>\$ 4,256.5</u>	<u>\$ 4,053.2</u>

The loan-to-value ratios by property type of the Company's commercial mortgage loans at December 31 were as follows (in millions):

	2024				
	Less Than 81%	81% to 95%	Above 95%	Total	% of Total
Office	\$ 34.8	\$ 22.2	\$ 43.7	\$ 100.7	6%
Apartments	605.3	49.7	35.7	690.7	39%
Industrial and other	359.9	4.5	14.8	379.2	21%
Hotels	547.6	21.6	50.0	619.2	34%
Total	<u>\$ 1,547.6</u>	<u>\$ 98.0</u>	<u>\$ 144.2</u>	<u>\$ 1,789.8</u>	<u>100%</u>

More than 86% of the Company's commercial mortgage loans' loan-to-value ratios are below 81% for the year ended December 31, 2024.

	2023				
	Less Than 81%	81% to 95%	Above 95%	Total	% of Total
Office	\$ 53.5	\$ 17.6	\$ 25.1	\$ 96.2	7%
Apartments	597.8	65.5	-	663.3	45%
Industrial and other	238.9	-	-	238.9	16%
Hotels	382.1	47.4	51.6	481.1	32%
Total	<u>\$ 1,272.3</u>	<u>\$ 130.5</u>	<u>\$ 76.7</u>	<u>\$ 1,479.5</u>	<u>100%</u>

More than 85% of the Company's commercial mortgage loans' loan-to-value ratios were below 81% for the year ended December 31, 2023.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

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 at December 31, translated into the equivalent rating agency designation (in millions):

2024						
	AAA/AA/A	BBB	BB	B	CCC and Lower	Total
Commercial mortgage loans:						
Primary lender	\$ 156.4	\$ 875.2	\$ 619.2	\$ 60.8	\$ -	\$ 1,711.6
Mezzanine loans	-	20.0	58.2	-	-	78.2
Total commercial mortgage loans	156.4	895.2	677.4	60.8	-	1,789.8
Residential mortgage loans:						
FHA insured and VA guaranteed	374.2	-	-	-	-	374.2
Other residential mortgage loans	104.7	2,832.1	20.4	1.9	-	2,959.1
Total residential mortgage loans	478.9	2,832.1	20.4	1.9	-	3,333.3
Total mortgage loans	<u>\$ 635.3</u>	<u>\$ 3,727.3</u>	<u>\$ 697.8</u>	<u>\$ 62.7</u>	<u>\$ -</u>	<u>\$ 5,123.1</u>
2023						
	AAA/AA/A	BBB	BB	B	CCC and Lower	Total
Commercial mortgage loans:						
Primary lender	\$ 178.0	\$ 947.7	\$ 288.5	\$ 17.7	\$ -	\$ 1,431.9
Mezzanine loans	-	22.6	25.0	-	-	47.6
Total commercial mortgage loans	178.0	970.3	313.5	17.7	-	1,479.5
Residential mortgage loans:						
FHA insured and VA guaranteed	428.1	-	-	-	-	428.1
Other residential mortgage loans	-	2,325.1	23.8	-	-	2,348.9
Total residential mortgage loans	428.1	2,325.1	23.8	-	-	2,777.0
Total mortgage loans	<u>\$ 606.1</u>	<u>\$ 3,295.4</u>	<u>\$ 337.3</u>	<u>\$ 17.7</u>	<u>\$ -</u>	<u>\$ 4,256.5</u>

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 100% as of December 31, 2024 and 100% as of December 31, 2023.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

The geographic distribution of commercial mortgage loans as of December 31 was as follows (in millions):

	2024	
	Carrying	Average
	Value	Loan-to-Value
		Ratio
Florida	\$ 242.7	49%
New York	208.1	65%
Texas	142.6	73%
California	140.5	73%
Virginia	128.3	64%
Massachusetts	110.0	60%
All other	817.6	74%
Total commercial mortgage loans	<u>\$ 1,789.8</u>	76%

All other consists of 20 jurisdictions, with no individual exposure exceeding \$101.6 million.

The geographic distribution of commercial mortgage loans as of December 31 was as follows (in millions):

	2023	
	Carrying	Average
	Value	Loan-to-Value
		Ratio
Colorado	\$ 175.8	68%
Florida	170.5	67%
New York	142.3	50%
Texas	128.8	61%
California	126.2	51%
Virginia	104.7	61%
All other	631.2	69%
Total commercial mortgage loans	<u>\$ 1,479.5</u>	64%

All other consists of 19 jurisdictions, with no individual exposure exceeding \$83.1 million.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

Interest rates, including fixed and variable, on the Company's portfolio of mortgage loans at December 31 were:

	2024		2023	
	Low	High	Low	High
Commercial mortgage loans:	2.6%	12.2%	2.6%	12.9%
Residential mortgage loans	2.2%	12.2%	4.8%	11.8%
Mezzanine mortgage loans	10.2%	13.7%	11.0%	14.4%

Interest rates, including fixed and variable, on new mortgage loans at December 31 were:

	2024		2023	
	Low	High	Low	High
Commercial mortgage loans:	4.3%	11.3%	4.7%	11.0%
Residential mortgage loans	4.0%	11.6%	7.1%	11.8%
Mezzanine mortgage loans	0.0%	0.0%	11.0%	11.0%

As of December 31, 2024 and 2023, the Company had no 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.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

Unrealized gains and losses on investments in non-affiliated preferred and common stocks are reported directly in unassigned funds and do not affect operations. The cost, gross unrealized gains and losses and fair value of those investments are summarized as follows (in millions):

	Cost	Fair Value	Gross Unrealized Gains	Gross Unrealized Losses
At December 31, 2024				
Non-affiliated preferred stocks	\$ 288.8	\$ 353.0	\$ 69.9	\$ 5.7
Non-affiliated common stocks	193.2	296.7	115.7	12.2
Total	<u>\$ 482.0</u>	<u>\$ 649.7</u>	<u>\$ 185.6</u>	<u>\$ 17.9</u>

	Cost	Fair Value	Gross Unrealized Gains	Gross Unrealized Losses
At December 31, 2023				
Non-affiliated preferred stocks	\$ 212.2	\$ 217.9	\$ 31.2	\$ 25.5
Non-affiliated common stocks	195.6	271.2	102.4	26.8
Total	<u>\$ 407.8</u>	<u>\$ 489.1</u>	<u>\$ 133.6</u>	<u>\$ 52.3</u>

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

The following tables present gross unrealized losses and fair values on bonds and non-affiliated preferred and common stocks by investment category and length of time that individual securities have been in a continuous unrealized loss position as of December 31 (in millions):

	2024					
	Twelve Months or Less			More Than Twelve Months		
	Fair Value	Gross Unrealized Loss	Number of Issuers	Fair Value	Gross Unrealized Loss	Number of Issuers
U.S. Government and agencies	\$ 23.6	\$ 0.6	4	\$ 35.5	\$ 38.6	5
All other governments	4.5	0.1	1	8.9	1.2	10
States, territories and possessions	63.9	0.8	4	84.2	5.2	8
Political subdivisions	21.0	0.4	4	92.0	6.3	9
Special revenue	385.2	8.8	38	974.9	131.0	91
Industrial and miscellaneous	6,184.6	98.8	635	11,846.5	1,646.3	1,236
Parent, subsidiaries and affiliates	127.1	1.1	7	226.0	14.5	5
Total bonds	<u>\$ 6,809.9</u>	<u>\$ 110.6</u>	<u>693</u>	<u>\$ 13,268.0</u>	<u>\$ 1,843.1</u>	<u>1,364</u>
Non-affiliated preferred stocks	\$ 53.8	\$ 1.0	5	\$ 50.9	\$ 4.7	3
Non-affiliated common stocks	15.2	1.5	40	13.8	10.7	15
Total non-affiliated preferred and common stocks	<u>\$ 69.0</u>	<u>\$ 2.5</u>	<u>45</u>	<u>\$ 64.7</u>	<u>\$ 15.4</u>	<u>18</u>

The December 31, 2024 gross unrealized losses exclude \$13.8 million of losses included in the carrying value. These losses include \$13.8 million from NAIC Class 6 bonds and were primarily included in industrial and miscellaneous.

	2023					
	Twelve Months or Less			More Than Twelve Months		
	Fair Value	Gross Unrealized Loss	Number of Issuers	Fair Value	Gross Unrealized Loss	Number of Issuers
U.S. Government and agencies	\$ 24.6	\$ 0.2	2	\$ 45.4	\$ 33.6	3
All other governments	-	-	0	18.2	1.0	11
States, territories and possessions	17.8	0.1	3	120.8	5.3	8
Political subdivisions	25.5	0.5	5	113.0	6.0	13
Special revenue	134.5	2.1	25	1,132.3	129.0	104
Industrial and miscellaneous	2,181.0	55.7	322	16,931.4	2,083.4	1,585
Parent, subsidiaries and affiliates	132.7	0.4	6	369.4	26.8	10
Total bonds	<u>\$ 2,516.1</u>	<u>\$ 59.0</u>	<u>363</u>	<u>\$ 18,730.5</u>	<u>\$ 2,285.1</u>	<u>1,734</u>
Non-affiliated preferred stocks	\$ 11.6	\$ 22.1	3	\$ -	\$ 3.4	0
Non-affiliated common stocks	5.0	4.6	31	9.0	22.2	18
Total non-affiliated preferred and common stocks	<u>\$ 16.6</u>	<u>\$ 26.7</u>	<u>34</u>	<u>\$ 9.0</u>	<u>\$ 25.6</u>	<u>18</u>

The December 31, 2023, gross unrealized losses include \$12.8 million of losses included in the carrying value. These losses include \$12.5 million from NAIC Class 6 bonds and \$0.3 million from RMBS whose ratings were obtained from outside modelers. These losses were primarily included in industrial and miscellaneous.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

The quality of the bond portfolio is determined by the use of Securities Valuation Office (“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 (in millions):

NAIC Class	Equivalent Rating Agency Designation	2024		2023	
		Carrying Value	% of Total	Carrying Value	% of Total
1	Aaa/Aa/A	\$ 22,015.1	58.7%	\$ 20,190.9	57.8%
2	Baa	13,502.9	36.0%	12,704.0	36.3%
3	Ba	1,112.8	3.0%	1,253.2	3.6%
4	B	526.2	1.4%	495.3	1.4%
5	Caa and lower	239.8	0.6%	287.0	0.8%
6	In or near default	111.4	0.3%	41.9	0.1%
	Total	<u>\$ 37,508.2</u>	<u>100.0%</u>	<u>\$ 34,972.3</u>	<u>100.0%</u>

When a decline in the fair value of a specific investment is considered to be other-than-temporary, a provision for impairment is charged to earnings (accounted for as realized capital loss) and the cost basis of that investment is reduced by the amount of the charge. The determination of whether unrealized losses are other-than-temporary requires judgment based on subjective as well as objective factors. Factors considered and resources used by management include:

- (a) whether the unrealized loss is credit-driven or a result of changes in market interest rates,
- (b) the extent to which fair value is less than cost basis,
- (c) cash flow projections received from independent sources,
- (d) historical operating, balance sheet and cash flow data contained in issuer Securities and Exchange Commission filings and news releases,
- (e) near-term prospects for improvement in the issuer and/or its industry,
- (f) third party research and communications with industry specialists,
- (g) financial models and forecasts,
- (h) the continuity of dividend payments, maintenance of investment grade ratings and hybrid nature of certain investments,
- (i) discussions with issuer management, and
- (j) the ability and intent to hold investment for a period of time sufficient to allow for any anticipated recovery in fair value.

Based on its analysis of the factors enumerated above, management believes (i) MMALIC will recover its cost basis in the securities with unrealized losses and (ii) that MMALIC has the ability and intent to hold securities until they recover in value. Although MMALIC has the ability to continue holding its investments with unrealized losses, its intent to hold them may change due to deterioration in the issuers’ creditworthiness, decisions to lessen exposure to a particular issuer or industry, asset/liability management decisions, market movements, changes in views about appropriate asset allocation or the desire to offset taxable realized gains. Should MMALIC’s ability or intent change with regard to a particular security, a charge for impairment would likely be required. While it is not possible to accurately predict if or when a specific security will become impaired, charges for other-than-temporary impairment (“OTTI”) could be material to results of operations in future periods.

Net realized gains (losses) on investments sold and charges for OTTI on investments held were as follows for the years ended December 31 (dollars in millions):

Year	Net Realized Gains (Losses)	Charges for Impairment	Total	Number of Investments with Impairment Charges
	(Net of IMR Transfers and Taxes)			
2024	\$ 73.2	\$ (148.1)	\$ (74.9)	161
2023	(64.3)	(89.4)	(153.7)	137
2022	8.4	(41.0)	(32.6)	138

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

The following is a summary of the carrying value and fair value of bonds as of December 31, 2024 and 2023 (in millions) 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
Maturity:				
One year or less	\$ 964.6	\$ 958.3	\$ 477.7	\$ 461.8
After one year through five years	10,257.1	10,221.2	7,313.4	7,226.3
After five years through ten years	9,264.8	9,002.9	10,259.6	9,804.4
After ten years	17,021.7	15,689.7	16,921.6	15,418.9
Total bonds by maturity	<u>\$ 37,508.2</u>	<u>\$ 35,872.1</u>	<u>\$ 34,972.3</u>	<u>\$ 32,911.4</u>

The aggregate amount of investment income generated as a result of prepayment penalties and acceleration fees was \$0.0 million, \$0.0 million, and \$0.6 million during 2024, 2023, and 2022, respectively.

Proceeds from sales of bonds were \$2,006.6 million, \$5,146.6 million, and \$10,640.3 million for 2024, 2023, and 2022, respectively. Gross realized gains of \$22.8 million, \$21.3 million, and \$282.1 million and gross realized losses of \$167.3 million, \$491.4 million, and \$232.4 million were realized on bonds during 2024, 2023, and 2022, respectively. The number of securities disposed of with a callable feature in 2024 and 2023 was 127 and 136, respectively.

MMALIC's \$4,316.6 million investment in MBS represents approximately 12% of the carrying value of its bonds at December 31, 2024. The Company's indirect exposure to subprime mortgage risk as of December 31, 2024 had a total actual cost and book adjusted carrying value of approximately \$1,197.0 million and \$1,191.4 million, respectively, and a total fair value of approximately \$1,113.7 million. MMALIC's \$4,365.1 million investment in MBS represents approximately 12% of the carrying value of its bonds at December 31, 2023. The Company's indirect exposure to subprime mortgage risk as of December 31, 2023 had a total actual cost and book adjusted carrying value of approximately \$1,185.0 million and \$1,184.6 million, respectively, and a total fair value of approximately \$1,083.9 million.

Leveraged loans are loans extended to companies that already have considerable amounts of debt. MMALIC 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 \$479.8 million and a fair value of \$481.5 million, of which approximately 77%, based on carrying value, were domestic leveraged loans. As of December 31, 2023, total leveraged loans had a carrying value of \$447.6 million and a fair value of \$446.9 million, of which approximately 83%, based on carrying value, were domestic leveraged loans.

The Company has no aggregate loan-backed securities with an OTTI in which the Company has the intent to sell or the inability or lack of intent to retain the investment in the security for a period of time to recover the amortized cost basis.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

The following table shows each loan-backed security with an OTTI recognized in 2024, as the present value of cash flows expected to be collected is less than the amortized cost basis of the security (in whole dollars):

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Statement of Operations	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
07325DAF1	\$ 188,446	\$ 183,894	\$ 4,552	\$ 183,894	\$ 173,542	03/31/2024
07389NAC9	252,999	244,622	8,378	244,622	249,997	03/31/2024
3622EAAA8	3,363,495	3,323,775	39,721	3,323,775	3,153,854	03/31/2024
61751DAE4	1,528,252	1,458,023	70,229	1,458,023	1,795,267	03/31/2024
86358RXY8	141,707	140,513	1,193	140,513	140,491	03/31/2024
86358RXZ5	221,359	218,722	2,638	218,722	201,247	03/31/2024
00703QAD4	3,309,564	3,330,880	(21,316)	3,330,880	2,331,478	03/31/2024
02147XAR8	569,821	568,694	1,127	568,694	462,724	03/31/2024
02152AAS8	1,681,039	1,680,195	844	1,680,195	1,709,668	03/31/2024
059522AU6	1,990,654	1,977,703	12,952	1,977,703	1,952,207	03/31/2024
05952GAT8	319,263	302,417	16,846	302,417	279,733	03/31/2024
05952GAV3	458,831	435,162	23,669	435,162	402,521	03/31/2024
07386XAH9	947,290	948,547	(1,257)	948,547	771,263	03/31/2024
12566UAN4	549,670	541,211	8,459	541,211	531,037	03/31/2024
12566XAM0	651,755	636,729	15,027	636,729	579,587	03/31/2024
12628LAD2	664,264	632,237	32,026	632,237	522,656	03/31/2024
12667F4N2	1,982,772	1,961,149	21,623	1,961,149	1,892,614	03/31/2024
17309BAB3	197,256	194,233	3,023	194,233	166,593	03/31/2024
32051GT70	601,477	580,656	20,821	580,656	513,722	03/31/2024
36244SAD0	2,013,709	2,018,709	(5,000)	2,018,709	2,114,288	03/31/2024
43739EAP2	555,880	552,194	3,685	552,194	523,782	03/31/2024
46627MCY1	3,736,516	3,706,574	29,942	3,706,574	3,728,355	03/31/2024
46627MEC7	346,366	345,013	1,353	345,013	316,216	03/31/2024
46627MEJ2	1,051,940	1,051,330	610	1,051,330	871,833	03/31/2024
47232CAH7	1,625,552	1,588,003	37,549	1,588,003	1,634,793	03/31/2024
643529AC4	499,851	483,505	16,346	483,505	541,706	03/31/2024
65535VMJ4	528,500	514,916	13,584	514,916	545,242	03/31/2024
65535VNL8	1,911,718	1,911,036	683	1,911,036	2,083,864	03/31/2024
65535VSJ8	1,249,637	1,197,771	51,865	1,197,771	1,003,257	03/31/2024
74928RAB0	215,991	215,991	(0)	215,991	236,763	03/31/2024
75115BAC3	932,748	928,740	4,009	928,740	1,022,173	03/31/2024
761118BU1	501,401	464,499	36,902	464,499	506,476	03/31/2024
761118GS1	1,045,906	1,039,755	6,151	1,039,755	922,272	03/31/2024
761118SC3	1,408,050	1,385,794	22,255	1,385,794	1,191,653	03/31/2024
855541AC2	727,538	712,958	14,579	712,958	653,434	03/31/2024
863579J90	310,964	284,727	26,237	284,727	287,552	03/31/2024
86360BAJ7	659,289	637,763	21,526	637,763	625,317	03/31/2024
87222EAB4	751,711	731,584	20,127	731,584	682,690	03/31/2024
87222EAC2	870,200	839,182	31,018	839,182	680,970	03/31/2024
93934NAC9	441,899	429,939	11,960	429,939	357,528	03/31/2024
45660LCK3	2,514,539	2,470,098	44,442	2,470,098	2,723,605	03/31/2024
058931AT3	1,087,439	1,038,180	49,259	1,038,180	879,088	03/31/2024
05949CKX3	1,152,881	1,152,938	(58)	1,152,938	1,158,454	03/31/2024

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Statement of Operations	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
05990HAT0	835,338	815,604	19,735	815,604	806,647	03/31/2024
07386YAE4	2,127,460	1,872,598	254,863	1,872,598	1,732,749	03/31/2024
07401CAS2	2,546,303	2,534,503	11,800	2,534,503	2,518,043	03/31/2024
12638PAB5	666,442	630,577	35,865	630,577	479,103	03/31/2024
12669G4K4	2,465,908	2,448,797	17,111	2,448,797	2,303,793	03/31/2024
12669GR45	454,211	451,011	3,200	451,011	405,877	03/31/2024
170257AE9	1,986,016	1,903,375	82,642	1,903,375	1,421,183	03/31/2024
2254582Y3	1,063,127	1,052,270	10,856	1,052,270	941,835	03/31/2024
225458L55	477,807	465,565	12,242	465,565	402,724	03/31/2024
32052EAA7	42,488	41,783	704	41,783	39,155	03/31/2024
32056JAA2	1,021,287	994,518	26,768	994,518	1,080,580	03/31/2024
362341FN4	694,244	680,711	13,534	680,711	609,991	03/31/2024
362341XC8	809,401	777,534	31,867	777,534	695,392	03/31/2024
41161PCX9	153,937	153,895	42	153,895	157,664	03/31/2024
46630WAL4	438,439	438,782	(343)	438,782	293,935	03/31/2024
576433D52	471,876	409,240	62,636	409,240	430,054	03/31/2024
57643MLZ5	205,469	199,902	5,567	199,902	176,526	03/31/2024
59023PAB9	470,257	467,493	2,764	467,493	476,269	03/31/2024
74958YAE2	262,093	259,755	2,338	259,755	258,713	03/31/2024
863579RP5	618,742	604,955	13,787	604,955	564,247	03/31/2024
863579UL0	255,178	254,285	893	254,285	237,173	03/31/2024
863579UU0	939,669	934,433	5,236	934,433	960,949	03/31/2024
863579XR4	1,954,913	1,890,491	64,421	1,890,491	1,887,147	03/31/2024
885220KW2	1,741,141	1,720,731	20,410	1,720,731	1,602,474	03/31/2024
03235TAA5	2,269,468	89,151	2,180,317	89,151	91,091	06/30/2024
62878HAA9	77,803,827	67,655,502	10,148,325	67,655,502	37,210,526	06/30/2024
07325DAF1	178,481	176,126	2,355	176,126	166,148	06/30/2024
3622EAAA8	3,292,504	3,184,660	107,843	3,184,660	3,041,184	06/30/2024
86358RXY8	123,852	123,852	0	123,852	123,889	06/30/2024
86358RXZ5	372,918	188,377	184,541	188,377	171,206	06/30/2024
00703QAD4	3,296,107	3,259,847	36,260	3,259,847	2,386,522	06/30/2024
02152AAS8	1,650,275	1,657,538	(7,263)	1,657,538	1,694,329	06/30/2024
05532TAF9	1,330,063	1,000,180	329,883	1,000,180	1,320,833	06/30/2024
059522AU6	2,241,312	1,925,540	315,772	1,925,540	1,895,287	06/30/2024
05952GAV3	459,594	459,364	231	459,364	396,506	06/30/2024
07384YKF2	1,676,124	1,597,771	78,353	1,597,771	1,509,395	06/30/2024
12566UAE4	391,661	388,055	3,606	388,055	342,216	06/30/2024
12566UAN4	537,632	510,793	26,839	510,793	530,113	06/30/2024
12628LAD2	642,284	622,397	19,887	622,397	514,736	06/30/2024
12667F4N2	1,914,833	1,908,135	6,698	1,908,135	1,810,552	06/30/2024
12667GAC7	587,654	584,787	2,867	584,787	567,539	06/30/2024
12668APC3	769,291	754,235	15,056	754,235	708,505	06/30/2024
17307GED6	1,262,267	1,251,250	11,017	1,251,250	1,309,786	06/30/2024
17309BAB3	194,329	190,609	3,721	190,609	163,894	06/30/2024
25150NAB0	1,429,029	1,411,817	17,212	1,411,817	1,189,708	06/30/2024
45254NNT0	86,269	46,530	39,739	46,530	37,525	06/30/2024

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Statement of Operations	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
46627MAD9	497,454	495,061	2,393	495,061	429,325	06/30/2024
46627MCY1	3,504,842	3,460,914	43,928	3,460,914	3,510,994	06/30/2024
46627MEJ2	1,029,088	1,028,470	619	1,028,470	850,323	06/30/2024
61748HUF6	444,541	437,080	7,462	437,080	394,526	06/30/2024
643529AC4	488,451	472,942	15,509	472,942	512,282	06/30/2024
65535VSJ8	1,198,546	1,139,006	59,540	1,139,006	965,916	06/30/2024
75115DAA3	176,480	172,897	3,583	172,897	155,478	06/30/2024
75116FBH1	1,316,094	1,293,501	22,593	1,293,501	1,096,145	06/30/2024
76110HH85	209,667	196,650	13,018	196,650	207,840	06/30/2024
761118BU1	356,973	358,468	(1,495)	358,468	390,598	06/30/2024
761118FM5	1,654,272	1,550,452	103,819	1,550,452	1,634,697	06/30/2024
761118GS1	577,336	578,234	(897)	578,234	519,129	06/30/2024
761118SC3	1,347,876	1,353,200	(5,324)	1,353,200	1,178,737	06/30/2024
855541AC2	681,799	664,359	17,440	664,359	610,581	06/30/2024
863579J90	281,218	263,740	17,478	263,740	257,606	06/30/2024
86360BAG3	1,593,226	1,526,542	66,684	1,526,542	1,446,404	06/30/2024
86360BAJ7	732,362	624,365	107,997	624,365	608,246	06/30/2024
87222EAB4	737,391	714,622	22,770	714,622	678,658	06/30/2024
87222EAC2	854,908	824,739	30,169	824,739	673,478	06/30/2024
93934NAC9	212,897	212,897	0	212,897	177,003	06/30/2024
45660LCK3	2,492,599	2,447,687	44,912	2,447,687	2,730,961	06/30/2024
058931AT3	849,462	844,051	5,410	844,051	736,680	06/30/2024
05946XY72	969,731	968,019	1,712	968,019	907,973	06/30/2024
05990HAT0	797,257	776,355	20,901	776,355	770,842	06/30/2024
073880AD8	1,041,747	980,882	60,865	980,882	884,127	06/30/2024
07401CAS2	2,149,928	1,800,366	349,563	1,800,366	1,769,018	06/30/2024
12544DAG4	76,422	76,273	149	76,273	63,205	06/30/2024
1266942H0	487,696	485,711	1,985	485,711	402,837	06/30/2024
126694HP6	424,687	418,006	6,681	418,006	407,545	06/30/2024
12669G3S8	1,109,352	1,086,152	23,199	1,086,152	970,937	06/30/2024
12669G4K4	2,416,802	2,413,996	2,805	2,413,996	2,282,559	06/30/2024
12669GR45	488,586	443,234	45,352	443,234	418,915	06/30/2024
2254582Y3	1,038,258	1,042,487	(4,229)	1,042,487	922,895	06/30/2024
225470VF7	1,214,433	1,144,277	70,156	1,144,277	1,034,928	06/30/2024
32052EAA7	41,561	40,891	670	40,891	38,638	06/30/2024
32056JAA2	946,028	935,645	10,383	935,645	957,523	06/30/2024
362341FN4	682,514	656,914	25,600	656,914	596,198	06/30/2024
362341XC8	753,782	753,720	62	753,720	684,524	06/30/2024
466247UG6	396,801	389,244	7,556	389,244	391,491	06/30/2024
46630WAL4	429,077	428,735	343	428,735	286,999	06/30/2024
46631NAA7	629,936	624,489	5,447	624,489	490,712	06/30/2024
46631NDT3	5,702,643	5,440,665	261,978	5,440,665	5,514,444	06/30/2024
52520MCE1	192,541	190,485	2,057	190,485	182,118	06/30/2024
57643MLZ5	197,781	191,438	6,343	191,438	175,020	06/30/2024
59023PAB9	459,882	457,928	1,954	457,928	464,081	06/30/2024
61758VAQ0	2,524,715	2,424,826	99,890	2,424,826	2,004,345	06/30/2024

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Statement of Operations	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
74958YAE2	259,088	254,354	4,734	254,354	256,384	06/30/2024
863579RP5	601,854	558,618	43,237	558,618	556,863	06/30/2024
863579UL0	255,370	250,985	4,385	250,985	234,764	06/30/2024
863579UU0	1,012,782	885,453	127,329	885,453	919,353	06/30/2024
863579XR4	1,816,437	1,747,652	68,785	1,747,652	1,724,184	06/30/2024
92925VAF7	1,963,141	1,392,435	570,706	1,392,435	1,835,677	06/30/2024
92979DAC9	2,345,113	2,281,758	63,356	2,281,758	2,403,743	06/30/2024
94985AAA7	172,846	172,336	510	172,336	162,836	06/30/2024
94986CAA2	160,856	162,103	(1,247)	162,103	209,862	06/30/2024
07325DAF1	168,747	158,506	10,241	158,506	162,126	09/30/2024
3622EAAA8	3,162,718	3,164,266	(1,548)	3,164,266	3,105,133	09/30/2024
86358RXZ5	173,920	162,831	11,089	162,831	147,869	09/30/2024
00703QAD4	3,230,243	2,980,491	249,753	2,980,491	2,393,260	09/30/2024
05951KAN3	536,453	516,986	19,467	516,986	480,378	09/30/2024
05952GAT8	301,408	301,407	1	301,407	279,298	09/30/2024
07384YKF2	1,545,478	1,473,109	72,368	1,473,109	1,502,463	09/30/2024
12566UAE4	382,321	381,811	510	381,811	347,647	09/30/2024
12628LAD2	623,895	538,842	85,054	538,842	488,888	09/30/2024
12667F4N2	1,854,333	1,825,794	28,539	1,825,794	1,795,414	09/30/2024
12667F5E1	885,926	883,092	2,834	883,092	840,192	09/30/2024
12667GAC7	574,616	574,616	0	574,616	569,728	09/30/2024
17307GED6	1,243,444	1,237,646	5,798	1,237,646	1,306,304	09/30/2024
17309BAB3	188,676	178,404	10,273	178,404	162,800	09/30/2024
25150NAB0	1,395,413	1,340,207	55,206	1,340,207	1,185,177	09/30/2024
32051GT70	553,883	489,420	64,463	489,420	470,987	09/30/2024
36244SAD0	2,079,721	1,738,096	341,626	1,738,096	1,990,034	09/30/2024
46627MAD9	485,365	467,136	18,228	467,136	418,182	09/30/2024
46627MEC7	333,531	312,472	21,058	312,472	300,268	09/30/2024
46627MEJ2	1,002,416	975,069	27,347	975,069	835,072	09/30/2024
61748HUF6	428,955	412,384	16,570	412,384	395,350	09/30/2024
643529AC4	475,293	476,634	(1,341)	476,634	500,686	09/30/2024
65535VSJ8	1,145,447	994,986	150,461	994,986	958,994	09/30/2024
75115DAA3	170,761	164,486	6,275	164,486	151,842	09/30/2024
761118FM5	1,541,807	1,543,298	(1,492)	1,543,298	1,629,022	09/30/2024
761118UG1	420,057	420,046	11	420,046	373,060	09/30/2024
863579J90	250,612	252,143	(1,531)	252,143	245,916	09/30/2024
86360BAG3	1,314,325	1,248,853	65,472	1,248,853	1,207,074	09/30/2024
86360BAJ7	600,711	599,768	944	599,768	589,162	09/30/2024
87222EAB4	717,218	700,713	16,505	700,713	677,103	09/30/2024
87222EAC2	837,388	792,140	45,248	792,140	670,814	09/30/2024
058931AT3	836,589	777,756	58,832	777,756	735,448	09/30/2024
05990HAT0	774,291	709,503	64,788	709,503	797,291	09/30/2024
073880AD8	958,917	955,572	3,345	955,572	876,008	09/30/2024
12544DAG4	75,232	74,708	525	74,708	64,751	09/30/2024
1266942H0	472,093	470,717	1,376	470,717	381,368	09/30/2024
12669G4K4	2,386,332	2,386,419	(87)	2,386,419	2,304,003	09/30/2024

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Statement of Operations	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
16162YAL9	304,287	300,592	3,695	300,592	302,447	09/30/2024
170257AE9	1,844,597	1,830,194	14,403	1,830,194	1,400,315	09/30/2024
2254582Y3	1,035,685	987,491	48,194	987,491	916,096	09/30/2024
225470VF7	1,045,176	1,047,328	(2,152)	1,047,328	914,335	09/30/2024
466247UG6	388,455	385,026	3,430	385,026	394,828	09/30/2024
46630WAL4	414,400	402,824	11,576	402,824	275,971	09/30/2024
46631NAA7	619,024	566,235	52,789	566,235	485,405	09/30/2024
52520MCE1	187,510	169,666	17,844	169,666	178,580	09/30/2024
57643MLZ5	189,667	181,845	7,821	181,845	175,427	09/30/2024
74958YAE2	252,881	235,028	17,853	235,028	260,844	09/30/2024
863579UU0	872,015	877,227	(5,212)	877,227	896,401	09/30/2024
92925VAF7	1,353,551	1,353,551	(0)	1,353,551	1,805,104	09/30/2024
62878HAA9	57,507,177	37,210,526	20,296,651	37,210,526	37,210,526	12/31/2024
86358RXZ5	150,451	150,523	(72)	150,523	128,721	12/31/2024
00703QAD4	2,884,931	2,591,154	293,777	2,591,154	2,159,579	12/31/2024
07386XAH9	895,372	883,112	12,260	883,112	700,640	12/31/2024
225470Q89	461,254	350,813	110,442	350,813	316,228	12/31/2024
32051GT70	516,567	526,142	(9,576)	526,142	447,968	12/31/2024
45254NNT0	40,960	10,690	30,269	10,690	21,416	12/31/2024
46627MAD9	452,369	457,946	(5,577)	457,946	392,752	12/31/2024
61748HUF6	409,958	408,345	1,613	408,345	379,740	12/31/2024
86360BAG3	1,252,210	1,243,829	8,381	1,243,829	1,137,848	12/31/2024
86360BAJ7	622,383	583,382	39,002	583,382	556,638	12/31/2024
87222EAC2	792,850	794,291	(1,441)	794,291	638,603	12/31/2024
058931AT3	547,740	547,703	37	547,703	507,449	12/31/2024
073880AD8	947,481	946,754	728	946,754	863,064	12/31/2024
12638PAB5	650,731	553,226	97,504	553,226	453,690	12/31/2024
1266942H0	457,088	442,059	15,028	442,059	352,275	12/31/2024
126694CS5	2,368,937	2,330,168	38,769	2,330,168	1,789,779	12/31/2024
126694LC0	1,302,316	1,096,712	205,604	1,096,712	956,653	12/31/2024
170257AE9	1,799,754	1,793,779	5,975	1,793,779	1,342,095	12/31/2024
2254582Y3	981,101	981,382	(281)	981,382	878,279	12/31/2024
46630WAL4	400,452	395,212	5,240	395,212	268,169	12/31/2024
74958YAE2	230,512	230,132	380	230,132	247,059	12/31/2024
863579UU0	853,614	853,536	78	853,536	847,155	12/31/2024
Total			\$ 40,145,833			

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

The following table shows each loan-backed security with an OTTI recognized in 2023, as the present value of cash flows expected to be collected is less than the amortized cost basis of the security (in whole dollars):

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Statement of Operations	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
00176BAM5	\$ 202,546	\$ 110,277	\$ 92,269	\$ 110,277	\$ 116,065	03/31/2023
001406AA5	1,763,035	1,274,229	488,807	1,274,229	1,285,767	03/31/2023
26827EAC9	9,193,316	4,723,119	4,470,196	4,723,119	6,207,776	03/31/2023
3622EAAA8	3,756,795	3,647,858	108,936	3,647,858	3,611,452	03/31/2023
61751DAE4	1,645,601	1,578,836	66,764	1,578,836	1,967,072	03/31/2023
617526AD0	2,356,207	2,115,198	241,009	2,115,198	2,354,557	03/31/2023
86358RXZ5	421,445	412,256	9,189	412,256	413,530	03/31/2023
05951KAN3	622,182	623,350	(1,169)	623,350	601,336	03/31/2023
059522AU6	2,269,369	2,102,631	166,738	2,102,631	2,176,835	03/31/2023
12628LAD2	785,041	763,053	21,988	763,053	660,429	03/31/2023
12667F4N2	2,210,900	2,186,739	24,161	2,186,739	2,182,686	03/31/2023
12667F5E1	1,062,067	1,059,207	2,860	1,059,207	995,081	03/31/2023
12668APC3	896,073	883,009	13,065	883,009	857,687	03/31/2023
17307GED6	1,409,643	1,393,308	16,335	1,393,308	1,455,502	03/31/2023
17309BAB3	220,495	214,662	5,834	214,662	195,222	03/31/2023
32051GSQ9	1,814,597	1,786,038	28,559	1,786,038	1,836,075	03/31/2023
32051GT70	663,419	662,609	810	662,609	596,313	03/31/2023
46627MAD9	589,002	581,089	7,914	581,089	518,389	03/31/2023
46627MEJ2	1,138,638	1,136,631	2,006	1,136,631	957,220	03/31/2023
59020UW43	223,543	223,584	(41)	223,584	245,108	03/31/2023
643529AC4	537,761	506,075	31,686	506,075	563,770	03/31/2023
74923GAC7	1,432,936	1,431,302	1,634	1,431,302	1,521,208	03/31/2023
74923HAQ4	538,028	538,123	(95)	538,123	480,166	03/31/2023
74928RAB0	248,088	241,996	6,091	241,996	266,975	03/31/2023
74928XBB6	4,436,827	3,886,418	550,409	3,886,418	4,352,809	03/31/2023
75115BAC3	1,010,823	1,015,108	(4,285)	1,015,108	1,087,275	03/31/2023
75115DAA3	195,780	193,598	2,183	193,598	182,546	03/31/2023
761118BU1	717,506	688,322	29,183	688,322	756,457	03/31/2023
761118FM5	2,089,659	1,852,770	236,889	1,852,770	1,945,475	03/31/2023
761118GS1	1,139,848	1,138,816	1,032	1,138,816	1,041,063	03/31/2023
761118SC3	1,581,486	1,581,588	(103)	1,581,588	1,360,351	03/31/2023
761118UG1	506,268	503,201	3,067	503,201	428,316	03/31/2023
76112BNM8	4,707,569	4,708,889	(1,320)	4,708,889	4,941,288	03/31/2023
855541AC2	854,276	851,419	2,857	851,419	808,830	03/31/2023
863579J90	344,828	339,476	5,352	339,476	355,595	03/31/2023
86360BAG3	1,782,553	1,688,545	94,008	1,688,545	1,858,413	03/31/2023
86360BAJ7	684,793	671,937	12,855	671,937	700,892	03/31/2023
87222EAB4	838,918	811,788	27,130	811,788	736,793	03/31/2023
87222EAC2	971,562	933,068	38,494	933,068	795,832	03/31/2023

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Statement of Operations	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
45660LCK3	2,673,423	2,598,842	74,581	2,598,842	2,689,571	03/31/2023
939336X99	1,829,627	1,670,689	158,938	1,670,689	1,792,660	03/31/2023
05949CHM1	768,548	755,812	12,736	755,812	773,623	03/31/2023
05949CKX3	1,213,201	1,188,146	25,055	1,188,146	1,243,199	03/31/2023
05990HAT0	934,146	930,177	3,969	930,177	940,458	03/31/2023
073880AD8	1,121,205	1,122,339	(1,134)	1,122,339	1,064,409	03/31/2023
07401CAS2	3,138,214	3,078,739	59,474	3,078,739	3,132,170	03/31/2023
12543XAD8	1,165,771	1,150,483	15,288	1,150,483	1,070,971	03/31/2023
12544DAG4	85,474	83,364	2,109	83,364	73,861	03/31/2023
12545EAK2	1,406,029	1,363,895	42,134	1,363,895	1,226,917	03/31/2023
12638PAB5	719,347	697,335	22,011	697,335	549,668	03/31/2023
126694CS5	2,842,754	2,832,174	10,581	2,832,174	2,292,959	03/31/2023
126694HP6	421,087	419,930	1,157	419,930	402,076	03/31/2023
12669G3S8	1,254,365	1,250,349	4,015	1,250,349	1,124,398	03/31/2023
16165MAG3	1,841,254	1,776,091	65,163	1,776,091	1,597,907	03/31/2023
2254582Y3	1,208,346	1,200,002	8,344	1,200,002	1,082,976	03/31/2023
225458L55	539,692	536,533	3,159	536,533	500,154	03/31/2023
225470VF7	1,460,576	1,422,984	37,592	1,422,984	1,400,985	03/31/2023
36185N6N5	4,571,722	4,071,935	499,788	4,071,935	4,514,039	03/31/2023
362341FN4	774,099	765,095	9,005	765,095	702,117	03/31/2023
362341XC8	857,596	848,675	8,921	848,675	768,173	03/31/2023
36242DQY2	99,752	97,979	1,772	97,979	93,530	03/31/2023
41161PCX9	191,672	191,284	388	191,284	190,228	03/31/2023
466247J46	74,610	73,055	1,554	73,055	73,519	03/31/2023
466247UG6	526,361	514,800	11,561	514,800	510,820	03/31/2023
46630WAB6	872,431	866,888	5,543	866,888	808,108	03/31/2023
46630WAL4	506,494	500,786	5,709	500,786	479,625	03/31/2023
46631NAA7	719,259	693,483	25,776	693,483	569,822	03/31/2023
576433D52	503,578	493,400	10,178	493,400	450,563	03/31/2023
57643MLZ5	284,150	280,753	3,397	280,753	269,995	03/31/2023
59023PAB9	508,302	498,819	9,484	498,819	517,983	03/31/2023
74958YAE2	287,181	287,688	(507)	287,688	287,680	03/31/2023
78473TAJ9	198,841	177,853	20,989	177,853	154,392	03/31/2023
863579RP5	609,579	590,361	19,218	590,361	577,909	03/31/2023
863579UL0	263,373	261,997	1,377	261,997	256,211	03/31/2023
92979DAC9	2,710,529	2,629,297	81,232	2,629,297	2,800,364	03/31/2023
94984DAC8	342,454	342,081	373	342,081	345,646	03/31/2023
94986CAA2	264,625	265,827	(1,202)	265,827	262,986	03/31/2023
001406AA55	27,755	-	27,755	-	-	06/30/2023
61751DAE4	1,614,822	1,548,177	66,645	1,548,177	1,908,732	06/30/2023
86358RXZ5	381,361	332,609	48,752	332,609	337,433	06/30/2023
02146TAL1	361,912	345,869	16,042	345,869	366,804	06/30/2023
02147XAR8	617,209	612,988	4,221	612,988	505,733	06/30/2023
059522AU6	2,107,010	2,107,010	-	2,107,010	2,147,399	06/30/2023

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Statement of Operations	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
07386XAH9	984,857	984,374	483	984,374	807,325	06/30/2023
12566UAN4	572,055	570,484	1,571	570,484	586,599	06/30/2023
12628LAD2	766,444	716,904	49,540	716,904	624,798	06/30/2023
12667F5E1	1,039,544	1,031,360	8,184	1,031,360	960,648	06/30/2023
12667GAC7	662,986	611,428	51,558	611,428	628,342	06/30/2023
12668APC3	845,763	838,619	7,144	838,619	804,549	06/30/2023
17309BAB3	213,365	208,774	4,591	208,774	183,775	06/30/2023
32051GSQ9	1,688,266	1,682,972	5,294	1,682,972	1,728,278	06/30/2023
32051GT70	654,707	650,913	3,793	650,913	584,241	06/30/2023
36244SAD0	2,252,386	2,071,962	180,424	2,071,962	2,271,187	06/30/2023
43739EAP2	616,209	611,759	4,449	611,759	570,177	06/30/2023
46627MAD9	572,129	572,115	13	572,115	503,882	06/30/2023
46627MEC7	377,567	371,830	5,737	371,830	339,925	06/30/2023
46627MEJ2	1,118,100	1,113,603	4,497	1,113,603	921,828	06/30/2023
643529AC4	520,520	491,053	29,467	491,053	557,549	06/30/2023
65535VNL8	2,089,478	2,081,888	7,590	2,081,888	2,063,447	06/30/2023
65535VSJ8	1,285,712	1,246,997	38,715	1,246,997	1,115,827	06/30/2023
74923HAQ4	525,772	519,269	6,502	519,269	443,687	06/30/2023
75116FBH1	1,485,771	1,465,650	20,121	1,465,650	1,253,422	06/30/2023
761118SC3	1,528,680	1,515,672	13,008	1,515,672	1,309,921	06/30/2023
761118UG1	485,611	483,232	2,379	483,232	409,243	06/30/2023
863579J90	326,147	321,439	4,707	321,439	331,247	06/30/2023
86360BAJ7	664,426	663,728	698	663,728	678,337	06/30/2023
87222EAB4	814,203	791,937	22,266	791,937	715,293	06/30/2023
87222EAC2	944,500	906,175	38,325	906,175	780,900	06/30/2023
05949CHM1	754,991	752,303	2,689	752,303	770,786	06/30/2023
05949CKX3	1,233,035	1,190,687	42,348	1,190,687	1,225,158	06/30/2023
07386YAE4	1,919,895	1,890,046	29,849	1,890,046	1,717,512	06/30/2023
073880AD8	1,095,079	1,087,921	7,158	1,087,921	1,010,811	06/30/2023
12543XAD8	1,146,866	1,132,734	14,132	1,132,734	1,025,398	06/30/2023
12544DAG4	82,048	82,482	(434)	82,482	72,144	06/30/2023
12638PAB5	704,325	687,341	16,984	687,341	538,077	06/30/2023
12669G3S8	1,216,352	1,205,920	10,432	1,205,920	1,077,627	06/30/2023
16165MAG3	1,698,141	1,698,815	(675)	1,698,815	1,501,094	06/30/2023
17025AAH5	866,588	804,309	62,279	804,309	831,165	06/30/2023
2254582Y3	239,471	239,472	(2)	239,472	214,686	06/30/2023
225458L55	535,805	532,092	3,713	532,092	459,983	06/30/2023
225470VF7	1,403,814	1,403,895	(81)	1,403,895	1,341,332	06/30/2023
45669AAD6	3,387,280	3,358,005	29,274	3,358,005	3,217,657	06/30/2023
466247J46	71,231	71,237	(5)	71,237	69,271	06/30/2023
466247ZP1	550,885	540,659	10,226	540,659	482,855	06/30/2023
46628LAB4	41,586	40,556	1,030	40,556	41,521	06/30/2023
46630WAL4	515,281	485,878	29,403	485,878	468,594	06/30/2023

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Statement of Operations	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
46631NAA7	691,427	678,636	12,791	678,636	532,232	06/30/2023
46631NDT3	6,223,773	6,162,743	61,029	6,162,743	6,052,651	06/30/2023
576433D52	492,252	487,446	4,806	487,446	417,672	06/30/2023
57643MLZ5	269,334	264,924	4,410	264,924	253,589	06/30/2023
59023PAB9	497,202	495,714	1,488	495,714	511,575	06/30/2023
74958YAE2	281,262	262,418	18,844	262,418	270,970	06/30/2023
863579XC7	1,084,387	1,062,034	22,353	1,062,034	1,101,633	06/30/2023
863579XR4	2,120,615	2,023,213	97,402	2,023,213	2,051,084	06/30/2023
86363GAF1	1,315,519	1,224,816	90,703	1,224,816	1,244,515	06/30/2023
885220KW2	1,906,234	1,901,275	4,960	1,901,275	1,823,623	06/30/2023
00176BAM54	101,071	71	101,000	71	78,651	09/30/2023
57430U301	1,207,914	922,371	285,543	922,371	815,210	09/30/2023
07325DAF1	214,725	211,984	2,742	211,984	195,404	09/30/2023
3622EAA A8	3,564,775	3,424,094	140,681	3,424,094	3,261,277	09/30/2023
61751DAE4	1,569,635	1,508,933	60,702	1,508,933	1,731,342	09/30/2023
86358RXY8	199,869	182,391	17,478	182,391	196,421	09/30/2023
86358RXZ5	297,911	283,221	14,691	283,221	280,466	09/30/2023
02146TAL1	356,025	334,459	21,566	334,459	347,841	09/30/2023
02147XAR8	595,098	598,203	(3,104)	598,203	483,800	09/30/2023
058933AN2	801,762	795,980	5,782	795,980	738,147	09/30/2023
059522AU6	2,113,373	2,046,846	66,528	2,046,846	2,043,226	09/30/2023
07386XAH9	967,729	884,778	82,951	884,778	783,965	09/30/2023
12628LAD2	722,914	702,073	20,842	702,073	584,662	09/30/2023
12667F4N2	2,131,981	2,102,525	29,456	2,102,525	2,003,869	09/30/2023
12667F5E1	998,934	999,062	(128)	999,062	919,366	09/30/2023
12667GAC7	641,949	642,107	(158)	642,107	605,263	09/30/2023
12668APC3	811,652	812,953	(1,300)	812,953	775,662	09/30/2023
17307GED6	1,383,968	1,370,895	13,074	1,370,895	1,414,213	09/30/2023
17309BAB3	205,994	202,794	3,201	202,794	171,985	09/30/2023
32051GSQ9	1,609,003	1,603,331	5,672	1,603,331	1,656,065	09/30/2023
32051GT70	638,394	635,227	3,166	635,227	561,409	09/30/2023
36244SAD0	2,086,866	2,091,595	(4,729)	2,091,595	2,092,913	09/30/2023
43739EAP2	600,361	591,499	8,862	591,499	566,842	09/30/2023
46627MAD9	551,967	541,058	10,909	541,058	474,792	09/30/2023
46627MEC7	364,017	360,581	3,437	360,581	323,064	09/30/2023
46627MEJ2	1,097,236	1,094,239	2,997	1,094,239	888,082	09/30/2023
643529AC4	504,332	491,904	12,428	491,904	538,114	09/30/2023
65535VNL8	2,075,144	2,055,698	19,446	2,055,698	2,078,429	09/30/2023
65535VSJ8	1,256,596	1,234,664	21,931	1,234,664	1,073,207	09/30/2023
69337BAH7	1,342,250	1,324,870	17,380	1,324,870	1,128,015	09/30/2023
74923HAQ4	509,767	510,394	(627)	510,394	429,265	09/30/2023
75115DAA3	188,747	185,664	3,083	185,664	182,465	09/30/2023
761118GS1	1,085,700	1,072,281	13,419	1,072,281	1,007,009	09/30/2023

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Statement of Operations	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
761118SC3	1,483,628	1,492,604	(8,976)	1,492,604	1,269,597	09/30/2023
761118UG1	468,938	469,663	(725)	469,663	393,703	09/30/2023
863579J90	308,602	305,810	2,792	305,810	317,961	09/30/2023
86360BAJ7	651,289	649,170	2,119	649,170	663,487	09/30/2023
87222EAB4	794,273	757,539	36,733	757,539	695,006	09/30/2023
87222EAC2	917,429	875,091	42,338	875,091	735,483	09/30/2023
41161PTN3	331,804	277,221	54,583	277,221	311,042	09/30/2023
45660LCK3	2,616,065	2,518,214	97,852	2,518,214	2,766,498	09/30/2023
05946XY72	1,018,663	1,014,239	4,424	1,014,239	947,595	09/30/2023
05949CHM1	666,490	660,363	6,127	660,363	690,602	09/30/2023
07386YAE4	1,885,974	1,866,881	19,093	1,866,881	1,705,295	09/30/2023
073880AD8	1,076,505	1,037,154	39,351	1,037,154	987,684	09/30/2023
12543XAD8	1,101,148	1,105,980	(4,831)	1,105,980	936,389	09/30/2023
12638PAB5	694,351	675,173	19,178	675,173	512,071	09/30/2023
12669G4K4	2,601,658	2,601,146	511	2,601,146	2,396,294	09/30/2023
12669GR45	498,496	476,051	22,445	476,051	430,865	09/30/2023
170257AE9	2,360,086	2,294,691	65,396	2,294,691	1,706,184	09/30/2023
17025AAH5	753,396	787,624	(34,228)	787,624	795,445	09/30/2023
225458L55	495,061	491,459	3,602	491,459	425,644	09/30/2023
225470VF7	1,387,201	1,333,114	54,088	1,333,114	1,298,598	09/30/2023
32052EAA7	46,567	43,785	2,782	43,785	40,679	09/30/2023
362341FN4	754,611	747,216	7,395	747,216	669,320	09/30/2023
362341XC8	827,434	812,370	15,063	812,370	684,900	09/30/2023
41161PCX9	180,773	179,982	791	179,982	176,391	09/30/2023
46631NDT3	5,999,611	6,009,390	(9,779)	6,009,390	5,617,945	09/30/2023
47233DAB7	595,329	204,708	390,622	204,708	681,585	09/30/2023
576433D52	486,384	480,875	5,509	480,875	413,266	09/30/2023
57643MLZ5	248,993	244,183	4,811	244,183	230,150	09/30/2023
59023PAB9	483,479	478,356	5,122	478,356	492,971	09/30/2023
74958TAB9	519,216	508,266	10,950	508,266	470,425	09/30/2023
863579RP5	591,272	566,391	24,881	566,391	560,020	09/30/2023
863579UL0	259,923	258,399	1,523	258,399	245,880	09/30/2023
863579UU0	1,016,080	963,663	52,416	963,663	990,946	09/30/2023
863579XC7	1,037,796	981,054	56,742	981,054	1,022,671	09/30/2023
86363GAF1	1,179,527	1,182,146	(2,619)	1,182,146	1,193,014	09/30/2023
885220KW2	1,896,532	1,874,254	22,278	1,874,254	1,835,343	09/30/2023
07325DAF1	193,552	193,679	(127)	193,679	183,083	12/31/2023
3622EAAA8	3,286,278	3,237,272	49,006	3,237,272	3,255,864	12/31/2023
61751DAE4	1,543,361	1,498,683	44,678	1,498,683	1,797,931	12/31/2023
75156VAD7	2,959,112	2,496,716	462,396	2,496,716	2,973,028	12/31/2023
86358RDX2	963,691	945,774	17,917	945,774	795,532	12/31/2023
86358RXY8	191,518	165,259	26,259	165,259	165,808	12/31/2023
86358RXZ5	327,597	248,323	79,275	248,323	244,869	12/31/2023

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NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Statement of Operations	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
00703QAD4	2,455,266	2,403,956	51,310	2,403,956	2,362,111	12/31/2023
02147XAR8	582,086	581,667	419	581,667	475,448	12/31/2023
02152AAS8	1,839,976	1,736,745	103,231	1,736,745	1,709,492	12/31/2023
058933AN2	794,268	793,985	283	793,985	750,932	12/31/2023
05951KAN3	580,528	579,964	564	579,964	514,479	12/31/2023
07386XAH9	876,767	875,510	1,257	875,510	782,619	12/31/2023
12628LAD2	708,617	661,150	47,467	661,150	587,483	12/31/2023
12667F4N2	2,025,464	2,012,088	13,376	2,012,088	1,984,305	12/31/2023
12667F5E1	983,360	978,296	5,064	978,296	909,176	12/31/2023
12667GAC7	619,616	613,153	6,463	613,153	585,116	12/31/2023
17307GED6	1,341,806	1,336,284	5,522	1,336,284	1,400,985	12/31/2023
17309BAB3	201,958	198,201	3,757	198,201	176,462	12/31/2023
32051GSQ9	1,522,783	1,512,933	9,850	1,512,933	1,515,991	12/31/2023
32051GT70	619,138	612,519	6,618	612,519	534,842	12/31/2023
36244SAD0	2,148,368	1,989,448	158,920	1,989,448	2,137,247	12/31/2023
43739EAP2	561,096	556,890	4,206	556,890	538,989	12/31/2023
46627MAD9	524,569	524,569	(0)	524,569	468,198	12/31/2023
46627MCY1	3,947,612	3,784,942	162,670	3,784,942	3,845,527	12/31/2023
46627MEC7	353,579	351,690	1,889	351,690	326,489	12/31/2023
643529AC4	505,690	486,982	18,708	486,982	551,521	12/31/2023
65535VNL8	1,947,633	1,933,908	13,724	1,933,908	2,036,022	12/31/2023
65535VSJ8	1,230,484	1,232,758	(2,274)	1,232,758	989,929	12/31/2023
69337BAH7	1,311,917	1,303,815	8,102	1,303,815	1,159,687	12/31/2023
74928RAB0	239,342	216,651	22,691	216,651	238,268	12/31/2023
74928XBB6	3,183,555	3,039,107	144,448	3,039,107	3,430,881	12/31/2023
75115BAC3	1,030,772	916,005	114,767	916,005	1,035,843	12/31/2023
75115DAA3	186,218	186,790	(572)	186,790	164,206	12/31/2023
75116FBH1	1,377,535	1,361,078	16,456	1,361,078	1,145,682	12/31/2023
76110HT90	840,834	582,373	258,461	582,373	917,175	12/31/2023
761118SC3	1,431,534	1,428,103	3,431	1,428,103	1,242,244	12/31/2023
855541AC2	750,496	745,072	5,424	745,072	691,191	12/31/2023
863579J90	303,000	300,072	2,928	300,072	306,643	12/31/2023
86360BAJ7	680,750	643,758	36,993	643,758	672,067	12/31/2023
87222EAB4	834,894	822,502	12,392	822,502	694,825	12/31/2023
87222EAC2	882,066	857,058	25,008	857,058	695,801	12/31/2023
45660LCK3	3,167,425	2,938,420	229,005	2,938,420	2,780,987	12/31/2023
058931AT3	1,095,711	1,095,714	(3)	1,095,714	918,016	12/31/2023
05946XY72	977,968	978,683	(715)	978,683	937,593	12/31/2023
05949CHM1	663,718	655,328	8,390	655,328	662,826	12/31/2023
05949CKX3	1,187,717	1,150,126	37,591	1,150,126	1,168,876	12/31/2023
073880AD8	1,030,655	1,019,083	11,571	1,019,083	930,752	12/31/2023
12544DAG4	78,643	78,571	72	78,571	64,456	12/31/2023
12638PAB5	679,907	659,700	20,206	659,700	486,778	12/31/2023

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D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Statement of Operations	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
1266942H0	512,111	510,107	2,004	510,107	423,601	12/31/2023
12669G4K4	2,556,809	2,555,364	1,445	2,555,364	2,427,811	12/31/2023
12669GR45	470,597	467,135	3,462	467,135	435,906	12/31/2023
2254582Y3	1,077,827	1,066,955	10,873	1,066,955	959,317	12/31/2023
225458L55	491,469	487,840	3,628	487,840	406,462	12/31/2023
32052EAA7	43,448	42,472	976	42,472	41,090	12/31/2023
362341FN4	733,600	729,603	3,996	729,603	662,609	12/31/2023
362341XC8	795,518	795,302	217	795,302	720,040	12/31/2023
466247UG6	427,081	426,051	1,029	426,051	391,055	12/31/2023
46628LAB4	37,967	37,273	694	37,273	37,689	12/31/2023
46630WAL4	455,687	451,993	3,694	451,993	302,703	12/31/2023
46631NDT3	5,867,333	5,886,670	(19,337)	5,886,670	5,731,594	12/31/2023
57643MLZ5	229,612	225,458	4,154	225,458	205,035	12/31/2023
59023PAB9	475,891	473,619	2,272	473,619	481,056	12/31/2023
863579RP5	600,470	597,146	3,324	597,146	549,353	12/31/2023
863579UL0	258,471	257,405	1,065	257,405	242,466	12/31/2023
863579UU0	958,195	945,112	13,083	945,112	980,662	12/31/2023
863579XC7	980,418	980,418	-	980,418	1,038,343	12/31/2023
863579XR4	1,957,805	1,957,254	552	1,957,254	2,023,487	12/31/2023
86363GAF1	1,167,594	1,159,765	7,829	1,159,765	1,173,720	12/31/2023
885220KW2	1,840,344	1,731,006	109,338	1,731,006	1,616,956	12/31/2023
92979DAC9	2,388,453	2,324,573	63,880	2,324,573	2,467,969	12/31/2023
94984DAC8	277,596	275,841	1,755	275,841	284,511	12/31/2023
Total			<u>\$ 13,772,890</u>			

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

The following table shows the amount of assets pledged to others as collateral or otherwise restricted for the years ended December 31 (in millions):

Restricted Asset Category	2024	2023	(Decrease)/ Increase	Gross Restricted to Total Assets	Restricted to Total Admitted Assets
Letter stock or securities restricted					
as to sale	\$ 125.2	\$ 157.4	\$ (32.2)	0.2%	0.2%
FHLB capital stock	41.5	41.5	-	0.1%	0.1%
On deposit with states	7.4	6.6	0.8	0.0%	0.0%
Pledged as collateral to FHLB (including assets backing funding agreements)	1,531.1	1,279.2	251.9	2.9%	2.9%
Pledged as collateral not captured in other categories	114.2	196.4	(82.2)	0.2%	0.2%
Total restricted assets	<u>\$ 1,819.4</u>	<u>\$ 1,681.1</u>	<u>\$ 138.3</u>	<u>3.4%</u>	<u>3.4%</u>

Net investment income consisted of the following for the years ended December 31 (in millions):

	2024	2023	2022
Investment income:			
Bonds	\$ 2,005.2	\$ 1,803.2	\$ 1,436.1
Equity securities	28.3	23.7	9.3
Mortgage loans	284.1	200.3	116.5
Policy loans	3.6	3.8	4.1
Cash and short-term investments	176.8	109.7	17.5
Other invested assets	120.2	131.9	96.1
Derivative instruments	420.2	(41.3)	(174.6)
Other	17.7	-	2.9
Gross investment income	<u>3,056.1</u>	<u>2,231.3</u>	<u>1,507.9</u>
Investment expenses	(114.2)	(72.2)	(35.6)
Ceded investment income	<u>(293.7)</u>	<u>(240.7)</u>	<u>(453.3)</u>
Net investment income	<u>\$ 2,648.2</u>	<u>\$ 1,918.4</u>	<u>\$ 1,019.0</u>

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

D. INVESTMENTS (CONTINUED)

The carrying value of partnership and limited liability company holdings by annual statement category as of December 31 were (in millions):

	<u>2024</u>	<u>2023</u>
Joint venture interests:		
Common stocks - subsidiaries and affiliates	\$ 1,205.6	\$ 0.1
Common stocks - unaffiliated	736.6	717.8
Real estate	132.3	93.3
Bonds/preferred stock	45.4	54.2
Mortgage loans	263.9	172.9
Other	117.7	110.2
Surplus notes	241.8	213.6
Residual tranches	46.3	44.7
Other	<u>16.0</u>	<u>1.0</u>
Gross other invested assets	2,805.6	1,407.8
Nonadmitted	<u>(10.3)</u>	<u>-</u>
Net admitted other invested assets	<u><u>\$ 2,795.3</u></u>	<u><u>\$ 1,407.8</u></u>

The Company held nine affiliated partnership and limited liability company in a loss position with accumulated losses of \$10.9 million as of December 31, 2024, and held one in a loss position with accumulated losses of less than \$0.1 million as of December 31, 2023.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

E. OTHER FINANCIAL INSTRUMENTS

The Company's derivative strategy employs a variety of derivative financial instruments including interest rate and currency swaps, options, financial futures, and forward contracts. 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.

MMALIC primarily utilizes a variety of financial instruments as part of its efforts to economically hedge and manage fluctuations in the fair value of its investment portfolio attributable to changes in general interest rate levels and to manage duration mismatch of assets and liabilities. Those instruments may include interest rate exchange agreements, equity index options purchased in either over-the-counter market or on the Chicago Board Options Exchange, payer swaptions, and commitments to extend credit. All instruments involve elements of credit and market risks in excess of the amounts recognized in the accompanying financial statements at a given point of time. The contract or notional amounts of those instruments reflect the extent of involvement in the various types of financial instruments.

Equity index options are contracts that give the purchaser the right, but not the obligation, to buy or sell securities at a specified price during a specified period. MMALIC's equity index options backing fixed-indexed and registered index-linked annuities are based on an existing market index (generally the S&P 500). The equity index options expire ratably between 2025 and 2031. Under the indexed annuity products, the crediting rate is linked to changes in the equity indices or Exchanged Traded Funds (ETF) for specified periods and participation rates. The prices of the options purchased are calculated with reference to the underlying index or ETF, participation rates, caps, floors, durations and notional amounts of the underlying contracts. As a purchaser of options, MMALIC pays, at the beginning of the contract, a premium for transferring the risk of an unfavorable change in the price of the underlying financial instrument. As of January 1, 2022, options backing the fixed-indexed annuities for which the company is applying the OAC prescribed practice are now accounted for at amortized cost.

As of December 31, 2024, MMALIC has entered into seventeen interest rate swaps 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 notional amounts of the interest rate swaps generally decline over each swap's respective life (the swaps expire between 2025 and 2042).

The Company uses currency swaps for the purpose of managing currency exchange risks in its assets and liabilities.

The Company utilizes certain other agreements including forward contracts and financial futures. Currency forwards are contracts in which the Company agrees with other parties to exchange specified amounts of identified currencies at a specific future date. Typically, the exchange rate is agreed upon at the time of the contract. 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 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 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.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

E. OTHER FINANCIAL INSTRUMENTS (CONTINUED)

Net collateral pledged by the counterparties was \$1,565.4 million as of December 31, 2024 and \$789.0 million as of December 31, 2023. In the event of default, the full market value exposure at risk, net of offsets and collateral, was \$419.8 million as of December 31, 2024 and \$425.9 million as of December 31, 2023. The exposure net of collateral, defined as net collateral pledged and statement values excluding accrued interest, was \$398.2 million as of December 31, 2024 and \$428.6 million as of December 31, 2023.

The following tables summarize the carrying values and notional amounts of the Company's derivative financial instruments within the general account:

December 31, 2024				
	Assets		Liabilities	
	Carrying Value	Notional Amount	Carrying Value	Notional Amount
(in millions)				
Fixed-indexed options*	\$ 681.8	\$ 19,482.1	\$ 304.6	\$ 14,292.3
Interest rate swaps	160.1	2,480.0	90.5	3,320.0
Currency swaps	10.4	445.8	16.6	392.9
Forward contracts	23.4	767.7	1.9	178.4
Total	<u>\$ 875.7</u>	<u>\$ 23,175.6</u>	<u>\$ 413.6</u>	<u>\$ 18,183.6</u>

*Beginning January 1, 2022, fixed-indexed options are held at amortized cost under OAC 3901-1-67. Prior to the adoption of OAC 3901-1-67, fixed-indexed options were carried at fair value. The fair value amount related to fixed-indexed options was \$973.4 million as of December 31, 2024.

December 31, 2023				
	Assets		Liabilities	
	Carrying Value	Notional Amount	Carrying Value	Notional Amount
(in millions)				
Fixed-indexed options*	\$ 723.8	\$ 19,765.4	\$ 418.1	\$ 16,036.9
Interest rate swaps	26.6	4,774.8	66.3	2,451.0
Financial futures	21.0	1,343.1	-	-
Currency swaps	-	-	38.8	443.5
Forward contracts	-	3.2	5.0	183.9
Total	<u>\$ 771.4</u>	<u>\$ 25,886.5</u>	<u>\$ 528.2</u>	<u>\$ 19,115.3</u>

*Beginning January 1, 2022, fixed-indexed options are held at amortized cost under OAC 3901-1-67. Prior to the adoption of OAC 3901-1-67, fixed-indexed options were carried at fair value. The fair value amount related to fixed-indexed options was \$822.9 million as of December 31, 2023.

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	\$ 2,480.0	\$ 2,484.8
Open interest rate swaps in a fixed receive position	3,320.0	4,741.0
Total interest rate swaps	<u>\$ 5,800.0</u>	<u>\$ 7,225.8</u>

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

E. OTHER FINANCIAL INSTRUMENTS (CONTINUED)

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

	Years Ended December 31,			
	2024		2023	
	Net Realized Gains (Losses) on Closed Contracts	Change In Net Unrealized Gains (Losses) on Open Contracts	Net Realized Gains (Losses) on Closed Contracts	Change In Net Unrealized Gains (Losses) on Open Contracts
	(in millions)			
Registered index-linked options	\$ 125.7	\$ 281.3	\$ 22.9	\$ 203.7
Interest rate swaps	0.3	109.0	-	30.0
Currency swaps	0.6	32.6	(0.1)	(35.0)
Forward contracts	3.1	26.5	0.3	(2.6)
Financial futures	(21.9)	(21.0)	0.2	21.0
Total	<u>\$ 107.8</u>	<u>\$ 428.4</u>	<u>\$ 23.3</u>	<u>\$ 217.1</u>

Fixed-indexed options are carried at amortized cost with amortization and expirations recorded in Net investment income. The Company recorded gains on expirations of \$1,110.2 million and amortization of \$661.3 million in 2024. The Company recorded gains on expirations of \$521.1 million and amortization of \$537.7 million in 2023.

The Company became a member of the Federal Home Loan Bank ("FHLB") on August 14, 2009. The FHLB makes advances and provides other banking services to member institutions. The Company owned \$20.0 million of FHLB Class B membership stock at December 31, 2024 and 2023. The Company has no membership stock eligible for redemption. Through its association with the FHLB and by purchasing a set amount of FHLB stock, the Company can enter into deposit-type contracts with the FHLB known as funding agreements.

At December 31, 2024 and 2023, MMALIC had \$500.0 million (the maximum amount of borrowings, as permitted by the FHLB, during the reporting period was \$500.0 million) in outstanding advances from the FHLB (included in liability for deposit-type contracts), bearing interest at rates ranging from 1.35% to 1.97% (average rate of 1.72% at December 31, 2024). The Company paid interest of approximately \$8.6 million, \$8.6 million, and \$8.4 million on FHLB advances in 2024, 2023 and 2022, respectively. These advances must be repaid between 2025 and 2030 (\$200.0 million in 2025 and \$300.0 million in 2030). The Company has invested the proceeds from the advances in bonds for the purpose of earning a spread over the interest payments due to the FHLB. Per the funding agreement, the Company was required to purchase 215,252 shares (\$21.5 million) of FHLB activity and excess stock.

The Company posted collateral to the FHLB of assets with a fair value of approximately \$1,458.5 million and \$1,204.1 million at December 31, 2024 and 2023, respectively. The Company posted collateral to the FHLB of assets with a carrying value of approximately \$1,531.1 million and \$1,279.2 million at December 31, 2024 and 2023, respectively. The Company's FHLB borrowing capacity is based on the Company's estimate of collateral eligible to be pledged with the FHLB. The deposit contract liabilities are reported in liability for deposit-type contracts in the balance sheet, and related assets are accounted for in the Company's general account. FHLB capital stock is reported in Common stocks in the balance sheet.

MMALIC has a \$750.0 million five-year credit facility, \$750.0 million of undrawn commitment, with a syndicate of lenders that can be used for general corporate purposes. During December 2024, the facility was established with a scheduled maturity on December 27, 2029. 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 year ended December 31, 2024, MMALIC was in compliance with all covenants under the credit facility. For the year ended December 31, 2024, there were no draws on the credit facility. Credit facility fees were less than \$1.0 million for the year ended December 31, 2024.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

E. OTHER FINANCIAL INSTRUMENTS (CONTINUED)

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	\$ 22.8	\$ 97.9	\$ 196.3	\$ 59.8	\$ 73.2	\$ 651.6	\$ 1,101.6
Mortgage Loans	105.0	221.7	101.4	18.8	12.0	2.6	461.5
Real Estate	1.1	1.1	-	-	-	5.1	7.3
Partnerships and LLC	27.3	31.4	50.9	53.9	80.9	195.5	439.9
Preferred Stock	16.0	-	-	-	-	1.8	17.8
Total	\$ 172.2	\$ 352.1	\$ 348.6	\$ 132.5	\$ 166.1	\$ 856.6	\$ 2,028.1

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.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

F. REINSURANCE

The Company is contingently liable with respect to reinsurance ceded in that the liability for such reinsurance would become that of the Company upon failure of any reinsurer to meet its obligations under a particular reinsurance agreement. The Company currently reinsures its ordinary life insurance, LTC, other health products and a portion of fixed and fixed-indexed annuity products. The maximum amount the Company retains on any one life under MassMutual's corporate retention limits is \$15.0 million.

On February 17, 2022, MMALIC entered into a Funds Withheld Coinsurance agreement effective February 1, 2022, with Martello Re Limited, a Bermuda-domiciled Class E life and annuity reinsurer launched in 2022. MMALIC ceded statutory reserves of approximately \$14.2 billion on a closed block of fixed, fixed-indexed and payout annuity policies, in exchange for a \$320 million ceding commission paid by Martello Re that was recorded to surplus net of tax. The Company has ceded approximately \$7.5 billion and \$10.0 billion of statutory annuity reserves at December 31, 2024 and 2023, respectively. The Company's funds held under reinsurance treaties was approximately \$7.3 billion and \$10.0 billion at December 31, 2024 and 2023, respectively.

The impact of the Martello Re transaction on MMALIC's income statement as of December 31, 2022 was as follows (in millions):

	<u>2022</u>
Premiums and other revenues:	
Premiums and annuity considerations	\$ (14,113.4)
Net investment income	(451.8)
Commissions and expense allowances and reserve adjustments on reinsurance ceded	451.6
Charges and fees for deposit-type contracts and miscellaneous income	<u>(34.6)</u>
Total premiums and other revenues	<u>\$ (14,148.2)</u>
Benefits and expenses:	
Policyholders' benefits	\$ (470.7)
Surrender benefits	(1,604.8)
Change in policy and contract reserves	(12,416.6)
Other	<u>317.2</u>
Total benefits and expenses	<u>\$ (14,174.9)</u>

Effective January 1, 2007, MMALIC entered into a reinsurance agreement with Loyal American Life Insurance Company ("Loyal"), at the time an indirect wholly-owned insurance subsidiary domiciled in Ohio, whereby Loyal cedes 100% of certain fixed-indexed annuity business written to MMALIC. Annuity reserves assumed by MMALIC under this agreement were \$8.8 million and \$10.7 million at December 31, 2024 and 2023, respectively.

On August 31, 2012, in conjunction with and prior to the sale of certain affiliated insurance companies to Cigna, the Company entered into a reinsurance agreement with Cigna which ceded 100% of all accident and health policies, excluding LTC. Under this agreement, all activity on these policies after existing reinsurance is ceded to Loyal, a Cigna subsidiary and one of the sold companies.

Also, effective August 31, 2012, the Company entered into an agreement to retrocede 90% of the life and annuity business assumed from Loyal to Hannover Life Reassurance Company of America. This business was previously reinsured directly from Loyal to Hannover Life Reassurance of Ireland. This transaction did not have any significant impact on the operations and capital of MMALIC.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

F. REINSURANCE (CONTINUED)

The Company entered into a coinsurance agreement with Great American Life Assurance Company (“GALAC”), an affiliated life insurance company domiciled in Ohio, effective June 30, 2011. Under this agreement the Company assumes 100% of GALAC’s life and annuity business, with statutory reserves of approximately \$4.0 million and \$4.3 million at December 31, 2024 and 2023, respectively. GALAC was sold to an unaffiliated insurance company on July 3, 2012, re-domiciled in Iowa, and is currently named Accordia Life and Annuity Company.

The Company entered into a coinsurance agreement with United Teacher Associates Insurance Company (“UTAIC”), a life insurance company domiciled in Texas, effective October 31, 2015. Under this agreement the Company assumes 100% of UTAIC’s life, annuity, and LTC business issued in the state of Florida. Effective December 31, 2016, UTAIC merged into Continental General Insurance Company, a life insurance company domiciled in Texas. Assumed reserves under this agreement were approximately \$57.3 million and \$55.3 million at December 31, 2024 and 2023, respectively.

The Company entered into a quota share indemnity reinsurance agreement on fixed-indexed annuity policies with Hannover Life Reassurance Company of America effective December 31, 2018. The reinsurance treaty transfers risk of certain surrender activity in MMALIC’s fixed-indexed annuity business. This treaty reduced statutory capital and surplus volatility related to MMALIC’s fixed-indexed annuity policies from stock market fluctuations, which could impact the Company’s risk-based capital. Effective January 1, 2022 the Company recaptured the fixed-indexed annuity policies ceded to Hannover Life Reassurance Company of America in the agreement that became effective on December 31, 2018. The financial impact of the reinsurance recapture was a decrease to statutory capital of \$140.6 million.

The Company entered into a flow coinsurance agreement with Commonwealth, a subsidiary of Global Atlantic Financial Group, effective May 7, 2020. Under this agreement, the Company cedes certain newly issued traditional fixed and fixed-indexed annuities on a quota share coinsurance basis with such quota share percentages being up to 50%. The Company has ceded approximately \$2,071.7 million and \$1,601.8 million of deferred annuity reserves to Commonwealth under this agreement at December 31, 2024 and 2023, respectively.

The Company entered into a block coinsurance agreement with Commonwealth effective October 1, 2020. Under this agreement the Company ceded approximately \$5.7 billion of deferred annuity reserves and transferred investments with a statutory carrying value of approximately \$5.7 billion and market value of approximately \$6.1 billion to Commonwealth. The Company has ceded approximately \$2,734.3 million and \$3,581.1 million of deferred annuity reserves under this agreement at December 31, 2024 and 2023, respectively.

The Company has reinsured with various insurance companies approximately \$12,433.3 million and \$15,350.1 million of reserves at December 31, 2024 and 2023, respectively.

The effect of reinsurance on premiums and annuity considerations for the years ended December 31 is as follows (in millions):

	2024	2023	2022
Direct premiums and annuity considerations	\$ 9,093.1	\$ 8,775.8	\$ 7,379.8
Reinsurance assumed	5.5	6.6	6.7
Reinsurance ceded	(547.4)	(275.6)	(14,584.8)
Net premium and annuity considerations	<u>\$ 8,551.2</u>	<u>\$ 8,506.8</u>	<u>\$ (7,198.3)</u>

The effect of reinsurance on benefits paid to policyholders and withdrawals on deposit-type contract funds during the years ended December 31 is as follows (in millions):

	2024	2023	2022
Direct benefits paid to policyholders and withdrawals on deposit-type contracts	\$ 7,944.3	\$ 7,621.5	\$ 5,063.7
Reinsurance assumed	30.7	37.1	26.8
Reinsurance ceded	(4,234.6)	(4,354.9)	(2,862.0)
Net benefits paid to policyholders and withdrawals on deposit-type contracts	<u>\$ 3,740.4</u>	<u>\$ 3,303.7</u>	<u>\$ 2,228.5</u>

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

G. FEDERAL INCOME TAXES

On August 16th, 2022, the Inflation Reduction Act 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 components of the net deferred tax assets at December 31 are as follows (in millions):

	<u>2024</u>	<u>2023</u>	<u>Change</u>
DTAs resulting in book/tax differences in:			
Ordinary:			
Deferred acquisition costs	\$ 91.4	\$ 77.6	\$ 13.8
Reserves	249.2	168.1	81.1
Investment items	126.5	111.7	14.8
Deferred compensation	0.1	0.2	(0.1)
Accrued expenses	6.9	5.8	1.1
Other	5.8	5.5	0.3
Total ordinary DTAs	<u>479.9</u>	<u>368.9</u>	<u>111.0</u>
Capital:			
Investment items	178.7	78.4	100.3
Total capital DTAs	<u>178.7</u>	<u>78.4</u>	<u>100.3</u>
Total DTAs	658.6	447.3	211.3
Deferred tax assets nonadmitted	<u>-</u>	<u>(36.1)</u>	<u>36.1</u>
Admitted DTAs	658.6	411.2	247.4
DTLs resulting in book/tax differences in:			
Ordinary:			
Section 807(f) amortization	14.2	21.7	(7.5)
Investment items	85.0	55.8	29.2
Depreciation/other	0.3	0.3	-
Reserve transition adjustment	11.0	22.0	(11.0)
Total ordinary DTLs	<u>110.5</u>	<u>99.8</u>	<u>10.7</u>
Capital:			
Unrealized gains	155.7	38.6	117.1
Investment items	100.7	-	100.7
Total capital DTLs	<u>256.4</u>	<u>38.6</u>	<u>217.8</u>
Total DTLs	<u>366.9</u>	<u>138.4</u>	<u>228.5</u>
Total net deferred admitted tax assets	<u>\$ 291.7</u>	<u>\$ 272.8</u>	<u>\$ 18.9</u>
Change in deferred tax assets nonadmitted	<u>\$ 36.1</u>	<u>\$ (33.9)</u>	

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

G. FEDERAL INCOME TAXES (CONTINUED)

The results of the admissibility calculations at December 31 are as follows (in millions):

	2024			2023			Change		
	Ordinary	Capital	Total	Ordinary	Capital	Total	Ordinary	Capital	Total
a. Federal income taxes paid in prior years recoverable through loss carrybacks	\$ -	\$ 70.4	\$ 70.4	\$ -	\$ 42.3	\$ 42.3	\$ -	\$ 28.1	\$ 28.1
b. Adjusted gross deferred tax assets expected to be realized (excluding the amount of deferred tax assets from (a) above) after application of the threshold limitation. (The lesser of (b)1 and (b)2 below)									
1. Adjusted gross deferred tax assets expected to be realized following the balance sheet date	225.3	17.8	243.1	218.5	12.0	230.5	6.8	5.8	12.6
2. Adjusted gross deferred tax assets allowed per limitation threshold	225.3	17.8	243.1	218.5	12.0	230.5	6.8	5.8	12.6
c. Adjusted gross deferred tax assets (excluding the amount of deferred tax assets from (a) and (b) above) offset by gross deferred tax liabilities	XXX	XXX	424.0	XXX	XXX	416.7	XXX	XXX	7.3
d. Deferred tax assets admitted as the result of application of SSAP No. 101	254.6	90.5	345.1	114.3	24.1	138.4	140.3	66.4	206.7
	<u>\$ 479.9</u>	<u>\$ 178.7</u>	<u>\$ 658.6</u>	<u>\$ 332.8</u>	<u>\$ 78.4</u>	<u>\$ 411.2</u>	<u>\$ 147.1</u>	<u>\$ 100.3</u>	<u>\$ 247.4</u>

The other admissibility criteria for the Company are as follows (dollars in millions):

	2024	2023	2022
a. Ratio percentage used to determine recovery period and threshold limitation amount	852%	828%	871%
b. Amount of adjusted capital and surplus used to determine recovery period and threshold limitation in the table above	\$ 2,826.4	\$ 2,778.2	\$ 2,770.8

The impact of the Company's tax planning strategies, which do not include the use of reinsurance, on the adjusted gross DTAs and net admitted adjusted gross DTAs by tax character is as follows:

	2024		2023		Change	
	Ordinary	Capital	Ordinary	Capital	Ordinary	Capital
a. Adjusted gross DTAs						
(% of total adjusted gross DTAs)	0%	0%	0%	0%	0%	0%
b. Net admitted adjusted gross DTAs						
(% of total net admitted adjusted gross DTAs)	0%	0%	4%	0%	-4%	0%

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

G. FEDERAL INCOME TAXES (CONTINUED)

The provision for incurred income taxes on operating earnings and capital gains and the change in DTAs and DTLs for the years ended December 31 are as follows (in millions):

	2024	2023	2022
Current federal income tax expense on operations	\$ 85.7	\$ 241.8	\$ 13.6
Federal income tax expense (benefit) on net realized capital gains	51.5	(23.4)	(14.3)
Total federal income tax expense (benefit)	<u>\$ 137.2</u>	<u>\$ 218.4</u>	<u>\$ (0.7)</u>
Net DTA(L)	\$ 18.9	\$ 200.6	\$ 10.5
Less: Items not recorded in the change in net deferred tax asset:			
Tax-effect of unrealized gains (losses)	117.1	(16.3)	(31.2)
Tax-effect of correction of error	-	(3.6)	-
Tax-effect of changes in nonadmitted DTA	(36.1)	33.9	(12.4)
Change in net deferred tax asset	<u>\$ 99.9</u>	<u>\$ 214.6</u>	<u>\$ (33.1)</u>

The Company's income tax expense and change in DTA/DTL for the year ended December 31 differs from the amount obtained by applying the federal statutory rate of 21% to income from operations before federal income taxes for the following reasons (in millions):

	2024	2023	2022
Provision computed at federal statutory rate	\$ (50.1)	\$ (29.6)	\$ 40.3
Reinsurance items	-	11.7	54.9
OAC 3901-1-67 adoption	-	-	(46.2)
Investment items	5.4	(3.8)	(10.4)
Nonadmitted assets	(1.2)	2.3	(3.6)
Provision to return adjustments	(4.1)	-	(0.1)
Section 481 - change in accounting method	-	25.2	-
Vine Street transfer from MassMutual	98.3	-	-
Derivative transfer to unrealized	(7.8)	-	-
Other	(3.2)	(2.0)	(2.5)
Total statutory income tax expense	<u>\$ 37.3</u>	<u>\$ 3.8</u>	<u>\$ 32.4</u>
Federal and foreign income tax expense (benefit)	\$ 137.2	\$ 218.4	\$ (0.7)
Change in net deferred income taxes	(99.9)	(214.6)	33.1
Total statutory income tax expense	<u>\$ 37.3</u>	<u>\$ 3.8</u>	<u>\$ 32.4</u>

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

G. FEDERAL INCOME TAXES (CONTINUED)

As of December 31, 2024 and 2023, the Company does not have any operating loss carryforwards available to offset future net income subject to federal income taxes. As of December 31, 2024 and 2023, the Company does not have a capital loss carryforward.

The following are income taxes incurred in the current and prior years that will be available for recoupment in the event of future net losses (in millions):

<u>Year</u>	<u>Operations</u>	<u>Realized Gains</u>	<u>Total</u>
2024	\$ -	\$ 57.0	\$ 57.0
2023	-	-	-
2022	-	13.4	13.4

As of December 31, 2024, MMALIC's consolidated federal income tax returns for the 2021 through 2024 tax years remain subject to examination by the IRS. The Company does not have any uncertain tax positions.

The consolidated federal income tax returns include the following entities:

AAG Insurance Agency, LLC
Annuity Investors Life Insurance Company
MM Ascend Life Investor Services, LLC
MassMutual Ascend Life Insurance Company
Manhattan National Holding, LLC
Manhattan National Life Insurance Company

The Company has determined that it is more likely than not that gross DTAs will be recoverable through future taxable income and that a valuation allowance is not necessary.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

H. RELATED PARTY TRANSACTIONS

Certain administrative, management, accounting, actuarial, data processing, underwriting, claim, collection and investment services are provided under agreements between MMALIC and affiliates at charges not unfavorable to MMALIC or the insurance affiliates. The net amount received from affiliates was \$9.7 million in 2024, the net amount received from affiliates was \$8.4 million in 2023, and the net amount received from affiliates was \$13.1 million in 2022, included in general insurance expenses in the Statement of Operations.

The Company has an agreement with Barings, LLC, an affiliate, which provides investment advisory services to the Company. MMALIC expensed investment management charges related to Barings, LLC of \$47.8 million in 2024, \$34.8 million in 2023 and \$32.8 million in 2022, included in net investment income in the Statement of Operations.

For 2024, the Company contributed to the retirement plans of Glidepath. The plans are for benefit of eligible employees of Glidepath providing services to MMALIC and affiliates. Glidepath sponsored a funded qualified defined contribution 401(k) thrift savings plan and unfunded nonqualified deferred compensation thrift savings plan for its employees and retirees. The Company's total matching thrift savings contributions included in general insurance expenses were \$4.7 million for the year ended December 31, 2024 and \$4.5 million for the year ended December 31, 2023. As of the close of business on December 31, 2024, the Company transitioned to a MassMutual employee qualified defined contribution plan and unfunded nonqualified deferred compensation thrift savings plan.

MMALIC has an agreement with MassMutual Ascend Life Investor Services ("MMALIS," formerly known as Great American Advisors, Inc.), a wholly-owned subsidiary of MMALIC, whereby MMALIS is the principal underwriter and distributor of MMALIC's registered index-linked annuity contracts. MMALIC pays MMALIS for acting as underwriter under a distribution agreement. MMALIC paid \$69.9 million in 2024 to MMALIS, 99% of which was paid to other broker/dealers as commissions. The remaining 1% of MMALIC commissions were paid to registered representatives of MMALIS. MMALIC paid \$69.2 million in 2023 to MMALIS, 99% of which was paid to other broker/dealers as commissions. The remaining 1% of MMALIC commissions were paid to registered representatives of MMALIS. MMALIC paid \$71.1 million in 2022 to MMALIS, 99% of which was paid to other broker/dealers as commissions. The remaining 1% of MMALIC commissions were paid to registered representatives of MMALIS. MMALIS exited the retail brokerage business on August 3, 2010 after MMALIC announced a definitive agreement with Lincoln Investment Planning, Inc., an independent broker dealer.

The Company paid an extraordinary dividend to Glidepath in the amount of \$600.0 million on December 23, 2024. The cash portion of the dividend was \$100.0 million, and the rest was a stock dividend. The Company paid \$200.0 million in ordinary dividends to Glidepath in 2023 and none in 2022.

The Company received a capital contribution from MassMutual of \$1,333.2 million in December 2024. The contribution consisted of Vine Street LLC (Schedule BA investment that owns equity investments), which at transfer was valued at \$1,234.9 million, and reported within Other invested assets on the statutory-basis Balance Sheet. This transaction created a deferred tax liability of \$98.3 million which was offset with a cash capital contribution.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

I. ANNUITY RESERVES AND DEPOSIT-TYPE FUNDS

At December 31, 2024, MMALIC's annuity (individual and group) reserves and deposit-type funds that are subject to discretionary withdrawal (with adjustment), subject to discretionary withdrawal (without adjustment), and not subject to discretionary withdrawal are summarized as follows (in millions):

A. Individual Annuities:

	General Account	Separate Account with Guarantees	Separate Account Nonguaranteed	Total	% of Total
1. Subject to discretionary withdrawal:					
a. With market value adjustment	\$ 28,630.2	\$ -	\$ -	\$ 28,630.2	60.0%
b. At book value less current surrender charge of 5% or more	5,221.3	-	-	5,221.3	10.9%
c. At fair value	-	-	908.6	908.6	1.9%
d. Total with market value adjustment or at fair value (total of a through c)	33,851.5	-	908.6	34,760.1	72.8%
e. At book value without adjustment (minimal or no charge or adjustment)	10,670.1	-	-	10,670.1	22.4%
2. Not subject to discretionary withdrawal	2,268.9	-	-	2,268.9	4.8%
3. Total (gross: direct + assumed)	46,790.5	-	908.6	47,699.1	100.0%
4. Reinsurance ceded	11,583.2	-	-	11,583.2	
5. Total (net) (3) - (4)	35,207.3	-	908.6	36,115.9	
6. Amount included in A(1)b above that will move to A(1)e in the year after the statement date	\$ 1,051.6	\$ -	\$ -	\$ 1,051.6	

B. Group Annuities:

	General Account	Separate Account with Guarantees	Separate Account Nonguaranteed	Total	% of Total
1. Subject to discretionary withdrawal:					
a. With market value adjustment	\$ -	\$ -	\$ -	\$ -	0.0%
b. At book value less current surrender charge of 5% or more	113.1	-	-	113.1	7.0%
c. At fair value	-	-	-	-	0.0%
d. Total with market value adjustment or at fair value (total of a through c)	113.1	-	-	113.1	7.0%
e. At book value without adjustment (minimal or no charge or adjustment)	645.3	-	-	645.3	40.1%
2. Not subject to discretionary withdrawal	851.1	-	-	851.1	52.9%
3. Total (gross: direct + assumed)	1,609.5	-	-	1,609.5	100.0%
4. Reinsurance ceded	455.2	-	-	455.2	
5. Total (net) (3) - (4)	1,154.3	-	-	1,154.3	
6. Amount included in A(1)b above that will move to A(1)e in the year after the statement date	\$ 2.4	\$ -	\$ -	\$ 2.4	

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

I. ANNUITY RESERVES AND DEPOSIT-TYPE FUNDS (CONTINUED)

C. Deposit-Type Funds
(no life contingencies):

	General Account	Separate Account with Guarantees	Separate Account Nonguaranteed	Total	% of Total
1. Subject to discretionary withdrawal:					
a. With market value adjustment	\$ -	\$ -	\$ -	\$ -	0.0%
b. At book value less current surrender charge of 5% or more	-	-	-	-	0.0%
c. At fair value	-	-	-	-	0.0%
d. Total with market value adjustment or at fair value (total of a through c)	-	-	-	-	0.0%
e. At book value without adjustment (minimal or no charge or adjustment)	-	-	-	-	0.0%
2. Not subject to discretionary withdrawal	907.2	-	-	907.2	100.0%
3. Total (gross: direct + assumed)	907.2	-	-	907.2	<u>100.0%</u>
4. Reinsurance ceded	120.6	-	-	120.6	
5. Total (net) (3) - (4)	<u>786.6</u>	<u>-</u>	<u>-</u>	<u>786.6</u>	
6. Amount included in A(1)b above that will move to A(1)e in the year after the statement date	\$ -	\$ -	\$ -	\$ -	

D. Reconciliation to total annuity reserves and deposit-type funds:

Net annuity reserves	\$ 36,360.9
Net supplementary contracts	0.7
Deposit-type funds	786.6
Separate account nonguaranteed liabilities	<u>908.6</u>
Total	<u>\$ 38,056.8</u>

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

I. ANNUITY RESERVES AND DEPOSIT-TYPE FUNDS (CONTINUED)

At December 31, 2023, MMALIC's annuity (individual and group) reserves and deposit-type funds that are subject to discretionary withdrawal (with adjustment), subject to discretionary withdrawal (without adjustment), and not subject to discretionary withdrawal are summarized as follows (in millions):

A. Individual Annuities:

	General Account	Separate Account with Guarantees	Separate Account Nonguaranteed	Total	% of Total
1. Subject to discretionary withdrawal:					
a. With market value adjustment	\$ 22,517.3	\$ -	\$ -	\$ 22,517.3	51.6%
b. At book value less current surrender charge of 5% or more	5,279.5	-	-	5,279.5	12.1%
c. At fair value	-	-	387.5	387.5	0.9%
d. Total with market value adjustment or at fair value (total of a through c)	27,796.8	-	387.5	28,184.3	64.6%
e. At book value without adjustment (minimal or no charge or adjustment)	13,422.5	-	-	13,422.5	30.7%
2. Not subject to discretionary withdrawal	2,063.5	-	-	2,063.5	4.7%
3. Total (gross: direct + assumed)	43,282.8	-	387.5	43,670.3	100.0%
4. Reinsurance ceded	14,472.5	-	-	14,472.5	
5. Total (net) (3) - (4)	28,810.3	-	387.5	29,197.8	
6. Amount included in A(1)b above that will move to A(1)e in the year after the statement date	\$ 970.2	\$ -	\$ -	\$ 970.2	

B. Group Annuities:

	General Account	Separate Account with Guarantees	Separate Account Nonguaranteed	Total	% of Total
1. Subject to discretionary withdrawal:					
a. With market value adjustment	\$ -	\$ -	\$ -	\$ -	0.0%
b. At book value less current surrender charge of 5% or more	116.0	-	-	116.0	6.8%
c. At fair value	-	-	-	-	0.0%
d. Total with market value adjustment or at fair value (total of a through c)	116.0	-	-	116.0	6.8%
e. At book value without adjustment (minimal or no charge or adjustment)	686.3	-	-	686.3	40.4%
2. Not subject to discretionary withdrawal	898.1	-	-	898.1	52.8%
3. Total (gross: direct + assumed)	1,700.4	-	-	1,700.4	100.0%
4. Reinsurance ceded	481.2	-	-	481.2	
5. Total (net) (3) - (4)	1,219.2	-	-	1,219.2	
6. Amount included in A(1)b above that will move to A(1)e in the year after the statement date	\$ 2.5	\$ -	\$ -	\$ 2.5	

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

I. ANNUITY RESERVES AND DEPOSIT-TYPE FUNDS (CONTINUED)

C. Deposit-Type Funds
(no life contingencies):

	General Account	Separate Account with Guarantees	Separate Account Nonguaranteed	Total	% of Total
1. Subject to discretionary withdrawal:					
a. With market value adjustment	\$ -	\$ -	\$ -	\$ -	0.0%
b. At book value less current surrender charge of 5% or more	-	-	-	-	0.0%
c. At fair value	-	-	-	-	0.0%
d. Total with market value adjustment or at fair value (total of a through c)	-	-	-	-	0.0%
e. At book value without adjustment (minimal or no charge or adjustment)	-	-	-	-	0.0%
2. Not subject to discretionary withdrawal	903.6	-	-	903.6	100.0%
3. Total (gross: direct + assumed)	903.6	-	-	903.6	<u>100.0%</u>
4. Reinsurance ceded	115.6	-	-	115.6	
5. Total (net) (3) - (4)	<u>788.0</u>	<u>-</u>	<u>-</u>	<u>788.0</u>	
6. Amount included in A(1)b above that will move to A(1)e in the year after the statement date	\$ -	\$ -	\$ -	\$ -	

D. Reconciliation to total annuity reserves and deposit-type funds:

Net annuity reserves	\$ 30,028.6
Net supplementary contracts	0.9
Deposit-type funds	788.0
Separate account nonguaranteed liabilities	<u>387.5</u>
Total	<u>\$ 31,205.0</u>

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

J. LIFE RESERVES

At December 31, 2024, MMALIC's account value, cash value and reserves for the breakouts of life insurance by withdrawal characteristics for general account products are summarized as follows (in millions):

		December 31, 2024		
		General Account		
	Account Value	Cash Value	Reserve	
A. Subject to discretionary withdrawal, surrender values, or policy loans:				
Universal Life	\$ 101.6	\$ 101.0	\$ 101.0	
Other Permanent Cash Value Life Insurance	-	46.6	46.6	
B. Not subject to discretionary withdrawal or no cash values				
Term Policies without Cash Value	XXX	XXX	176.7	
Accidental Death Benefits	XXX	XXX	0.1	
Disability - Active Lives	XXX	XXX	0.1	
Disability - Disabled Lives	XXX	XXX	4.0	
Miscellaneous Reserves	XXX	XXX	5.1	
C. Total (gross: direct + assumed)	101.6	147.6	333.6	
D. Reinsurance ceded	61.3	89.9	206.8	
E. Total (net) (C) - (D)	<u>\$ 40.3</u>	<u>\$ 57.7</u>	<u>\$ 126.8</u>	
F.				
Reconciliation to total life reserves:			Amount	
Life insurance, total (net)			\$ 121.9	
Accidental death benefits, total (net)			-	
Disability - active lives, total (net)			-	
Disability - disabled lives, total (net)			1.4	
Miscellaneous reserves, total (net)			3.5	
Total			<u>\$ 126.8</u>	

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

J. LIFE RESERVES (CONTINUED)

At December 31, 2023, MMALIC's account value, cash value and reserves for the breakouts of life insurance by withdrawal characteristics for general account products are summarized as follows (in millions):

		December 31, 2023		
		General Account		
	Account Value	Cash Value	Reserve	
A. Subject to discretionary withdrawal, surrender values, or policy loans:				
Universal Life	\$ 105.4	\$ 104.6	\$ 104.6	
Other Permanent Cash Value Life Insurance	-	48.7	48.7	
B. Not subject to discretionary withdrawal or no cash values				
Term Policies without Cash Value	XXX	XXX	184.2	
Accidental Death Benefits	XXX	XXX	0.1	
Disability - Active Lives	XXX	XXX	0.1	
Disability - Disabled Lives	XXX	XXX	3.4	
Miscellaneous Reserves	XXX	XXX	5.5	
C. Total (gross: direct + assumed)	105.4	153.3	346.6	
D. Reinsurance ceded	64.2	93.9	216.3	
E. Total (net) (C) - (D)	<u>\$ 41.2</u>	<u>\$ 59.4</u>	<u>\$ 130.3</u>	
F.				
Reconciliation to total life reserves:			Amount	
Life insurance, total (net)			\$ 125.2	
Accidental death benefits, total (net)			-	
Disability - active lives, total (net)			-	
Disability - disabled lives, total (net)			1.3	
Miscellaneous reserves, total (net)			3.8	
Total			<u>\$ 130.3</u>	

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

K. CAPITAL AND SURPLUS

The portion of the Company's unassigned funds represented or reduced by each item below is as follows at December 31 (in millions):

	<u>2024</u>	<u>2023</u>	<u>2022</u>
Unrealized gains and losses (excluding subsidiaries)	\$ 741.2	\$ 339.7	\$ 213.4
Nonadmitted asset values	\$ (129.0)	\$ (54.7)	\$ (31.9)
Asset valuation reserve	\$ (636.3)	\$ (528.4)	\$ (577.1)

Life/health insurance companies are subject to certain Risk-Based Capital ("RBC") requirements as specified by the NAIC. Under those requirements, the amount of capital and surplus maintained by a life/health insurance company is to be determined based on the various risk factors related to it. At December 31, 2024 and 2023, MMALIC exceeds the RBC requirements.

The maximum amount of dividends which can be paid to stockholders by life insurance companies domiciled in the State of Ohio without prior approval of the Insurance Commissioner is the greater of 10% of surplus as regards policyholders or net income as of the preceding December 31, but only to the extent of earned surplus as of the preceding December 31. The maximum amount of dividends payable in 2025 without prior approval is \$422.5 million based on 10% of surplus as regards to policyholders as of the preceding December 31. At December 31, 2024, surplus as regards policyholders was \$4,224.6 million, earned surplus was \$1,822.4 million, and 2024 net loss was \$253.9 million.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTES TO STATUTORY-BASIS FINANCIAL STATEMENTS (CONTINUED)

L. SEPARATE ACCOUNT

The Company utilizes a non-unitized separate account to record and account for assets and liabilities for individual registered index-linked annuities. MMALIC maintains the separate account pursuant to the laws of Ohio for the purpose of supporting the obligation to adjust the indexed strategy values based on the daily value calculation or rise and fall of the index. The assets of the separate account are held in MMALIC's name on behalf of the separate account and legally belong to MMALIC. The assets in the separate account are not chargeable with liabilities arising out of any other business the Company conducts. MMALIC may invest these assets in hedging instruments, including derivative contracts as well as other assets permitted under state law (ORC 3907.15). To support the Company's obligations to adjust the index strategy values, the Company may move funds between the separate account and the general account. MMALIC is not obligated to invest the assets of the separate account according to any particular plan except as the Company may be required to by state insurance laws (MMALIC does have a derivative use plan).

In accordance with the products and transactions recorded within the separate account, all assets are considered legally insulated from the general account and are not chargeable with liabilities incurred in any other business operation of the Company. As of December 31, 2024 and 2023, the Company's separate account statement included legally insulated registered index-linked annuity assets of \$984.2 million and \$443.3 million, respectively.

With regard to the products and transactions recorded within the separate account, registered index-linked annuity products have guarantees backed by the general account. The separate account does not remit any risk charges to the general account for guaranteed benefits for the registered index-linked annuity products. The general account has not paid any guarantees for registered index-linked annuity products through December 31, 2024.

Net transfers to or (from) the Company's separate account for the years ended December 31, 2024, 2023, and 2022 were \$521.1 million, \$356.8 million and (\$22.0) million, respectively.

All separate account reserves are non-guaranteed and subject to discretionary withdrawal at fair value. Investments in the separate account at December 31, 2024 had a cost of \$472.0 million and fair value of \$908.6 million. The notional amount of these investments at December 31, 2024 was \$7,695.6 million. Investments in the separate account at December 31, 2023 had a cost of \$232.6 million and fair value of \$387.5 million. The notional amount of these investments at December 31, 2023 was \$5,650.5 million.

SUPPLEMENTARY INFORMATION

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTE TO SUPPLEMENTAL SCHEDULE OF SELECTED STATUTORY-BASIS FINANCIAL DATA
AND SUPPLEMENTAL INVESTMENT DISCLOSURES
DECEMBER 31, 2024

Basis of Presentation

The accompanying supplemental schedules and interrogatories present selected statutory-basis financial data as of December 31, 2024 and for the year then ended for purposes of complying with the National Association of Insurance Commissioners' ("NAIC") *Annual Statement Instructions* and the NAIC's *Accounting Practices and Procedures Manual*, and agrees to or is included in the amounts reported in the Company's 2024 Statutory Annual Statement as filed with the Ohio Department of Insurance. Captions not presented were not applicable to the Company.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL SCHEDULE OF SELECTED STATUTORY-BASIS FINANCIAL DATA
DECEMBER 31, 2024
(Dollars in millions)

Investment income earned:	
U.S. Government bonds	\$ 8.0
Bonds exempt from U.S. tax	-
Other bonds (unaffiliated)	1,973.6
Bonds of affiliates	23.6
Preferred stocks (unaffiliated)	17.4
Common stocks (unaffiliated)	10.9
Common stocks (affiliated)	-
Mortgage loans	284.1
Real estate	-
Policy loans	3.6
Cash, cash equivalents and short-term investments	176.8
Derivative instruments	420.2
Other invested assets	137.9
	<u>\$ 3,056.1</u>
Gross investment income	<u>\$ 3,056.1</u>
Real estate owned (book value less encumbrances)	<u>\$ -</u>
Mortgage loans - book value:	
Residential mortgages	\$ 3,333.3
Commercial mortgages	1,789.8
	<u>\$ 5,123.1</u>
Total mortgage loans	<u>\$ 5,123.1</u>
Mortgage loans by standing - book value	
Good standing	<u>\$ 5,123.1</u>
Interest overdue more than 90 days, not in foreclosure	<u>\$ -</u>
Other long term assets - statement value	<u>\$ 2,795.3</u>
Bonds and stocks of parents, subsidiaries and affiliates - book value	
Bonds	<u>\$ 969.7</u>
Common stocks	<u>\$ 482.1</u>
Bonds (including short-term investments and cash equivalents) by expected maturity - statement value	
Due within one year or less	\$ 6,643.3
Over 1 year through 5 years	16,422.2
Over 5 years through 10 years	10,150.1
Over 10 years through 20 years	4,864.5
Over 20 years	2,559.3
	<u>\$ 40,639.4</u>
Total by maturity	<u>\$ 40,639.4</u>
Bonds (including short-term investments and cash equivalents) by NAIC designation - statement value	
NAIC 1	\$ 22,980.5
NAIC 2	15,668.7
NAIC 3	1,112.8
NAIC 4	526.2
NAIC 5	239.8
NAIC 6	111.4
Total by NAIC designation	<u>\$ 40,639.4</u>
Total bonds publicly traded	<u>\$ 14,593.4</u>
Total bonds privately placed	<u>\$ 26,046.0</u>
Preferred stocks - statement value	<u>\$ 297.9</u>
Common stocks - market value	<u>\$ 778.8</u>
Short-term investments - book value	<u>\$ 376.0</u>
Derivative instruments owned - statement value	<u>\$ 462.1</u>
Cash on deposit	<u>\$ 61.7</u>
Cash equivalents	<u>\$ 2,973.5</u>

(Continued)

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL SCHEDULE OF SELECTED STATUTORY-BASIS FINANCIAL DATA
(CONTINUED)
DECEMBER 31, 2024
(Dollars in millions)

Life insurance in force:	
Ordinary	<u>\$ 3,560.0</u>
Group life	<u>\$ 11.6</u>
Amount of accidental death insurance in-force under ordinary policies:	<u>\$ 58.7</u>
Life insurance with disability provisions in-force:	
Ordinary	<u>\$ 58.5</u>
Group life	<u>\$ -</u>
Annuities:	
Ordinary:	
Immediate - amount of income payable	<u>\$ 185.4</u>
Deferred - fully paid account balance	<u>\$ 29,423.3</u>
Deferred - not fully paid - account balance	<u>\$ 15,626.7</u>
Group	
Amount of income payable	<u>\$ 74.5</u>
Fully paid account balance	<u>\$ 83.0</u>
Not fully paid - account balance	<u>\$ 675.0</u>
Accident and health insurance - premiums in force:	
Ordinary	<u>\$ 2.8</u>
Claim payments 2024	
Other accident and health:	
2024	<u>\$ 4.6</u>

See accompanying independent auditors' report.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL INVESTMENT DISCLOSURES
DECEMBER 31, 2024
(Dollars in millions)

- MMALIC's total admitted assets as reported on page two of its Annual Statement excluding separate account assets are \$52,396.0 million.
- Following are the 10 largest exposures to a single issuer/borrower/investment, by investment category, excluding: (i) U.S. Government, U.S. Government agency securities and those U.S. Government money market funds listed in the appendix to the SVO Practices and Procedures Manual as exempt, (ii) property occupied by MMALIC, and (iii) policy loans.

Issuer	Amount	Percent of Total Admitted Assets
NP Inc	\$ 645.5	1.2%
Annuity Investors Life Insurance Co	464.5	0.9%
Luxury Mortgage Corp	456.7	0.9%
FHA/VA Residential Whole Loans	376.8	0.7%
McKesson Corp	362.2	0.7%
Churchill Finance LLC	265.8	0.5%
NQM Funding LLC	222.4	0.4%
Herlan Peak Funding Trust	168.0	0.3%
Deephaven Mortgage LLC	160.4	0.3%
Perimeter Master Note Business Trust	152.6	0.3%

- MMALIC's total admitted assets held in bonds (including short-term investments and cash equivalents) and preferred stocks by NAIC rating, are as follows:

Bonds			Preferred Stocks		
NAIC Rating	Amount	Percentage of Total Admitted Assets	NAIC Rating	Amount	Percentage of Total Admitted Assets
NAIC-1	\$ 22,980.5	43.9%	P/RP-1	\$ 15.0	0.0%
NAIC-2	15,668.7	29.9%	P/RP-2	251.5	0.5%
NAIC-3	1,112.8	2.1%	P/RP-3	7.3	0.0%
NAIC-4	526.2	1.0%	P/RP-4	-	0.0%
NAIC-5	239.8	0.5%	P/RP-5	8.3	0.0%
NAIC-6	111.4	0.2%	P/RP-6	15.8	0.0%
Total	<u>\$ 40,639.4</u>	<u>77.6%</u>	Total	<u>\$ 297.9</u>	<u>0.5%</u>

- Assets held in foreign investments:

	Amount	Percent of Total Admitted Assets
Total admitted assets held in foreign investments	\$ 9,213.3	17.6%
Foreign-currency-denominated investments	-	0.0%
Insurance liabilities denominated in that same foreign currency	-	0.0%

(Continued)

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL INVESTMENT DISCLOSURES (CONTINUED)
DECEMBER 31, 2024
(Dollars in millions)

5. Aggregate foreign investment exposure categorized by NAIC sovereign rating:

	Amount	Percent of Total Admitted Assets
Countries rated NAIC-1	\$ 8,797.7	16.8%
Countries rated NAIC-2	103.8	0.2%
Countries rated NAIC-3 or below	311.8	0.6%

6. Two largest foreign investment exposures to a single country, categorized by the country's NAIC sovereign rating:

	Amount	Percent of Total Admitted Assets
Countries rated NAIC-1:		
Cayman Islands	\$ 3,975.8	7.6%
United Kingdom	1,171.3	2.2%
Countries rated NAIC-2		
Italy	\$ 50.7	0.1%
Mexico	29.8	0.1%
Countries rated NAIC-3 or below		
Northern Mariana Islands	\$ 99.0	0.2%
Greenland	23.5	0.0%

7. The Company has \$9,213.3 million of unhedged foreign currency exposure.

8. Aggregate unhedged foreign currency exposure categorized by NAIC sovereign rating:

	Amount	Percent of Total Admitted Assets
Countries rated NAIC-1	\$ 8,797.7	16.8%
Countries rated NAIC-2	103.8	0.2%
Countries rated NAIC-3 or below	311.8	0.6%

9. Largest unhedged foreign currency exposures by country, categorized by the country's NAIC sovereign designation:

	Amount	Percent of Total Admitted Assets
Countries rated NAIC-1:		
Cayman Islands	\$ 3,975.8	7.6%
United Kingdom	1,171.3	2.2%
Countries rated NAIC-2		
Italy	\$ 50.7	0.1%
Mexico	29.8	0.1%
Countries rated NAIC-3 or below		
Northern Mariana Islands	\$ 99.0	0.2%
Greenland	23.5	0.0%

(Continued)

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL INVESTMENT DISCLOSURES (CONTINUED)
DECEMBER 31, 2024
(Dollars in millions)

10. Ten largest non-sovereign (i.e. non-governmental) foreign issues:

Issuer	NAIC Rating	Amount	Percent of Total Admitted Assets
NP Inc	Mortgage Loan	\$ 244.8	0.5%
CIP VIII Holdings Spv LP Inc	1	139.5	0.3%
DNB Bank ASA	1	90.9	0.2%
Elis SA	2	88.0	0.2%
BP Capital Markets PLC	1	83.3	0.2%
Seaspan Holdco III Ltd	2	80.0	0.2%
Modec Finance B.V.	2	75.0	0.1%
Canadian Pacific Railway Co	2	65.9	0.1%
Heineken NV	2	62.4	0.1%
Golub Capital Partners CLO 17 Ltd	2	60.4	0.1%

11. Assets held in Canadian investments are less than 2.5% of the Company's total admitted assets.

12. Assets held with contractual sales restrictions are less than 2.5% of the Company's total admitted assets.

13. Following are MMALIC's total admitted assets held in the largest 10 equity interests:

Name of Issuer	Amount	Percentage of Total Admitted Assets
Annuity Investors Life Insurance Co	\$ 464.5	0.9%
CGL Holdings LLC	77.3	0.1%
NexBank Capital Inc	47.3	0.1%
Federal Home Loan Banks	41.5	0.1%
TPG Operating Group II LP	33.3	0.1%
Athene Holding Ltd	27.0	0.1%
Morgan Stanley	26.7	0.1%
AT&T Mobility II LLC	23.3	0.0%
Apollo Global Management Inc	20.0	0.0%
Reinsurance Group of America Inc	17.5	0.0%

14. Following are MMALIC's largest three investments held in nonaffiliated, privately placed equities:

Name of Issuer	Amount	Percentage of Total Admitted Assets
CGL Holdings LLC	\$ 77.3	0.1%
NexBank Capital Inc	47.3	0.1%
Federal Home Loan Banks	41.5	0.1%

15. Assets held in general partnership interests, excluding limited partnership interests and LLC investments, are less than 2.5% of the Company's total admitted assets.

16. Following are MMALIC's total admitted assets held in the largest 10 mortgage loans:

Type (Residential, Commercial, Agricultural)	Amount	Percentage of Total Admitted Assets
NP Inc (Residential)	\$ 645.5	1.2%
Luxury Mortgage Corp (Residential)	450.7	0.9%
Churchill Finance LLC (Residential)	383.1	0.7%
FHA/VA Residential Whole Loans (Residential)	376.8	0.7%
NQM Funding LLC (Residential)	222.4	0.4%
Herlan Peak Funding Trust (Residential)	168.0	0.3%
Deephaven Mortgage LLC (Residential)	160.4	0.3%
Quontic Bank (Residential)	125.9	0.2%
Colchis Real Properties Income Fund II LP (Residential)	100.0	0.2%
Deephaven Residential Mortgage Trust (Residential)	87.8	0.2%

(Continued)

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL INVESTMENT DISCLOSURES (CONTINUED)
DECEMBER 31, 2024
(Dollars in millions)

17. Following are MMALIC's loan-to-value ratios as determined from the most current appraisal:

Loan-to-Value	Residential		Commercial		Agricultural	
above 95%	\$ 3,194.9	6.1%	\$ 144.2	0.3%	\$ -	0.0%
91% to 95%	138.4	0.3%	21.6	0.0%	-	0.0%
81% to 90%	-	0.0%	76.4	0.1%	-	0.0%
71% to 80%	-	0.0%	341.2	0.7%	-	0.0%
below 70%	-	0.0%	1,206.4	2.3%	-	0.0%

18. The assets held in real estate are less than 2.5% of the Company's total admitted assets.

19. Investments in mezzanine real estate loans are less than 2.5% of the Company's total admitted assets.

20. The Company has no admitted assets subject to securities lending agreements, repurchase agreements, reverse repurchase agreements, dollar repurchase agreements, or dollar reverse repurchase agreements.

21. The Company owns \$377.2 million in hedging options.

22. The Company's potential exposure for swaps and forwards is \$82.7 million.

23. The Company does not have any potential exposure for financial futures.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL INVESTMENT DISCLOSURES (CONTINUED)
DECEMBER 31, 2024
(Dollars in millions)

Investment Categories	Gross Investment Holdings*		Admitted Assets as Reported in the Annual Statement			
	Amount	Percentage of Column 1 Line 13	Amount	Securities Lending Reinvested Collateral Amount	Total (Col 3 +4) Amount	Percentage of Column 5 Line 13
1. Long-Term Bonds:						
1.01 U.S. Governments	\$ 168.6	0.3%	\$ 168.6	\$ -	\$ 168.6	0.3%
1.02 All Other Governments	14.8	0.0%	14.8	-	14.8	0.0%
1.03 U.S. States, Territories and Possessions etc., Guaranteed	157.5	0.3%	157.5	-	157.5	0.3%
1.04 U.S. Political Subdivisions of States, Territories and Possessions, Guaranteed	221.8	0.4%	221.8	-	221.8	0.4%
1.05 U.S. Special Revenue and Special Assessment Obligations, etc., Non-Guaranteed	1,759.2	3.5%	1,759.2	-	1,759.2	3.5%
1.06 Industrial and Miscellaneous	29,378.4	57.9%	29,378.4	-	29,378.4	57.9%
1.07 Hybrid Securities	1,186.6	2.3%	1,186.6	-	1,186.6	2.3%
1.08 Parent, Subsidiaries and Affiliates	969.6	1.9%	969.6	-	969.6	1.9%
1.09 SVO Identified Funds	-	0.0%	-	-	-	0.0%
1.10 Unaffiliated Bank Loans	3,651.7	7.2%	3,651.7	-	3,651.7	7.2%
1.11 Total Long-Term Bonds	37,508.2	73.8%	37,508.2	-	37,508.2	73.8%
2. Preferred Stocks:						
2.01 Industrial and Misc. (Unaffiliated)	297.9	0.6%	297.9	-	297.9	0.6%
2.02 Parent, Subsidiaries and Affiliates	-	0.0%	-	-	-	0.0%
2.03 Total Preferred Stock	297.9	0.6%	297.9	-	297.9	0.6%
3. Common Stocks:						
3.01 Industrial and Miscellaneous Publicly Traded (Unaffiliated)	139.0	0.3%	139.0	-	139.0	0.3%
3.02 Industrial and Miscellaneous Other (Unaffiliated)	157.1	0.3%	157.1	-	157.1	0.3%
3.03 Parent, Subsidiaries and Affiliates Publicly Traded	-	0.0%	-	-	-	0.0%
3.04 Parent, Subsidiaries and Affiliates Other	482.1	0.9%	482.1	-	482.1	0.9%
3.05 Mutual Funds	-	0.0%	-	-	-	0.0%
3.06 Unit Investment Trusts	-	0.0%	-	-	-	0.0%
3.07 Closed-End Funds	-	0.0%	-	-	-	0.0%
3.08 Exchange traded funds	0.6	0.0%	0.6	-	0.6	0.0%
3.09 Total Common Stocks	778.8	1.5%	778.8	-	778.8	1.5%
4. Mortgage Loans:						
4.01 Farm Mortgages	-	0.0%	-	-	-	0.0%
4.02 Residential Mortgages	3,333.3	6.6%	3,333.3	-	3,333.3	6.6%
4.03 Commercial Mortgages	1,711.6	3.4%	1,711.6	-	1,711.6	3.4%
4.04 Mezzanine Real Estate Loans	78.2	0.2%	78.2	-	78.2	0.2%
4.05 Total Mortgage Loans	5,123.1	10.2%	5,123.1	-	5,123.1	10.2%
5. Real estate:						
5.01 Properties Occupied by Company	-	0.0%	-	-	-	0.0%
5.02 Properties Held for Production of Income	-	0.0%	-	-	-	0.0%
5.03 Properties Held for Sale	-	0.0%	-	-	-	0.0%
5.04 Total Real Estate	-	0.0%	-	-	-	0.0%
6. Cash, Cash Equivalents, and Short-Term Investments:						
6.01 Cash	61.7	0.1%	61.7	-	61.7	0.1%
6.02 Cash Equivalents	2,973.5	5.8%	2,973.5	-	2,973.5	5.8%
6.03 Short-Term Investments	376.0	0.7%	376.0	-	376.0	0.7%
6.04 Total Cash, Cash Equivalents, and Short-Term Investments	3,411.2	6.6%	3,411.2	-	3,411.2	6.6%
7. Contract Loans	27.5	0.1%	27.5	-	27.5	0.1%
8. Derivatives	875.7	1.7%	875.7	-	875.7	1.7%
9. Other Invested Assets	2,805.6	5.5%	2,795.3	-	2,795.3	5.5%
10. Receivables for Securities	2.9	0.0%	2.9	-	2.9	0.0%
11. Securities Lending	-	0.0%	-	-	-	0.0%
12. Other Invested Assets	-	0.0%	-	-	-	0.0%
13. Total Invested Assets	50,830.9	100.0%	50,820.6	-	50,820.6	100.0%

* Gross investment holdings as valued in compliance with NAIC SAP.

See accompanying independent auditors' report.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL SCHEDULE OF LIFE AND HEALTH REINSURANCE DISCLOSURES
FOR THE YEAR ENDED DECEMBER 31, 2024

(Dollars in millions)

The following information regarding reinsurance contracts is presented to satisfy the disclosure requirements in SSAP No. 61, *Life, Deposit-Type and Accident and Health Reinsurance*, which apply to reinsurance contracts entered into, renewed or amended on or after January 1, 1996.

1. Has MassMutual Ascend Life Insurance Company reinsured any risk with any other entity under a reinsurance contract (or multiple contracts with the same reinsurer or its affiliates) that is subject to Appendix A-791, *Life and Health Reinsurance Agreements*, and includes a provision that limits the reinsurer's assumption of significant risks identified in Appendix A-791?

Examples of risk-limiting features include provisions such as a deductible, a loss ratio corridor, a loss cap, an aggregate limit or other provisions that result in similar effects.

Yes ☐ No ☒

If yes, indicate the number of reinsurance contracts to which such provisions apply: _____

If yes, indicate if deposit accounting was applied for all contracts subject to Appendix A-791 that limit significant risks.

Yes ☐ No ☐ N/A ☒

2. Has MassMutual Ascend Life Insurance Company reinsured any risk with any other entity under a reinsurance contract (or multiple contracts with the same reinsurer or its affiliates) that is not subject to Appendix A-791, for which reinsurance accounting was applied and includes a provision that limits the reinsurer's assumption of risk?

Examples of risk-limiting features include provisions such as a deductible, a loss ratio corridor, a loss cap, an aggregate limit or other provisions that result in similar effects.

Yes ☐ No ☒

If yes, indicate the number of reinsurance contracts to which such provisions apply: _____

If yes, indicate whether the reinsurance credit was reduced for the risk-limiting features.

Yes ☐ No ☐ N/A ☒

3. Does MassMutual Ascend Life Insurance Company have any reinsurance contracts (other than reinsurance contracts with a federal or state facility) that contain one or more of the following features which may result in delays in payment in form or in fact:

- (a) Provisions that permit the reporting of losses to be made less frequently than quarterly;
- (b) Provisions that permit settlements to be made less frequently than quarterly;
- (c) Provisions that permit payments due from the reinsurer to not be made in cash within ninety (90) days of the settlement date (unless there is no activity during the period); or
- (d) The existence of payment schedules, accumulating retentions from multiple years, or any features inherently designed to delay timing of the reimbursement to the ceding entity.

Yes ☐ No ☒

(Continued)

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL SCHEDULE OF LIFE AND HEALTH REINSURANCE DISCLOSURES
(CONTINUED)
FOR THE YEAR ENDED DECEMBER 31, 2024
(Dollars in millions)

4. Has MassMutual Ascend Life Insurance Company reflected reinsurance accounting credit for any contracts that are not subject to Appendix A-791 and not yearly renewable term reinsurance, which meet the risk transfer requirements of SSAP No. 61?

Type of contract:	Response:	Identify reinsurance contract(s):	Has the insured event(s) triggering contract coverage been recognized?
Assumption reinsurance – new for the reporting period	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		N/A
Non-proportional reinsurance, which does not result in significant surplus relief	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>

5. Has MassMutual Ascend Life Insurance Company ceded any risk, which is not subject to Appendix A-791 and not yearly renewable term reinsurance, under any reinsurance contract (or multiple contracts with the same reinsurer or its affiliates) during the period covered by the financial statements, and either:

- (a) Accounted for that contract as reinsurance under statutory accounting principles (SAP) and as a deposit under generally accepted accounting principles (GAAP); or

Yes ☐ No ☒ N/A ☐

- (b) Accounted for that contract as reinsurance under GAAP and as a deposit under SAP?

Yes ☐ No ☒ N/A ☐

If the answer to item (a) or item (b) is yes, include relevant information regarding GAAP to SAP differences from the accounting policy footnote to the audited statutory-basis financial statements to explain why the contract(s) is treated differently for GAAP and SAP below:

See accompanying independent auditors' report