MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
Administrative Office: P.O. Box 5423, Cincinnati OH 45201-5423
Street Address: 191 Rosa Parks Street, Cincinnati OH 45202
Policy Administration: 1-800-789-6771

INDEX FRONTIER® 5 ANNUITY
PROSPECTUS DATED MAY 1, 2023

The Index Frontier® 5 annuity is an Individual Index-linked Modified Single Premium Deferred Annuity (the "Contract") issued by MassMutual Ascend Life Insurance Company® ("MassMutual Ascend Life," "we" or "us"). It provides that we will pay annuity payout benefits to you in exchange for your purchase payments. The Contract offers you the opportunity to allocate funds to indexed strategies for one-year periods (a "Term") and a declared rate strategy (together with the indexed strategies, the "Crediting Strategies"). Indexed strategies provide returns based, in part, on the change in the value of a market index or the share price of an exchange-traded fund (an "Index"). The returns of an Index do not include reinvestment of any dividends.

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 the Contract Effective Date.

A glossary of defined terms used herein can be found in the Special Terms section starting on page 5 of this prospectus.

The Contract currently offers four Conserve Strategies, four Growth Strategies, and one Buffer Strategy.

Conserve/0% Floor Strategies	**Index**	**Maximum Loss/Floor of 0% Per Term**
S&P 500 0% Floor	S&P 500® Index	If you allocate money at the start of a Term to a Conserve Strategy, you cannot lose that money during the Term due to a negative change in the Index.
SPDR Gold Shares 0% Floor	SPDR® Gold Shares ETF	
iShares U.S. Real Estate 0% Floor	iShares U.S. Real Estate ETF	
iShares MSCI EAFE 0% Floor	iShares MSCI EAFE ETF	
Growth/-10% Floor Strategies	**Index**	**Maximum Loss/Floor of 10% Per Term**
S&P 500 -10% Floor	S&P 500® Index	If you allocate money at the start of a Term to a Growth Strategy, you can lose up to 10% of that money during the Term due to a negative change in the Index.
SPDR Gold Shares -10% Floor	SPDR® Gold Shares ETF	
iShares U.S. Real Estate -10% Floor	iShares U.S. Real Estate ETF	
iShares MSCI EAFE -10% Floor	iShares MSCI EAFE ETF	
10% Buffer Strategy	**Index**	**End of Term Buffer of 10% Per Term**
S&P 500 10% Buffer	S&P 500® Index	If you allocate money at the start of a Term to a Buffer Strategy, at the end of the Term you can lose up to 90% of that money due to a negative change in the Index. At the end of the Term, 10% of the money you allocated is protected from loss. You can lose more than 90% of that money if you withdraw it before the end of the Term.

At the end of a Term, we may stop offering any particular Indexed Strategy, but we will always offer at least one Indexed Strategy. Consequently, any Indexed Strategy listed above may not be available after the end of the initial Term. 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 listed above. In addition, if we reduce the available number of Index Strategies to just one Indexed Strategy, your ability to increase your Account Value could be significantly reduced.

In general, we will set a higher Maximum Gain for a Growth Strategy than the Maximum Gain for a Conserve Strategy that uses the same Index, and we will set a higher Maximum Gain for the Buffer Strategy than for the Growth Strategy that uses the same Index.

- The value of an indexed strategy will increase if there is a positive change in the applicable Index value during a Term. Any increase during a Term is subject to an upper limit called the Maximum Gain. At least 10 days before a Term starts, we will post the Maximum Gain that will apply to an Indexed Strategy for that Term on our website. We can change the Maximum Gain for each new Term of an indexed strategy.
- Before the end of a Term, any increase in the value of an indexed strategy is also subject to a vesting factor. The vesting factor limits the portion of the positive change in the Index that we take into account when we calculate the increase in the strategy value. The vesting factor varies depending on the day of the Term. It is 25% for any date within the first half of a Term, 50% for any date within the second half of a Term, and 100% at the end of a Term.

- The value of a Conserve/0% Floor Strategy will not decrease even if there is a negative change in the applicable Index value during a Term.
- The value of a Growth/-10% Floor Strategy will decrease if there is a negative change in the applicable Index value during a Term. Any decrease during a Term for a Growth Strategy is subject to a lower limit called the Maximum Loss. The Maximum Loss for each Term of a Growth Strategy is 10%. **Each Growth Strategy includes a risk of potential loss of up to 10% of principal and any prior earnings each Term.**
- The value of a 10% Buffer Strategy will decrease if there is a negative change in the applicable Index Value that is larger than the Buffer during a Term. The Buffer is the portion of a negative Index Change for a Term that is disregarded when calculating Buffer Strategy losses. The Buffer varies depending on the day of the Term. The Buffer at the end of a Term is 10%. Before the end of the Term, the Buffer is calculated daily as a prorated share of the annual 10% Buffer. **Each Buffer Strategy includes a risk of potential loss of principal and any prior earnings. At maximum, the Buffer protects 10% of principal and any prior earnings from loss each Term.**

Note: The S&P 500 Buffer strategy is not available for Contracts issued prior to May 2020.

The Contract also offers a declared rate strategy, which earns interest during a Term at a fixed rate we set before that Term begins. The fixed interest rate varies from Term to Term, but will never be less than 1%. Note: The declared rate strategy is not available for Contracts issued in Missouri.

The Contract is intended for long-term investment purposes and may not be appropriate for investors who plan to take withdrawals (including systematic withdrawals and required minimum distributions) during the first five contract years. An early withdrawal charge may apply if you take a withdrawal or Surrender the Contract during the first five contract years. That charge will reduce strategy values, including the value of a Conserve/0% Floor Strategy. The early withdrawal charge is 8% for withdrawals and Surrenders of the Contract in the first contract year, and falls each contract year during the five-year period. Withdrawals and surrenders may also be subject to income tax, and withdrawals and surrenders before age 59½ may also be subject to an additional 10% penalty tax.

Risk Factors for this Contract appear on pages 12-16 and pages A6-A10. Indexed annuity contracts are complex insurance and investment vehicles. You should speak with a financial advisor about the Index Frontier 5 and its features, benefits, risks, and fees, and whether the Contract is appropriate for you based upon your financial situation and objectives.

Please read this prospectus before investing and keep it for future reference. It contains important information about your annuity and MassMutual Ascend Life that you ought to know before investing. It describes all material rights and obligations under the Contract including material state variations.

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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.

- **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.**
- **The Contract is a security. It involves investment risk and may lose value. There is a risk of loss of principal under the Contract and that loss can become greater due to Early Withdrawal Charges.**

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 doesn't invest in any equity, debt or other investments. If you buy this Contract, you aren't investing directly in an Index, the stocks included in an Index, or the underlying investments or other assets held by an Index.

The "S&P 500 Index" is a product of S&P Dow Jones Indices LLC or its affiliates ("SPDJI") and has been licensed for use by MassMutual Ascend Life Insurance Company. S&P®, S&P 500®, US 500, The 500, iBoxx®, iTraxx® and CDX® are trademarks of S&P Global, Inc. or its affiliates ("S&P"); Dow Jones® is a registered trademark of Dow Jones Trademark Holdings LLC ("Dow Jones"); MassMutual Ascend Life Insurance Company's Products is not sponsored, endorsed, sold or promoted by SPDJI, Dow Jones, S&P, their respective affiliates, and none of such parties make any representation regarding the advisability of investing in such product(s) nor do they have any liability for any errors, omissions, or interruptions of the S&P 500 Index.

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The principal underwriter of the Contract is MM Ascend Life Investor Services, LLC. The offering of the Contract is intended to be continuous. The underwriter will use its best efforts to sell the Contract.

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

If you purchase a Contract, you may cancel it 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. In many states, you will bear the risk of investment gain or loss before cancellation. The right to cancel is described more fully in the Right to Cancel section of this prospectus.

Our form number for the Contract is P1822217NW. Our form numbers for the strategy endorsements to the Contract are E1322417NW, E1322517NW, E1322617NW, E1322717NW, E1322817NW, E1322917NW, E1323017NW, E1829620NW, E1829720NW, and E1829820NW. The form numbers may vary by state. The Securities and Exchange Commission file number for the Contract is 333-270740.

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INDEX FRONTIER® 5 ANNUITY INFORMATION

Special Terms

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

ACCOUNT VALUE. The sum of the values of each Crediting Strategy, plus the value of the Purchase Payment Account, if any.

ANNUITANT. The natural person or persons on whose life 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.

BAILOUT TRIGGER. The Maximum Gain for the next Term of an Indexed Strategy that triggers a waiver of Early Withdrawal Charges under the Bailout right of an Indexed Strategy.

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. The portion of a negative Index Change for a Term that is disregarded when determining a Vested Loss for a Buffer Strategy. The Buffer varies depending on the day of the Term. Once the final Market Day of the Term has been reached, the Buffer is 10%. Before the final Market Day, the Buffer is equal to: 10% x ((365 – N) / 365), where N is equal to the number of days remaining until the final Market Day of the Term.

CONTRACT. The legally binding agreement between you and MassMutual Ascend Life, including applicable endorsements and riders.

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

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

CONTRACT SPECIFICATIONS PAGE. The page in 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. A specified method by which interest or gain or loss is calculated for a Term. The Crediting Strategies that are currently available are set out on the first page of this prospectus.

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.

DECLARED RATE STRATEGY. A Crediting Strategy that credits interest at a Declared Rate.

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 in excess of the Free Withdrawal Allowance (including systematic withdrawals and required minimum distributions). 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.

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 would otherwise apply. This amount is described in the Free Withdrawal Allowance section of this prospectus. Like any other withdrawal, an amount withdrawn that is covered by the Free Withdrawal Allowance will reduce the value of an Indexed Strategy on a dollar-for dollar basis, and will proportionally reduce the Investment Base of a Strategy.

INDEX. A stock market index or an exchange-traded fund.

INDEX CHANGE. The increase or decrease, if any, in the applicable Index Value over a Term of an Indexed Strategy.

INDEX VALUE. For Indexed Strategies that use the S&P 500 Index, the Index Value is the closing value of the Index. For Indexed Strategies that use the SPDR Gold Shares ETF, the iShares U.S. Real Estate ETF, or the iShares MSCI EAFE ETF, the Index Value is the fund's closing share price on the NYSE Arca.

INDEXED STRATEGY. A Crediting Strategy that provides a return based, in part, on changes in an Index Value.

INVESTMENT BASE. The amount applied to an Indexed Strategy at the start of a current Term. A withdrawal and any related Early Withdrawal Charge reduces the Investment Base proportionally to the reduction in the value of that Indexed Strategy due to the withdrawal or charge. For example, if a withdrawal reduces the value of an Indexed Strategy by 15%, then it will reduce the Investment Base of that Strategy by 15%.

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

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

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

MAXIMUM GAIN. The largest positive Index Change for a Term that is taken into account to determine the Vested Gain for a given Indexed Strategy. We set the Maximum Gain for each Term of an Indexed Strategy before the first day of that Term. For a given Term, we may set a different Maximum Gain for amounts attributable to Purchase Payments received on different dates. The Maximum Gain can also be called a "Cap".

MAXIMUM LOSS. The most negative Index Change for a Term that is taken into account to determine a Vested Loss for a given Conserve Strategy or Growth Strategy. The Maximum Loss for a Growth Strategy is a loss of 10% and will apply to all Terms of that Growth Strategy. The Maximum Loss for a Conserve Strategy is 0% and will apply to all Terms of that Conserve Strategy. The Maximum Loss can also be called a "Floor".

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 Death Benefit may be paid. Standard options are described in the Payout Options section of this prospectus.

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

PURCHASE PAYMENT ACCOUNT. An account where a Purchase Payment is held from the date it is applied to the Contract until the first Strategy Application Date on or after that date.

REQUEST IN GOOD ORDER. Information provided or a request made 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.

Information provided or a request made is complete and satisfactory when we have received: (1) all the information and legal documentation that we require to process the information or the request; and (2) instructions that are sufficiently clear that we do not need to exercise any discretion to process the information or the request. If you have any questions, you should contact us or your registered representative before submitting 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. The Account Value minus the Early Withdrawal Charge that would apply on a Surrender of the Contract.

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 gain or loss is calculated. Each Term is one year long, and will start and end on a Strategy Application Date. A new Term will start on the date that the preceding Term ends.

VESTED GAIN. The portion of any positive Index Change for the Term of an Indexed Strategy that is taken into account when determining the value of that Indexed Strategy. For any day of a Term, the Vested Gain is equal to: (1) any positive Index Change for the Term, but not exceeding the Maximum Gain set for that Term; multiplied by (2) the applicable Vesting Factor for that day; and then multiplied by (3) the remaining Investment Base for that Term.

VESTED LOSS. The portion of any negative Index Change for the Term of an Indexed Strategy that is taken into account when determining the value of that Indexed Strategy. For any day of a Term, the Vested Loss is equal to: (1) any negative Index Change for the Term, after taking into account either the Maximum Loss for each Term of that Indexed Strategy or the Buffer; multiplied by (2) the remaining Investment Base for that Term.

VESTING FACTOR. A factor used to determine a Vested Gain. Vesting Factors are described in the Vested Gains and Losses section of this prospectus.

Summary

The MassMutual Ascend Life Index Frontier® 5 annuity is a modified single premium deferred 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.

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

The following chart describes the key features of the Contract. Read this prospectus for more detailed information about the Contract.

Benefits	• The **Annuity Payout Benefit** is a series of periodic payments made under a Payout Option. This benefit can provide you with income for a fixed period of time or for life. It is based on the Account Value on the Annuity Payout Initiation Date. • The **Cash Benefit** lets you take out all of your Account Value (surrender) or take out part of it (withdrawal). An Early Withdrawal Charge generally applies if you take money out during the first five Contract Years. You can Surrender your Contract or take a withdrawal before the Annuity Payout Initiation Date. • The **Death Benefit** is payable if you die before the Annuity Payout Initiation Date. This benefit is paid to your beneficiaries. It is based on the Death Benefit Value, which will never be less than your Purchase Payments, reduced proportionately for withdrawals. Please see the Annuity Payout Benefit, Cash Benefit, and Death Benefit sections on pages 50, 40, and 52 for more information

<table>
<tr>
<td>Purchase Payments</td>
<td>The Contract is a modified single premium annuity. This means we will accept Purchase Payments only during the purchase payment period, which ends two months after the Contract Effective Date. The initial Purchase Payment must be at least $25,000. Each additional Purchase Payment must be at least $10,000. You will need our prior approval if:

you are age 80 or younger and want to make a Purchase Payment(s) of more than $1,000,000; or
you are over age 80 and want to make a Purchase Payment(s) of more than $750,000.

Please see the Purchase section on page 16 for more information.</td>
</tr>
<tr>
<td>Issue Age</td>
<td>Each Owner must be age 80 or younger on the Contract Effective Date. Please see the Purchase section on page 16 for more information.</td>
</tr>
<tr>
<td>Indexed Strategies</td>
<td>We currently offer nine Indexed Strategies.
<table>
<tr><td>Conserve/0% Floor Strategies</td><td>Index</td></tr>
<tr><td>S&P 500 0% Floor</td><td>S&P 500® Index</td></tr>
<tr><td>SPDR Gold Shares 0% Floor</td><td>SPDR® Gold Shares ETF</td></tr>
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<tr><td>iShares MSCI EAFE -10% Floor</td><td>iShares MSCI EAFE ETF</td></tr>
<tr><td>10% Buffer Strategy</td><td>Index</td></tr>
<tr><td>S&P 500 10% Buffer</td><td>S&P 500® Index</td></tr>
</table>
Conserve/0% Floor Strategies

The value of a Conserve Strategy will increase if there is a positive Index Change during a Term. Any positive Index Change is subject to the applicable Maximum Gain for the Term. Before the end of the Term, any positive Index Change is also subject to a Vesting Factor. A Vested Gain can never be more than the Maximum Gain for that Term.
The value of a Conserve Strategy will never decrease due to a negative Index Change during a Term.

Growth/-10% Floor Strategies

The value of a Growth Strategy will increase if there is a positive Index Change during a Term. Any positive Index Change is subject to the applicable Maximum Gain for the Term. Before the end of the Term, any positive Index Change is also subject to a Vesting Factor. A Vested Gain can never be more than the Maximum Gain for that Term.
The value of a Growth Strategy will decrease due to a negative Index Change during a Term. If you allocate money to a Growth Strategy, you can lose up to 10% of that money during the Term due to a negative Index Change.

10% Buffer Strategy

The value of the Buffer Strategy will increase if there is a positive Index Change during a Term. Any positive Index Change is subject to the applicable Maximum Gain for the Term. Before the end of the Term, any positive Index Change is also subject to a Vesting Factor. A Vested Gain can never be more than the Maximum Gain for that Term.
The value of the Buffer Strategy will decrease due to a negative Index Change during a Term. If you allocate money to the Buffer Strategy, at the end of the Term you can lose up to 90% of that money due to a negative Index Change. At the end of the Term, 10% of the money you allocated is protected from loss. You can lose more than 90% of that money if you withdraw it before the end of the Term.

<u>Note: The S&P 500 Buffer strategy is not available for Contracts issued prior to May 2020.</u>

Please see the Indexed Strategies section on page 19 for more information.</td>
</tr>
</table>

Indexed Strategy Value and Investment Base	At the start of a Term, the value of an Indexed Strategy is equal to the Investment Base for that Term, which is the amount applied to that Strategy for that Term. During a Term, a Vested Gain increases the Strategy value or a Vested Loss reduces the Strategy value. A withdrawal reduces the Strategy value, including the value of any Conserve/0% Floor Strategy, by the amount of the withdrawal and related Early Withdrawal Charge. A withdrawal reduces the Investment Base by the portion of the Investment Base needed to pay for the withdrawal and related Early Withdrawal Charge. The reduction in the Investment Base is proportional to the reduction in the Strategy value. This means that we calculate the percentage of Strategy Value that is being withdrawn and we reduce your Investment Base by the same percentage. If you take a withdrawal when your Strategy Value is less than your Investment Base, the amount of Investment Base reduction will exceed the dollar amount of your withdrawal. For example, if your Strategy Value is $30,000 and you withdraw $12,000, you have withdrawn 40% of Strategy Value. If your Investment Base was $40,000 before the withdrawal, it would be reduced by $16,000 ($40,000 x .40) and your new Investment Base after the withdrawal would be $24,000 ($40,000 – $16,000). If your Strategy Value is greater than your Investment Base, the amount of the Investment Base reduction will be less than the dollar amount of the withdrawal. Please see the Indexed Strategies section on page 19 for more information.
Vested Gains and Losses	• Each day of a Term, the value of an Indexed Strategy is adjusted for the Vested Gain or Loss since the start of that Term. We use the following formulas to calculate Vested Gains and Losses. • Vested Gain = any positive Index Change for the Term (but not exceeding the Maximum Gain set for the Term) x applicable Vesting Factor for that day x remaining Investment Base for the current Term. • Vested Loss = any negative Index Change for the Term (after taking into account either the Maximum Loss for the Term or the Buffer, as applicable) x remaining Investment Base for the current Term. Please see the Vested Gains and Losses section on page 22 for more information
Maximum Gains	We set a Maximum Gain for each Indexed Strategy prior to the start of each Term. This means the Maximum Gain for an Indexed Strategy may change for each Term. At least 10 days before the next Term starts, we will post the Maximum Gain that will apply to an Indexed Strategy for that next Term on our website. The Previous Notice Methods section of this prospectus describes a different process used to provide notice of the Maximum Gain for each Indexed Strategy that will apply to Contracts issued prior to May 1, 2019. In general, we will set a higher Maximum Gain for a Growth/-10% Floor Strategy than the Maximum Gain for a Conserve/0% Floor Strategy that uses the same Index. In general, we will set a higher Maximum Gain for a 10% Buffer Strategy than the Maximum Gain for a Growth Strategy that uses the same Index. Please see the Vested Gains and Losses section on page 22 for more information.
Maximum Losses	The Maximum Loss for each Term of a Conserve Strategy is 0%. The Maximum Loss for each Term of a Growth Strategy is a loss of 10%. The Maximum Loss for each Term of the Buffer Strategy is a loss of 90%, or more than 90% if a withdrawal is taken before the end of the Term. In addition, your cumulative loss over Multiple Terms could exceed 90% of your investment. Please see the Vested Gains and Losses section on page 22 for more information.
Buffer	The Buffer at the end of each Term of a Buffer Strategy is 10%. Before the end of each Term, the Buffer is calculated daily as a prorated share of the annual 10% Buffer. Please see the Vested Gains and Losses section on page 22 for more information.

Vesting Factors	Vesting Factors for the Indexed Strategies are fixed and are applied as follows: • For a positive Index Change during a Term, the Vesting Factors are 25% for any date within the first six months of a Term; 50% for any date within the final six months of a Term but before the final Market Date of the Term; and 100% on or after the final Market Date of the Term. A Vesting Factor below 100% limits any positive increase during a Term. • **For a negative Index Change during a Term, there is no Vesting Factor.** Please see the Vested Gains and Losses section on page 22 for more information.
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. A Declared Rate will never be less than 1%. 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. The Previous Notice Methods section of this prospectus describes a different process used to provide notice of the Declared Rate that will apply to Contracts issued prior to May 1, 2019. Please see the Declared Rate Strategy section on page 18 for more information.
Strategy Renewals	At the end of each Term of a given Crediting Strategy, we will apply the ending value of that Strategy to a new Term of that same Strategy. The amount applied to a new Term will not include any amount that is moved as part of a reallocation at the Term end. Please see the Strategy Renewals and Reallocations at Term End section on page 39 for more information.
Strategy Reallocations	At the end of a Term, you may reallocate the ending values of the Crediting Strategies for that Term among the Strategies. Please see the Strategy Renewals and Reallocations at Term End section on page 39 for more information.
Access to Your Money Through Withdrawals	You may take a withdrawal from your Contract at any time prior to the Annuity Payout Initiation Date. • During the first five Contract Years, unless you qualify for the Free Withdrawal Allowance or the bailout right as described below, an Early Withdrawal Charge will apply. • A withdrawal from an Indexed Strategy will reduce the value of that Strategy on a dollar-for-dollar basis. A withdrawal from an Indexed Strategy during a Term will proportionally reduce the Investment Base used to calculate any subsequent Vested Gain or Loss in that Term. • In addition to any applicable Early Withdrawal Charge, a withdrawal may be subject to income tax, and a withdrawal before age 59½ may also be subject to an additional 10% penalty tax. Please see the Early Withdrawal Charge section on page 48 for more information.

<table>
<tr>
<td>Early Withdrawal Charge</td>
<td>An Early Withdrawal Charge applies during the first five Contract Years if you Surrender your Contract or withdraw an amount in excess of the Free Withdrawal Allowance. The charge is equal to the amount subject to the charge multiplied by the applicable rate set out below.

<table>
<tr><td>Contract Year</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6+</td></tr>
<tr><td>Early Withdrawal Charge Rate</td><td>8%</td><td>7%</td><td>6%</td><td>5%</td><td>4%</td><td>0%</td></tr>
</table>
If you take a withdrawal from your Contract, the amount subject to the charge is the amount you withdraw plus any amount needed to pay the Early Withdrawal Charge. If you Surrender your Contract, the amount subject to the charge is your Account Value.

When you request a withdrawal, we will reduce the amount we pay you by the amount of the Early Withdrawal Charge. If you instruct us to pay you the specific withdrawal amount, we will instead 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 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 (1) a withdrawal that qualifies for the Free Withdrawal Allowance; (2) to any withdrawal under the Bailout right; or (3) the amount, if any, that qualifies for another waiver. Please see the Early Withdrawal Charge section below for more information.

For example, if after using their Free Withdrawal Allowance a contractholder requested that an additional $10,000 be withdrawn from their Account Value when an 8% Early Withdrawal Charge was in effect, a $800 Early Withdrawal Charge would apply (8% of $10,000 withdrawn). The contractholder would receive $9,200 ($10,000 - $800), minus any income tax withholding.

Similarly, if a contractholder instead requested that they receive a net amount of $10,000 from their account in the same circumstances, we would treat the Early Withdrawal Charge amount as an additional requested withdrawal subject to an Early Withdrawal Charge. This means that we will “gross up” your requested withdrawal to cover applicable Early Withdrawal Charges (and any income tax withholding). If we assume that no income tax withholding applies, the withdrawal would be grossed up to $10,870, calculated by dividing the net amount requested by 1 minus the Early Withdrawal Charge rate ($10,000 / (1 – 0.08)). The Early Withdrawal Charge would be $870 (8% of the $10,870 withdrawal), and the contractholder would receive $10,000 ($10,870 - $870).</td>
</tr>
<tr>
<td>Free Withdrawal Allowance</td>
<td>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. Like any other withdrawal, an amount withdrawn that is covered by the Free Withdrawal Allowance will reduce the value of a Crediting Strategy on a dollar-for dollar basis, and will proportionally reduce the Investment Base of a Strategy. Please see the Early Withdrawal Charge section on page 48 for more information.</td>
</tr>
<tr>
<td>Bailout Right</td>
<td>We will waive the Early Withdrawal Charge on an amount you withdraw if: (1) you withdraw it at the end of a Term from an Indexed Strategy; and (2) either the Maximum Gain for such Indexed Strategy for the next Term is less than the Bailout Trigger for the current Term, or such Indexed Strategy will not be available for the next Term. If the Bailout right will apply at the end of a Term, we will notify you at least 30 days before the end of that Term. The Bailout right does not apply to your initial Term. Please see the Early Withdrawal Charge section on page 48 for more information.</td>
</tr>
</table>

Payout Options	Like all annuity contracts, the Contract offers a range of Payout Options, which provide payments for your lifetime or for a fixed period. After payments begin, you cannot change the Payout Option or any fixed period you selected. The standard Payout Options are listed below. • Fixed Period Payout • Life Payout • Life Payout with Payments for at Least a Fixed Period • Joint and One-half Survivor Payout Please see the Payout Options section on page 54 for more information.
Death Benefit	A Death Benefit is payable under the Contract if you die before the Annuity Payout Initiation Date. If the Owner is a non-natural person, such as a trust or a corporation, then a Death Benefit is payable under the Contract if an Annuitant dies before the Annuity Payout Initiation Date. The Death Benefit Value is the greater of: (1) the Account Value as of the applicable date; or (2) your Purchase Payment(s) reduced proportionally for all withdrawals, but not including amounts applied to pay Early Withdrawal Charges. Please see the Death Benefit section on page 52 for more information.
Tax Deferral	The Contract is generally tax deferred, which means that you are not taxed on the earnings in your Contract until the money is paid to you. Contracts owned by non-natural owners, such as trusts and corporations, are subject to special rules. A tax-qualified retirement plan such as an IRA also provides tax deferral. Buying the Contract within a tax-qualified retirement plan does not give you any extra tax benefits. There should be reasons other than tax deferral for buying the Contract within a tax-qualified retirement plan. Please see the Federal Tax Considerations section on page 66 for more information.
Right to Cancel	If you purchase a Contract, you may cancel it 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. In many states, you will bear the risk of investment gain or loss before cancellation. Please see the Right to Cancel (Free Look) section on page 59 for more information.

Risk Factors

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

Loss of Principal Related to Growth Strategy and Buffer Strategy due to Negative Index Changes	There is a significant risk of loss of principal and related earnings due to negative Index Changes if you allocate your Purchase Payment(s) to a Growth/-10% Floor Strategy or 10% Buffer Strategy. Such a loss may be substantial. This risk exists for each Growth Strategy because you agree to absorb any loss in the Index during the Term up to the Maximum Loss of 10%. This risk exists for each Buffer Strategy because you agree to absorb any loss in the Index that exceeds the Buffer. This risk of loss does not exist if you allocate your Purchase Payment(s) to the Declared Rate Strategy or to a Conserve/0% Floor Strategy. If you allocate money to a Growth Strategy, you may lose up to 10% at the end of each Term. If you allocate money to a Growth Strategy over multiple Terms, you may lose up to 10% each Term, which may result in a cumulative loss that is greater than 10%. If you allocate money to a Buffer Strategy, you may lose up to 90% at the end of each Term. If you allocate money to a Buffer Strategy and withdraw it before the end of the Term, you may lose more than 90% because the Buffer is less than 10% until the end of the Term. If you allocate money to a Buffer Strategy over multiple Terms, you may lose up to 90% at the end of each Term, which may result in a cumulative loss that is greater than 90%.

Loss of Principal Related to Early Withdrawal Charge	There is also a risk of loss of principal and related earnings if you take a withdrawal from your Contract or Surrender it during the first five Contract Years. This risk exists for each Strategy because an Early Withdrawal Charge may apply. A withdrawal from any Strategy, including any Conserve/0% Floor Strategy, when an Early Withdrawal Charge applies, will reduce the value of the Strategy. This reduction will occur even if there is a Vested Gain on the date of the withdrawal. An Early Withdrawal Charge may reduce the value of an Indexed Strategy by more than increases in the value of the Indexed Strategy resulting from Vested Gains in the current and prior Terms.
Long-Term Nature of Contract	The Contract is a deferred annuity, which means the Annuity Payout Benefit will begin on a future date. 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 and charges included in the Contract reflect its long-term nature.
Limits on Investment Return	Any increase in the value of an Indexed Strategy over a Term is limited by a Maximum Gain. Any increase in the value of an Indexed Strategy before the end of a Term is also limited by a Vesting Factor, which will be less than 100%. Due to these limitations, in many cases the return on money allocated to an Indexed Strategy will not fully reflect the corresponding positive Index Change for a Term. The value of an Indexed Strategy only captures an Index Value at the applicable Market Close. You will bear the risk that an Index Value might be significantly lower at that Market Close than at another point during the Term. We measure the Index Change by comparing the Index Value on the first day of the Term to the Index Value on the last day of the Term. This means that if the Index Value is lower on the last day of the Term, you may experience negative or flat performance even if the Index experienced gains through some, or most, of the Term.
Limits on Reallocations	You cannot reallocate money among the Crediting Strategies prior to the end of a Term. If you want to take money out of Strategy during a Term, you must take a withdrawal from that Strategy or Surrender your Contract.
Early Withdrawal Charge	If you withdraw money from or Surrender the Contract during the first five Contract Years, we will deduct an Early Withdrawal Charge unless the Free Withdrawal Allowance or Bailout right applies. Deduction of the Early Withdrawal Charge may result in loss of principal and any prior earnings. An Early Withdrawal Charge will reduce Strategy values, including Conserve/0% Floor Strategy values.
Timing of Withdrawals, Surrender, Annuity Payout Initiation Date, or Death Benefit Claim	You should take into consideration the dates on which the Term(s) of your Indexed Strategies end relative to the timing of a withdrawal or Surrender, the Annuity Payout Initiation Date, or the submission of a Death Benefit claim. For example, a withdrawal from an Indexed Strategy before the end of a Term will lock in the existing Vested Gain or Loss. In addition, due to the Vesting Factors that we use to calculate Vested Gains, increase in the value of an Indexed Strategy before the end of a Term will be less than the corresponding positive Index Change.
No Ability to Determine Strategy Values in Advance	If you request a withdrawal from an Indexed Strategy, we will process the withdrawal 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 value of an Indexed Strategy or the amount of any Vested Gain or Vested Loss. Likewise, you will not be able to determine in advance the amount payable upon Surrender, applied to the Annuity Payout Benefit, or payable as the Death Benefit.
Changes in Declared Rates	We set a Declared Rate for each new Term of the Declared Rate Strategy. The Declared Rate may be as low as 1%. You risk the possibility that the Declared Rate for a new Term may be lower than you would find acceptable.
Changes in Maximum Gains	We set a Maximum Gain for each new Term of an Indexed Strategy. The Maximum Gain for a new Term of an Indexed Strategy may be lower than its Maximum Gain for the current Term and may be as low as 1%. You risk the possibility that the Maximum Gain for a new Term may be lower than you would find acceptable.

Unavailable Indexed Strategies	At the end of a Term, we may stop offering any Indexed Strategy and, consequently, an Indexed Strategy you selected may not be available after the end of a Term. An Indexed Strategy you selected also may not be available after the end of a Term due to minimums and maximums that we set. In that case, if you do not withdraw the funds pursuant to your Bailout Right or reallocate them to another Crediting Strategy, then we will reallocate the applicable funds to a default Strategy. The funds allocated to a default Strategy may earn a return that is lower than the return they would have earned if there had been no reallocation, but will not increase the risk of loss of principal and any prior earnings.
Unavailable Declared Rate Strategy	At the end of a Term, we may stop offering the Declared Rate Strategy and, consequently, only Indexed Strategies, which may earn 0% for any Term, will be available after the end of the Term. In this case, we will offer at least one Indexed Strategy with a Maximum Loss of 0%. Unlike a Declared Rate Strategy, no earnings are guaranteed for an Indexed Strategy.
Replacement of an Index	We have the right to replace an Index if it is discontinued or we are no longer able to use it, its calculation changes substantially, or we determine that hedging instruments are difficult to acquire or the cost of hedging becomes excessive. We may do so at the end of a Term or during a Term. If we replace an Index during a Term, we will calculate Vested Gains and Losses using the old Index up until the replacement date. After the replacement date, we will calculate Vested Gains and Losses using the new Index. 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 if there had been no replacement.
Involuntary Termination of Contract	If your Account Value falls below the minimum value of $5,000 for any reason, we may terminate your Contract. For example, we may terminate your Contract if a loss on a Growth/-10% Floor Strategy or a 10% Buffer Strategy causes your Account Value to fall below $5,000.
No Direct Investment in the Market	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. Index Changes for these Strategies are calculated without taking into account dividends paid on stocks that make up the S&P 500 Index. 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. Index Changes for these Strategies are calculated without taking into account dividends paid by the SPDR Gold Shares ETF. When you allocate money to an Indexed Strategy that uses the iShares U.S. Real Estate ETF, you will not be investing in that exchange-traded fund, in the securities or other assets that it holds, or in any real estate investment trust. Index Changes for these Strategies are calculated without taking into account dividends paid by the iShares U.S. Real Estate ETF. When you allocate money to an Indexed Strategy that uses the iShares MSCI EAFE ETF, you will not be investing in that exchange-traded fund or in the securities or other assets that it holds, or in any stock included in the MSCI EAFE Index. Index Changes for these Strategies are calculated without taking into account dividends paid by the iShares MSCI EAFE ETF. Because changes in the value of an Indexed Strategy are subject to Maximum Gains and either Maximum Losses or a Buffer, as applicable, and may be subject to a Vesting Factor, the performance of an Indexed Strategy may diverge from the performance of the Index.

Market Risk	Money allocated to a Growth/-10% Floor Strategy or 10% Buffer Strategy that uses the S&P 500 Index is subject to the risk that the market value of the underlying securities that comprise the S&P 500 Index may decline. For a Growth Strategy, you will absorb any such market loss up to the amount of the Maximum Loss of 10%. For a Buffer Strategy, you will absorb any such market loss to the extent it exceeds the Buffer. In addition, any positive change in the Index Value over a Term will be lower than the total return on an investment in the stocks that comprise the S&P 500 Index because the total return will reflect dividend payments on those stocks and the Index Values will not reflect those dividend payments. Because the return on an Indexed Strategy that uses the S&P 500 Index will be subject to limitations and will be linked to its performance and not the performance of the underlying stocks, 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. Money allocated to a Growth/-10% Floor Strategy that uses the SPDR Gold Shares ETF is subject to the risk that its share price may decline. You will absorb any such market loss up to the amount of the Maximum Loss of 10%. The share price of the SPDR Gold Shares ETF is tied to the price of gold, which has fluctuated widely over the past several years. The share price may not replicate the performance of gold. In addition, because the return on any indexed strategy that uses the SPDR Gold Shares ETF will be subject to limitations and will be linked to the performance of the SPDR Gold Shares ETF and not the performance of the price of gold, your return may be less than that of another investment linked directly to the fund's performance or the price of gold. In addition, due to the same limitations, your return may be less than that of a direct investment in the SPDR Gold Shares ETF. Money allocated to a Growth/-10% Floor Strategy that uses the iShares U.S. Real Estate ETF is subject to the risk that its share price may decline. You will absorb any such market loss up to the amount of the Maximum Loss of 10%. The share price of the iShares U.S. Real Estate ETF is tied to the performance of the real estate sector, which is highly sensitive to general and local economic conditions and developments, characterized by intense competition and periodic overbuilding, and subject to risks associated with leverage. The share price may not replicate the performance of the fund, its underlying index, or the components of that index. In addition, because the return on any indexed strategy that uses the iShares U.S. Real Estate ETF will be subject to limitations and will be linked to the performance of the iShares U.S. Real Estate ETF and not the performance of its underlying index or the components of that index, your return may be less than that of another investment linked directly to the performance of the fund, its underlying index, or a direct investment in such components. In addition, due to the same limitations, your return may be less than that of a direct investment in the iShares U.S. Real Estate ETF. Money allocated to a Growth/-10% Floor Strategy that uses the iShares MSCI EAFE ETF is subject to the risk that its share price may decline. You will absorb any such market loss up to the amount of the Maximum Loss of 10%. 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. In addition, because the return on any indexed strategy that uses the iShares MSCI EAFE ETF will be subject to limitations and will be linked to the performance of the iShares MSCI EAFE ETF and not the performance of its underlying index or the components of that index, your return may be less than that of another investment linked directly to the performance of the fund, its underlying index, or a direct investment in such components. In addition, due to the same limitations, your return may be less than that of a direct investment in the iShares MSCI EAFE ETF. 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. 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.
Regulatory Risk	MassMutual Ascend Life is not an investment company and is not 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.
Reliance on Our Claims-Paying Ability	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. Various factors, such as those listed below, could materially affect our business, financial condition, cash flows or future results and, in turn, our financial strength and claims-paying ability. A more complete discussion of these factors appears on pages A6-A10. • Adverse developments in financial markets and deterioration in global economic conditions • Unfavorable interest rate environments • Losses on our investment portfolio • Loss of market share due to intense competition • Ineffectiveness of risk management policies • Changes in applicable law and regulations • Inability to obtain reinsurance or to collect on reinsurance • Downgrade or potential downgrade in our financial strength rating • Variations from actual experience and management's estimates and assumptions • The amount of capital we must hold to meet our statutory requirements can vary significantly from time to time • Legal actions and regulatory proceedings • Difficulties with technology or data security • Failure to protect the confidentiality of customer information • Failure to maintain effective and efficient information systems • Occurrence of catastrophic events, public health crises (e.g., the COVID-19 pandemic), terrorism or military actions The economic impacts of the COVID-19 pandemic may negatively affect our financial condition and results of operations. The extent to which the COVID-19 pandemic impacts financial markets, the global economy, and our financial strength and claims-paying ability will depend on future developments that cannot be predicted with certainty. We continue to be subject to significant state solvency regulations that require us to reserve amounts to pay our contractual guarantees. Please see "Management's Discussion and Analysis of Financial Condition and Results of Operations," "Risk Factors Related to MMALIC's Business," and "Financial Statements", and "Regulation" for additional financial information about the company and the state solvency regulations to which we are subject.

Purchase

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 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. We reserve the right to reject any application in our discretion.

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.

We must receive your initial Purchase Payment on or before the Contract Effective Date. We must receive each additional Purchase Payment 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.

The initial Purchase Payment must be at least $25,000. Each additional Purchase Payment must be at least $10,000. You will need our prior approval if you are age 80 or younger and want to make a Purchase Payment(s) of more than $1,000,000; or you are over age 80 and want to make a Purchase Payment(s) of more than $750,000.

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 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 annuity, directly transfer it to an Index Frontier annuity, or roll it over to an Index Frontier 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 also pay a sales charge under the new annuity or account, or you may pay an early withdrawal charge if you later take withdrawals from the new annuity or account. 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 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 existing 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. On each Strategy Application Date, we will apply the then current balance of the Purchase Payment Account to the Crediting Strategies you selected.

In certain 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.

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 1%.

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. 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.

Initial Strategy Selections
You make your initial selection of Crediting Strategies in your purchase application. Your initial selection is set out on your Contract Specifications Page.

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 your Request in Good Order with the Crediting Strategies you selected 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.

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. 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.

Declared Rate Strategy

Note: The Declared Rate Strategy is not available for Contracts issued in Missouri.

The Declared Rate Strategy earns interest at a fixed rate with annual compounding. Interest will be credited daily to amounts held under the Declared Rate Strategy.

We will set the Declared Rate for a Term before that Term starts. It is guaranteed for the entire Term. At least 10 days before the initial Term starts, we will post the Declared Rate that will apply to the Declared Rate Strategy for that Term on our website (www.massmutualascend.com/RILArates).

If you are not satisfied with the Declared Rate offered for your initial Term, you may rescind your Contract by returning it and giving written notice of your decision to rescind. You will have 20 days in which to rescind your Contract. The rescission period will end at midnight of the 20th day after the date on which your initial Term starts. If you exercise this rescission right, we will return your Purchase Payment(s), without any adjustment for the Early Withdrawal Charge.

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/RILArates). The Previous Notice Methods section of this prospectus describes a different process used to provide notice of the Declared Rate that will apply to Contracts issued prior to May 1, 2019.

In any event, the Declared Rate for a Term will never be less than the guaranteed minimum interest rate set out in the Declared Rate Strategy endorsement included in your Contract. This rate will be at least 1% per year.

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.

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 Declared Rate Strategy and both payments are applied on March 20. Each Term of the Declared Rate 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 Declared Rate Strategy. Your initial Purchase Payment is applied on May 6 and the other Purchase Payment is applied on June 20. The Declared Rate Strategy will have Terms that start and end on May 6 and other Terms that start and end on June 20.

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 and related Early Withdrawal Charge taken from the Strategy during the current Term; plus
- interest that we have credited on the balances in the Strategy for the current Term.

Indexed Strategies

The Indexed Strategies provide returns that are based, in part, upon changes in an Index Value. The Indexed Strategies do not earn interest at a fixed rate. Unlike a traditional variable annuity, the values of the Indexed Strategies are not based on the investment performance of underlying portfolios.

Each Indexed Strategy has a Maximum Gain for each Term.

- We will set a new Maximum Gain for each Indexed Strategy prior to the start of each Term. In general, the Maximum Gain for a Growth Strategy will be higher than the Maximum Gain for a Conserve Strategy using the same Index, and the Maximum Gain for a Buffer Strategy will be higher than the Maximum Gain for a Growth Strategy using the same Index.

Each Conserve Strategy and Growth Strategy has a Maximum Loss for each Term.

- The Maximum Loss for each Term of a Conserve Strategy is 0%. The Maximum Loss for each Term of a Growth Strategy is a loss of 10%.

Each Buffer Strategy has a Buffer for each Term.

- The Buffer at the end of each Term is 10%. Before the end of each Term, the Buffer is calculated daily as a prorated share of the annual 10% Buffer.

Changes in the value of an Indexed Strategy reflect the change in the applicable Index Value since the start of the applicable Term, the Maximum Gain we set for that Indexed Strategy for that Term, the applicable Vesting Factor, and the applicable Buffer or Maximum Loss for that Indexed Strategy. **If you select a Growth Strategy or a Buffer Strategy, then each Term it is possible for you to lose a portion of your Purchase Payment(s) and any earnings allocated to that Indexed Strategy.**

See Vested Gains and Losses section below for additional details.

The Indexed Strategies that are currently available are listed below. You may allocate your funds to any of the Indexed Strategies, subject to the procedures disclosed in this prospectus.

Conserve/0% Floor Strategies	**Index**	**Maximum Loss/Floor of 0%**
S&P 500 0% Floor	S&P 500® Index	If you allocate money at the start of a Term to a Conserve Strategy, you cannot lose that money during the Term due to a negative change in the Index.
SPDR Gold Shares 0% Floor	SPDR® Gold Shares ETF	
iShares U.S. Real Estate 0% Floor	iShares U.S. Real Estate ETF	
iShares MSCI EAFE 0% Floor	iShares MSCI EAFE ETF	
Growth/-10% Floor Strategies	**Index**	**Maximum Loss/Floor of 10%**
S&P 500 -10% Floor	S&P 500® Index	If you allocate money at the start of a Term to a Growth Strategy, you can lose up to 10% of that money during the Term due to a negative change in the Index.
SPDR Gold Shares -10% Floor	SPDR® Gold Shares ETF	
iShares U.S. Real Estate -10% Floor	iShares U.S. Real Estate ETF	
iShares MSCI EAFE -10% Floor	iShares MSCI EAFE ETF	
10% Buffer Strategy	**Index**	**End of Term Buffer of 10%**
S&P 500 10% Buffer	S&P 500® Index	If you allocate money at the start of a Term to a Buffer Strategy, at the end of the Term you can lose up to 90% of that money due to a negative change in the Index. At the end of the Term, 10% of the money you allocated is protected from loss. You can lose more than 90% of that money if you withdraw it before the end of the Term.

Note: The S&P 500 Buffer strategy is not available for Contracts issued prior to May 2020.

An Early Withdrawal Charge may apply if you take a withdrawal during the first five Contract Years. That charge will reduce Strategy values, including the value of a Conserve/0% Floor Strategy.

Term

Each Term of an Indexed 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 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 Crediting 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 and both payments are applied on 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. Your initial Purchase Payment is applied on May 6 and the other Purchase Payment is applied on June 20. That Indexed Strategy will have Terms that start and end on May 6 and other Terms that start and end on June 20.

Indexed Strategy Value

The value of an Indexed Strategy is equal to:

- the Investment Base for that Term, which is the amount applied to the Strategy at the start of the current Term; minus
- the portion of that Investment Base that is taken from the Strategy to pay for each withdrawal and related Early Withdrawal Charge during the current Term; and plus or minus
- the Vested Gain or Loss for that Term on the remaining portion of the Investment Base.

The portion of the Investment Base that is taken from an Indexed Strategy to pay for a withdrawal and any related Early Withdrawal Charge is proportional to the reduction in the value of the Indexed Strategy for the withdrawal and any related charge. This means that we calculate the percentage of Strategy Value that is being withdrawn and we reduce the Investment Base by the same percentage.

- A withdrawal and any related charge will reduce the value of an Indexed Strategy by an amount equal to the withdrawal and any charge.
- But the reduction in the Investment Base to pay for a withdrawal and any related charge is proportional to the reduction in the value of the Indexed Strategy. For example, if the withdrawal and any related charge reduces the value of an Indexed Strategy by 15%, then it will reduce the Investment Base by 15%.
- If there is a Vested Gain, then the portion of the Investment Base taken will be less than the withdrawal and any related charge. With a Vested Gain, the Indexed Strategy value will be higher than the Investment Base. For example, a 15% reduction in the Investment Base will be less than a 15% reduction in the Strategy value.
- **If there is a Vested Loss, then the portion of the Investment Base taken will be greater than the withdrawal and any related charge.** With a Vested Loss, the Investment Base will be higher than Indexed Strategy value. For example, a 15% reduction in the Investment Base will be greater than a 15% reduction in the Strategy value.

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

Percentage reduction in Strategy value = withdrawal plus any related Early Withdrawal Charge / Strategy value immediately before the withdrawal

Proportionate reduction in Investment Base = Investment Base immediately before the withdrawal x percentage reduction in Strategy value

Remaining Investment Base = Investment Base immediately before the withdrawal - reduction in Investment Base

Examples. You allocate $5,000 to an Indexed Strategy at the start of a Term. This means the Investment Base for the Term is $5,000. You take a $1,000 withdrawal and that amount includes the amount needed to pay any related Early Withdrawal Charge that applies to the withdrawal.

Assume at the time of your withdrawal that you have a Vested Gain of 5%.

- The Vested Gain is equal to $250 ($5,000 x 0.05).
- The Strategy value on the withdrawal date is $5,250 ($5,000 + $250).
- The withdrawal (including any related Early Withdrawal Charge) reduces the Strategy value by $1,000.
- The Strategy value after the withdrawal is $4,250 ($5,250 - $1,000).
- The percentage reduction in the Strategy value is 19.05% ($1,000 / $5,250).
- The proportionate reduction in the Investment Base is $952 ($5,000 x 0.1905).
- The remaining Investment Base is $4,048 ($5,000 - $952).
- Due to the Vested Gain, the proportionate reduction in the Investment Base ($952) is less than the withdrawal and related charge ($1,000). This means, after the withdrawal, the Investment Base is $4,048 rather than $4,000.

Assume at the time of your withdrawal that you have a Vested Loss of 10%.

- The Vested Loss is equal to $500 ($5,000 x 0.10).
- The Strategy value on the withdrawal date is $4,500 ($5,000 - $500).
- The withdrawal (including any related Early Withdrawal Charge) reduces the Strategy value by $1,000.
- The Strategy value after the withdrawal is $3,500 ($4,500 - $1,000).
- The percentage reduction in the Strategy value is 22.22% ($1,000 / $4,500).
- The proportionate reduction in the Investment Base is $1,111 ($5,000 x 0.2222).
- The remaining Investment Base is $3,889 ($5,000 - $1,111).
- Due to the Vested Loss, the proportionate reduction in the Investment Base ($1,111) is greater than the withdrawal and related charge ($1,000). This means, after the withdrawal, the Investment Base is $3,889 rather than $4,000.

Vested Gains and Losses

Overview
Each day of a Term, the value of an Indexed Strategy includes the Vested Gain or Loss, if any, since the start of that Term. Vested Gain or Loss is calculated on the remaining Investment Base for that Term.

Here is the formula that we use to calculate the amount of the Vested Gain or Loss.

Amount of Vested Gain or Loss = remaining Investment Base x Vested Gain or Loss percentage

Example. At the beginning of a Term in Contract Year 10, your entire Account Value of $100,000 is allocated to a Growth/-10% Floor Strategy. You do not take any withdrawals during that Term. You Surrender your Contract at the end of that Term. No Early Withdrawal Charge applies to a Surrender in Contract Year 10.

- If the Vested Gain is 4%, then the Strategy value includes a $4,000 Vested Gain ($100,000 x 0.04). The amount payable upon Surrender will be $104,000 ($100,000 + $4,000).
- If the Vested Loss is 3%, then the Strategy value includes a $3,000 Vested Loss ($100,000 x 0.03). The amount payable upon Surrender will be $97,000 ($100,000 - $3,000).

If in this example your Surrender occurs in Contract Year 4 instead, when a 5% Early Withdrawal Charge applies, the amount payable upon Surrender is reduced by applicable Early Withdrawal Charges. For this example, we assume that the Account Value was $100,000 on the most recent Contract Anniversary.

- If the Vested Gain is 4%, then the amount payable is reduced by Early Withdrawal Charges of $4,700, calculated as 5% of the Strategy Value minus the Free Withdrawal Allowance (5% x ($104,000 – ($100,000 x 10%))). The amount payable upon Surrender will be $99,300 ($104,000 - $4,700).
- If the Vested Loss is 3%, then the amount payable is reduced by Early Withdrawal Charges of $4,350, calculated as 5% of the Strategy Value minus the Free Withdrawal Allowance (5% x ($97,000 – ($100,000 x 10%))). The amount payable upon Surrender will be $92,650 ($97,000 - $4,350).

Index Change. Before we can calculate the Vested Gain or Loss since the start of a Term, we must determine the Index Change since the start of that Term. The Index Change is the increase or decrease in the applicable Index Value. This increase or decrease is expressed as a percentage of the applicable Index Value at the start of that Term. It is measured from the Index Value at the start of that Term to the Index Value at the last Market Close on or before the date the Index Change is determined.

Example. The Index Value was 1000 at the start of a Term.

- If the Index Value at the applicable Market Close is 1065, then there is a positive Index Change of 6.5% ((1065 - 1000) / 1000).
- If the Index Value at the applicable Market Close is 925, then there is a negative Index Change of 7.5% ((925 - 1000) / 1000).

Indexes. 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 Value 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 product of S&P Dow Jones Indices LLC. For more information, visit www.US.SPIndices.com.

The SPDR Gold Shares 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 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 iShares U.S. Real Estate ETF is an exchange traded fund that seeks to track the investment performance of the Dow Jones U.S. Real Estate Index. This underlying index measures the performance of the real estate sector in the U.S. equity market. 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 fund is subject to certain risks including the risk that it may not replicate the performance of the underlying index and those risks associated with concentrated investment in REITS. The fund's performance will be reduced by its expenses and fees. The fund's shares trade on the NYSE Arca under the symbol IYR. For more information, visit **www.iShares.com** and search ticker symbol IYR.

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. 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 fund is subject to certain risks including the risk that it may not replicate the performance of the underlying index and those risks associated with investment in non-U.S. issuers. The fund's performance will be reduced by its expenses and fees. The fund's shares trade on the NYSE Arca under the symbol EFA. For more information, visit **www.iShares.com** and search ticker symbol EFA.

Index Values. Index Values are determined at each Market Close. An Index Value at the start of a Term is its value at the last Market Close on or before the first day of that Term. An Index Value at the end of a Term is its value at the Market Close on the last Market Day of that Term. We will use consistent sources to obtain the closing values of an Index. We currently obtain the closing values for the S&P 500 Index and the SPDR Gold Shares ETF from S&P Dow Jones Indices LLC and the closing values for the iShares MSCI EAFE ETF and the iShares U.S. Real Estate ETF from BlackRock, Inc. If those sources are no longer available, we will select an alternative published source(s) to obtain such values.

Market Close. A Market Close is the close of the regular or core trading session on the market used to measure an Index Change for a give Indexed Strategy.

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

Vested Gain

The Vested Gain is the portion of any positive Index Change that is taken into account when determining the value of an Indexed Strategy. Here is the formula that we use to calculate a Vested Gain for any day of a Term.

> Vested Gain = any positive Index Change since the start of the current Term (but not exceeding the Maximum Gain set for the Term) x applicable Vesting Factor for that day x remaining Investment Base for the current Term

Maximum Gain. The Maximum Gain for an Indexed Strategy is the largest positive Index Change for a Term that is taken into account to determine the Vested Gain for that Indexed Strategy for that Term. For example, if the Maximum Gain for a Term is 5% and the Index Change at the end of that Term is positive 8%, then the Vested Gain for that Term is 5%.

- **The Maximum Gain will vary between Indexed Strategies.**
- **The Maximum Gain for a given Indexed Strategy will vary between Terms.**
- **We guarantee that the Maximum Gain for a Term of an Indexed Strategy will never be less than 1%.**
- **For each Term, your return on an Indexed Strategy may be less than any positive Index Change over that Term.**
- **For each Term, your return on an Indexed Strategy may be less than the Maximum Gain.**

We set the Maximum Gain for each Indexed Strategy based on the cost of hedging, interest rates, and other market factors, and the Purchase Payments received for a Contract. In general, the Maximum Gain we set for a Growth/-10% Floor Strategy will be higher than the Maximum Gain we set for the corresponding Conserve/0% Floor Strategy, and the Maximum Gain for a 10% Buffer Strategy will be higher than the Maximum Gain for the corresponding Growth Strategy. Likewise, we may set Maximum Gains for Contracts with larger Purchase Payments that are higher than Maximum Gains for Contracts with smaller Purchase Payments.

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 Maximum Gain for each Strategy Application Date may vary. The Maximum Gain for the first Strategy Application Date will be available on our website (www.massmutualascend.com/RILArates) 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 Maximum Gain will apply. If we receive the application for the Contract within eight days after the date you sign it, we will guarantee the Maximum Gain 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 **Indexed Strategy**:

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

Example : You sign an application for a Contract on May 1 and allocate all of your Purchase Payments to the S&P 500 -10% Floor Strategy. On the date of the application, the Maximum Gain for the first Strategy Application Date (May 6) is 13%. 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 Maximum Gains for the next two Strategy Application Dates are 14% (May 20) and 12% (June 6).

In this case, the initial 1-year Term for the first Purchase Payment would begin on May 20 and would have a 14% Maximum Gain (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 13% Maximum Gain (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 14% Maximum Gain (the May 20 rate effective for Purchase Payments received between May 7 and May 20), and the initial 1-year Term for the second Purchase Payment received on May 23 would have a 12% Maximum Gain (the June 6 rate effective for Purchase Payments received between May 21 and June 6).

Once your Contract is effective, we will send you a written notice at least 30 days before the end of each Term with information about the Indexed Strategies that will be available for the next Term. At least 10 days before the next Term starts, we will post the Maximum Gain that will apply to an Indexed Strategy for that next Term on our website (www.massmutualascend.com/RILArates). The Previous Notice Methods section of this prospectus describes a different process used to provide notice of the Maximum Gain for each Indexed Strategy that will apply to Contracts issued prior to May 1, 2019.

Because we can change the Maximum Gain that applies to an Indexed Strategy, the Contract has a Bailout right that allows you to take a withdrawal without incurring an Early Withdrawal Charge under certain circumstances. See Bailout Right discussion in the Early Withdrawal Charge section below.

Vesting Factor. The Vesting Factor varies depending on the day of the Term for which the Vested Gain is calculated. A Vesting Factor limits the portion of a positive Index Change that is taken into account when calculating the Vested Gain for a given Indexed Strategy for a given Term.

	Vesting Factor
Dates within first six months of a Term	25%
Dates within the final six months of a Term but before the final Market Day of that Term	50%
On the final Market Day of a Term	100%

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

Months are measured from the first day of the Term. For example, if a Term starts on January 20, the final six months of that Term will begin on July 20.

If any date in a Term is after the final Market Day of that Term, then a 100% Vesting Factor applies on that date when Vested Gain for that Term is calculated. For example, if a Term ends on a Monday when the markets are closed due to a holiday, then the final Market Day of that Term is the Friday before that holiday. If an automatic transaction is scheduled for Saturday, then the 100% Vesting Factor applies to that transaction.

Example. On the date of Surrender, your entire Account Value of $100,000 is allocated to the S&P 500 Growth/-10% Floor Strategy, which has a 12% Maximum Gain for the Term. You Surrender your Contract in month 9 of that Term, which means a Vesting Factor of 50% applies. For this example, we assume that you did not take any withdrawals before you Surrender your Contract. Assume there is a positive Index Change of 15% at the date on which you Surrender your Contract. Because the Index Change exceeds the Maximum Gain, the Maximum Gain applies and limits the Index Change to 12%. As a result, the Vested Gain is 6% (12% x 0.50). The Investment Base on the date of Surrender is $100,000. The Vested Gain that applies upon Surrender will be $6,000 ($100,000 x 0.06) and the amount payable will be $106,000 minus any related Early Withdrawal Charge.

Vested Loss

The Vested Loss is the portion of any negative Index Change that is taken into account when determining the value of an Indexed Strategy. Here is the formula that we use to calculate a Vested Loss for any day of a Term.

> Vested Loss = any negative Index Change since the start of the current Term (after taking into account either the Maximum Loss for each Term or the Buffer, as applicable) x remaining Investment Base for the current Term

Maximum Loss. The Maximum Loss for a Conserve/0% Floor Strategy or a Growth/-10% Floor Strategy is the most negative Index Change for a Term that is taken into account to determine the Vested Loss for that Indexed Strategy for that Term. For example, if the Maximum Loss for a Term is 10% and the negative Index Change at the end of that Term is 14%, then the Vested Loss for that Term is 10%.

- The Maximum Loss for each Term of a Conserve Strategy is 0%. This means that the value of a Conserve Strategy will not decrease due to a negative Index Change.
- The Maximum Loss for each Term of a Growth Strategy is a loss of 10%. This means that the value of a Growth Strategy will not decrease by more than 10% during a Term due to a negative Index Change.
- The Maximum Loss will not vary depending on the day of the Term. This means that for a Growth Strategy, the Maximum Loss throughout the Term is 10%.

Buffer. The Buffer is the portion of a negative Index Change for a Term that is disregarded when determining a Vested Loss for a 10% Buffer Strategy. The Buffer varies depending on the day of the Term. The Buffer at the end of a Term is 10%. Before the end of the Term, the Buffer is calculated daily as a prorated share of the annual 10% Buffer. For example, when 40% of a Term has elapsed, the Buffer on that day equals 40% of the Buffer that would apply at the end of the Term. When 80% of a Term has elapsed, the Buffer on that day equals 80% of the Buffer that would apply at the end of the Term. As a result, a negative Index Change of 15% would produce different Vested Losses at the following junctures:

- Day 146 of Term:
    Days Remaining to last Market Day of Term: 219
    Buffer: 10% x (365-219)/365 = 4%
    Vested Loss: 15% - 4% = 11%
- Day 292 of Term:
    Days Remaining to last Market Day of Term: 73
    Buffer: 10% x (365-73)/365 = 8%
    Vested Loss: 15% - 8% = 7%

- End of Term:
  Buffer: 10%
  Vested Loss: 15% -10% = 5%

No Vesting Factor. A Vesting Factor does not apply when the Vested Loss is calculated. This means that all of the negative Index Change is taken into account when calculating the Vested Loss for a given Indexed Strategy for a given Term.

Example. On the date of Surrender, your entire Account Value of $100,000 is allocated to the S&P 500 Growth Strategy, which has a 10% Maximum Loss. You Surrender your Contract before the end of a Term. For this example, we assume that you did not take any withdrawals before you Surrender your Contract. Assume there is a negative Index Change of 12.5% on the day that you Surrender your Contract. Because the Index Change exceeds the Maximum Loss, the Maximum Loss applies and limits the Index Change to 10%. As a result, the Vested Loss is 10%. The Investment Base on the date of Surrender is $100,000. The Vested Loss that applies upon Surrender will be $10,000 ($100,000 x 0.10 = $10,000) and the amount payable will be $90,000 minus any related Early Withdrawal Charge.

Effect of Vested Gains and Losses
Here is a summary of the effect of Vested Gains and Losses in various situations.

Vested Gain	A Vested Gain increases the Indexed Strategy value.	If you take a withdrawal, the Investment Base will be reduced by less than the actual amount of the withdrawal and any related Early Withdrawal Charge because of the Vested Gain.
Vested Loss	A Vested Loss reduces the Indexed Strategy value.	If you take a withdrawal, the Investment Base will be reduced by more than the actual amount of the withdrawal and any related Early Withdrawal Charge because of the Vested Loss.
Additional Information	Any change in an Indexed Strategy value will affect the Account Value, which is used to determine the Surrender Value, the Annuity Payout Value and the Death Benefit Value.	If you take a withdrawal, you will receive the amount you requested and the Indexed Strategy value will be reduced by the amount of the withdrawal and any related Early Withdrawal Charge.

Asymmetrical Impact of Index Changes on Growth and Buffer Strategies Using the Same Index

A Growth/-10% Floor Strategy and a 10% Buffer Strategy that use the same Index will often perform differently over identical time periods. These divergent results are produced by variations in the methods used to calculate Vested Gains and Vested Losses for Growth Strategies and Buffer Strategies. You should consider these variations if you are choosing between a Growth Strategy and a Buffer Strategy, and whether either is consistent with your income needs and risk tolerance. Currently, the only Index used by both a Growth Strategy and a Buffer Strategy is the S&P 500 Index.

Vested Gain Variations

Vested Gains for Growth Strategies and Buffer Strategies are calculated using the same formula, but that formula can produce different results when different Maximum Gains are applied. The Maximum Gain for a Buffer Strategy generally will be higher than the Maximum Gain for a Growth Strategy that uses the same Index. This is because the maximum amount of money you can lose is larger for a Buffer Strategy than a Growth Strategy.

For example, if we set a 12% Maximum Gain for the S&P 500 Growth Strategy and a 14% Maximum Gain for the S&P 500 Buffer Strategy, then the Vested Gains for identical investments in these two strategies would be the same over any period that the Index Value increased up to 12%, but would diverge over any period that the Index Value increased by more than 12%. During any such period, the Vested Gains for the Growth Strategy would be capped at 12%, while the Vested Gains for the Buffer Strategy may reach as high as 14%. As a result, it is possible for the Buffer Strategy to increase in value to a greater extent than the Growth Strategy.

Vested Loss Variations

The formulas used to calculate Vested Losses for Growth Strategies and Buffer Strategies are similar, except Vested Losses for a Growth Strategy are limited by a Maximum Loss, while Vested Losses for a Buffer Strategy are limited by a Buffer. The 10% Maximum Loss for a Growth Strategy does not change throughout the Term, which means that any negative Index Change between 0% and -10% is taken into account whenever Vested Loss is calculated. The amount of the Buffer for a Buffer Strategy increases each day during the course of each Term, culminating with a 10% Buffer at the end of each Term. This means that any a negative Index Change from 0 to -10% is disregarded when calculating Vested Loss at the end of the Term, but a smaller portion of a negative Index Change is disregarded when measuring a Vested Loss before the end of the Term.

The differences in the impact of negative Index Changes on a Growth Strategy and a Buffer Strategy using the same Index over the same Term depends on two variables: the size of the negative Index Change and the size of the Buffer on the date that the Vested Losses are measured.

The following chart illustrates how changes to these two variables impact Vested Losses for a Growth Strategy and a Buffer Strategy using the same Index over the same Term:

Impact of Negative Index Changes on Growth and Buffer Strategy Values Throughout Term

	Vested Loss on:									
	Day 73 (20% of Term Elapsed)		Day 146 (40% of Term Elapsed)		Day 219 (60% of Term Elapsed)		Day 292 (80% of Term Elapsed)		End of Term (100% of Term Elapsed)	
Index Change	Growth Strategy	Buffer Strategy 2% Buffer	Growth Strategy	Buffer Strategy 4% Buffer	Growth Strategy	Buffer Strategy 6% Buffer	Growth Strategy	Buffer Strategy 8% Buffer	Growth Strategy	Buffer Strategy 10% Buffer
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
-2%	-2%	0%	-2%	0%	-2%	0%	-2%	0%	-2%	0%
-4%	-4%	-2%	-4%	0%	-4%	0%	-4%	0%	-4%	0%
-6%	-6%	-4%	-6%	-2%	-6%	0%	-6%	0%	-6%	0%
-8%	-8%	-6%	-8%	-4%	-8%	-2%	-8%	0%	-8%	0%
-10%	-10%	-8%	-10%	-6%	-10%	-4%	-10%	-2%	-10%	0%
-12%	-10%	-10%	-10%	-8%	-10%	-6%	-10%	-4%	-10%	-2%
-14%	-10%	-12%	-10%	-10%	-10%	-8%	-10%	-6%	-10%	-4%
-16%	-10%	-14%	-10%	-12%	-10%	-10%	-10%	-8%	-10%	-6%
-18%	-10%	-16%	-10%	-14%	-10%	-12%	-10%	-10%	-10%	-8%
-20%	-10%	-18%	-10%	-16%	-10%	-14%	-10%	-12%	-10%	-10%
-22%	-10%	-20%	-10%	-18%	-10%	-16%	-10%	-14%	-10%	-12%

In general, Growth Strategies are designed to protect against larger negative Index Changes, while Buffer Strategies are designed to protect against smaller negative Index Changes. When identical investments are made in a Growth Strategy and a Buffer Strategy using the same Index over the same Term, a negative change in the Index produces the following results:

- a negative Index Change between 0% and -10%, measured on any day, would have a greater negative impact on the Growth Strategy
- a negative Index Change between -10% and -20% could have a greater negative impact on either strategy, depending on the Index Change and the size of the Buffer on the day the Index Change is measured
- a negative Index Change below -20%, measured on any day, would have a greater negative impact on the Buffer Strategy

See Examples - Impact of Withdrawals on Contract Values and Amounts Realized section below for examples that illustrate these concepts.

Examples - Impact of Withdrawals on Contract Values and Amounts Realized

These examples are intended to show you how a withdrawal from an Indexed Strategy before the end of the Term affects the Indexed Strategy values, Vested Gains and Losses, and amounts realized at the end of the Term. These examples assume that you allocate a $50,000 Purchase Payment to the S&P 500 Growth/-10% Floor Strategy and a $50,000 Purchase Payment to the S&P 500 10% Buffer Strategy. The examples assume that the withdrawals are 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.

Example A: Withdrawal When Index Rising Steadily

Impact of $10,000 Withdrawal on Day 146 of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Investment Base at Term Start	$50,000	$50,000
Index Value at Term Start	1000	1000
Index Value at Date of Withdrawal	1040	1040
Positive Index Change	(1040 - 1000) / 1000 = 4.00%	(1040 - 1000) / 1000 = 4.00%
Maximum Gain	Gain of 12%	Gain of 14%
Positive Index Change Limited by Maximum Gain	4.00%	4.00%
Vesting Factor on Day 146	25%	25%
Vested Gain as a Percentage	4.00% x 25% = 1.00% Vested Gain	4% x 25% = 1.00% Vested Gain
Vested Gain in Dollars	$50,000 x 1.00% = $500 Vested Gain	$50,000 x 1.00% = $500 Vested Gain
Strategy Value before Withdrawal	$50,000 + $500 = $50,500	$50,000 + $500 = $50,500
Amount Withdrawn	$5,000	$5,000
Percentage Reduction in Strategy Value	$5,000 / $50,500 = 9.90%	$5,000 / $50,500 = 9.90%
Proportional Reduction in Investment Base	$50,000 x .0990 = $4,950	$50,000 x .0990 = $4,950
Remaining Investment Base after Withdrawal	$50,000 - $4,950 = $45,050	$50,000 - $4,950 = $45,050

Value at End of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Remaining Investment Base after Withdrawal	$45,050	$45,050
Index Value at Term Start	1000	1000
Index Value at Term End	1130	1130
Positive Index Change	(1130 - 1000) / 1000 = 13.00%	(1130 - 1000) / 1000 = 13.00%
Maximum Gain	Gain of 12%	Gain of 14%
Positive Index Change Limited by Maximum Gain	12.00%	13.00%
Vesting Factor at Term End	100%	100%
Vested Gain as a Percentage	12.00% x 100% = 12.00% Vested Gain	13% x 100% = 13.00% Vested Gain
Vested Gain in Dollars	$45,050 x 12.000% = $5,406 Vested Gain	$45,050 x 13.00% = $5,857 Vested Gain
Strategy Value at Term End	$45,050 + $5,406 = $50,456	$45,050 + $5,857 = $50,907

<u>S&P 500 Growth Strategy</u>

In this example, the amount you realized on your $50,000 investment in the S&P 500 Growth Strategy at the end of the Term is $55,456 ($5,000 withdrawal plus the $50,456 Strategy value at the end of the Term).

Had no withdrawal occurred, your S&P 500 Growth Strategy value at the end of the Term would have been $56,000 ($50,000 Investment Base plus $6,000 gain ($50,000 x 12.00%)).

This hypothetical Strategy value of $56,000 exceeds the amount realized of $55,456 because:

- the gain at the time of the withdrawal caused the reduction in the Investment Base to be less than the actual amount withdrawn ($5,000 - $4,950 = $50); and

- the subsequent gain at the term end was calculated on a smaller Investment Base, which caused that gain to be smaller than the hypothetical gain ($5,406 - $6,000 = -$594).

The result for the S&P 500 Growth Strategy ($50 - $594 = -$544) is equal to the difference between the hypothetical Strategy value and the amount realized ($56,000 - $544 = $55,456).

S&P 500 Buffer Strategy
The amount you realized on your $50,000 investment in the S&P 500 Buffer Strategy at the end of the Term is $55,907 ($5,000 withdrawal plus the $50,907 Strategy value at the end of the Term). Had no withdrawal occurred, your S&P 500 Buffer Strategy value at the end of the Term would have been $56,500 ($50,000 Investment Base plus $6,500 gain ($50,000 x 13.00%)). This hypothetical Strategy value exceeds the amount realized for the same reasons described above for the S&P 500 Growth Strategy.

Your investment in the S&P 500 Buffer Strategy outperformed the S&P 500 Growth Strategy by $451 in this example. The amount you realized under the Buffer Strategy ($55,907) exceeds the amount you realized under the Growth Strategy ($55,456) because the Growth Strategy had a lower Maximum Gain, and the Index Change at the end of the Term exceeded the Growth Strategy's lower Maximum Gain.

Example B: Withdrawal When Index Falls and Then Rises

Impact of $10,000 Withdrawal on Day 146 of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Investment Base at Term Start	$50,000	$50,000
Index Value at Term Start	1000	1000
Index Value at Date of Withdrawal	880	880
Negative Index Change	(880 - 1000) / 1000 = -12.00%	(880 - 1000) / 1000 = -12.00%
Maximum Loss	Loss of 10%	N/A
Negative Index Change Limited by Maximum Loss	-10.00%	N/A
Buffer on Day 146 of Term	N/A	10% x (365-219)/365 = 4.00% Buffer
Negative Index Change Absorbed by Buffer	N/A	-4.00%
Negative Index Change after Buffer	N/A	-12.00% - (-4.00)% = -8.00%
Vested Loss as a Percentage	-10.00% x 100% = 10.00% Vested Loss	-8.00% x 100% = 8.00% Vested Loss
Vested Loss in Dollars	$50,000 x 10.00% = $5,000 Vested Loss	$50,000 x 8.00% = $4,000 Vested Loss
Strategy Value before Withdrawal	$50,000 - $5,000 = $45,000	$50,000 - $4,000 = $46,000
Amount Withdrawn*	$4,945	$5,055
Percentage Reduction in Strategy Value	$4,945 / $45,000 = 10.99%	$5,055 / $46,000 = 10.99%
Proportional Reduction in Investment Base	$50,000 x .1099 = $5,495	$50,000 x .1099 = $5,495
Remaining Investment Base after Withdrawal	$50,000 - $5,495 = $44,505	$50,000 - $5,495 = $44,505

Value at End of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Remaining Investment Base after Withdrawal	$44,505	$44,505
Index Value at Term Start	1000	1000
Index Value at Term End	1130	1130
Positive Index Change	(1130 - 1000) / 1000 = 13%	(1130 - 1000) / 1000 = 13%
Maximum Gain	Gain of 12%	Gain of 14%
Positive Index Change Limited by Maximum Gain	12.00%	13.00%
Vesting Factor at Term End	100%	100%
Vested Gain as a Percentage	12.00% x 100% = 12.00% Vested Gain	13.00% x 100% = 13.00% Vested Gain
Vested Gain in Dollars	$44,505 x 12.00% = $5,341 Vested Gain	$44,505 x 13.00% = $5,786 Vested Gain
Strategy Value at Term End	$44,505 + $5,341 = $49,846	$44,505 + $5,786 = $50,291

*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 $91,000 ($45,000 + $46,000). The S&P 500 Growth Strategy value was 49.45% of that total value ($45,000 / $91,000 = 49.45%), so 49.45% of the $10,000 withdrawal ($4,945) was taken from it. The S&P 500 Buffer Strategy value was 50.55% of that total value ($46,000 / $91,000 = 50.55%), so 50.55% of the $10,000 withdrawal ($5,055) was taken from it.

S&P 500 Growth Strategy
In this example, the amount you realized on your $50,000 investment in the S&P 500 Growth Strategy at the end of the Term is $54,791 ($4,945 withdrawal plus the $49,846 Strategy value at the end of the Term).

Had no withdrawal occurred, your S&P 500 Growth Strategy value at the end of the Term would have been $56,000 ($50,000 Investment Base plus $6,000 gain ($50,000 x 12.00%)).

This hypothetical Strategy value of $56,000 exceeds the amount realized of $54,791 because:

- the loss at the time of the withdrawal caused the reduction in the Investment Base to be greater than the actual amount withdrawn ($4,945 - $5,495 = -$550); and
- the subsequent gain at the term end was calculated on a smaller Investment Base, which caused that gain to be smaller than the hypothetical gain ($5,341 - $6,000 = -$659).

The result for the S&P 500 Growth Strategy (-$550 + -$659 = -$1,209) is equal to the difference between the hypothetical Strategy value and the amount realized ($56,000 - $1,209 = $54,791).

S&P 500 Buffer Strategy
The amount you realized on your $50,000 investment in the S&P 500 Buffer Strategy at the end of the Term is $55,346 ($5,055 withdrawal plus the $50,291 Strategy value at the end of the Term). Had no withdrawal occurred, your S&P 500 Buffer Strategy value at the end of the Term would have been $56,500 ($50,000 Investment Base plus $6,500 gain ($50,000 x 13.00%)). This hypothetical Strategy value exceeds the amount realized for the same reasons described above for the S&P 500 Growth Strategy.

Your investment in the S&P 500 Buffer Strategy outperformed the S&P 500 Growth Strategy by $555 in this example. The amount you realized under the Buffer Strategy ($55,346) exceeds the amount you realized under the Growth Strategy ($54,791) for two reasons: (1) at the time of the withdrawal, the Buffer absorbed more of the negative Index Change (4 percentage points of the -12.00% change) than the Maximum Loss absorbed (2 percentage points of the -12.00% change), thus resulting in more of the withdrawal being taken from the Buffer Strategy's value even though the Investment Base of both strategies was reduced by the same amount, and (2) the Index Change at the end of the Term exceeded the Growth Strategy's lower Maximum Gain, thus increasing the Buffer Strategy's value to a greater extent.

Example C: Withdrawal When Index Falling Steadily

Impact of $10,000 Withdrawal on Day 146 of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Investment Base at Term Start	$50,000	$50,000
Index Value at Term Start	1000	1000
Index Value at Date of Withdrawal	980	980
Negative Index Change	(980 - 1000) / 1000 = -2.00%	(980 - 1000) / 1000 = -2.00%
Maximum Loss	Loss of 10%	N/A
Negative Index Change Limited by Maximum Loss	-2.00%	N/A
Buffer on Day 146 of Term	N/A	10% x (365-219)/365 = 4.00% Buffer
Negative Index Change Absorbed by Buffer	N/A	Entire -2.00% Index Change
Negative Index Change after Buffer	N/A	0%
Vested Loss as a Percentage	-2.00% x 100% = 2.00% Vested Loss	0.00% Vested Loss
Vested Loss in Dollars	$50,000 x 2.00% = $1,000 Vested Loss	$0 Vested Loss
Strategy Value before Withdrawal	$50,000 - $1,000 = $49,000	$50,000 - $0 = $50,000
Amount Withdrawn*	$4,949	$5,051
Percentage Reduction in Strategy Value	$4,949 / $49,000 = 10.10%	$5,051 / $50,000 = 10.10%
Proportional Reduction in Investment Base	$50,000 x .1010 = $5,050	$50,000 x .1010 = $5,050
Remaining Investment Base after Withdrawal	$50,000 - $5,051 = $44,950	$50,000 - $5,051 = $44,950

Value at End of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Remaining Investment Base after Withdrawal	$44,950	$44,950
Index Value at Term Start	1000	1000
Index Value at Term End	860	860
Negative Index Change	(860 - 1000) / 1000 = -14.00%	(860 - 1000) / 1000 = -14.00%
Maximum Loss	Loss of 10%	N/A
Negative Index Change Limited by Maximum Loss	-10.00%	N/A
Buffer at End of Term	N/A	10% Buffer
Negative Index Change Absorbed by Buffer	N/A	-10.00%
Negative Index Change after Buffer	N/A	-14.00% - (-10.00)% = -4.00%
Vested Loss as a Percentage	-10.00% x 100% = 10.00% Vested Loss	-4.00% x 100% = 4.00% Vested Loss
Vested Loss in Dollars	$44,950 x 10.00% = $4,495 Vested Loss	$44,950 x 4.00% = $1,798 Vested Loss
Strategy Value at Term End	$44,950 - $4,455 = $40,454	$44,950 - $1,798 = $43,152

*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 $99,000 ($49,000 + $50,000). The S&P 500 Growth Strategy value was 49.49% of that total value ($49,000 / $99,000 = 49.49%), so 49.49% of the $10,000 withdrawal ($4,949) was taken from it. The S&P 500 Buffer Strategy value was 50.51% of that total value ($50,000 / $99,000 = 50.51%), so 50.51% of the $10,000 withdrawal ($5,051) was taken from it.

S&P 500 Growth Strategy
In this example, the amount you realized on your $50,000 investment in the S&P 500 Growth Strategy at the end of the Term is $45,404 ($4,949 withdrawal plus the $40,455 Strategy value at the end of the Term).

Had no withdrawal occurred, your S&P 500 Growth Strategy value at the end of the Term would have been $45,000 ($50,000 Investment Base minus $5,000 loss ($50,000 x -10.00%)).

The amount realized of $45,404 exceeds this hypothetical Strategy value of $45,000 because:

- the loss at the time of the withdrawal caused the reduction in the Investment Base to be greater than the actual amount withdrawn ($4,949 - $5,050 = -$101); and
- the subsequent loss at the term end was calculated on a smaller Investment Base, which caused that loss to be smaller than the hypothetical loss ($5,000 - $4,495 = $505).

The result for the S&P 500 Growth Strategy ($505 - $101 = $404) is equal to the difference between the amount realized and the hypothetical Strategy value ($45,404 - $404 = $45,000).

S&P 500 Buffer Strategy
The amount you realized on your $50,000 investment in the S&P 500 Buffer Strategy at the end of the Term is $48,203 ($5,051 withdrawal plus the $43,152 Strategy value at the end of the Term). Had no withdrawal occurred, your S&P 500 Buffer Strategy value at the end of the Term would have been $48,000 ($50,000 Investment Base minus $2,000 loss ($50,000 x -4.00%)). This hypothetical Strategy value is lower than the amount realized for the same reasons described above for the S&P 500 Growth Strategy.

Your investment in the S&P 500 Buffer Strategy outperformed the S&P 500 Growth Strategy by $2,799 in this example. The amount you realized under the Buffer Strategy ($48,203) exceeds the amount you realized under the Growth Strategy ($45,404) for two reasons: (1) at the time of the withdrawal, the Buffer absorbed all of the negative Index Change of -2.00%, while the Maximum Loss did not absorb any of the negative Index Change, thus resulting in more of the withdrawal being taken from the Buffer Strategy's value even though the Investment Base of both strategies was reduced by the same amount, and (2) at the end of the Term, the Buffer absorbed more of the negative Index Change (10 percentage points of the -14.00% change) than the Maximum Loss absorbed (4 percentage points of the -14.00% change), thus reducing the Strategy value of the Growth Strategy to a greater extent.

Example D: Withdrawal When Index Falling Steadily and Precipitously

Impact of $10,000 Withdrawal on Day 146 of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Investment Base at Term Start	$50,000	$50,000
Index Value at Term Start	1000	1000
Index Value at Date of Withdrawal	850	850
Negative Index Change	(850 - 1000) / 1000 = -15.00%	(850 - 1000) / 1000 = -15.00%
Maximum Loss	Loss of 10%	N/A
Negative Index Change Limited by Maximum Loss	-10.00%	N/A
Buffer on Day 146 of Term	N/A	10% x (365-219)/365 = 4.00% Buffer
Negative Index Change Absorbed by Buffer	N/A	-4.00%
Negative Index Change after Buffer	N/A	-15.00% - (-4.00)% = -11.00%
Vested Loss as a Percentage	-10.00% x 100% = 10.00% Vested Loss	-11.00% x 100% = 11.00% Vested Loss
Vested Loss in Dollars	$50,000 x 10.00% = $5,000 Vested Loss	$50,000 x 11.00% = $5,500 Vested Loss
Strategy Value before Withdrawal	$50,000 - $5,000 = $45,000	$50,000 - $5,500 = $44,500
Amount Withdrawn*	$5,028	$4,972
Percentage Reduction in Strategy Value	$5,028/ $45,000 = 11.17%	$4,972/ $44,500 = 11.17%
Proportional Reduction in Investment Base	$50,000 x .1117 = $5,585	$50,000 x .1117 = $5,585
Remaining Investment Base after Withdrawal	$50,000 - $5,585 = $44,415	$50,000 - $5,585 = $44,415

Value at End of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Remaining Investment Base after Withdrawal	$44,415	$44,415
Index Value at Term Start	1000	1000
Index Value at Term End	750	750
Negative Index Change	(750 - 1000) / 1000 = -25.00%	(750 - 1000) / 1000 = -25.00%
Maximum Loss	Loss of 10%	N/A
Negative Index Change Limited by Maximum Loss	-10.00%	N/A
Buffer at End of Term	N/A	10% Buffer
Negative Index Change Absorbed by Buffer	N/A	-10.00%
Negative Index Change after Buffer	N/A	-25.00% - (-10.00)% = -15.00%
Vested Loss as a Percentage	-10.00% x 100% = 10.00% Vested Loss	-15.00% x 100% = 15.00% Vested Loss
Vested Loss in Dollars	$44,415 x 10.00% = $4,442 Vested Loss	$44,415 x 15.00% = $6,662 Vested Loss
Strategy Value at Term End	$44,415 - $4,442 = $39,973	$44,415 - $6,662 = $37,753

*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 $89,500 ($45,000 + $44,500). The S&P 500 Growth Strategy value was 50.28% of that total value ($45,000 / $89,500 = 50.28%), so 50.28% of the $10,000 withdrawal ($5,028) was taken from it. The S&P 500 Buffer Strategy value was 49.72% of that total value ($44,500 / $89,500 = 49.72%), so 49.72% of the $10,000 withdrawal ($4,972) was taken from it.

S&P 500 Growth Strategy
In this example, the amount you realized on your $50,000 investment in the S&P 500 Growth Strategy at the end of the Term is $45,001 ($5,028 withdrawal plus the $39,973 Strategy value at the end of the Term).

Had no withdrawal occurred, your S&P 500 Growth Strategy value at the end of the Term would have been $45,000 ($50,000 Investment Base minus $5,000 loss ($50,000 x -10.00%)).

The amount realized equals (after taking into account the effects of rounding) this hypothetical Strategy value of $45,000 because the Maximum Loss equally limited the negative Index Change both at the time of withdrawal and at the end of the Term.

S&P 500 Buffer Strategy
The amount you realized on your $50,000 investment in the S&P 500 Buffer Strategy at the end of the Term is $42,725 ($4,972 withdrawal plus the $37,753 Strategy value at the end of the Term). Had no withdrawal occurred, your S&P 500 Buffer Strategy value at the end of the Term would have been $42,500 ($50,000 Investment Base minus $7,500 loss ($50,000 x -15.00%)). The amount realized of $42,725 exceeds this hypothetical Strategy value of $42,500 because:

- the loss at the time of the withdrawal caused the reduction in the Investment Base to be greater than the actual amount withdrawn ($4,972 - $5,585 = -$613); and
- the subsequent loss at the term end was calculated on a smaller Investment Base, which caused that loss to be smaller than the hypothetical loss ($7,500 - $6,662 = -$838).

The result for the S&P 500 Buffer Strategy (-$613 + $838 = $225) is equal to the difference between the amount realized and the hypothetical Strategy value ($42,725 - $225 = $42,500).

Your investment in the S&P 500 Buffer Strategy underperformed the S&P 500 Growth Strategy by $2,276 in this example. The amount you realized under the Buffer Strategy ($42,725) is smaller than the amount you realized under the Growth Strategy ($45,001) for two reasons: (1) at the time of the withdrawal, the Buffer absorbed less of the negative Index Change of -15.00%, thus resulting in more of the withdrawal being taken from the Buffer Strategy's value even though the Investment Base of both strategies was reduced by the same amount, and (2) at the end of the Term, the Buffer absorbed less of the negative Index Change (10 percentage points of the -25.00% change) than the Maximum Loss absorbed (15 percentage points of the -25.00% change), thus reducing the Strategy value of the Buffer Strategy to a greater extent.

Example E: Withdrawal When Index Rises and Then Falls

Impact of $10,000 Withdrawal on Day 146 of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Investment Base at Term Start	$50,000	$50,000
Index Value at Term Start	1000	1000
Index Value at Date of Withdrawal	1080	1080
Positive Index Change	(1080 - 1000) / 1000 = 8.00%	(1080 – 1000) / 1000 = 8.00%
Maximum Gain	Gain of 12%	Gain of 14%
Positive Index Change Limited by Maximum Gain	8.00%	8.00%
Vesting Factor on Day 146	25%	25%
Vested Gain as a Percentage	8.00% x 25% = 2.00% Vested Gain	8.00% x 25% = 2.00% Vested Gain
Vested Gain in Dollars	$50,000 x 2.00% = $1,000 Vested Gain	$50,000 x 2.00% = $1,000 Vested Gain
Strategy Value before Withdrawal	$50,000 + $1,000 = $51,000	$50,000 + $1,000 = $51,000
Amount Withdrawn	$5,000	$5,000
Percentage Reduction in Strategy Value	$5,000 / $51,000 = 9.80%	$5,000 / $51,000 = 9.80%
Proportional Reduction in Investment Base	$50,000 x .0980 = $4,900	$50,000 x .0980 = $4,900
Remaining Investment Base after Withdrawal	$50,000 - $4,900 = $45,098	$50,000 - $4,900 = $45,100

Value at End of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Remaining Investment Base after Withdrawal	$45,100	$45,100
Index Value at Term Start	1000	1000
Index Value at Term End	860	860
Negative Index Change	(860 - 1000) / 1000 = -14.00%	(860 - 1000) / 1000 = -14.00%
Maximum Loss	Loss of 10%	N/A
Negative Index Change Limited by Maximum Loss	-10.00%	N/A
Buffer at End of Term	N/A	10% Buffer
Negative Index Change Absorbed by Buffer	N/A	-10.00%
Negative Index Change after Buffer	N/A	-14% - (-10%) = -4.00%
Vested Loss as a Percentage	-10.000% x 100% = 10.00% Vested Loss	-4.00% x 100% = 4.00% Vested Loss
Vested Loss in Dollars	$45,098 x 10.00% = $4,510 Vested Loss	$45,098 x 4.00% = $1,804 Vested Loss
Strategy Value at Term End	$45,100 - $4,510 = $40,590	$45,100 - $1,804 = $43,296

S&P 500 Growth Strategy

In this example, the amount you realized on your $50,000 investment in the S&P 500 Growth Strategy at the end of the Term is $45,588 ($5,000 withdrawal plus the $40,588 Strategy value at the end of the Term).

Had no withdrawal occurred, your S&P 500 Growth Strategy value at the end of the Term would have been $45,000 ($50,000 Investment Base minus $5,000 loss ($50,000 x -10%)).

The amount realized of $45,590 exceeds this hypothetical Strategy value of $45,000 because:

- the gain at the time of the withdrawal caused the reduction in the Investment Base to be less than the actual amount withdrawn ($5,000 - $4,900 = $100); and
- the subsequent loss at the term end was calculated on a smaller Investment Base, which caused that loss to be smaller than the hypothetical loss ($5,000 - $4,510 = $490).

The result for the S&P 500 Growth Strategy ($100 + $490 = $590) is equal to the difference between the amount realized and the hypothetical Strategy value ($45,590 - $590 = $45,000).

S&P 500 Buffer Strategy

The amount you realized on your $50,000 investment in the S&P 500 Buffer Strategy at the end of the Term is $48,296 ($5,000 withdrawal plus the $43,296 Strategy value at the end of the Term). Had no withdrawal occurred, your S&P 500 Buffer Strategy value at the end of the Term would have been $48,000 ($50,000 Investment Base minus $2,000 loss ($50,000 x -4.00%)). This hypothetical Strategy value is lower than the amount realized for the same reasons described above for the S&P 500 Growth Strategy.

Your investment in the S&P 500 Buffer Strategy outperformed the S&P 500 Growth Strategy by $2,706 in this example. The amount you realized under the Buffer Strategy ($48,296) exceeds the amount you realized under the Growth Strategy ($45,590) because, at the end of the Term, the Buffer absorbed more of the negative Index Change (10 percentage points of the -14.00% change) than the Maximum Loss absorbed (4 percentage points of the -14.00% change), thus reducing the Strategy value of the Growth Strategy to a greater extent.

Example F: Multiple Withdrawals in a Volatile Market

Impact of $2,500 Withdrawal on Day 146 of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Investment Base at Term Start	$50,000	$50,000
Index Value at Term Start	1000	1000
Index Value at Date of Withdrawal	1040	1040
Positive Index Change	(1040 - 1000) / 1000 = 4.00%	(1040 – 1000) / 1000 = 4.00%
Maximum Gain	Gain of 12%	Gain of 14%
Positive Index Change Limited by Maximum Gain	4.00%	4.00%
Vesting Factor on Day 146	25%	25%
Vested Gain as a Percentage	4.00% x 25% = 1.00% Vested Gain	4.00% x 25% = 1.00% Vested Gain
Vested Gain in Dollars	$50,000 x 1.00% = $500 Vested Gain	$50,000 x 1.00% = $500 Vested Gain
Strategy Value before Withdrawal	$50,000 + $500 = $50,500	$50,000 + $500 = $50,500
Amount Withdrawn	$1,250	$1,250
Percentage Reduction in Strategy Value	$1,250 / $50,500 = 2.48%	$1,250 / $50,500 = 2.48%
Proportional Reduction in Investment Base	$50,000 x .0248 = $1,240	$50,000 x .0248 = $1,240
Remaining Investment Base after Day 146 Withdrawal	$50,000 - $1,240 = $48,760	$50,000 - $1,240 = $48,760

Impact of $3,500 Withdrawal on Day 219 of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Remaining Investment Base after Day 146 Withdrawal	$48,760	$48,760
Index Value at Term Start	1000	1000
Index Value at Date of Withdrawal	970	970
Negative Index Change	(970 - 1000) / 1000 = -3.00%	(970 - 1000) / 1000 = -3.00%
Maximum Loss	Loss of 10%	N/A
Negative Index Change Limited by Maximum Loss	-3.00%	N/A
Buffer on Day 219 of Term	N/A	10% x (365-146)/365 = 6.00% Buffer
Negative Index Change Absorbed by Buffer	N/A	Entire -3% Index Change
Negative Index Change after Buffer	N/A	0.00%
Vested Loss as Percentage	-3.00% x 100% = 3.00% Vested Loss	0.00% Vested Loss
Vested Loss in Dollars	$48,760 x 3.00% = $1,463 Vested Loss	$0 Vested Loss
Strategy Value before Withdrawal	$48,760 - $1,463 = $47,297	$48,760 - $0 = $48,760
Amount Withdrawn*	$1,723	$1,777
Percentage Reduction in Strategy Value	$1,723 / $47,297 = 3.64%	$1,777 / $48,760 = 3.64%
Proportional Reduction in Investment Base	$48,760 x .0364 = $1,775	$48,760 x .0364 = $1,775
Remaining Investment Base after Day 219 Withdrawal	$48,760 - $1,775 = $46,985	$48,760 - $1,775 = $46,985

Impact of $4,000 Withdrawal on Day 292 of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Remaining Investment Base after Day 219 Withdrawal	$46,985	$46,985
Index Value at Term Start	1000	1000
Index Value at Date of Withdrawal	1150	1150
Positive Index Change	(1150 - 1000) / 1000 = 15.00%	(1150 - 1000) / 1000 = 15.00%
Maximum Gain	Gain of 12%	Gain of 14%

Positive Index Change Limited by Maximum Gain	12.00%	14.00%
Vesting Factor in Month 8	50%	50%
Vested Gain as a Percentage	12.00% x 50% = 6.00% Vested Gain	14.00% x 50% = 7.00% Vested Gain
Vested Gain in Dollars	$46,985 x 6.00% = $2,819 Vested Gain	$46,985 x 7.00% = $3,289 Vested Gain
Strategy Value before Withdrawal	$46,985 + $2,819 = $49,804	$46,985 + $3,289 = $50,274
Amount Withdrawn*	$1,991	$2,009
Percentage Reduction in Strategy Value	$1,991 / $49,804 = 4.00%	$2,009 / $50,274 = 4.00%
Proportional Reduction in Investment Base	$46,985 x .0400 = $1,879	$46,985 x .0400 = $1,879
Remaining Investment Base after Day 292 Withdrawal	$46,985 - $1,879 = $45,106	$46,985 - $1,879 = $45,106

Value at End of Term	S&P 500 Growth Strategy	S&P 500 Buffer Strategy
Remaining Investment Base after Day 292 Withdrawal	$45,106	$45,106
Index Value at Term Start	1000	1000
Index Value at Term End	860	860
Negative Index Change	(860 - 1000) / 1000 = -14.0%	(860 - 1000) / 1000 = -14.00%
Maximum Loss	Loss of 10%	N/A
Negative Index Change Limited by Maximum Loss	-10.00%	N/A
Buffer at End of Term	N/A	10% Buffer
Negative Index Change Absorbed by Buffer	N/A	-10.00%
Negative Index Change after Buffer	N/A	-14.00% - (-10.00)%) = -4.00%
Vested Loss as a Percentage	-10.00% x 100% = 10.00% Vested Loss	-4.00% x 100% = 4.00% Vested Loss
Vested Loss in Dollars	$45,106 x 10.00% = $4,511 Vested Loss	$45,106 x 4.00% = $1,804 Vested Loss
Strategy Value at Term End	$45,106 - $4,511 = $40,595	$45,106 - $1,804 = $43,302

*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, on Day 219 the total value of all Indexed Strategies immediately before the withdrawal was $96,057 ($47,297 + $48,760). The S&P 500 Growth Strategy value was 49.24% of that total value ($47,297 / $96,057 = 49.24%), so 49.24% of the $3,500 withdrawal ($1,723) was taken from it. The S&P 500 Buffer Strategy value was 50.76% of that total value ($48,760 / $96,057 = 50.76%), so 50.76% of the $3,500 withdrawal ($1,777) was taken from it.

In this example, on Day 292 the total value of all Indexed Strategies immediately before the withdrawal was $100,078 ($49,804 + $50,274). The S&P 500 Growth Strategy value was 49.77% of that total value ($49,804 / $100,078 = 49.77%), so 49.77% of the $4,000 withdrawal ($1,991) was taken from it. The S&P 500 Buffer Strategy value was 50.23% of that total value ($50,274 / $100,078 = 50.23%), so 50.23% of the $4,000 withdrawal ($2,009) was taken from it.

S&P 500 Growth Strategy

In this example, the amount you realized on your $50,000 investment in the S&P 500 Growth Strategy at the end of the Term is $45,559 ($4,964 total withdrawals plus the $40,595 Strategy value at the end of the Term).

Had no withdrawal occurred, your S&P 500 Growth Strategy value at the end of the Term would have been $45,000 ($50,000 Investment Base minus $5,000 loss ($50,000 x -10.00%)).

The amount realized of $45,561 exceeds this hypothetical Strategy value of $45,000 because:

- the gains at the time of the $1,250 and $1,991 withdrawals caused the reductions in the Investment Base to be less than the actual amounts withdrawn ($1,250 - $1,240 = $10 and $1,991 - $1,879 = $112);
- the loss at the time of the $1,723 withdrawal caused the reduction in the Investment Base to be greater than the actual amount withdrawn ($1,723 - $1,775 = -$52); and

- the subsequent loss at the term end was calculated on a smaller Investment Base, which caused that loss to be less than the hypothetical loss ($5,000 - $4,511 = $489).

The result for the S&P 500 Growth Strategy ($10 + $112 - $52 + $489 = $559) is equal to the difference between the amount realized and the hypothetical Strategy value ($45,559 - $559 = $45,000).

S&P 500 Buffer Strategy
The amount you realized on your $50,000 investment in the S&P 500 Buffer Strategy at the end of the Term is $48,338 ($5,036 total withdrawals plus the $43,302 Strategy value at the end of the Term). Had no withdrawal occurred, your S&P 500 Buffer Strategy value at the end of the Term would have been $48,000 ($50,000 Investment Base minus $2,000 loss ($50,000 x -4.00%)). This hypothetical Strategy value is lower than the amount realized for the same reasons described above for the S&P 500 Growth Strategy.

Your investment in the S&P 500 Buffer Strategy outperformed the S&P 500 Growth Strategy by $2,779 in this example. The amount you realized under the Buffer Strategy ($48,398) exceeds the amount you realized under the Growth Strategy ($45,559) for three reasons: (1) at the time of the Day 219 withdrawal, the Buffer absorbed all of the negative Index Change of -3.00%, while the Maximum Loss did not absorb any of the negative Index Change, thus resulting in more of the withdrawal being taken from the Buffer Strategy's value even though the Investment Base of both strategies was reduced by the same amount, (2) at the time of the Day 292 withdrawal, the Index Change exceeded the Maximum Gain of both the Buffer Strategy and the Growth Strategy, but the Buffer Strategy had a higher Maximum Gain than the Growth Strategy, resulting in more of the withdrawal being taken from the Buffer Strategy's value even though the Investment Base of both strategies was reduced by the same amount, and (3) at the end of the Term, the Buffer absorbed more of the negative Index Change (10 percentage points of the -14.00% change) than the Maximum Loss absorbed (4 percentage points of the -14.00% change), thus reducing the Strategy value of the Growth Strategy to a greater extent.

Strategy Renewals and Reallocations at Term End

Renewals
At the end of each Term of a given Crediting Strategy, we will apply the ending value of that Strategy to a new Term of that same Strategy. The amount applied to a new Term of the same Strategy will not include any amount that is moved to a different Strategy as part of a reallocation at the Term end.

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 on or before the last day of the Term. For example, if the end of a Term falls on a weekend, we must receive your request on the last Market Day before that weekend.

Limitations
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 renewal or reallocation will be subject to Strategy availability, minimums and maximums. Currently there are no limitations on the amounts that may be applied to a 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 Maximum Gain in effect for that Strategy for that new Term. For example, the Declared Rate for a new Term of the Declared Rate Strategy may be different than the Declared Rate for the Term that is ending. Likewise, the Maximum Gain for an Indexed Strategy for a new Term may be different than the Maximum Gain for that Indexed Strategy for the Term that is ending.

Availability of Strategies
At the end of a Term, we may eliminate a particular Strategy in our discretion. 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 Maximum Gains that will apply for that next Term on our website. The Previous Notice Methods section of this prospectus describes a different process used to provide notice of the Declared Rate and the Maximum Gains that will apply to contracts issued prior to May 1, 2019.

We are not obligated to offer the Declared Rate Strategy or any one particular Indexed Strategy. At the end of a Term, we can add or stop offering any Strategy at our discretion. For example, we could stop offering Growth/-10% Floor Strategies after the first five Contract Years. 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.

One Indexed Strategy will always be available. If the Declared Rate Strategy is no longer available, then we must offer an Indexed Strategy that has a Maximum Loss of 0%. Unlike a Declared Rate Strategy, no earnings are guaranteed for an Indexed Strategy.

If we add or stop offering a Strategy at the end of a Term, we will send you a notification. If funds are held in a 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.

If you have allocated money to an Indexed Strategy and that Indexed Strategy will not be available for the next Term, then the Bailout right will apply. In this case, you may withdraw money from that Indexed Strategy at the end of the current Term without incurring an Early Withdrawal Charge, or you may reallocate amounts to another Strategy. If you have allocated money to the Declared Rate Strategy and it will not be available for the next Term, the Bailout right will not apply.

Reallocations to Default Strategies
At the end of a Term, to the extent any amount cannot be applied to a given Crediting Strategy for the next Term because that Strategy is no longer available or the amount is under the minimum or over the maximum for that Strategy for the new Term, if you do not withdraw the funds pursuant to your Bailout Right or reallocate them to another Index Strategy, then we will reallocate the amount to a default Strategy.

Here are the rules that will apply to reallocations to a default Strategy.
- We will reallocate to the Declared Rate Strategy.
- If no Declared Rate Strategy is available, then we will designate an Indexed Strategy that has a Maximum Loss of 0% and we will reallocate to that designated Strategy.

If the amount to be applied exceeds the maximum, then the default reallocation rules will apply only to the excess amount. For example, if the maximum amount for a Crediting Strategy is $50,000 and the amount to be applied is $54,000, then the default reallocation rules will apply only to the excess $4,000.

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).

A Surrender must be made by a Request in Good Order. The amount paid upon Surrender is the Surrender Value. 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 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. Unless you instruct us otherwise by a Request in Good Order prior to the date of the withdrawal, a withdrawal will be taken in the following order:

- first proportionally from funds that then qualify for a waiver of the Early Withdrawal Charge pursuant to the Bailout right;
- then from the Purchase Payment Account;
- then proportionally from the Declared Rate Strategies until all Declared Rate Strategies are exhausted; and
- then proportionally from Indexed Strategies.

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.

If an Early Withdrawal Charge applies to your withdrawal, you will receive the amount that you requested, and 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 also reduces the Investment Base used to calculate the Vested Gain or Loss for the Term. The reduction in the Investment Base for a withdrawal and any related Early Withdrawal Charge is proportional to the reduction in the Account Value. See Vested Gains and Losses section above.

Automatic Withdrawals

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

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

Currently, we do not charge a fee to participate in an automatic 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 automatic withdrawal program. If imposed, the fee will not exceed $30 annually.

Before electing an automatic withdrawal, you should consult with a financial advisor. Automatic withdrawals are similar to starting Annuity Payout Benefit payments, but will result in different taxation of payments and potentially a different amount of total payments over the life of your Contract. Automatic withdrawals will reduce the amount available under the Free Withdrawal Allowance described below. Unless a waiver applies, an Early Withdrawal Charge may apply to an automatic withdrawal during the Early Withdrawal Charge period.

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.

Examples - Amount Available for Withdrawal

The following examples are intended to help you understand the amount that may be available for withdrawal in different market environments.

Example G: Amount Available for a Withdrawal When Index Rises

This example assumes:

- you allocate a $50,000 Purchase Payment to the S&P 500 Growth/-10% Floor Strategy and a $50,000 Purchase Payment to the S&P 500 10% Buffer Strategy;
- the Contract Effective Date and the Term Start Date are both April 6, 2024;
- the Maximum Gain for the initial Term of the S&P 500 Growth Strategy is 12% and the S&P 500 Buffer Strategy is 14%;
- you request a $10,000 withdrawal on Day 146 of the Term (August 30, 2024);
- you do not take any other withdrawals during the initial Term; and
- the Term End Date is April 6, 2025.

Term Start Date - April 6, 2024	S&P 500 Growth Strategy	S&P 500 Buffer Strategy	
Strategy Value	$50,000	$50,000	See Footnote 1 below.
Investment Base	$50,000	$50,000	See Footnote 1 below.
Maximum Gain for Term	Gain of 12%	Gain of 14%	See Footnote 2 below.
Index Value	1900	1900	
Withdrawal Date - August 30, 2024			
Index Value	1976	1976	
Positive Index Change	4.00%	4.00%	See Footnote 3 below.
Positive Index Change Limited by Maximum Gain	4.00%	4.00%	See Footnote 4 below.
Vesting Factor on Day 146	25%	25%	See Footnote 5 below.
Vested Gain as a Percentage	1.00%	1.00%	See Footnote 6 below.
Vested Gain in Dollars	$500	$500	See Footnote 6 below.
Strategy Value before Withdrawal	$50,500	$50,500	See Footnote 7 below.
Amount of Withdrawal Requested	$10,000	$10,000	
Free Withdrawal Allowance	$5,000	$5,000	See Footnote 8 below.
Early Withdrawal Charge	$435	$435	See Footnote 9 below.
Total Amount Withdrawn	$10,435	$10,435	See Footnote 10 below.
Percentage Reduction in Strategy Value	20.66%	20.66%	See Footnote 11 below.
Proportional Reduction in Investment Base	$10,330	$10,330	See Footnote 11 below.
Remaining Investment Base after Withdrawal	$39,670	$39,670	See Footnote 12 below.
Strategy Value after Withdrawal	$40,065	$40,065	See Footnote 13 below.
Term End Date - April 6, 2025			
Index Value	2033	2033	
Positive Index Change	7.00%	7.00%	See Footnote 14 below.
Positive Index Change Limited by Maximum Gain	7.00%	7.00%	See Footnote 15 below.
Vesting Factor at Term End	100%	100%	See Footnote 16 below.
Vested Gain as a Percentage	7.00%	7.00%	See Footnote 17 below.
Remaining Investment Base after Withdrawal	$39,670	$39,670	See Footnote 12 below.
Vested Gain in Dollars	$2,777	$2,777	See Footnote 17 below.
Strategy Value at Term End	$42,447	$42,447	See Footnote 18 below.

Footnote 1. On the Term Start Date, the Strategy value is equal to the amount applied to the Strategy on the Term Start Date. The amount applied on the Term Start Date is also the beginning Investment Base.

Footnote 2. The Maximum Gain is the largest positive Index Change for a Term taken into account to determine the Vested Gain. In this example, the Maximum Gain is 12% (for the Growth Strategy) or 14% (for the Buffer Strategy), which means it will not affect the calculation of Vested Gain unless the Index goes up more than 12% or 14%, respectively.

Footnote 3. The Index Change is equal to the percentage change in the Index Value measured from the Term Start Date to the withdrawal date.

Formula	(Index Value on withdrawal date - Index Value on Term Start Date) / Index Value on Term Start Date
Calculation	(1976 - 1900) / 1900 = 4.00%

Footnote 4. In this example, the Index Change on the withdrawal date is not limited by the Maximum Gain because the Index did not go up more than 12% for the Growth Strategy or 14% for the Buffer Strategy.

Footnote 5. A Vesting Factor limits the portion of a positive Index Change that is taken into account to determine the Vested Gain. The Vesting Factor for a positive Index Change varies depending on the day of the Term. The Vesting Factor for a positive Index Change on any date within the first six months of a Term is 25%. The Vesting Factor for a positive Index Change on any date within the final six months of a Term (but before the Final Market Day of the Term) is 50%. The Vesting Factor for a positive Index Change on the final Market Day of the Term (or any date after that when the Vested Gain for the Term is calculated) is 100%. In this example, the Vesting Factor is 25% because the withdrawal date is a date within the first six months of the Term.

Footnote 6. When there is a positive Index Change, we use the following formulas to calculate the Vested Gain.

Formula	Index Change limited by Maximum Gain x Vesting Factor = Vested Gain percentage
Calculation	4.00% x 25% = 1.00%

Formula	Remaining Investment Base for the current Term x Vested Gain percentage = Vested Gain in dollars
Calculation	$50,000 x 0.0100 = $500

Footnote 7. In this example, there is a Vested Gain on the withdrawal date and you have not taken any withdrawals before that date. This means the Strategy value on the withdrawal date is the Investment Base plus the Vested Gain as of that date.

Formula	Investment Base + Vested Gain = Strategy value
Calculation	$50,000 + $500 = $50,500

Footnote 8. The Free Withdrawal Allowance (FWA) for the first Contract Year is 10% of the Purchase Payment. The FWA for each subsequent Contract Year is 10% of the Account Value as of the most recent Contract Anniversary.

Formula	Purchase Payment x 10% = FWA for first Contract Year
Calculation	$50,000 x 0.10 = $5,000

Footnote 9. The Early Withdrawal Charge that would apply to your withdrawal is equal to the amount subject to the charge multiplied by the Early Withdrawal Charge rate (EWC rate). The amount subject to the charge includes the charge itself. The amount subject to the charge does not include the FWA. The EWC rate depends on the Contract Year. In this example, the withdrawal occurs in the first Contract Year, when the EWC rate is 8%. The Early Withdrawal Charge rate declines after each of the first five Contract Years. There is no Early Withdrawal Charge after Contract Year 5.

Formula	[(Requested withdrawal - FWA) x EWC rate] / (1.00 - EWC rate) = Early Withdrawal Charge
Calculation	[($10,000 - $5,000) x 0.08] / (1.00 - 0.08) = $5,000 x 0.08 / 0.92 = $400 / 0.92 = $435

Footnote 10. When you request a withdrawal, you receive the amount you requested. If an Early Withdrawal Charge applies, we also withdraw an amount equal to the charge. This means that the total amount withdrawn from your annuity is equal to the amount you requested plus the applicable Early Withdrawal Charge.

Formula	Requested withdrawal + Early Withdrawal Charge = total amount withdrawn
Calculation	$10,000 + $435 = $10,435

Footnote 11. When you take a withdrawal, the portion of the Investment Base taken to pay for the withdrawal is proportional to the reduction in the value of the Indexed Strategy due to the withdrawal. If there is a Vested Gain as of the withdrawal date, the reduction in the Investment Base will be less than the total amount withdrawn. This difference occurs because your withdrawal is credited with a proportionate share of the Vested Gain.

Formula	Total amount withdrawn / Strategy value before withdrawal = percentage reduction in Strategy value
Calculation	$10,435 / $50,500 = 20.66%

Formula	Investment Base before withdrawal x percentage reduction in Strategy value = proportional reduction in Investment Base
Calculation	$50,000 x 0.2066 = $10,330

Footnote 12. On the withdrawal date after the withdrawal, the remaining Investment Base is equal to the Investment Base before the withdrawal minus the proportional reduction in the Investment Base for the withdrawal.

Formula	Investment Base before withdrawal - proportional reduction in Investment Base for withdrawal = Investment Base after withdrawal
Calculation	$50,000 - $10,330 = $39,670

Footnote 13. On the withdrawal date, the Strategy value after the withdrawal is equal to Strategy value before the withdrawal minus the total amount withdrawn.

Formula	Strategy value before withdrawal - total amount withdrawn = Strategy value after withdrawal
Calculation	$50,500 - $10,435 = $40,065

Footnote 14. The Index Change on the Term End Date is equal to the percentage change in the Index Value measured from the Term Start Date to the Term End Date.

Formula	(Index Value on Term End Date - Index Value on Term Start Date) / Index Value on Term Start Date
Calculation	(2033 - 1900) / 1900 = 7.00%

Footnote 15. In this example, the Index Change on the Term End Date is not limited by the Maximum Gain because the Index did not go up more than 12% for the Growth Strategy or 14% for the Buffer Strategy.

Footnote 16. The Vesting Factor for a positive Index Change on the Term End Date is 100%.

Footnote 17. When there is a positive Index Change, we use the following formulas to calculate the Vested Gain.

Formula	Index Change limited by Maximum Gain x Vesting Factor = Vested Gain percentage
Calculation	7.00% x 100% = 7.00%

Footnote 18. In this example, there is a Vested Gain on the Term End Date and you have taken a $10,000 withdrawal during the Term. This means the Strategy value on that date is the remaining Investment Base on the Term End Date plus the Vested Gain as of that date.

Formula	Remaining Investment Base on Term End Date + Vested Gain = Strategy value on Term End Date
Calculation	$39,670 + $2,777 = $42,447

Example H: Amount Available for a Withdrawal When Index Falls

This example assumes:

- you allocate a $50,000 Purchase Payment to the S&P 500 Growth/-10% Floor Strategy and a $50,000 Purchase Payment to the S&P 500 10% Buffer Strategy;
- the Contract Effective Date and the Term Start Date are both April 6, 2024;
- you request a $10,000 withdrawal on Day 146 of the Term (August 30, 2024);
- you do not take any other withdrawals during the initial Term; and
- the Term End Date is April 6, 2025.

Term Start Date - April 6, 2024	S&P 500 Growth Strategy	S&P 500 Buffer Strategy	
Strategy Value	$50,000	$50,000	See Footnote 1 below.
Investment Base	$50,000	$50,000	See Footnote 1 below.
Maximum Loss	Loss of 10%	N/A	See Footnote 2 below.
End of Term Buffer	N/A	10% Buffer	See Footnote 3 below.
Index Value	1900	1900	
Withdrawal Date - August 30, 2024			
Index Value	1786	1786	
Negative Index Change	-6.00%	-6.00%	See Footnote 4 below.
Negative Index Change Limited by Maximum Loss	-6.00%	N/A	See Footnote 5 below.
Buffer on Day 146	N/A	4.00% Buffer	See Footnote 6 below.
Vested Loss as a Percentage	-6.00%	-2.00%	See Footnote 7 below.
Vested Loss in Dollars	-$3,000	-$1,000	See Footnote 7 below.
Strategy Value before Withdrawal	$47,000	$49,000	See Footnote 8 below.
Amount of Withdrawal Requested	$10,000	$10,000	
Free Withdrawal Allowance	$5,000	$5,000	See Footnote 9 below.
Early Withdrawal Charge	$435	$435	See Footnote 10 below.
Total Amount Withdrawn	$10,435	$10,435	See Footnote 11 below.
Percentage Reduction in Strategy Value	22.20%	21.30%	See Footnote 12 below.
Proportional Reduction in Investment Base	$11,100	$10,650	See Footnote 12 below.
Remaining Investment Base after Withdrawal	$38,900	$39,350	See Footnote 13 below.
Strategy Value after Withdrawal	$36,565	$38,565	See Footnote 14 below.
Term End Date - April 6, 2025			
Index Value	1748	1748	
Negative Index Change	-8.00%	-8.00%	See Footnote 15 below.
Negative Index Change Limited by Maximum Loss	-8.00%	N/A	See Footnote 16 below.
Negative Index Change Limited by Buffer	N/A	0.00%	See Footnote 17 below.
Vested Loss Percentage	-8.00%	0.00%	See Footnote 18 below.
Remaining Investment Base	$38,900	$39,350	See Footnote 13 below.
Vested Loss in Dollars	$3,112	$0	See Footnote 18 below.
Strategy Value at Term End	$35,788	$39,350	See Footnote 19 below.

Footnote 1. On the Term Start Date, the Strategy value is equal to the amount applied to the Strategy on the Term Start Date. The amount applied on the Term Start Date is also the beginning Investment Base.

Footnote 2. The Maximum Loss is the largest negative Index Change for a Term taken into account to determine the Vested Loss for Growth Strategies. In this example, the Maximum Loss is 10%, which means it will not affect the calculation of Vested Loss unless the Index goes down more than 10%.

Footnote 3. The Buffer is the portion of a negative Index Change for a Term that is disregarded when determining a Vested Loss for a Buffer Strategy. The Buffer varies depending on the day of the Term. Once the final Market Day of the Term has been reached, the Buffer is 10%. Before the final Market Day, the Buffer is:

$$10\% \quad x \quad \frac{365 - N}{365}$$

where N is equal to the number of days remaining until the final Market Day of the Term.

Footnote 4. The Index Change is equal to the percentage change in the Index Value measured from the Term Start Date to the withdrawal date.

Formula	(Index Value on withdrawal date - Index Value on Term Start Date) / Index Value on Term Start Date
Calculation	(1786 - 1900) / 1900 = -6.00%

Footnote 5. In this example, the negative Index Change on the withdrawal date is not limited by the Maximum Loss because the Index did not go down more than 10%.

Footnote 6. In this example, only a portion of the negative Index Change on the withdrawal date is limited by the Buffer because the Index went down more than 4.00%.

Footnote 7.

Vested Loss – Growth Strategies: When there is a negative Index Change, we use the following formulas to calculate the Vested Loss for Growth Strategies.

Formula	Index Change limited by Maximum Loss = Vested Loss percentage
Calculation	-6.00% = -6.00%

Formula	Remaining Investment Base for the current Term x Vested Loss percentage = Vested Loss in dollars
Calculation	$50,000 x -0.0600 = -$3,000

Vested Loss – Buffer Strategies: When there is a negative Index Change, we use the following formulas to calculate the Vested Loss for Buffer Strategies.

Formula	Index Change limited by Buffer = Vested Loss percentage
Calculation	-6.00% Index Change – (-4.00%) Buffer = -2.00%

Formula	Remaining Investment Base for the current Term x Vested Loss percentage = Vested Loss in dollars
Calculation	$50,000 x -0.0200 = -$1,000

Footnote 8. In this example, there is a Vested Loss on the withdrawal date and you have not taken any withdrawals before that date. This means the Strategy value on the withdrawal date is the Investment Base, minus the Vested Loss as of that date.

Formula	Investment Base - Vested Loss = Strategy value
Calculation	For Growth Strategy: $50,000 - $3,000 = $47,000
	For Buffer Strategy: $50,000 - $1,000 = $49,000

Footnote 9. The Free Withdrawal Allowance (FWA) for the first Contract Year is 10% of the Purchase Payment. The FWA for each subsequent Contract Year is 10% of the Account Value as of the most recent Contract Anniversary.

Formula	Purchase Payment x 10% = FWA for first Contract Year
Calculation	$50,000 x 10% = $5,000

Footnote 10. The Early Withdrawal Charge that would apply to your withdrawal is equal to the amount subject to the charge multiplied by the Early Withdrawal Charge rate (EWC rate). The amount subject to the charge includes the charge itself. The amount subject to the charge does not include the FWA. The EWC rate depends on the Contract Year. In this example, the withdrawal occurs in the first Contract Year, when the EWC rate is 8%. The Early Withdrawal Charge rate declines after each of the first five Contract Years. There is no Early Withdrawal Charge after Contract Year 5.

Formula	[(Requested withdrawal - FWA) x EWC rate] / (1.00 - EWC rate) = Early Withdrawal Charge
Calculation	[($10,000 - $5,000) x 0.08] / (1.00 - 0.08) = $5,000 x 0.08 / 0.92 = $400 / 0.92 = $435

Footnote 11. When you request a withdrawal, you receive the amount you requested. If an Early Withdrawal Charge applies, we also withdraw an amount equal to the charge. This means that the total amount withdrawn from your annuity is equal to the amount you requested plus the applicable Early Withdrawal Charge.

Formula	Requested withdrawal + Early Withdrawal Charge = total amount withdrawn
Calculation	$10,000 + $435 = $10,435

Footnote 12. When you take a withdrawal, the portion of the Investment Base taken to pay for the withdrawal is proportional to the reduction in the value of the Indexed Strategy due to the withdrawal. If there is a Vested Loss as of the withdrawal date, the reduction in the Investment Base will be more than the total amount withdrawn. This difference occurs because your withdrawal is charged with a proportionate share of the Vested Loss.

Formula	total amount withdrawn / Strategy value before withdrawal = percentage reduction in Strategy value
Calculation	For Growth Strategy: $10,435 / $47,000 = 22.20% For Buffer Strategy: $10,435 / $49,000 = 21.30%
Formula	Investment Base before withdrawal x percentage reduction in Strategy value = proportional reduction in Investment Base
Calculation	For Growth Strategy: $50,000 x 0.2220 = $11,100 For Buffer Strategy: $50,000 x 0.2130 = $10,650

Footnote 13. On the withdrawal date, the remaining Investment Based after the withdrawal is equal to the Investment Base before the withdrawal minus the proportional reduction in the Investment Base for the withdrawal.

Formula	Investment Base before withdrawal - proportional reduction in Investment Base for withdrawal = Investment Base after withdrawal
Calculation	For Growth Strategy: $50,000 - $11,100 = $38,900 For Buffer Strategy: $50,000 - $10,650 = $39,350

Footnote 14. On the withdrawal date, the Strategy value after the withdrawal is equal to the Strategy value before the withdrawal minus the total amount withdrawn.

Formula	Strategy value before withdrawal - total amount withdrawn = Strategy value after withdrawal
Calculation	For Growth Strategy: $47,000 - $10,435 = $36,565 For Buffer Strategy: $49,000 - $10,435 = $38,565

Footnote 15. The Index Change on the Term End Date is equal to the percentage change in the Index Value measured from the Term Start Date to the Term End Date.

Formula	(Index Value on Term End Date - Index Value on Term Start Date) / Index Value on Term Start Date
Calculation	(1748 - 1900) / 1900 = -8.00%

Footnote 16. For the Growth Strategy, in this example, the negative Index Change on the Term End Date is not limited by the Maximum Loss because the Index did not go down more than 10%.

Footnote 17. For the Buffer Strategy, in this example, the entire negative Index Change on the Term End Date is limited by the Buffer because the Index went down less than 10%.

Footnote 18.

Vested Loss – Growth Strategies: When there is a negative Index Change, we use the following formula to calculate the Vested Loss percentage for Growth Strategies.

Formula	Index Change limited by Maximum Loss = Vested Loss percentage
Calculation	-8.00% = -8.00%

Formula	Remaining Investment Base for the current Term x Vested Loss percentage = Vested Loss in dollars
Calculation	$38,899 x -0.0800 = -$3,112

Vested Loss – Buffer Strategies: When there is a negative Index Change, we use the following formula to calculate the Vested Loss percentage for Buffer Strategies.

Formula	Index Change limited by Buffer = Vested Loss percentage
Calculation	-8% Index Change > -10% Buffer = 0%

Formula	Remaining Investment Base for the current Term x Vested Loss percentage = Vested Loss in dollars
Calculation	$39,352 x 0.0000 = $0

Footnote 19. In this example, there is a Vested Loss on the Term End Date for the Growth Strategy and you have taken a $10,000 withdrawal during the Term. This means the Strategy value on that date is the remaining Investment Base on the Term End Date minus the Vested Loss as of that date.

Formula	Remaining Investment Base on Term End Date - Vested Loss = Strategy value
Calculation	$38,900 - $3,112 = $35,788

In this example, there is no Vested Loss on the Term End Date for the Buffer Strategy and you have taken a $10,000 withdrawal during the Term. This means the Strategy value on that date is the remaining Investment Base on the Term End Date.

Formula	Remaining Investment Base on Term End Date = Strategy value
Calculation	$39,350 = $39,350

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 support higher Declared Rate Strategy interest rates and Indexed Strategy Maximum Gains by investing assets for a longer duration.

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.

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 plus any amount needed to pay the Early Withdrawal 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: (1) the Free Withdrawal Allowance; (2) the amount, if any, that qualifies under the Bailout right; or (3) the amount, if any, that qualifies for another 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%

Example. You Surrender your annuity 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 0.04) and you receive $96,000.

Example. You take a $10,000 withdrawal from your annuity 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 $400 ($10,000 x 0.04) and you receive $9,600.

An Early Withdrawal Charge may apply if you take a withdrawal during the first five Contract Years. That charge will reduce Strategy values, including the value of a Conserve/0% Floor Strategy.

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 ($200,000 x 0.10). 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.

Early Withdrawal Charge Waivers

Bailout Right. We will waive the Early Withdrawal Charge on amounts that you withdraw from this Contract at the end of a current Term if the amounts are held under an Indexed Strategy for that Term and either:

- the Maximum Gain for the next Term of that Strategy is less than its Bailout Trigger for the current Term; or
- that Strategy will not be available for the next Term.

Each current Term of an Indexed Strategy has its own Bailout Trigger, even if no funds are held under the Indexed Strategy for that Term. If your Contract has multiple Purchase Payments, the Bailout Trigger for one current Term of an Indexed Strategy may be different from the Bailout Trigger for another current Term of the same Indexed Strategy that started on a different date.

The initial Bailout Trigger for each Indexed Strategy is set out on the Contract Specifications page. It is less than the Maximum Gain that we anticipate setting for the initial Term of that Indexed Strategy.

For each subsequent Term, the Bailout Trigger is the lesser of:

- the Bailout Trigger for the Term that ended on the date the current Term began; or
- the Maximum Gain set for the current Term.

This means that:

- if the Maximum Gain is never set below the Bailout Trigger, then the Bailout Trigger will not change; and
- if the Maximum Gain is ever set below the Bailout Trigger, then the Bailout Trigger will be reduced for the new Term and for each Term that starts on an anniversary of that Term start date.

The Bailout Trigger will never increase from one Term to the next.

Example. The Bailout Trigger for the initial Term of an Indexed Strategy is 6.5%.
- If we set the Maximum Gain for the next Term of that Indexed Strategy at 7.5%, then you will not qualify for a waiver of the Early Withdrawal Charge at the end of the current Term and the Bailout Trigger for that next Term will continue to be 6.5%.
- If we set the Maximum Gain for the next Term of that Indexed Strategy at 5.5%, then you will qualify for a waiver of the Early Withdrawal Charge at the end of the current Term and the Bailout Trigger for that next Term will change to 5.5%.

If this waiver will apply to an Indexed Strategy at the end of a Term, we will notify you in writing at least 30 days before that Term ends. You may elect a withdrawal under the Bailout right by a Request in Good Order. We must receive your request before the end of the applicable Term.

This waiver will only apply to the amount held under the Indexed Strategy for the Term that is ending. It will not apply to amounts then held under a different Strategy, or to amounts held under the same Strategy for a Term ending on a different date. You may not carry over any unused part of the waiver from one Term to the next.

If you withdraw funds that qualify for a waiver under the Bailout right, the withdrawal will reduce the Free Withdrawal Allowance for the applicable Contract Year. For example, if the amount you withdraw that qualifies for a waiver under the Bailout right in Contract Year 4 is more than 10% of your Account Value as of the most recent Contract Anniversary, then no Free Withdrawal Allowance will be available for subsequent withdrawals in Contract Year 4.

Instead of withdrawing amounts that qualify for a waiver under the Bailout right, you may wish to reallocate those amounts to a different Strategy. A Request in Good Order to reallocate funds must be received by us before the end of the applicable Term.

Extended Care Waiver. (Rider form R1462316NW-Waiver of Early Withdrawal Charges for Extended Care Rider). We will waive the Early Withdrawal Charge that would otherwise apply if you make a Request in Good Order and:
- your Contract is modified by the Extended Care Waiver Rider;
- 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 at least one year after the Contract Effective Date; 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. In California, the Extended Care Waiver Rider has been replaced with the Waiver of Early Withdrawal Charges for Facility Care or Home Care or Community-Based Services Rider, which provides for a waiver of Early Withdrawal Charges under an expanded variety of circumstances. Please see the rider for details.

Terminal Illness Waiver. (Rider form R1462416NW-Waiver of Early Withdrawal Charges Upon Terminal Illness Rider). We will waive the Early Withdrawal Charge that would otherwise apply if you make a Request in Good Order and:
- your Contract is modified by the Waiver of Early Withdrawal Charges upon Terminal Illness Rider;
- 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; and
- the diagnosis is rendered by a physician more than one year after the Contract Effective Date.

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. Please see the rider for details.

Required Minimum Distributions. No special waiver of Early Withdrawal Charges exists for required minimum distributions except as may be offered from time to time under an automated payment program.

State Limitations. In some states, our ability to waive fees or charges may be limited by applicable laws, regulations or administrative positions. Please see the "State Variations" section below for information on additional state variations.

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, and your Beneficiary designations will no longer apply. 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 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, 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.

The earliest permitted date and the latest permitted date for the Annuity Payout Initiation Date are set out on your Contract Specifications Page. 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, and the payment interval.

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.

Form of Annuity Payout Benefit

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.

In place of that, 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 below. 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.

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 payments.

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 becomes a successor owner of the Contract, 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.

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 the receipt of proof of death and a Request in Good Order for a lump sum payment.
- 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 and a Request in Good Order. 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 or 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, and the payment interval.

Death Benefit Value

The Death Benefit Value is the greater of:

- the Account Value determined as of the date that the Death Benefit Value is determined; or
- the Purchase Payments, reduced proportionally for all withdrawals, but not including amounts applied to pay Early Withdrawal Charges (the "Purchase Payment base").

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

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. 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 x 0.08 = $9,600

Determination Date

The date that the Death Benefit Value is determined is the earlier of: (1) the first anniversary of the date of death; or (2) the date that we have received both proof of death and Requests in Good Order with instructions as to the form of Death Benefit from all Beneficiaries. Thus, in many cases where there are multiple Beneficiaries, the date that the Death Benefit Value is determined will be the date when the last Beneficiary submits the necessary Request in Good Order or the first anniversary of death. Until then, the Contract values remain in the Crediting Strategies and the Indexed Strategy values may fluctuate. This risk is borne by the Beneficiaries.

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;
- 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.

Form of Death Benefit

The Death Benefit is paid in the form of annual payments for a fixed period of two years.

In place of that, 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.

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

Any election is subject to the Death Benefit Distribution Rules described below.

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 payments.

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.

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.

Option	Description for Annuity Payout Benefit	Description for Death Benefit
Fixed Period Payout	We will make periodic payments to you, or to the Annuitant, if you direct, for the fixed period of time that you select. • 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 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.	We will make periodic payments to the Beneficiary for the fixed period of time that you or the Beneficiary selects. • 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. The fixed period cannot exceed the life expectancy of the Beneficiary. For a tax-qualified contract, the fixed period also cannot exceed 10 years.

Option	Description for Annuity Payout Benefit	Description for Death Benefit
Life Payout	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.	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. 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. For a tax-qualified contract, a Life Payout is not available to all Beneficiaries.
Life Payout with Payments for at Least a Fixed Period	We will make periodic payments to you, or to the Annuitant, if you direct, for as long as the Annuitant lives. • 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 a tax-qualified contract, fixed periods longer than 10 years are not available.	We will make periodic payments to the Beneficiary for as long as the Beneficiary lives. • 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. 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.

<table>
<tr><th>Option</th><th>Description for Annuity Payout Benefit</th><th>Description for Death Benefit</th></tr>
<tr><td>Joint and One-Half Survivor Payout</td><td>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.
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.
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 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.</td><td>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.
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.
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 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.

A Joint and One-Half Survivor Payout is only available to a Beneficiary who is the surviving spouse of the owner.</td></tr>
</table>

We will make payments in any other form of Payout Option 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 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 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.

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 Applications and Requests

Processing Applications and Initial Purchase Payments

We will process an application when we have received both the application and the initial Purchase Payment.

- If that happens on a Market Day before the Market Close, we will process the application and apply the Purchase Payment on that Market Day.
- If that happens on a Market Day after the Market Close or on a day that is not a Market Day, then we will process the application and apply the Purchase Payment on the next Market Day.

We cannot process your application if it is not a Request in Good Order or if we have not received your initial Purchase Payment. Likewise, we cannot apply your initial Purchase Payment if we have not received your application.

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

Processing Additional Purchase Payments

- If we receive an additional Purchase Payment on a Market Day before the Market Close, we will apply it on that Market Day.
- If we receive an additional 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 on the next Market Day.

We cannot apply an additional Purchase Payment if we do not have complete instructions from you.

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

Processing Requests

Requests may be made by mail at P.O. Box 5423, Cincinnati OH 45201-5423. Request by fax may be made at 800-807-9777. Requests for reallocations among 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 (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 at 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 automatic 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 automatic 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, President's Day, Good Friday, Memorial Day, 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.

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

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;
- an emergency exists such that it is not reasonably practicable to determine fairly the value of the Index; or
- we are permitted to do so under a regulatory order.

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.

Right to Cancel (Free Look)

If you change your mind about owning the Contract, you can cancel it within 20 days after you receive it. If you purchased 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.

When you cancel the Contract within this free look period, we will not assess an Early Withdrawal Charge. Unless otherwise required by state law, you will receive the Account Value of your Contract on the day that we receive your cancellation request. The amount you receive may be more or less than your Purchase Payment(s) depending upon the amount of interest earned by your Contract during the free look period and any Vested Gain or Loss that applies as of the day that we receive your cancellation request. This means that you bear the risk of any decline in the Account Value of your Contract during the free look period. 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.

In certain 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. In those states, no interest or Vested Gain will be paid.

Annual Statement and Confirmations

At least once each calendar 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) the interest credited to your Contract and Vested Gains and Losses credited to your Contract.

We will also send you written confirmations of Purchase Payments, 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 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 has been triggered, 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).

Owner

The Owner on the Contract Effective Date is set out on your Contract Specifications Page. The Owner possesses all of the ownership rights under a Contract, such as making allocations among the Strategies, electing a Payout Option, and designating a Beneficiary.

If an Owner is a trust, custodial account, corporation, limited liability company, partnership, or other entity, then the age of the eldest Annuitant is treated as the age of the Owner for all purposes of this Contract.

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 at any time during your lifetime. A change of Owner cancels all prior Beneficiary designations. It does not cancel a designation of an Annuitant or a Payout Option election.
- ***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.

Assignment

- ***For a Nonqualified Contract***. 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 assign your rights under this Contract except to the limited extent permitted by the tax qualification endorsement.

An assignment must be made by a Request in Good Order. We are not responsible for the validity of any assignment. An assignment may have adverse tax consequences.

The rights of a person holding an 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 the person holding it or as provided by law.

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;
- the sole Beneficiary under the Contract is your spouse or a revocable trust or custodial account created by your spouse;
- either you make that election by a Request in Good Order before your death or your spouse makes that election by a Request in Good Order before the Death Benefit Payment Date; and
- you were not a successor owner of the Contract.

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 52.

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 the natural person on whose life Annuity Payout Benefit payments are based. The Annuitant on the Contract Effective Date is set out on your Contract Specifications Page.

- ***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 natural person 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 a joint Owner, then the surviving Owner is the Beneficiary no matter what other designation you may have made.
- In all other cases, you may designate a person or person who will be the Beneficiaries as provided in the Designation of Beneficiary provision of the Contract.
- If no designated Beneficiary is surviving, then the Beneficiary is your estate.
- If the sole Beneficiary under the Contract is your spouse or a revocable trust or custodial account created by 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. We must receive the request on or before the date of death for which a Death Benefit is payable.

- You may designate two or more persons jointly as the Beneficiaries. Unless you state otherwise, joint Beneficiaries that are surviving are entitled to equal shares.
- You may designate one or more persons as contingent Beneficiary. Unless you state otherwise, a contingent Beneficiary is entitled to a benefit only if there is no primary Beneficiary who that is surviving.

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.

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.

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 underpaid amount with interest. If payments would be lower, we may deduct the overpaid amount, with interest, from succeeding payments.

Involuntary Termination

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 Vested Gains and Vested Losses used to calculate the values of Indexed Strategies with Terms that are not ending on the termination date.

Loans

Loans are not available under the Contract.

Previous Notice Methods

For contracts issued before May 1, 2019, we will send you a written notice at least 30 days before the end of each Term with the Declared Rate and the Maximum Gains that will apply for the next Term.

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.massmutualascend.com or call us at 1-800-789-6771.

The following information is a summary of material state variations as of the date of this prospectus.

General

For Contracts Issued in Illinois and New Jersey: References to “spouse” have been changed to “spouse or civil union partner.”

Extended Care Waiver Rider. The table below summarizes material state variations related to the rider.

For Contracts Issued in:	*Variations in Extended Care Waiver Rider*
California	The Waiver of Early Withdrawal Charges for Facility Care or Home Care or Community-Based Services Rider (CA Rider) replaces the Extended Care Waiver Rider. The CA Rider provides a waiver under an expanded set of circumstances. The waiver will apply if, at the time of the withdrawal or 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	The conditions under which the waiver applies have been modified. The waiver will apply if at the time of a withdrawal or 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.
Kansas	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.
Massachusetts and Missouri	This waiver rider in not available in Massachusetts or Missouri.
Montana	The definition of medically necessary has been modified and refers to the insured’s physician.
Nebraska	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	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.”
Pennsylvania	The conditions under which the waiver is available have been modified. The waiver will apply if at the time of a withdrawal or 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.”
Vermont	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. 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.”

For Contracts Issued in:	*Variations in Extended Care Waiver Rider*
Washington	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 Rider. The table below summarizes material state variations related to the rider.

For Contracts Issued in:	*Variations in Terminal Illness Waiver Rider*
Illinois, Kansas, Washington	As a result of the terminal illness, your life expectancy must be 24 months from the date of death, rather than 12 months.
Kansas	The diagnosis must be rendered 90 days after the contract effective date, rather than one year after the contract effective date.
New Jersey	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.
Massachusetts	This waiver rider in not available in Massachusetts.
Pennsylvania	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. The waiver is based on a terminal condition as defined in the rider, rather than a terminal illness.
Texas	The diagnosis must be rendered on or after the contract effective date, rather than one year after the contract effective date.

Form of Annuity Payout Benefit

For Contracts Issued in Texas: Payments under a Payout Option are subject to a $50 minimum.

Right to Cancel (Free Look)

State law governs the length of the free look period and the amount of the refund that you will receive. The table below summarizes the state law provisions.

For Contracts Issued in:	*Free Look Period and Refund*	*Replacement Situations: Free Look Period and Refund*
Alabama, Colorado, Hawaii, Iowa, Maine, Mississippi, Montana, New Mexico, Ohio, Oregon, Vermont, Virginia, West Virginia	20 days Account Value	30 days Account Value + Fees/Charges
Alaska, Arizona, Connecticut, Illinois, Kansas, Michigan, New Jersey, North Dakota, South Dakota	20 days Account Value + Fees/Charges	30 days Account Value + Fees/Charges
Arkansas, District of Columbia, Pennsylvania	20 days Account Value	30 days Account Value
Delaware, Indiana, Massachusetts, Tennessee	20 days Account Value	30 days Purchase Payments
Georgia, Idaho, Missouri, Nevada, Oklahoma, Utah	20 days Purchase Payments	30 days Purchase Payments
Kentucky, Louisiana, Maryland, Nebraska, New Hampshire, North Carolina, Rhode Island, South Carolina, Texas	20 days Purchase Payments	30 days Account Value + Fees/Charges
California	30 days Account Value + Fees/Charges If owner is age 60 or older, refund amount is Purchase Payments	30 days Account Value + Fees/Charges If owner is age 60 or older, refund amount is Purchase Payments
Florida	21 days Account Value + Fees/Charges	30 days Account Value + Fees/Charges
Minnesota	20 days Account Value + Fees/Charges	30 days Purchase Payments

For Contracts Issued in:	*Free Look Period and Refund*	*Replacement Situations: Free Look Period and Refund*
Washington	20 days Greater of: (1) Purchase Payments or (2) Account Value minus taxes	30 days Purchase Payments
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

Assignment
For Contracts Issued in Ohio: Subject to the tax qualifications endorsement, if any, 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.

Amendment of the Contract
For Contracts Issued in Florida and Texas: 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
For Contracts Issued in Texas: 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.

Index Replacement

We may replace an Index if it is discontinued or we are no longer able to use it, its calculation changes substantially, or we determine that hedging instruments are difficult to acquire or the cost of hedging becomes excessive. 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 an Index during a Term, we will calculate Vested Gains and Losses using the old Index up until the replacement date. After the replacement date, we will calculate Vested Gains and Losses 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 Index Change for the old Index from the start of the Term to the replacement date.

If we replace an Index, the applicable Maximum Gain and Bailout Trigger for the Term, the applicable Maximum Loss or Buffer, and the Vesting Factors will not change.

Example. This example is intended to show how we would calculate Vested Gain or Loss on any day during a Term if we have replaced an Index during the Term. This example assumes: (1) you allocate $50,000 to a Growth/-10% Floor Strategy; and (2) the replacement is made on day 90 of the Term. To simplify the example, we assume that you take no withdrawals during the Term.

Index Change on Replacement Date for Old Index	
Old Index Value at Term Start	1000
Old Index Value on Replacement Date	1050
Old Index Change on Replacement Date	(1050 - 1000) / 1,000 = 5%

The 5% Index Change 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	
Old Index Change on Replacement Date	5%
New Index Value on Replacement Date	1785

Modified Start of Term Value for New Index	1785 / (100% + 5%) = 1700

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

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
Positive Index Change	(1853 - 1,700) / 1700) = 9%
Maximum Gain	Gain of 8%
Positive Index Change Limited by Maximum Gain	8%
Vesting Factor for Positive Index Change at Term End	100%
Vested Gain as a Percentage	8% x 100% = 8%
Vested Gain in Dollars	$50,000 x 8% = $4,000
Strategy Value at Term End	$50,000 + $4,000 = $54,000

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 who is not affiliated with MassMutual Ascend Life.

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. 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 59 1/2, 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 59 1/2, 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 59 1/2, 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	• 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))	• IRC §409A • Nongovernmental IRC §457(b) • IRC §457(f)	• 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	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. 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.		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. 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.
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.		

	Tax-Qualified Contracts and Plans	Nonqualified Deferred Compensation Plans	Other Non-Tax-Qualified Contracts
Possible Penalty Taxes for Distributions Before Age 59 1/2	Taxable portion of payments made before age 59 1/2 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 59 1/2 may be subject to a 10% penalty tax. Penalty taxes do not apply to payments after the Owner's death. Other exceptions may apply.
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 age 73 (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. Some beneficiaries may take payments over life or life expectancy, and others must receive all benefits within five or ten years after 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.

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.

Distribution of the Contracts

MM Ascend Life Investor Services, LLC ("MMALIS") is the principal underwriter and distributor of the securities offered through this prospectus. MMALIC and MMALIS are affiliated because MMALIS is a subsidiary of MMALIC. 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 MMALIC 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 to 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, MMALIC pays for some of MMALIS's operating and other expenses, including overhead and legal and accounting fees. MMALIC may reimburse MMALIS for certain sales expenses, such as marketing materials and advertising expenses, and other expenses of distributing the Contracts.

MMALIC 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 is not expected to 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. MMALIC 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.

MMALIC 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, MMALIC 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 MMALIC 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’s 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.

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 Indexed Strategy values for Vested Gains and Losses associated with the Indexed Strategies. 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 Indexed Strategy values for Vested Gains and Losses associated with the Indexed Strategies, we may move money between the Separate Account and our General 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.

Experts

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, 2022 and 2021, and for each of the years in the two-year period ended December 31, 2022, 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 19, 2023 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 19, 2023 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.

The statutory-basis financial statements of MassMutual Ascend Life Insurance Company (formerly known as Great American Life Insurance Company) as of December 31, 2020 and for the year then ended, appearing in this Prospectus and Registration Statement have been audited by Ernst & Young LLP, 221 East 4th Street, Suite 2900, Cincinnati, Ohio 45202, independent auditors, as set forth in their report included thereon. These statutory-basis financial statements are included in this registration statement in reliance on the report of Ernst & Young LLP given on the authority of such firm as experts in accounting and auditing.

The Ernst & Young LLP report dated May 14, 2021 of Great American 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 Ernst & Young 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 Registration Statement

We filed a Registration Statement with the Securities and Exchange Commission under the Securities Act of 1933 relating to the Contracts offered by this prospectus. This prospectus was filed as a part of the Registration Statement, but it does not constitute the complete Registration Statement. The Registration Statement contains further information relating to the Company and the Contracts. The Registration Statement and the exhibits thereto may be inspected and copied at the office of the Securities and Exchange Commission, located at 100 F Street, N.E., Washington, D.C., and may also be accessed at www.sec.gov. The Securities and Exchange Commission file number for the Contract is 333-270740.

Statements in this prospectus discussing the content of the Contracts and other legal instruments are summaries. The actual documents are filed as exhibits to the Registration Statement. For a complete statement of the terms of the Contracts or any other legal document, refer to the appropriate exhibit to the Registration Statement.

SECTION II

MASSMUTUAL ASCEND LIFE INFORMATION

Overview

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. 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.

Below is a chart that shows the relationships among MassMutual, MassMutual Ascend Life, and other MassMutual subsidiaries that are mentioned in this Section II of this prospectus. Each subsidiary in the chart is wholly-owned by its immediate parent.

Massachusetts Mutual Life Insurance Company ("MassMutual")

- Glidepath Holdings Inc. ("Glidepath") is a subsidiary of MassMutual. It is a financial services holding company.
    - **MassMutual Ascend Life Insurance Company** ("MMALIC") is a subsidiary of Glidepath. It is the issuer of the annuities that are the subject of this Registration Statement and other annuity products.
        - MM Ascend Life Investor Services, LLC ("MMALIS") is a subsidiary of MMALIC. It is the principal underwriter and distributor of the annuities that are the subject of this Registration Statement.
- MM Asset Management Holding LLC is a subsidiary of MassMutual. It is a financial services holding company.
    - Barings LLC ("Barings") is a subsidiary of MM Asset Management Holding LLC. It provides investment services for MassMutual and certain of its affiliated companies, including MMALIC.

Prior to October 3, 2022, MMALIC'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.

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

Directors and Executive Officers of MassMutual Ascend Life

Below is a list of the names and ages of the individuals who will serve as directors and executive officers of MMALIC, and a description of the business experience of each of the respective individuals.

Name	Year of Birth	Position(s) with MassMutual Ascend Life	Served in Position(s) Since
Dominic L. Blue	1976	Director	May 2021
Donna Carrelli	1974	Head of Insurance Operations	February 2022
Susan M. Cicco	1971	Director	May 2021
Geoffrey J. Craddock	1959	Director	May 2021
Roger W. Crandall	1964	Director, Chairman of the Board	May 2021
Michael R. Fanning	1963	Director, Vice Chairman of the Board and Chief Executive Officer	May 2021

Name	Year of Birth	Position(s) with MassMutual Ascend Life	Served in Position(s) Since
John P. Gruber	1962	Senior Vice President, Secretary, Chief Compliance Officer and General Counsel	November 2005
Paul A. LaPiana	1969	Director	May 2021
Sears Merritt	1981	Director	May 2022
Mark F. Muething	1959	Director President	October 1993 April 2018
Michael J. O'Connor	1969	Director	May 2021
Eric W. Partlan	1973	Director, Chief Investment Officer	May 2021
Brian P. Sponaugle	1969	Senior Vice President and Treasurer	May 2022
Arthur W. Wallace	1974	Director	May 2021
Elizabeth A. Ward	1964	Director	May 2021

Dominic L. Blue

Mr. Blue has served as the Head of MassMutual Strategic Distributors since October 2020. Mr. Blue has served in various positions with MassMutual since August 2011.

Donna Carrelli

Ms. Carrelli has served as MMALIC's Head of Insurance Operations since February 2022. Ms. Carrelli has served in various positions with the Company since March 1998.

Susan M. Cicco

Ms. Cicco has served as the Head of Human Resources & Employee Experience since January 2017 and also has served since July 2020 as the Chief of Staff to the CEO. Ms. Cicco has served in various positions with MassMutual since 1993.

Geoffrey J. Craddock

Mr. Craddock has served as the Chief Risk Officer of MassMutual since October 2017. Previously, Mr. Craddock served as the leader of risk management and asset allocation at MassMutual's former subsidiary, OppenheimerFunds, Inc., from 2008 through September 2017.

Roger W. Crandall

Mr. Crandall has served as Chairman of the Board of MMALIC since May 28, 2021. Mr. Crandall has served as Chairman, President and Chief Executive Officer of MassMutual since December 2010. Mr. Crandall has served in various positions with MassMutual since 1988.

Michael R. Fanning

Mr. Fanning has served as Vice Chairman of the Board and Chief Executive Officer of MMALIC since May 28, 2021. Mr. Fanning has served as Head of MassMutual U.S. (formerly USIG) since January 2009. He is responsible for MassMutual's insurance products and services. Mr. Fanning joined MassMutual in November 2006 and previously served as Chief Operating Officer of USIG.

John P. Gruber

Mr. Gruber has served as MMALIC's Senior Vice President, General Counsel and Secretary since November 2005. He also serves as Chief Compliance Officer of MMALIC. Mr. Gruber has served in various positions with the Company since July 1993.

Paul A. LaPiana

Mr. LaPiana has served as Head of MMUS Product since February of 2019. Mr. LaPiana joined MassMutual in July of 2016 and served as the Head of Field Management until he assumed his current role.

Sears Merritt

Mr. Merritt has served as the Head of Enterprise Technology & Experience since May 2022. Mr. Merritt has served in various positions with MassMutual since 2014.

Mark F. Muething

Mr. Muething has served as President of MMALIC since April 2018. Mr. Muething served in various positions with MMALIC since October 1993.

Michael J. O'Connor

Mr. O'Connor has served as the General Counsel of MassMutual since February 2017. Mr. O'Connor has served in various positions with MassMutual since he joined the company in 2005, including as the Chief of Staff to the CEO.

Eric W. Partlan

Mr. Partlan has served as MMALIC's Chief Investment Officer since May 28, 2021. Mr. Partlan has served as the Head of Portfolio Management at MassMutual since January 2013. He joined MassMutual in January of 2010 as the Head of Investment Risk and served in that office until he assumed his current role.

Brian P. Sponaugle

Mr. Sponaugle has served as Senior Vice President and Treasurer of MMALIC since June 2022.

Arthur W. Wallace

Mr. Wallace has served as MassMutual's Chief Actuary since he joined MassMutual in October of 2019. Previously, Mr. Wallace was Chief Actuary at Prudential Financial from November 2014 until joining MassMutual.

Elizabeth A. Ward

Ms. Ward has served as the Chief Financial Officer of MassMutual since June 2016. Ms. Ward has served in various positions since joining MassMutual in 2007, including as Chief Actuary and as Chief Enterprise Risk Officer.

Executive Compensation

MMALIC does not have any employees. Its parent, Glidepath, provides personnel to MMALIC pursuant to a Services Agreement between MMALIC and Glidepath.

As a result, MMALIC does not determine or pay any compensation to its executive officers or additional personnel provided by Glidepath. Glidepath determines and pays salaries, bonuses and other compensation to its executive officers and additional personnel provided by Glidepath commensurate with their positions, tenure and levels of responsibility. Glidepath also determines whether and to what extent it will provide employee benefits plans to such persons.

See "Transactions with Related Persons" for more information about the Services Agreement.

Director Compensation

Mark Muething is the only director who is an employee of Glidepath. No director receives any additional compensation for serving as a director.

Director Independence

No director is considered independent under independence standards applicable to MMALIC. MMALIC does not have a separately designated audit, nominating or compensation committee, but MassMutual's audit committee performs a similar function for MMALIC.

Compensation Committee Interlocks and Insider Participation

MMALIC does not have a compensation committee.

Security Ownership of Certain Beneficial Owners and Management

MassMutual indirectly owns 100% of the voting securities of MMALIC. MassMutual's principal executive offices are located at 1295 State Street, Springfield, Massachusetts 01111-0001.

Transactions with Related Persons

Transactions between MMALIC and Glidepath

Pursuant to a Leased Employee Agreement between MMALIC and Glidepath, Glidepath furnishes MMALIC with personnel as requested by MMALIC. MMALIC pays for these services on the basis of cost, which must be fair and reasonable. Payments for these services by MMALIC to Glidepath were approximately $98 million in 2022.

Transactions between MMALIC and MassMutual or Other MassMutual Subsidiaries

MMALIC and Barings are parties to an Investment Services Agreement under which Barings provides investment services to MMALIC in accordance with guidelines. MMALIC pays Barings a fee based on Barings's cost of providing these services.

Pursuant to an Administrative Services Agreement between MMALIC and MassMutual, MassMutual furnishes MMALIC 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 MMALIC to MassMutual were approximately $4.4 million in 2022.

MMALIC 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 MMALIC 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.

Transactions Involving Immediate Family Members of MMALIC's Directors and Executive Officers

A brother of MMALIC's President is a partner and Chairman of the Board of Keating Muething & Klekamp PLL. MMALIC and its related entities paid Keating Muething & Klekamp approximately $0.4 million in 2022, $1.1 million in 2021, and $1.2 million in 2020.

Review, Approval or Ratification of Transactions with Related Persons

MMALIC's senior management team approves all related party transactions involving directors and executive officers of MMALIC, including relevant transactions described in "Transactions Involving Immediate Family Members of MMALIC's Directors and Executive Officers" above. In considering the transaction, MMALIC's senior management team may consider all relevant factors, including as applicable: the business rationale for entering into the transaction; the alternatives to entering into a related person transaction; whether the transaction is on terms comparable to those available to third parties, or in the case of employment relationships, to employees generally; the potential for the transaction to lead to an actual or apparent conflict of interest and any safeguards imposed to prevent such actual or apparent conflicts; and the overall fairness of the transaction to MMALIC. Potential related party transactions are covered by MMALIC's Code of Conduct policy. Approval of such related person transactions would be evidenced by resolutions of the Finance committee of the MMALIC Board of Directors in accordance with its practice of reviewing and approving transactions in this manner.

Change in Accountants

Prior to the acquisition of GALIC by MassMutual on May 28, 2021, Ernst & Young LLP (E&Y) had been engaged to act as independent auditors of GALIC. On May 28, 2021, E&Y resigned as GALIC's independent auditors. On the same day, as the result of becoming a wholly-owned subsidiary of MassMutual, KPMG LLP ("KPMG"), which had been engaged by the Board of MassMutual, became GALIC's new independent registered public accounting firm to audit GALIC's statutory-basis financial statements for the fiscal year 2021.

The E&Y report dated May 14, 2021 on GALIC's statutory-basis financial statements as of December 31, 2020 and for each of the two years in the period ended December 31, 2020 did not contain any adverse opinion or a disclaimer of opinion and were not qualified or modified as to uncertainty, audit scope or accounting principles other than what is disclosed in the following paragraph.

The E&Y report dated May 14, 2021 of Great American Life Insurance Company includes explanatory language that states that the financial statements are prepared by Great American 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 Ernst & Young 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.

For the fiscal years ended December 31, 2019 and 2020 and any subsequent interim period prior to May 28, 2021, there were: (i) no disagreements between GALIC and E&Y on any matter of accounting principles or practices, financial statement disclosure, or auditing scope or procedures, which disagreements, if not resolved to the satisfaction of E&Y, would have caused E&Y to make reference to the subject matter of the disagreements in connection with its report, and (ii) no reportable events within the meaning set forth in Item 304(a)(1)(v) of Regulation S-K.

MMALIC provided E&Y with a copy of this disclosure before its filing with the SEC and requested that E&Y provide us with a letter addressed to the SEC stating whether or not it agrees with the above statements. A copy of that letter, furnished by E&Y in response to that request, is filed as Exhibit 16 to the registration statement filed with the SEC.

For the fiscal years ended December 31, 2019 and 2020, and any subsequent interim period prior to May 28, 2021, GALIC did not consult with KPMG regarding (i) the application of accounting principles to a specified transaction, either completed or proposed, or the type of audit opinion that might be rendered on GALIC's financial statements, and KPMG did not provide either a written report or oral advice to GALIC that was an important factor considered by GALIC in reaching a decision as to any accounting, auditing, or financial reporting issue, or (ii) any matter that was either the subject of a disagreement (as defined in Item 304(a)(1)(iv) of Regulation S-K and the related instructions) or a reportable event (as defined in Item 304(a)(1)(v) of Regulation S-K).

Information on MMALIC’s Business and Property

Competition

MMALIC’s annuity businesses operate in highly competitive markets. They compete with other insurers and financial institutions based on many factors, including: (i) ratings; (ii) financial strength; (iii) reputation; (iv) service to policyholders and agents; (v) product design (including interest rates credited, bonus features and index participation); and (vi) commissions. Because most policies are marketed and distributed through independent agents, the insurance companies must also compete for agents.

No single insurer dominates the markets in which MMALIC’s annuity businesses compete. See Risks Primarily Related to MMALIC’s Financial Strength and Claims-Paying Ability. MMALIC’s competitors include (i) individual insurers and insurance groups, (ii) mutual funds and (iii) other financial institutions. In a broader sense, MMALIC’s annuity businesses compete for retirement savings with a variety of financial institutions offering a full range of financial services. In the financial institution annuity market, MMALIC’s annuities compete directly against competitors’ annuities, certificates of deposit and other investment alternatives at the point of sale.

Sales of annuities, including renewal premiums, are affected by many factors, including: (i) competitive annuity products and rates; (ii) the general level and volatility of interest rates, including the slope of the yield curve; (iii) the favorable tax treatment of annuities; (iv) commissions paid to agents; (v) services offered; (vi) ratings from independent insurance rating agencies; (vii) other alternative investments; (viii) performance and volatility of the equity markets; (ix) media coverage of annuities; (x) regulatory developments regarding suitability and the sales process; and (xi) general economic conditions.

Financial Strength Ratings

MMALIC believes that the ratings assigned by independent insurance rating agencies are an important competitive factor because agents, potential policyholders and financial institutions often use a company’s rating as an initial screening device in considering annuity products. MMALIC believes that a rating in the “A” category by at least one rating agency is necessary to successfully compete in its primary annuity markets. In 2022, MMALIC was rated A+ (Superior) by A.M. Best and A+ by Standard & Poor’s.

Regulation

MMALIC is subject to regulation in the jurisdictions where MMALIC does business. In general, the insurance laws of the various states establish regulatory agencies with broad administrative powers governing, among other things, premium rates, solvency standards, licensing of insurers, agents and brokers, trade practices, forms of policies, maintenance of specified reserves and capital for the protection of policyholders, deposits of securities for the benefit of policyholders, investment activities and relationships between insurance subsidiaries and their parents and affiliates. Material transactions between insurance subsidiaries and their parents and affiliates generally must receive prior approval of the applicable insurance regulatory authorities and be disclosed.

The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 ("Dodd-Frank Act"), among other things, established a Federal Insurance Office ("FIO") within the U.S. Treasury. Under this law, the regulatory framework for the FIO to carry out its mandate to focus on systemic risk oversight continues to evolve. Since its formation, the FIO has worked with the National Association of Insurance Commissioners ("NAIC") and other stakeholders to explore a hybrid approach to regulation of the insurance industry; however, the state-based system of regulation has largely been retained. MMALIC cannot predict the future role of the FIO and its role in regulation of the insurance industry and how that might ultimately affect MMALIC's operations.

Most states have created insurance guaranty associations that assess solvent insurers to pay claims of insurance companies that become insolvent. Annual guaranty assessments for MMALIC has not been material.

<u>Risks Primarily Related to MMALIC's Financial Strength and Claims-Paying Ability</u>

We make annuity payout benefits payments and pay death benefits for this Contract from our general account. We also pay benefits for other insurance contracts from our general account, and our general account is subject to claims by our creditors. Our ability to make payments from our general account is subject to our financial strength. Set out below are the most significant factors that may negatively impact our financial strength and claims-paying ability.

Financial losses could adversely affect our financial strength and claims-paying ability.

Owners of MMALIC's insurance products do not share in the profits and losses generated by our business. However, if we were to experience significant losses, we might not have sufficient assets in our general account to satisfy all of the guarantees provided in our insurance contracts. Events that may result in financial losses are listed below. We cannot predict the impact that any of these events may ultimately have on our financial strength and claims-paying ability.

<u>Adverse developments in financial markets and deterioration in global economic conditions.</u>

Worldwide financial markets have, from time to time, experienced significant and unpredictable disruption. For example, a prolonged economic downturn may result in heightened credit risk, reduction in the valuation of certain investments and decreased economic activity. Our financial position is materially impacted by the global economy and capital markets. During an economic downturn, we could experience a drop in the demand for our insurance products. In addition, surrenders and withdrawals from MMALIC's insurance products might also increase during an economic downturn, and owners of MMALIC's insurance products might opt to discontinue or delay paying insurance premiums or additional purchase payments.

<u>Unfavorable interest rate environments.</u>

During periods of declining interest rates, we may experience losses as the spread tightens between crediting rates that we pay to owners of our insurance contracts and returns on our investments. During periods of increasing rates, we may experience financial losses due to increases in surrenders and withdrawals under our insurance contracts as owners of those contracts choose to seek higher returns.

<u>Losses on our investment portfolio.</u>

A significant majority of MMALIC's investment portfolio consists of fixed maturity investments, which are subject to both interest rate risk and credit risk. Interest rate risk refers to how the values of our fixed maturity investments fluctuate in response to changes in market interest rates. Increases in market interest rates generally result in decreases in the value of our fixed maturity investment portfolio. On the other hand, decreases in rates generally result in increases in the portfolio value. Credit risk refers to the risk that certain investments may default or become impaired due to deterioration in the financial condition of the issuers of those investments.

A portion of MMALIC's investment portfolio consists of equity investments that are generally valued based on quoted market prices and subject to market risk. Market risk refers to how market prices for equity investments are subject to fluctuation due to general market conditions or changes in the actual or perceived attractiveness of an investment. A decrease in the market price for an equity investment could result in losses upon the sale of that investment.

MMALIC's investment portfolio also includes investments that lack liquidity, such as privately placed fixed maturity investments, mortgage loans, collateralized debt obligations, commercial mortgage-backed securities, real estate and limited partnership interests. If we were required to sell illiquid investments on short notice, we might have difficulty doing so and may be forced to sell them for less than fair value.

Loss of market share due to intense competition.

There is strong competition among individual insurers and insurance groups, mutual funds and other financial institutions seeking clients for the products we provide. Competition is based on numerous factors including the ability to recruit and retain distribution, reputation, product design, crediting rates, insurance product performance, scope of distribution, perceived financial strength and credit ratings. If competition limits MMALIC's ability to write new or renewal business at adequate rates, its results of operations will be adversely affected.

Ineffectiveness of risk management policies.

Our risk management policies and procedures, which are intended to identify, monitor and manage economic risks, may not be fully effective at mitigating risk exposures in all market conditions or against all types of risk. For instance, we use derivatives to alleviate risks related to floating-rate investments as well as annuity products that credit interest or provide a return based, in part, on the change in a referenced index. Our use of derivatives may not accurately counterbalance the actual risk exposure, and any derivatives held may not be sufficient to completely hedge the associated risks. In addition, counterparties may fail to perform under the derivative financial instruments. We may also decide not to hedge, or fail to identify, certain risks to which we are exposed. Ultimately, our use of derivatives and other risk management strategies may be inadequate to protect against the full extent of the exposure or losses we seek to mitigate.

Changes in applicable law and regulations may affect our financial strength and claims-paying ability.

We are subject to comprehensive regulation and supervision by government agencies in all the jurisdictions in which we operate. Our operations, products and services are subject to a variety of state and federal laws. We are regulated by various regulatory authorities and self-regulatory authorities including state insurance departments, state securities administrators, the Securities and Exchange Commission, the Financial Industry Regulatory Authority, the Internal Revenue Service and the Department of Labor.

Changes to state and federal laws and regulations may materially impact the way we conduct business. Moreover, the pace of changes to the regulatory environment continues to increase. Federal and state governments, including federal and state regulatory authorities, are active in the regulation of the manufacture, sale and administration of annuity products. We cannot predict the potential effects that any new laws or regulations, changes in existing laws and regulations, or the interpretation or enforcement of laws and regulations may have on our business, but such changes may negatively impact our financial strength and claims-paying ability.

The inability to obtain or collect on reinsurance could adversely affect our financial strength and claims-paying ability.

We use reinsurance for various business segments as part of our risk management strategy. While reinsurance agreements typically bind the reinsurer for the life of the business reinsured at specific pricing, market conditions may determine the availability and cost of the reinsurance for new business. Our risk of loss increases if we are unable to purchase reinsurance at acceptable terms. We are also subject to credit risk related to the ability of a reinsurer to meet its obligations. If we are unable to purchase reinsurance at acceptable terms or if the financial condition of our reinsurers is impaired, it may impact our ability to meet our financial obligations.

A downgrade or potential downgrade in MMALIC's financial strength ratings by one or more rating agencies could adversely affect its financial strength and claims-paying ability.

MMALIC's claims-paying and financial strength is rated A+ (Superior) by A.M. Best and A+ by Standard & Poor's. We believe a rating in the "A" category by at least one rating agency is important for us to successfully compete in our primary annuity markets. We also believe the ratings assigned by these independent insurance rating agencies are an important competitive factor because agents, potential contract owners and financial institutions often use a company's rating as an initial screening device in considering annuity products. A downgrade in MMALIC's claims-paying and financial strength ratings could adversely impact MMALIC's financial strength and claims-paying ability by causing financial losses to our business. Such losses may be due to:

- Reduction in new sales of annuity products;
- Harm to our relationships with distributors of our annuity products;
- Increases to the cost of capital or limitation on our access to sources of capital;
- Harm to our ability to obtain reinsurance or reasonable terms for reinsurance;
- Significant increases in the number and amount of surrenders of, or withdrawals from, our annuity products; and
- Pressure to increase the crediting rates for our annuity products.

Variations from actual experience and management's estimates and assumptions could result in inadequate reserves.

We establish and maintain reserves to pay future benefits and claims of our policyholders and contract holders. The reserves we established are estimates, primarily based on actuarial assumptions with regard to our future experience, which involve the exercise of significant judgment. Our future financial results depend on the extent to which our actual future experience is consistent with the assumptions we have used in pricing our products and determining our reserves. Many factors can affect future experience, including investment yields (and spreads over fixed annuity crediting rates), benefit utilization rates, equity market performance, the cost of call and put options used in the indexed annuity business, persistency, mortality, surrenders, annuity benefit payments, withdrawals, expenses incurred and changes in regulations. Developing such assumptions is complex and involves information obtained from company-specific and industry-wide data, as well as general economic information. We cannot precisely predict the ultimate amounts we will pay for actual benefits or the timing of those payments. We use actuarial models to assist us in establishing reserves. If actual results differ significantly from our estimates and assumptions, our claim costs could increase significantly and our reserves could be inadequate. If so, we will be required to increase reserves or accelerate amortization of deferred acquisition costs. We cannot be certain that our reserves will ultimately be sufficient to pay future benefit and claims of policyholders and contract holders.

The amount of capital that we must hold to meet our statutory capital requirements can vary significantly from time to time.

Statutory capital requirements are set by applicable state insurance regulators and the NAIC. State insurance regulators have established regulations that govern reserving requirements and provide minimum capitalization requirements based on risk-based capital ("RBC") ratios for life insurance companies. Statutory surplus and RBC ratios may change in a given year based on a number of factors, including statutory income or losses, reserve changes, excess capital held to support growth, changes in equity market levels, interest rate changes, the value of certain fixed-income and equity securities, and changes to the RBC formulas. Additionally, state insurance regulators have significant leeway in interpreting existing regulations, which could further impact the amount of statutory capital or reserves that we must maintain. There is no guarantee that we will be able to maintain our current RBC ratio in the future or that our RBC ratio will not fall to a level that could have a material adverse effect on our business. If we are unable to maintain minimum capitalization requirements, our business may be subject to significant increases in supervision or control by state insurance regulators.

Legal actions and regulatory proceedings may adversely affect our financial strength and claims-paying ability.

We have been named as defendant in lawsuits. We have also been involved in regulatory investigations and examinations. We may be involved in lawsuits and regulatory actions in the future. Lawsuits and regulatory actions arise in various contexts, including MMALIC's roles as an insurer, investor, securities issuer and taxpaying entity. These actions may result in material amounts of damages or fines that we must pay and may involve certain regulatory authorities that have substantial power over our business operations. A negative outcome in any legal action or regulatory proceeding that results in significant financial losses or operational burdens may adversely impact MMALIC's financial position and claims-paying ability.

We may experience difficulties with technology or data security, which could have an adverse effect on our business.

We use computer systems and services to store, retrieve, evaluate and utilize company and customer data and information. Systems failures or outages could compromise our ability to perform business functions in a timely manner, which could harm our ability to conduct business and hurt our relationships with business partners and customers. In the event of a disaster such as a natural catastrophe, an industrial accident, a blackout, a malicious software attack, a terrorist attack or war, our systems may be inaccessible to employees, customers or business partners for an extended period of time. As a result, our employees may be unable to perform their duties for an extended period of time if our data or systems are disabled or destroyed.

Our computer systems are subject to cyber-attacks, viruses, malware, hackers and other external hazards, as well as inadvertent errors, equipment and system failures and to unauthorized or illegitimate actions by employees, consultants, agents and other persons with legitimate access to our systems. In addition, over time, the sophistication of these threats continues to increase. Our administrative and technical controls as well as other preventative actions used to reduce the risk of cyber incidents and protect our information may be insufficient to detect or prevent future unauthorized access, other physical and electronic break-ins, cyber-attacks or other security breaches to our computer systems or those of third parties with whom we transact business.

We have increasingly outsourced certain technology and business process functions to third parties and may continue to do so in the future. Outsourcing of certain technology and business process functions to third parties may expose us to increased risk related to data security or service disruptions. If we do not effectively develop, implement and monitor these relationships, third-party providers do not perform as anticipated, technological or other problems are incurred with a transition, or outsourcing relationships relevant to our business process functions are terminated, we may not realize expected productivity improvements or cost efficiencies and may experience operational difficulties, increased costs and a loss of business.

The increased risks identified above could expose us to data loss, disruption of service, monetary and reputational damages, competitive disadvantage and significant increases in compliance costs, and costs to improve the security and resiliency of our computer systems. The compromise of personal, confidential or proprietary information could also subject us to legal liability or regulatory action under evolving cyber-security, data protection and privacy laws and regulations enacted by the U.S. federal and state governments, or by various regulatory organizations. As a result, our ability to conduct business and our results of operations might be materially and adversely affected.

Any failure to protect the confidentiality of customer information could have a material adverse effect on our business and financial condition.

We are subject to privacy regulations and confidentiality obligations, including the Gramm-Leach-Bliley Act and state privacy laws and regulations, that restrict the use and dissemination of, and access to, the information we produce, store or maintain in the course of our business. We also have contractual obligations to protect certain confidential information received through various business relationships. The obligations generally include protecting such information in the same manner and to the same extent as we protect our own confidential information, and, in some instances, may impose indemnity obligations on us relating to unlawful or unauthorized disclosure of any such information.

If we do not properly comply with privacy regulations or fail to protect confidential information, we could experience adverse consequences, including reputational damage, possible litigation, and regulatory sanctions, such as penalties, fines and loss of license. This could have adverse impact on our image or customer relationships and, consequently, result in loss of business partners, lower sales, lapses of existing business or increased expenses. While we may maintain insurance to mitigate or offset these risks, we cannot be certain that any such insurance coverage would be sufficient in amount or scope to fully address any resulting losses or liability.

Failure to maintain effective and efficient information systems could adversely affect our business.

Our various lines of business depend greatly on the use of effective information systems. Maintaining and updating current information systems and the development of new systems to match emerging technology, regulatory standards and customer expectations requires a substantial commitment of resources. We must maintain adequate information systems in order to perform necessary business functions, including processing premium and purchase payments, administering our products, providing customer support and paying claims. We also use systems for investment management, financial reporting and data analysis to support our reserves and other actuarial estimates. Any interruptions may reduce our revenues or increase our expenses, and may adversely impact our reputation, business partnerships and customer relationships. In addition, system interruptions may impair our ability to timely and accurately complete our financial reporting and other regulatory obligations, and may impact the effectiveness of our internal controls over financial reporting.

The occurrence of catastrophic events, pandemics, terrorism or military actions could adversely affect our business operations.

The occurrence of natural or man-made disasters and catastrophes, including pandemics such as the outbreak of the coronavirus commonly referred to as “COVID-19”, acts of terrorism, floods, earthquakes, industrial accident, blackout, cyberattack, malicious software, insider threat, insurrections and military actions, including the Russian/Ukraine conflict and the resulting response by the United States and other countries, unanticipated problems with our business continuity plans and disaster recovery systems, or a support failure from a third party vendor, could adversely affect our business operations and business results. In addition to impacting our normal business operations, such disasters and catastrophes may impact us indirectly by changing the condition and behavior of our customers, business counterparties and regulators, as well as by causing declines or volatility in the economic and financial markets. We maintain business continuity plans for our operations, but we cannot predict with certainty when normal operations would resume if such an event occurred.

Forward-Looking Statements

The disclosures in this Form S-1 contain certain forward-looking statements that are subject to numerous assumptions, risks or uncertainties. The Private Securities Litigation Reform Act of 1995 provides a safe harbor for forward-looking statements. Some of the forward-looking statements can be identified by the use of words such as “anticipates”, “believes”, “expects”, “projects”, “estimates”, “intends”, “plans”, “seeks”, “could”, “may”, “should”, “will” or the negative version of those words or other comparable terminology. Such forward-looking statements include statements relating to: expectations concerning market and other conditions and their effect on future premiums, revenues, earnings and investment activities; recoverability of asset values; and rate changes.

Actual results and/or financial condition could differ materially from those contained in or implied by such forward-looking statements for a variety of reasons including but not limited to the following and those discussed in Risk Factors.

- changes in financial, political and economic conditions, including changes in interest and inflation rates, currency fluctuations and extended economic recessions or expansions in the U.S. and/or abroad;
- performance of securities markets, including the cost of equity index options;
- new legislation or declines in credit quality or credit ratings that could have a material impact on the valuation of securities in MMALIC’s investment portfolio;
- the availability of capital;
- regulatory actions (including changes in statutory accounting rules);
- changes in the legal environment affecting MMALIC or its customers;
- tax law and accounting changes;
- terrorist activities (including any nuclear, biological, chemical or radiological events), incidents of war or losses resulting from civil unrest and other major losses;
- disruption caused by cyber-attacks or other technology breaches or failures by MMALIC or its business partners and service providers, which could negatively impact MMALIC’s business and/or expose MMALIC to litigation;
- availability of reinsurance and ability of reinsurers to pay their obligations;
- trends in persistency and mortality;
- competitive pressures;
- the ability to obtain adequate rates and policy terms; and
- changes in MMALIC’s financial strength ratings assigned by major ratings agencies.

The forward-looking statements herein are made only as of the date of this report. MMALIC assumes no obligation to publicly update any forward-looking statements.

Management's Discussion and Analysis of Financial Conditions and Results of Operations

The following discussion provides an assessment of the financial position and results of operations on a statutory basis of MassMutual Ascend Life Insurance Company ("MMALIC" or "Company") operations. Statutory accounting practices ("SAP") financial information is prepared and presented in accordance with accounting practices prescribed or permitted by the National Association of Insurance Commissioners ("NAIC") and the Ohio Department of Insurance. Certain differences exist between SAP and U.S. generally accepted accounting principles ("GAAP"). See Note B of MMALIC's statutory basis audited financial statements, which are included elsewhere in this document, for a discussion of these differences.

OVERVIEW

In the fourth quarter of 2022, the Company's name was changed to MassMutual Ascend Life Insurance Company, formerly known as Great American Life Insurance Company ("GALIC"). MMALIC, a stock life insurance company domiciled in the state of Ohio, is a direct, wholly-owned subsidiary of Glidepath Holdings Inc., a financial services holding company wholly-owned by Massachusetts Mutual Life Insurance Company ("MassMutual").

MMALIC predominantly markets traditional fixed, fixed-indexed, and registered index-linked annuities nationwide to the savings and retirement markets and maintains term and universal life in-force business, which the Company manages as one operating segment. MMALIC is licensed to write life, annuity and accident & health insurance in the District of Columbia and all states other than New York.

CHANGE OF OWNERSHIP

On May 28, 2021, MassMutual purchased MMALIC, formerly known as GALIC, and its two insurance subsidiaries, Annuity Investors Life Insurance Company and Manhattan National Life Insurance Company, as well as a broker-dealer affiliate, MM Ascend Life Investor Services, LLC (formerly known as Great American Advisors, LLC) and insurance distributor AAG Insurance Agency, LLC from American Financial Group, Inc. ("AFG"). Total proceeds for the sale were $3.57 billion. MMALIC and its subsidiaries at that date became a direct wholly-owned subsidiary of Glidepath Holdings Inc., a financial services holding company wholly-owned by MassMutual.

NOTABLE TRANSACTIONS

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 $320.0 million ceding commission paid by Martello Re. The transaction resulted in a significant increase to MMALIC's Risk Based Capital ratio.

Effective January 1, 2022, the Company recaptured the fixed-indexed annuity policies ceded to Hannover Life Reassurance Company of America pursuant to an Indemnity Reinsurance Agreement, dated December 31, 2018. The financial impact of the reinsurance recapture was a decrease to statutory capital of $140.6 million and reported as a change in policyholder reserves.

In 2021 the Ohio Department of Insurance promulgated Ohio Administrative Code Section 3901-1-67, Alternative Derivative and Reserve Accounting Practices (OAC 3901-1-67). This regulation allows Ohio-domiciled insurance companies to utilize certain alternative derivative and reserve accounting practices for eligible derivative instruments and indexed products, respectively, in order to better align the measurement of indexed product reserves and the derivatives that hedge them. Effective January 1, 2022, the Company elected to apply OAC 3901-1-67 to its derivative instruments hedging fixed-indexed annuity products and fixed-indexed reserve liabilities.

Under OAC 3901-1-67, derivative instruments will be carried on the statutory balance sheet 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 annuity products will only reflect index interest credits at the end of the crediting term as compared to partial index interest credits accumulating throughout the crediting term as an increase in aggregate reserves for life and accident and health contracts. As a result of the Company's election to apply OAC 3901-1-67 as of January 1, 2022, total statutory admitted assets decreased $393.6 million, total statutory liabilities decreased $236.2 million and total statutory capital and surplus decreased $157.4 million. The following table summarizes the components of the total decrease in statutory surplus (in millions):

Change in reserve on account of change in valuation basis	$	236.2
Cumulative effect of change in accounting principle		(454.4)
Change in net deferred tax asset		46.2
Change in nonadmitted assets		14.6
Total decrease in statutory surplus	$	(157.4)

ANALYIS OF RESULTS OF OPERATIONS – YEARS ENDED DECEMBER 31, 2022 AND 2021

The following table presents MMALIC's statutory results of operations for the periods indicated:

	Year Ended December 31		
	2022	2021	% Change
Revenues:			
Premiums and annuity considerations	$ (7,198.3)	$ 5,027.0	-243%
Net investment income	1,019.0	1,951.0	-48%
Other income	581.0	97.0	499%
Total premiums and other revenues	(5,598.3)	7,075.0	-179%
Benefits and Expenses:			
Policyholder benefits	505.8	901.2	-44%
Surrender benefits	1,460.5	2,208.0	-34%
Change in policyholder reserves	(8,743.9)	3,107.8	-381%
Direct commissions and commissions and expense allowances on reinsurance assumed	364.6	285.2	28%
Other expenses	610.5	317.0	93%
Total benefits and expenses	(5,802.5)	6,819.2	-185%
Operating results before federal income taxes and realized capital gains (losses)	204.2	255.8	-20%
Federal income taxes on operations	(13.6)	(45.5)	-70%
Operating results before realized gains (losses)	190.6	210.3	-9%
Realized gains (losses) net of federal income taxes	(32.6)	118.7	-127%
Net income	$ 158.0	$ 329.0	-52%

Operating results before federal income taxes and realized capital gains (losses) decreased by 20% for the 12 months ended December 31, 2022 compared to the 12 months ended December 31, 2021. This decrease was primarily attributable to the Hannover reinsurance treaty recapture and the impact from the Martello Re reinsurance transaction.

Net income decreased 52% in 2022 compared to 2021. This decrease was largely driven by items mentioned above, along with realized losses in 2022 compared to realized gains in 2021. The realized losses in 2022 were primarily related to sales of fixed maturities, equities, and derivative instruments. The realized gains in 2021 were primarily related to sales of fixed maturities, equities, and other invested assets.

Revenues

Total revenues decreased to ($5,598.3) million in the 12 months ended December 31, 2022 from $7,075.0 million for the 12 months ended December 31, 2021. Following is a discussion of the primary contributors to this decrease.

This decrease is primarily attributable to the initial Martello Re transaction recorded through premium and annuity considerations (offset in change in policyholder reserves). Excluding the initial Martello Re ceded premium of $14.2 billion, premium and annuity considerations increased 39%. This increase is primarily attributable to higher traditional fixed, fixed-indexed and registered index-linked annuity sales in 2022. Net investment income decreased 48% in the 2022 period compared to 2021, primarily due to ceded investment income related to the Martello Re reinsurance transaction, and lower income on derivative instruments. Gross investment income, excluding derivative instruments, increased 16% primarily due to growth in annuity sales.

The following table provides a summary of the components of net investment income:

	Year Ended December 31	
	2022	2021
Investment income:		
Bonds	$ 1,436.1	$ 1,240.2
Equity securities	9.3	28.5
Mortgage loans	116.5	74.6
Real estate	-	11.9
Policy loans	4.1	4.7
Cash and short-term investments	17.5	18.8
Other invested assets	96.1	75.8
Derivative instruments	(174.6)	543.7
Other	2.9	2.0
Gross investment income	1,507.9	2,000.2
Investment expenses	(35.6)	(49.2)
Ceded investment income	(453.3)	-
Net investment income	$ 1,019.0	$ 1,951.0

Other income increased 499% from 2021 to 2022, primarily due to the $320.0 million ceding commission paid by Martello Re. In accordance with statutory accounting practices, ceding commissions representing gains on the reinsurance of in-force blocks of business are deferred in surplus and amortized over the reinsurance contract period. The offsetting impact of ceding commissions is recorded in other income with a corresponding increase in surplus representing the deferred gain that will be amortized over the reinsurance contract.

Benefits and Expenses

Policyholder benefits decreased 44% in 2022 compared to 2021. This decrease was primarily attributable to ceded annuity benefits related to the Martello Re transaction. Surrender benefits decreased 34% in 2022 compared to the prior year due to ceded surrenders related to the Martello Re transaction. Net Surrender and withdrawal benefits were offset by a corresponding change in policyholder reserves. The death benefits paid pursuant to life insurance policies resulted in an impact to operating earnings by the amount of benefits paid above the amount of policyholder reserves released, net of reinsurance.

Change in policyholder reserves decreased 381% in 2022 compared to 2021. This decrease was primarily the result of the initial Martello Re transaction recorded through Change in policyholder reserves (offset in Premiums and annuity considerations). The initial Martello Re transaction in the first quarter of 2022 resulted in a reduction of annuity reserves of approximately $14.2 billion.

Commissions related expenses – direct commissions and expense allowances on reinsurance assumed increased 28% in 2022 compared to 2021, primarily due to higher commissions on record gross annuity sales in 2022. Other expenses increased 93% from 2021 to 2022 primarily due to the amortization of the ceding commission paid by Martello Re. The amortization of the ceding commission is offset by the ceding commission reported in Other income.

Realized Gains (Losses) Net of Federal Income Taxes

Realized losses net of federal income taxes in 2022 were ($32.6) million compared to gains of $118.7 million in 2021. For statutory reporting purposes, realized gains (losses) reported on the statement of operations are net of gains and losses transferred to the Interest Maintenance Reserve ("IMR"). Amounts transferred to IMR, which is a liability reported in the statement of financial position, are the portion of gains and losses for securities sold that relates to gains and losses resulting from changes in interest rates and are amortized into operations over the estimated remaining lives of the securities sold. Gains and losses reported in the statement of operations are credit and non-interest related. The decrease is mainly due to the net gain recognized by MMALIC in 2021 related to the sale of Schedule BA assets to AFG prior to MassMutual's acquisition of MMALIC and its subsidiaries.

ANALYIS OF RESULTS OF OPERATIONS – YEARS ENDED DECEMBER 31, 2021 AND 2020

The following table presents the statutory results of operations for the periods indicated:

	Year Ended December 31		
	2021	2020	% Change
Revenues:			
Premiums and annuity considerations	$ 5,027.0	$ (2,716.0)	-285%
Net investment income	1,951.0	1,908.8	2%
Other income	97.0	469.7	-79%
Total premiums and other revenues	7,075.0	(337.5)	-2196%
Benefits and Expenses:			
Policyholder benefits	901.2	845.4	7%
Surrender benefits	2,208.0	2,106.6	5%
Change in policyholder reserves	3,107.8	(4,081.0)	-176%
Direct commissions and commissions and expense allowances on reinsurance assumed	285.2	194.1	47%
Other expenses	317.0	256.6	24%
Total benefits and expenses	6,819.2	(678.3)	-1105%
Operating results before federal income taxes and realized capital gains (losses)	255.8	340.8	-25%
Federal income taxes on operations	(45.5)	61.9	-174%
Operating results before realized gains (losses)	210.3	402.7	-48%
Realized gains (losses) net of federal income taxes	118.7	(218.6)	-154%
Net income	$ 329.0	$ 184.1	79%

Operating results before federal income taxes and realized capital gains (losses) decreased by 25% for the 12 months ended December 31, 2021 compared to the 12 months ended December 31, 2020. This decrease was primarily attributable to higher commission and general expenses during the 2021 period and lower other income related to a 2020 adjustment to IMR for reinsurance, partially offset by increased earnings generated from the growth in inforce annuity business in 2021.

Net income increased 79% in 2021 compared to 2020. This increase was largely driven by realized gains in 2021 compared to realized losses in 2020 and a Federal income tax benefit for 2021 compared to Federal tax expenses in 2020. The realized gains in 2021 were primarily related to sales of fixed maturities, equities, and other invested assets. The realized losses reported in 2020 were primarily attributable to an adjustment to IMR related to new reinsurance.

Revenues

Total revenues increased to $7,075.0 million in the 12 months ended December 31, 2021 from ($337.5) million for the 12 months ended December 31, 2020. Following is a discussion of the primary contributors to this increase.

Excluding an initial ceded premium of $6.1 billion paid to Commonwealth Annuity and Life Insurance Company (“Commonwealth”) in October 2020 pursuant to a block reinsurance transaction, premiums increased 49%. This increase is primarily attributable to an increase in registered index-linked annuity sales in 2021 and the impact of COVID-19 on annuity sales in 2020. Net investment income increased 2% in the 2021 period compared to 2020, primarily due to the growth in the annuity business in 2021.

The following table provides a summary of the components of net investment income:

	Year Ended December 31	
	2021	2020
Investment income:		
Bonds	$ 1,240.2	$ 1,390.5
Equity securities	28.5	77.8
Mortgage loans	74.6	71.0
Real estate	11.9	24.2
Policy loans	4.7	5.0
Cash and short-term investments	18.8	37.4
Other invested assets	75.8	66.3
Derivative instruments	543.7	283.0
Other	2.0	1.7
Gross investment income	2,000.2	1,956.9
Investment expenses	(49.2)	(48.1)
Net investment income	$ 1,951.0	$ 1,908.8

Other income decreased 79% from 2020 to 2021, primarily due to an adjustment to IMR in October 2020 related to the new reinsurance agreement with Commonwealth. Excluding the 2020 adjustment to IMR, other income decreased approximately 16% from 2020 to 2021, primarily related to lower reinsurance experience refunds in 2021.

Benefits and Expenses

Policyholder benefits increased 7% in 2021 compared to 2020. This was primarily attributable to an increase in payout annuity benefits and life and annuity death benefits. Surrender benefits increased 5% in 2021 compared to the prior year due to growth in the annuity business. Surrender and withdrawal benefits were offset by a corresponding decrease in policyholder reserves. The death benefits paid pursuant to life insurance policies impacted operating earnings by the amount of benefit paid above the amount of policyholder reserve released, net of reinsurance.

Change in policyholder reserves increased 176% in 2021 compared to 2020. This increase was primarily the result of the annuity block reinsurance agreement with Commonwealth, effective in October 2020. The initial ceded premium to Commonwealth of $6.1 billion resulted in a reduction of annuity reserves of approximately $5.7 billion in 2020.

Commissions related expenses – direct commissions and expense allowances on reinsurance assumed – increased 47% in 2021 compared to 2020, primarily due to higher commissions on increased annuity sales in 2021. Other expenses increased 24% from 2020 to 2021 primarily due to higher investment management expenses and expenses related to the acquisition of MMALIC by MassMutual.

Realized Gains (Losses) Net of Federal Income Taxes

Realized gains net of federal income taxes in 2021 were $118.7 million compared to losses of $218.6 million in 2020. For statutory reporting purposes, realized gains (losses) reported on the statement of operations were net of gains and losses transferred to the IMR. Amounts transferred to IMR, which is a liability reported in the statement of financial position, were the portion of gains and losses for securities sold related to gains and losses resulting from changes in interest rates and were amortized into operations over the estimated remaining lives of the securities sold. Gains and losses reported in the statement of operations were credit and non-interest related. The improvement in realized gains net of federal income taxes from 2020 to 2021 was primarily due to lower impairment losses in 2021 and a large transfer to IMR in 2020 related to a new reinsurance transaction with Commonwealth.

LIQUIDITY AND CAPITAL RESOURCES

Liquidity

Management believes MMALIC has sufficient resources to meet its liquidity requirements. MMALIC's liquidity requirements relate primarily to the liabilities associated with its annuity and life products as well as operating costs and expenses, taxes, and contributions of capital to its subsidiaries. Historically, cash flows from premiums and investment income have provided more than sufficient funds to meet these requirements. Funds received in excess of cash requirements are generally invested in additional marketable securities. In addition, MMALIC generally holds a significant amount of highly liquid, short-term investments. If funds generated from operations are insufficient to meet liquidity requirements for any period, MassMutual may contribute funds to MMALIC.

MMALIC's annuity operations typically produce positive net operating cash flows as investment income exceeds acquisition costs and operating expenses. Interest credited on annuity policyholder funds is a non-cash increase in MMALIC's annuity reserves, and annuity premiums, benefits and withdrawals are considered financing activities due to the deposit-type nature of annuities. For the full year, net cash provided by operating activities was $5.76 billion in 2022 and net cash provided by operating activities was $3.85 billion in 2021.

MMALIC's financing activities consist primarily of transactions with annuity policyholders and dividend payments to its former parent company. Net cash used in financing activities was $1,121.8 million in 2022 compared to $1,305.1 million in 2021, a decrease of $183.3 million. Net deposits on deposit-type contracts were $50.4 million in 2022 compared to withdrawals of $1,056.1 million in 2021, a decrease of $1,106.5 million. In addition, MMALIC paid no cash dividends to its parent in 2022 compared to $300.0 million paid to its former parent in 2021. Excluding an initial funds held under reinsurance treaties balance of $14,159.0 million related to the Martello Re transaction, the 2022 change was $1,481.7 million compared to $0.0 million in 2021.

The Company is a member of the Federal Home Loan Bank ("FHLB"). The FHLB makes advances and provides other banking services to member institutions. The Company owned $20.0 million and $25.0 million of FHLB Class B membership stock at December 31, 2022 and 2021, respectively. 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.

In 2022, the FHLB advanced MMALIC $300.0 million. In 2021, MMALIC repaid $931.0 million to the FHLB. At December 31, 2022 and 2021, MMALIC had $500.0 million and $200.0 million, respectively, 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, 2022). The Company paid interest of approximately $8.4 million and $4.4 million on these advances in 2022 and 2021, 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. As required by the funding agreement, the Company purchased 282,623 shares ($28.3 million) of FHLB activity and excess stock.

The Company also posted collateral to the FHLB of assets with a fair value and carrying value of approximately $1,030.9 million and $1,102.3 million, respectively, as of December 31, 2022. 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, reported in liability for deposit-type contracts in the balance sheet, and related assets are accounted for in the Company's general account.

MMALIC has no material contractual purchase obligations or other long-term liabilities at December 31, 2022 or 2021.

Policyholder Liabilities

Liquidity needs vary by annuity and life product. Factors that impact a product's need for liquidity include interest rate levels, contract size, competitive products, termination or surrender charges, market value adjustments, federal income taxes, and benefit levels. To help assure that obligations will be met when they fall due, the Company uses asset/liability cash flow management techniques that take into consideration current and total investment return requirements, asset and liability durations, risk tolerance, and cash flow requirements. The fair values for liabilities under all insurance contracts are taken into consideration in the overall management of interest rate risk.

The Company's products include features that enhance the Company's liquidity position. Virtually all individual deferred annuity products contain surrender charges of varying durations, reducing the risk that customers will request a full surrender during the period charges are in effect. Surrender charges allow the Company to better plan the maturities of its invested assets by reducing the risk that future cash outflows will exceed anticipated levels. Also, 40% of the Company's in-force annuity products (measured by reserves) at December 31, 2022 had a market value adjustment ("MVA") that protects the Company when surrenders occur as a result of changes in market interest rates.

The following table provides a summary of statutory annuity reserves at December 31, 2022 by withdrawal characteristics:[(1)]

	Annuity Reserves Amount	% of Total
Subject to discretionary withdrawal:		
a. With market value adjustment	$ 17,148.9	39.6%
b. At book value less current surrender charge of 5% or more	7,163.2	16.5%
c. At fair value	30.6	0.1%
d. Total with market value adjustment or at fair value (total of a through c)	24,342.7	56.2%
e. At book value without adjustment (minimal or no charge or adjustment)	15,187.8	35.0%
Not subject to discretionary withdrawal	3,818.3	8.8%
Total (gross: direct + assumed)	43,348.8	100.0%
Reinsurance ceded	18,424.3	
Total (net)	$ 24,924.5	

(1) Annuity contract reserves and deposit fund liabilities are monetary amounts that an insurer must have available to provide for future obligations with respect to annuities and deposit funds. Reserves are liabilities on the balance sheets of financial statements prepared in conformity with statutory accounting practices. These amounts are at least equal to the value to be withdrawn by policyholders.

As indicated in the table above, 8.8% of policyholder funds at December 31, 2022 were not subject to discretionary withdrawal and another 56.2% were subject to adjustments and charges that are designed to protect the Company from early withdrawals in the event that they occur. We believe that this structure provides the Company with a relatively stable block of deposit liabilities which helps reduce the risk of unexpected cash withdrawals and the adverse financial effects cash withdrawals could cause.

Some MMALIC annuity products include guaranteed benefits, including guaranteed minimum death benefits and guaranteed minimum withdrawal benefits. These guarantees are designed to protect contract holders against significant downturns in securities markets and fluctuations in interest rates. Periods of significant and sustained downturns in securities markets, increased equity volatility, or reduced interest rates could result in an increase in the valuation of liabilities associated with products with guaranteed benefits. An increase in these liabilities would result in a decrease in MMALIC's net income.

MMALIC manages market risks by utilizing a comprehensive asset/liability management process involving the monitoring of asset and liability interest rate sensitivities for its various products. This process includes cash flow testing under various interest rate scenarios, including severe stress tests. Although cash flow testing includes many different scenarios, cash flow requirements are inherently unpredictable, as they are affected by external factors, such as changes in interest rates.

MMALIC also utilizes a variety of financial instruments as part of its efforts to efficiently 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 the 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 reflect the extent of involvement in the various types of financial instruments.

There can be no assurance that future experience regarding benefit payments and surrenders will be similar to historic experience because withdrawal and surrender levels are influenced by factors such as the interest rate environment and the Company's claims-paying and financial strength ratings.

Capital Resources

The NAIC's model law for risk based capital ("RBC") applies to life, accident and health companies. RBC formulas determine the amount of capital that an insurance company needs so that it has an acceptable expectation of not becoming financially impaired. At December 31, 2022, the capital ratios of MMALIC and its insurance subsidiaries substantially exceeded the applicable RBC requirements.

The maximum amount of dividends which can be paid to stockholders of life insurance companies domiciled in the State of Ohio without prior approval of the Ohio Insurance Director is the greater of 10% of surplus as regards to 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 by MMALIC in 2023 without prior approval is $283.1 million based on 10% of surplus as regards to policyholders as of the preceding December 31. At December 31, 2022, surplus as regards policyholders was $2,831.1 million, earned surplus was $2,015.9 million, and 2022 net income was $158.0 million.

The Company entered into a flow coinsurance agreement with Commonwealth, 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 $1,417.8 million and $1,038.4 million of deferred annuity reserves to Commonwealth under this agreement at December 31, 2022 and 2021, 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 $4.5 billion and $5.2 billion of deferred annuity reserves under this agreement at December 31, 2022 and 2021, respectively.

INVESTMENTS

MMALIC had total cash and invested assets of $41,690.4 million and $37,304.9 million at December 31, 2022 and 2021, respectively, as illustrated below (in millions):

	2022		2021	
	Carrying Value	% of Carrying Value	Carrying Value	% of Carrying Value
Cash and invested assets:				
Bonds	$ 33,331.9	79.9%	$ 31,141.6	83.5%
Preferred stocks	185.0	0.4%	394.4	1.1%
Common stocks	281.4	0.7%	279.6	0.7%
Investments in affiliates and subsidiaries	401.9	1.0%	384.1	1.0%
Mortgage loans	3,088.8	7.4%	2,148.5	5.8%
Cash, cash equivalents and short-term investments	1,991.2	4.8%	1,008.9	2.7%
Policy loans	31.5	0.1%	64.2	0.2%
Derivative instruments	873.0	2.1%	706.9	1.9%
Other invested assets	1,505.7	3.6%	1,176.7	3.1%
Total cash and invested assets	$ 41,690.4	100.0%	$ 37,304.9	100.0%

All investments held by the Company are monitored for conformity with the qualitative and quantitative limits prescribed by the applicable Ohio laws and regulations. MMALIC attempts to optimize investment income while building the value of its portfolio, placing emphasis upon total long-term performance. Management believes that a high quality investment portfolio should generate a stable and predictable investment return.

The following table summarizes the carrying values and estimated fair values of the Company's bond portfolio for the year ended December 31, 2022 (in millions):

	2022		
	Carrying Value	Fair Value	Unrealized Gain (Losses)
U.S. Government and agencies	$ 98.9	$ 64.0	$ (34.9)
All other governments	19.2	17.8	(1.4)
States, territories and possessions	190.7	183.1	(7.6)
Political subdivisions	272.7	268.7	(4.0)
Special Revenue	1,691.6	1,537.0	(154.6)
Industrial and miscellaneous	30,538.0	27,421.0	(3,117.0)
Parent, subsidiaries and affiliates	520.8	468.3	(52.5)
Total bonds	$ 33,331.9	$ 29,959.9	$ (3,372.0)

The following table summarizes the carrying values and estimated fair values of the Company's bond portfolio for the year ended December 31, 2021 (in millions):

	2021		
	Carrying Value	Fair Value	Unrealized Gain (Losses)
U.S. Government and government agencies	$ 16.3	$ 17.9	$ 1.6
States, municipalities and political subdivisions	2,317.7	2,530.7	213.0
Foreign government	26.7	29.1	2.4
Residential MBS	2,116.9	2,199.5	82.6
Commercial MBS	822.5	844.3	21.8
Asset-backed securities	7,679.5	7,773.1	93.6
All other bonds	18,162.0	19,310.2	1,148.2
Total bonds	$ 31,141.6	$ 32,704.8	$ 1,563.2

The Company's bond portfolio consisted of 94% and 95% of investment grade securities at December 31, 2022 and 2021, respectively. The NAIC Securities Valuation Office ("SVO") is responsible for the day-to-day credit quality assessment and valuation of securities owned by state-regulated insurance companies. The NAIC assigns securities quality ratings and uniform valuations, which are used by insurers when preparing their annual statements to their state insurance regulators. The NAIC ratings are similar to the rating agency designations of the Nationally Recognized Statistical Rating Organizations ("NRSRO") for marketable bonds. NAIC ratings 1 and 2 include bonds generally considered investment grade. NAIC ratings 3 through 6 include bonds generally considered below investment grade. Typically, if a security has been rated by an NRSRO, the SVO utilizes that rating and assigns an NAIC designation based on the following system:

NAIC Rating	NRSRO Equivalent
1	Aaa/Aa/A
2	Baa
3	Ba
4	B
5	Caa and Lower
6	In or near default

The following table summarizes MMALIC's bond portfolio by NAIC ratings (in millions):

	2022		2021	
	Carrying Value	% of Carrying Value	Carrying Value	% of Carrying Value
NAIC Rating				
1	$ 17,725.2	53.2%	$ 17,466.7	56.1%
2	13,435.6	40.3%	12,262.8	39.4%
3	1,475.9	4.4%	762.8	2.4%
4	454.6	1.4%	545.3	1.8%
5	209.4	0.6%	70.0	0.2%
6	31.2	0.1%	34.0	0.1%
Total Bonds	$ 33,331.9	100.0%	$ 31,141.6	100.0%

The table below sets out the expected maturities of MMALIC's bonds as of December 31, 2022 (in millions):

	2022	
	Carrying Value	% of Carrying Value
Maturity:		
One year or less	$ 2,834.3	8.5%
After one year through five years	12,227.3	36.7%
After five years through ten years	10,341.3	31.0%
After ten years	7,929.0	23.8%
Total bonds by maturity	$ 33,331.9	100.0%

The table below sets out the expected maturities of MMALIC's bonds as of December 31, 2021 (in millions):

	2021	
	Carrying Value	% of Carrying Value
Maturity:		
One year or less	$ 491.2	1.6%
After one year through five years	6,935.6	22.3%
After five years through ten years	8,000.2	25.7%
After ten years	5,095.7	16.4%
Total bonds by maturity	20,522.7	65.9%
Mortgage-backed securities	2,939.4	9.4%
Asset-backed securities	7,679.5	24.7%
Total bonds by maturity	$ 31,141.6	100.0%

The expected maturities in the foregoing tables may differ from the contractual maturities because certain borrowers have the right to call or prepay obligations with or without call or prepayment penalties.

Fair values for MMALIC's portfolio are determined by MMALIC's internal investment professionals using data from nationally recognized pricing services as well as non-binding broker quotes. Fair values of equity securities are generally based on published closing prices. When prices obtained for the same security vary, MMALIC's internal investment professionals select the price they believe is most indicative of an exit price.

The pricing services engaged by MMALIC's investment professionals use a variety of observable inputs to estimate fair value of bonds that do not trade on a daily basis. These inputs include, but are not limited to, recent reported trades, benchmark yields, issuer spreads, bids or offers, reference data, and measures of volatility.

The pricing of mortgage backed securities ("MBS") is unique as fair value includes estimates of the rate of future prepayments and defaults of principal over the remaining life of the underlying collateral. Due to the lack of transparency in the process that brokers use to develop MBS prices, valuations based on brokers' prices are classified as Level 3 in the hierarchy unless the price can be corroborated, for example, by comparison to similar securities priced using observable inputs.

Valuation techniques utilized by pricing services and prices obtained from external sources are reviewed by MMALIC's 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, these investment professionals consider widely published indices (as benchmarks), recent trades, changes in interest rates, general economic conditions, and the credit quality of the specific issuers. In addition, MMALIC communicates directly with pricing services regarding the methods and assumptions used in pricing, including verifying, on a test basis, the inputs used by the services to value specific securities.

MBS are subject to significant prepayment risk because, in periods of declining interest rates, mortgages may be repaid more rapidly than scheduled as borrowers refinance higher rate mortgages to take advantage of lower rates. MBS represented approximately 13% and 9% of MMALIC's bond portfolio at December 31, 2022 and 2021, respectively.

Municipal bonds represented approximately 5% and 7% of MMALIC's fixed maturity portfolio at December 31, 2022 and 2021, respectively. MMALIC's municipal bond portfolio is high quality, with the majority of the securities rated investment grade as of year-end 2022 and 2021. The portfolio is well diversified across the states of issuance and individual issuers.

When a decline in the value of a specific investment is considered to be other-than-temporary, an allowance for credit losses (impairment) is charged to earnings (accounted for as a realized loss). 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,
e) near-term prospects for improvement in the issuer or its industry,
f) third-party research and communications with industry specialists,
g) financial models and forecasts,
h) the continuity of interest payments, maintenance of investment grade ratings and hybrid nature of certain investments,
i) discussions with issuer management, and
j) ability and intent to hold the investment for a period sufficient to allow for anticipated recovery in fair value.

Based on its analysis of the factors listed above, management believes MMALIC will recover its cost basis in the bond securities with unrealized losses and that MMALIC has the ability to hold the securities until they recover in value and had no intent to sell them at December 31, 2022. Although MMALIC can continue holding its bond 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 regarding a particular security, a charge for impairment would likely be required. Significant declines in the fair value of MMALIC's investment portfolio could have a significant adverse effect on MMALIC's liquidity. For information on MMALIC's realized gains (losses) on securities, see *"Realized Gains (Losses) Net of Federal Income Taxes*."

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 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.

The following table presents the estimated fair value and admitted value for assets and reported value for liabilities of derivatives as of December 31, 2022 and 2021:

(dollars in millions)

Derivative instruments:	2022		2021	
	Carrying Value	**Estimated Fair Value**	**Carrying Value**	**Estimated Fair Value**
Assets:				
Options*	$ 846.8	$ 287.4	$ 665.0	$ 665.0
Interest rate swaps	25.2	25.2	41.9	41.9
Currency swaps	0.9	0.9	-	-
Forward contracts	0.1	0.1	-	-
Total derivative instruments assets	$ 873.0	$ 313.6	$ 706.9	$ 706.9
	Carrying Value	**Estimated Fair Value**	**Carrying Value**	**Estimated Fair Value**
Liabilities:				
Options*	$ 598.6	$ -	$ 14.9	$ 14.9
Interest rate swaps	95.0	95.0	-	-
Currency swaps	4.8	4.8	-	-
Forward contracts	2.5	2.5	-	-
Total derivative instruments liabilities	$ 700.9	$ 102.3	$ 14.9	$ 14.9

*Effective 1/1/2022, Fixed-indexed options are carried at amortized cost per OAC 3901-1-67.
Estimated Fair Value of options is reported net in the asset section for disclosure.

CRITICAL ACCOUNTING POLICIES

Significant accounting policies are summarized in *Note B — "Significant Accounting Policies"* to the financial statements. The preparation of financial statements in conformity with accounting practices prescribed or permitted by the NAIC and the Ohio Department of Insurance, which vary in some respects from GAAP. As more information becomes known, these estimates and assumptions will likely change and may impact amounts reported in the future. The areas where management believes the degree of judgment required to determine amounts recorded in the financial statements is most significant are as follows:

- calculation of statutory reserves, and
- the valuation of investments.

Qualitative and Quantitative Disclosures about Market Risk

Market risk represents the potential economic loss arising from adverse changes in the fair value of financial instruments. MMALIC’s exposures to market risk relate primarily to its investment portfolio and annuity contracts, which are exposed to interest rate risk and, to a lesser extent, equity price risk.

MMALIC’s exposures to interest rate risk relate primarily to the fair value of MMALIC’s bond securities, which are inversely correlated to changes in interest rates. MMALIC’s bond portfolio is comprised of primarily fixed-rate investments with intermediate-term maturities. Structuring the bond portfolio in this manner provides MMALIC with flexibility in reacting to interest rate fluctuations.

MMALIC's portfolios are managed with an objective of achieving an adequate risk-adjusted return while maintaining sufficient liquidity to meet policyholder obligations. The portfolios are managed in an effort to adequately position the duration and interest rate sensitivity of the assets against the projected cash flows of policyholder liabilities.

MassMutual Ascend Life Insurance Company

Statutory-Basis Financial Statements

As of December 31, 2022 and 2021 and for each of the three years ended December 31, 2022, 2021 and 2020 with Report of Independent Auditors

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY

Statutory-Basis Financial Statements

As of December 31, 2022 and 2021 and for each of the three years ended December 31, 2022, 2021 and 2020

Contents

KPMG LLP
Suite 500
191 West Nationwide Blvd.
Columbus, OH 43215-2568

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 (formerly Great American Life Insurance Company) (the Company), which comprise the balance sheet statutory-basis as of December 31, 2022 and 2021, and the related statement of operations statutory-basis, statement of changes in capital and surplus statutory-basis, and statement of cash flow statutory-basis for the years then ended, 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 sheet statutory-basis of the Company as of December 31, 2022 and 2021, and the results of its operations and its cash flow for the years then ended 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, 2022 and 2021, or the results of its operations or its cash flows for the years then ended.

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, in 2022, the 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. Our opinion is not modified with respect to this matter.

Other Matter

The accompanying financial statements of the Company as of December 31, 2020 and for the year then ended were audited by other auditors whose report thereon, dated May 14, 2021, expressed an adverse opinion on those financial statements with respect to U.S. generally accepted accounting principles and an unmodified opinion with respect to accounting practices prescribed or permitted by the Ohio Department of Insurance.

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

Columbus, Ohio
April 19, 2023

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
BALANCE SHEET
STATUTORY-BASIS
(Dollars in millions, except share data)

	December 31 2022	December 31 2021
ADMITTED ASSETS		
Cash and invested assets:		
Bonds - at amortized cost (fair value: $29,959.9 and $32,704.8)	$ 33,331.9	$ 31,141.6
Preferred stocks - principally at fair value (cost: $165.5 and $332.2)	185.0	394.4
Common stocks - at fair value (cost: $220.5 and $209.6)	281.4	279.6
Investments in affiliates and subsidiaries - at subsidiary capital and surplus (cost: $242.1 and $236.3)	401.9	384.1
Mortgage loans	3,088.8	2,148.5
Cash, cash equivalents and short-term investments	1,991.2	1,008.9
Policy loans	31.5	64.2
Derivative instruments	873.0	706.9
Other invested assets	1,505.7	1,176.7
Total cash and invested assets	41,690.4	37,304.9
Net deferred federal income tax asset	72.2	61.7
Deferred and uncollected premiums	7.7	6.8
Current federal income tax recoverable	89.6	-
Investment income due and accrued	414.7	278.9
Company-owned life insurance	218.7	212.6
Funds held as collateral	-	408.3
Other admitted assets	286.0	108.1
Total general account admitted assets	42,779.3	38,381.3
Separate account assets	103.7	67.6
Total admitted assets	$ 42,883.0	$ 38,448.9
LIABILITIES, CAPITAL AND SURPLUS		
Liabilities:		
Policy benefit reserves	$ 24,310.4	$ 33,290.5
Liability for deposit-type contracts	779.8	592.1
Policy and contract claims	140.6	270.6
Asset valuation reserve	577.1	504.1
Funds held under reinsurance treaties	12,677.3	-
Interest maintenance reserve	93.3	95.3
Current federal and foreign income tax payable	-	14.9
Commissions, general expenses, taxes, licenses and fees due or accrued	59.4	68.6
Payable for securities	120.1	163.6
Liability for funds held as collateral	209.5	435.3
Derivatives	700.9	-
Other liabilities	278.3	68.2
Total general account liabilities	39,946.7	35,503.2
Separate account liabilities	103.7	67.6
Total liabilities	40,050.4	35,570.8
Capital and surplus:		
Common stock - $7.50 par value; 1,200,000 shares authorized; 201,000 shares issued and outstanding	1.5	1.5
Gross paid-in and contributed surplus	815.2	815.2
Unassigned funds	2,015.9	2,061.4
Total capital and surplus	2,832.6	2,878.1
Total liabilities, capital and surplus	$ 42,883.0	$ 38,448.9

See accompanying notes to statutory-basis financial statements.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
STATEMENT OF OPERATIONS
STATUTORY-BASIS
(Dollars in millions)

	Year Ended December 31		
	2022	**2021**	**2020**
Premiums and other revenues:			
Premiums and annuity considerations	$ (7,198.3)	$ 5,027.0	$ (2,716.0)
Net investment income	1,019.0	1,951.0	1,908.8
Amortization of interest maintenance reserve	36.4	23.5	11.9
Commissions and expense allowances and reserve adjustments on reinsurance ceded	496.8	(50.8)	(26.6)
Charges and fees for deposit-type contracts and miscellaneous income	47.8	124.3	484.4
Total premiums and other revenues	(5,598.3)	7,075.0	(337.5)
Benefits and expenses:			
Policyholders' benefits	505.8	901.2	845.4
Surrender benefits	1,460.5	2,208.0	2,106.6
Change in policy and contract reserves	(8,743.9)	3,107.8	(4,081.0)
Interest and adjustments on deposit-type contracts	142.3	118.7	124.0
Direct commissions and commissions and expense allowances on reinsurance assumed	364.6	285.2	194.1
General insurance expenses	158.7	145.3	105.9
Insurance taxes, licenses and fees	12.2	12.6	8.0
Net transfers to or (from) separate accounts	(22.0)	36.8	10.6
Other	319.3	3.6	8.1
Total benefits and expenses	(5,802.5)	6,819.2	(678.3)
Income from operations before federal income taxes and net realized capital gains and losses	204.2	255.8	340.8
Federal income tax (expense) benefit on operations	(13.6)	(45.5)	61.9
Income from operations before net realized capital gains and losses	190.6	210.3	402.7
Net realized capital gains (losses):			
Net realized capital gains before related federal income taxes and transfers to interest maintenance reserve	(12.6)	301.1	266.7
Federal income tax (expense) benefit on net realized capital gains	14.3	(118.3)	(118.0)
Interest maintenance reserve transfers, net of tax	(34.3)	(64.0)	(367.3)
Net realized capital gains (losses)	(32.6)	118.7	(218.6)
Net income	$ 158.0	$ 329.0	$ 184.1

See accompanying notes to statutory-basis financial statements.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
STATEMENT OF CHANGES IN CAPITAL AND SURPLUS
STATUTORY-BASIS
(Dollars in millions)

	Year Ended December 31		
	2022	**2021**	**2020**
Common stock:			
Balance at beginning of year	$ 1.5	$ 1.5	$ 2.5
Transferred to gross paid-in and contributed surplus	-	-	(1.0)
Balance at end of year	$ 1.5	$ 1.5	$ 1.5
Gross paid-in and contributed surplus:			
Balance at beginning of year	$ 815.2	$ 814.0	$ 812.4
Contributions from parent	-	1.2	0.6
Transferred from common stock	-	-	1.0
Balance at end of year	$ 815.2	$ 815.2	$ 814.0
Unassigned funds:			
Balance at end of prior year	$ 2,061.4	$ 2,081.7	$ 2,053.2
Change in reserve on account of change in valuation basis*	236.2	-	-
Cumulative effect of change in accounting principle*	(454.4)	-	-
Adjusted beginning balance	1,843.2	2,081.7	2,053.2
Net income	158.0	329.0	184.1
Change in net unrealized gains (losses) on derivatives	(204.1)	(67.7)	19.0
Change in net unrealized foreign exchange capital gains	8.8	-	
Change in net unrealized capital gains, net of deferred taxes	3.5	93.1	47.3
Change in net deferred tax asset*	(33.1)	39.4	21.7
Change in nonadmitted assets*	(4.6)	(20.7)	12.9
Change in asset valuation reserve	(73.0)	(93.4)	28.5
Change in surplus as a result of reinsurance	317.2	-	-
Dividends to parent	-	(300.0)	(285.0)
Balance at end of year	$ 2,015.9	$ 2,061.4	$ 2,081.7
Total capital and surplus	$ 2,832.6	$ 2,878.1	$ 2,897.2

* Effective January 1, 2022, the Company elected to apply Ohio Administrative Code 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
STATEMENT OF CASH FLOW
STATUTORY-BASIS
(Dollars in millions)

	Year Ended December 31		
	2022	**2021**	**2020**
Operations:			
Premiums and annuity considerations	$ 6,877.6	$ 5,028.1	$ (2,714.9)
Net investment income	1,244.9	2,392.4	2,490.9
Benefits paid	(2,266.8)	(3,052.6)	(2,978.2)
Commissions, expenses and other deductions	(551.5)	(408.9)	(316.3)
Federal income taxes paid	(103.8)	(140.3)	(81.5)
Other	562.2	33.1	140.7
Net cash provided by (used in) operations	5,762.6	3,851.8	(3,459.3)
Investing activities:			
Sales, maturities or repayments of investments, net:			
Bonds	14,058.5	6,454.7	10,795.9
Stocks	18.2	338.1	309.8
Mortgage loans	537.0	506.8	114.8
Real estate	-	65.8	32.1
Other invested assets	274.0	716.5	108.2
Net gains or (losses) on cash, cash equivalents and short-term investments	(0.1)	2.6	3.2
Miscellaneous proceeds	(22.3)	-	-
Purchases of investments:			
Bonds	(16,364.8)	(9,899.7)	(5,586.6)
Stocks	(109.2)	(78.6)	(292.2)
Mortgage loans	(1,107.7)	(1,074.4)	(322.4)
Real estate	-	(1.1)	(4.2)
Other invested assets	(300.9)	(232.4)	(259.1)
Miscellaneous applications	(673.9)	(389.3)	(499.5)
Net decrease in policy loans	32.7	5.8	17.0
Net cash (used in) provided by investing activities	(3,658.5)	(3,585.2)	4,417.0
Financing and miscellaneous activities:			
Net deposits (withdrawals) on deposit-type contracts	50.4	(1,056.1)	(96.2)
Dividends to parent	-	(300.0)	(285.0)
Other	(1,172.2)	51.0	(4.0)
Net cash used in financing and miscellaneous activities	(1,121.8)	(1,305.1)	(385.2)
Net increase (decrease) in cash and short-term investments	982.3	(1,038.5)	572.5
Cash and short-term investments at beginning of year	1,008.9	2,047.4	1,474.9
Cash and short-term investments at end of year	$ 1,991.2	$ 1,008.9	$ 2,047.4
Cash flow information for non-cash transactions:			
Bond conversions and refinancing	$ 453.1	$ -	
Bonds transferred to mortgage loans	362.7	-	
Bonds transferred to other invested assets	119.7	-	
Other invested assets transferred to bonds	17.1	-	
Net investment income payment-in-kind for bonds	1.1	-	
Common stock conversions	0.2	-	
Maturity extensions	-	385.9	
Exchanges	-	162.0	
Transfers	-	30.0	
Securities acquired from dividends/return of capital distribution	-	7.1	
Capitalized interest	-	5.6	
Securities acquired as capital contributions	-	0.7	

See accompanying 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., 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. ("GAFRI"), a financial services holding company wholly-owned by American Financial Group, Inc. ("AFG"). 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 and the District of Columbia.

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,
(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 No. 97, *Investments in Subsidiary, Controlled and Affiliated Entities* ("SSAP No. 97"), 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 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,
(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,

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

(m) for statutory reporting, reinsurance agreements are reported in accordance with Statement of Statutory Accounting Principle No. 61R, *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 surplus 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. 5R, 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, and
(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
(r) changes in deferred taxes are recognized in operations under GAAP versus a change in surplus for statutory reporting.

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.

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 Ohio Administrative Code Section 3901-1-67, Alternative Derivative and Reserve Accounting Practices (OAC 3901-1-67).

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

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 income (loss) between NAIC SAP and prescribed practice is shown below:

				Year Ended December 31		
Net Income (*in millions*)	SSAP #	F/S Page	State of Domicile	2022	2021	2020
(1) State basis	XXX	XXX	XXX	$ 158.0	$ 329.0	$ 184.1
(2) State prescribed practices that are an increase/(decrease) from NAIC SAP OAC 3901-1-67:	XXX	XXX	XXX			
Derivative instruments	86	4	OH	(26.4)	-	-
Reserves for fixed indexed annuities	51	4	OH	(188.0)	-	-
Tax impact	101	4	OH	45.0	-	-
(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	$ 327.4	$ 329.0	$ 184.1

A reconciliation of the Company's capital and surplus between the NAIC SAP and prescribed practice is shown below:

				Year Ended December 31		
Surplus (*in millions*)	SSAP #	F/S Page	State of Domicile	2022	2021	2020
(5) Statutory surplus state basis	XXX	XXX	XXX	$ 2,832.6	$ 2,878.1	$ 2,897.2
(6) State prescribed practices that are an increase/(decrease) from NAIC SAP OAC 3901-1-67:						
Derivative instruments	86	2, 4	OH	(39.2)	-	-
Reserves for fixed indexed annuities	51	3, 4	OH	48.2	-	-
Tax impact	101	2, 4	OH	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	$ 2,810.5	$ 2,878.1	$ 2,897.2

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.

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. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

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) investment real estate or property acquired in satisfaction of debt are carried at depreciated cost, less encumbrances,
f) RILA options, forward contracts, financial futures, currency swaps and interest rate swaps are carried at fair value,
g) 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,
h) 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,
i) mortgage loans on real estate are carried at amortized cost less an allowance, and
j) 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).

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). The fair value of this collateral is recorded as an asset (included in Funds held as collateral) and the offsetting obligation to return the collateral is recorded as a liability (included in Liability for funds held as collateral).

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.

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

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 2022 and 2021, 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.

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, 2022 and December 31, 2021, was $1.9 million and $2.1 million, respectively. The net amount of insurance in force for these reserves at December 31, 2022 and December 31, 2021 was approximately $16.1 million and $18.1 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-fifth 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.

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

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 3.00% to 8.75%. 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 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. As of December 31, 2022 and 2021 additional reserves were not required.

FEDERAL INCOME TAXES

Through the first five months of 2021, the Company had an intercompany tax allocation agreement with AFG. Pursuant to the agreement, the Company's tax expense was determined based upon its inclusion in the consolidated tax return of AFG and its includable subsidiaries. Estimated payments were made quarterly during the year. Following year-end, additional settlements would be made on the original due date of the return and, when extended, at the time the return was filed. The method of allocation among the companies under the agreement was based upon separate return calculations with current credit for net losses to the extent the losses provide a benefit in the consolidated return.

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.

B. SIGNIFICANT ACCOUNTING POLICIES (CONTINUED

ADOPTION OF NEW ACCOUNTING STANDARDS

In November 2021, the NAIC adopted modifications to SSAP No. 43R, Loan-Backed and Structured Securities, effective December 31, 2022. The modifications require investments in residual tranches to be reported as partnerships and limited liability companies. Residual tranches will be carried at the lower of amortized cost or fair value, with changes in value recorded as unrealized gains or losses. The modifications did not have a material effect on the Company’s financial statements.

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

SUBSEQUENT EVENTS

Management has evaluated all events occurring after December 31, 2022, through the date the financial statements were available to be issued, to determine whether any event required either recognition or disclosure in the financial statements.

Due to the recent national banking issues, MM Ascend evaluated their positions with Silicon Valley Bank and Signature Bank. In the first quarter of 2023, MM Ascend impaired approximately $15.2 million and $30 million of investments with Silicon Valley Bank and Signature Bank, respectively. Any future impairments to those securities would be immaterial. MM Ascend has no material indirect exposure to Silicon Valley Bank and Signature Bank.

C. FAIR VALUE MEASUREMENTS

Accounting standards for measuring fair value are based on inputs used in estimating fair value. 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 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 corporate and municipal bonds, asset-backed securities, MBS, non-affiliated common stocks, non-affiliated preferred stocks, surplus notes, separate account assets and liabilities, funds held as collateral 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.

Financial assets and liabilities measured at fair value on a recurring basis categorized into the three-level fair value hierarchy at December 31, 2022 are summarized below (in millions):

C. FAIR VALUE MEASUREMENTS (CONTINUED)

Description	Level 1	Level 2	Level 3	Total
Assets:				
Bonds:				
Special revenue	$ -	$ -	$ -	$ -
Industrial and miscellaneous	-	8.6	12.7	21.3
Total bonds	-	8.6	12.7	21.3
Non-affiliated preferred stocks	24.0	-	127.3	151.3
Non-affiliated common stocks	142.3	-	139.1	281.4
Currency swaps	-	1.0	-	1.0
Currency forwards	-	0.1	-	0.1
Interest rate swaps	-	25.2	-	25.2
Separate account assets	1.1	102.6	-	103.7
Total assets accounted for at fair value	$ 167.4	$ 137.5	$ 279.1	$ 584.0
Liabilities:				
Currency swaps	$ -	$ 4.8	$ -	$ 4.8
Currency forwards	-	2.5	-	2.5
Interest rate swaps	-	95.0	-	95.0
Separate account liabilities	$ 1.1	$ 102.6	$ -	$ 103.7
Total liabilities accounted for at fair value	$ 1.1	$ 204.9	$ -	$ 206.0

Financial assets and liabilities measured at fair value on a recurring basis categorized into the three-level fair value hierarchy at December 31, 2021 are summarized below (in millions):

Description	Level 1	Level 2	Level 3	Total
Assets:				
Bonds:				
Residential MBS	$ -	$ 5.5	$ -	$ 5.5
Asset-backed securities	-	-	8.4	8.4
All other bonds	-	0.1	-	0.1
Total bonds	-	5.6	8.4	14.0
Non-affiliated preferred stocks	31.7	189.5	143.4	364.6
Non-affiliated common stocks	19.2	88.4	172.0	279.6
Derivative instruments	-	706.9	-	706.9
Separate account assets	-	67.6	-	67.6
Total assets accounted for at fair value	$ 50.9	$ 1,058.0	$ 323.8	$ 1,432.7
Liabilities:				
Separate account liabilities	$ -	$ 67.6	$ -	$ 67.6
Total liabilities accounted for at fair value	$ -	$ 67.6	$ -	$ 67.6

*The adoption of SSAP No. 32 – *Preferred Stock – Revised* ("SSAP 32R") in 2021 resulted in a large shift of the Company's preferred stocks from the cost basis to fair value on a recurring basis.

The Company had no material assets or liabilities measured at fair value on a nonrecurring basis as of December 31, 2022 and 2021.

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 1/1/2022	Gain (Losses) in Net Income	Losses (Gains) in Surplus	Purchases	Issuances	Settlements	Transfers In	Transfers Out	Other	Balance as of 12/31/2022
Financial assets:										
Industial and miscellaneous	$ 8.4	$ (9.3)	$ (3.0)	$ -	$ -	$ (4.9)	$ -	$ -	$ 21.5	$ 12.7
Preferred stocks - unaffiliated	143.4	-	59.8	-	-	-	-	-	(75.9)	127.3
Common stocks - unaffiliated	172.0	(0.6)	83.8	6.4	48.3	(52.5)	9.0	-	(127.3)	139.1
Total financial assets	$ 323.8	$ (9.9)	$ 140.6	$ 6.4	$ 48.3	$ (57.4)	$ 9.0	$ -	$ (181.7)	$ 279.1

Description	Commercial MBS	Residential MBS	Non-affiliated Preferred Stocks	Non-affiliated Common Stocks	Asset-backed securities	All other bonds
Balance at January 1, 2021	-	0.2	22.0	229.7	57.6	-
Transfers into Level 3	8.2	-	79.4	6.9	-	15.2
Transfers out of Level 3 to Level 2	-	(0.1)	-	(81.4)	(14.1)	-
Transfers out of Level 3 to cost basis	-	-	(2.9)	-	(44.7)	-
Total gains (losses) included in net income	0.2	-	9.7	0.2	(0.2)	(15.1)
Total gains (losses) included in surplus	(0.4)	-	46.1	24.4	1.4	(0.1)
Purchases and issuances	0.4	-	4.6	3.2	-	-
Sales and settlements	-	(0.1)	(15.5)	(11.0)	-	-
Balance at December 31, 2021	$ 8.4	$ -	$ 143.4	$ 172.0	$ -	$ -

*Significant transfers out of Level 3 in 2021 included: 1) impact of adoption of SSAP 32R in 2021 on non-affiliated preferred stocks moved to surplus; and 2) transfers of non-affiliated common stocks to Level 2 due to new owner's fair value methodology.

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, 2022 (in millions):

Description	Fair Value	Carrying Value	Level 1	Level 2	Level 3
Financial assets:					
Bonds:					
U.S. Government and agencies	$ 64.0	$ 98.9	$ -	$ 64.0	$ -
All other governments	17.8	19.2	-	17.8	-
States, territories and possessions	183.1	190.7	-	183.1	-
Political subdivisions	268.7	272.7	-	268.7	-
Special Revenue	1,537.0	1,691.6	-	1,537.0	-
Industrial and miscellaneous	27,421.0	30,538.0	-	20,029.5	7,391.5
Parent, subsidiaries and affiliates	468.3	520.8	-	347.8	120.5
Total bonds	$ 29,959.9	$ 33,331.9	$ -	$ 22,447.9	$ 7,512.0
Non-affiliated preferred stocks	198.3	185.0	38.5	-	159.8
Non-affiliated common stocks	281.4	281.4	142.3	-	139.1
Mortgage loans	2,846.5	3,088.8	-	-	2,846.5
Currency forwards	0.1	0.1	-	0.1	-
Fixed-indexed annuity options	287.4	846.8	102.6	184.8	-
Interest rate swaps	25.2	25.2	-	25.2	-
Currency swaps	0.9	0.9	-	0.9	-
Separate account assets	103.7	103.7	1.1	102.6	-
Cash, cash equivalents and short term-investments	1,991.2	1,991.2	1,991.2	-	-
Policy loans	31.5	31.5	-	-	31.5
Total financial assets	$ 35,726.1	$ 39,886.5	$ 2,275.7	$ 22,761.5	$ 10,688.9
Financial liabilities:					
Currency swaps	4.8	4.8	-	4.8	-
Currency forwards	2.5	2.5	-	2.5	-
Interest rate swaps	95.0	95.0	-	95.0	-
Fixed-indexed annuity options	-	598.6	-	-	-
Funds held as collateral	209.5	209.5	-	209.5	-
Separate account liabilities	103.7	103.7	1.1	102.6	-
Total financial liabilities	$ 415.5	$ 1,014.1	$ 1.1	$ 414.4	$ -

*Separate account liabilities incorporates the fair value of the separate account reserve and equity indexput options.

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, 2021 (in millions):

Description	Fair Value	Carrying Value	Level 1	Level 2	Level 3
Financial assets:					
Bonds:					
U.S. Government and government agencies	$ 17.9	$ 16.3	$ -	$ 17.9	$ -
States, municipalities and political subdivisions	2,530.7	2,317.7	-	2,472.2	58.5
Foreign government	29.1	26.7	-	29.1	-
Residential MBS	2,199.5	2,116.9	-	2,195.5	4.0
Commercial MBS	844.3	822.5	-	835.9	8.4
Asset- backed securities	7,773.1	7,679.5	-	7,576.5	196.6
All other bonds	19,310.2	18,162.0	-	17,088.3	2,221.9
Total bonds	$ 32,704.8	$ 31,141.6	$ -	$ 30,215.4	$ 2,489.4
Non-affiliated preferred stocks	396.1	394.4	41.9	189.7	164.5
Non-affiliated common stocks	279.6	279.6	19.2	88.4	172.0
Separate account assets	67.6	67.6	-	67.6	-
Surplus notes	1,123.6	1,092.3	-	247.9	875.7
Mortgage loans	2,121.4	2,148.5	-	-	2,121.4
Derivative instruments	706.9	706.9	-	706.9	-
Funds held as collateral	408.3	408.3	-	408.3	-
Policy loans	64.2	64.2	-	-	64.2
Cash, cash equivalents and short term-investments	1,008.9	1,008.9	1,008.9	-	-
Total financial assets	$ 38,881.4	$ 37,312.3	$ 1,070.0	$ 31,924.2	$ 5,887.2
Financial liabilities:					
Annuity reserves and liability for deposit-type reserves	$ 42,785.0	$ 33,651.1	$ -	$ -	$ 42,785.0
Separate account liabilities	67.6	67.6	-	67.6	-
Funds held as collateral	435.3	435.3	-	435.3	-
Total financial liabilities	$ 43,287.9	$ 34,154.0	$ -	$ 502.9	$ 42,785.0

*Separate account liabilities incorporates the fair value of the separate account reserve and equity index put options.

** Surplus notes are included in other invested assets on the balance sheet.

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:

Annuity Reserves: The fair values of all benefits were estimated based on expected cash flows discounted using forward interest rates adjusted for cash flow uncertainty and the Company's credit risk and includes the impact of maintenance expenses.

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.

Funds held as collateral: The collateral held by MMALIC consists of cash under the Company's exclusive control and is stated at fair value.

D. INVESTMENTS

Bonds at December 31 consisted of the following (in millions):

	2022			
	Carrying Value	Fair Value	Gross Unrealized Gains	Gross Unrealized Losses
U.S. Government and agencies	$ 98.9	$ 64.0	$ 0.9	$ 35.8
All other governments	19.2	17.8	-	1.4
States, territories and possessions	190.7	183.1	0.6	8.2
Political subdivisions	272.7	268.7	4.9	8.9
Special Revenue	1,691.6	1,537.0	4.0	158.6
Industrial and miscellaneous	30,538.0	27,421.0	99.6	3,216.6
Parent, subsidiaries and affiliates	520.8	468.3	3.6	56.1
Total bonds	$ 33,331.9	$ 29,959.9	$ 113.6	$ 3,485.6

The December 31, 2022 gross unrealized losses exclude $15.7 million of losses included in the carrying value. These losses include $15.4 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.

	2021			
	Carrying Value	Fair Value	Gross Unrealized Gains	Gross Unrealized Losses
U.S. Government and government agencies	$ 16.3	$ 17.9	$ 1.6	$ -
States, municipalities and political subdivisions	2,317.7	2,530.7	213.3	0.3
Foreign government	26.7	29.1	2.4	-
Residential MBS	2,116.9	2,199.5	119.3	36.7
Commercial MBS	822.5	844.3	24.2	2.4
Asset-backed securities	7,679.5	7,773.1	126.5	32.9
All other bonds	18,162.0	19,310.2	1,209.9	61.7
Total bonds	$ 31,141.6	$ 32,704.8	$ 1,697.2	$ 134.0

At December 31, 2022 and 2021, the Company held unrated or less-than-investment grade bonds of $2,171.2 million and $1,352.3 million, respectively, with an aggregate fair value of $1,968.2 million and $1,384.7 million, respectively. Those holdings amounted to 6.5% and 4.3% of the Company’s investments in bonds and approximately 5.1% and 3.5% of the Company’s total admitted assets at December 31, 2022 and 2021, 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 2022, 2021 or 2020.

D. INVESTMENTS (CONTINUED)

The carrying value and fair value of the Company's mortgage loans at December 31, 2022 were as follows (in millions):

	2022	
	Carrying Value	Fair Value
Commercial mortgage loans:		
Primary lender	$ 1,263.5	$ 1,160.4
Mezzanine loans	22.6	22.6
Total commercial mortgage loans	1,286.1	1,183.0
Residential mortgage loans:		
FHA insured and VA guranteed	486.6	439.5
Other residential mortgage loans	1,316.1	1,224.0
Total residential mortgage loans	1,802.7	1,663.5
Total mortgage loans	$ 3,088.8	$ 2,846.5

The loan-to-value ratios by property type of the Company's commercial mortgage loans at December 31, 2022 were as follows (in millions):

	2022				
	Less Than 81%	81% to 95%	Above 95%	Total	% of Total
Office	$ 79.1	$ -	$ 30.8	$ 109.9	9%
Apartments	441.5	82.9	-	524.4	41%
Industrial and other	224.7	-	-	224.7	17%
Hotels	351.3	75.8	-	427.1	33%
Retail	-	-	-	-	0%
Total	$ 1,096.6	$ 158.7	$ 30.8	$ 1,286.1	100%

More than 85% of the Company’s commercial mortgage loans’ loan-to-value ratios are below 81% for the year ended December 31, 2022.

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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, 2022, translated into the equivalent rating agency designation (in millions):

	2022					
	AAA/AA/A	BBB	BB	B	CCC and Lower	Total
Commercial mortgage loans:						
Primary lender	$ 174.8	$ 798.4	$ 276.1	$ -	$ 14.2	$ 1,263.5
Mezzanine loans	-	22.6	-	-	-	22.6
Total commercial mortgage loans	174.8	821.0	276.1	-	14.2	1,286.1
Residential mortgage loans:						
FHA insured and VA guranteed	481.6	5.0	-	-	-	486.6
Other residential mortgage loans	56.3	1,259.8	-	-	-	1,316.1
Total residential mortgage loans	537.9	1,264.8	-	-	-	1,802.7
Total mortgage loans	$ 712.7	$ 2,085.8	$ 276.1	$ -	$ 14.2	$ 3,088.8

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, 2022.

The geographic distribution of commercial mortgage loans was as follows:

	2022	
	Carrying Value	Average Loan-to-Value Ratio
Florida	$ 194.3	76%
Colorado	175.8	67%
Texas	174.1	54%
New York	104.1	43%
Virginia	87.3	64%
Indiana	70.4	60%
All other	480.1	60%
Total commercial mortgage loans	$ 1,286.1	61%

All other consists of 18 jurisdictions, with no individual exposure exceeding $70.4 million.

D. INVESTMENTS (CONTINUED)

Interest rates, including fixed and variable, on the Company's portfolio of mortgage loans at December 31, 2022 were (in millions):

	2022	
	Low	High
Commercial mortgage loans:	2.6%	11.7%
Residential mortgage loans	2.2%	11.7%
Mezzanine mortgage loans	10.0%	13.3%

Interest rates, including fixed and variable, on new mortgage loans at December 31, 2022 were (in millions):

	2022	
	Low	High
Commercial mortgage loans:	2.6%	11.7%
Residential mortgage loans	2.5%	11.7%
Mezzanine mortgage loans	10.0%	13.3%

As of December 31, 2022, 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.

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, 2022				
Non-affiliated preferred stocks	$ 165.5	$ 198.3	$ 58.5	$ 25.7
Non-affiliated common stocks	220.5	281.4	87.8	26.9
Total	$ 386.0	$ 479.7	$ 146.3	$ 52.6

	Cost	Fair Value	Gross Unrealized Gains	Gross Unrealized Losses
At December 31, 2021				
Non-affiliated preferred stocks	$ 332.2	$ 396.1	$ 67.1	$ 3.2
Non-affiliated common stocks	209.6	279.6	81.8	11.8
Total	$ 541.8	$ 675.7	$ 148.9	$ 15.0

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):

	2022					
	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	$ 49.5	$ 35.8	2	$ -	$ -	-
All other governments	17.8	1.4	11	-	-	-
States, territories and possessions	160.6	8.2	10	-	-	-
Political subdivisions	157.9	8.9	22	-	-	-
Special Revenue	1,378.7	158.6	118	-	-	-
Industrial and miscellaneous	23,786.8	3,212.8	2,170	101.2	19.4	28
Parent, subsidiaries and affiliates	444.6	56.1	13	-	-	-
Total bonds	$ 25,995.9	$ 3,481.8	2,346	$ 101.2	$ 19.4	28
Non-affiliated preferred stocks	$ 1.3	$ 25.7	2	$ -	$ -	-
Non-affiliated common stocks	36.8	26.9	53	-	-	-
Total non-affiliated preferred and common stocks	$ 38.1	$ 52.6	55	$ -	$ -	-

The December 31, 2022 gross unrealized losses include $15.7 million of losses included in the carrying value. These losses include $15.4 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.

	2021			
	Twelve Months or Less		More Than Twelve Months	
	Fair Value	Gross Unrealized Loss	Fair Value	Gross Unrealized Loss
States, municipalities and political subdivisions	$ 23.0	$ 0.3	$ -	$ -
Residential MBS	1,007.2	22.4	33.0	14.3
Commercial MBS	249.6	2.4	8.4	-
Asset-backed securities	2,343.7	18.1	530.3	14.8
All other bonds	2,555.6	54.9	191.9	6.8
Total bonds	$ 6,179.1	$ 98.1	$ 763.6	$ 35.9
Non-affiliated preferred stocks	$ 11.9	$ -	$ 18.0	$ 3.2
Non-affiliated common stocks	16.4	11.4	1.7	0.4
Total non-affiliated preferred and common stocks	$ 28.3	$ 11.4	$ 19.7	$ 3.6

At December 31, 2021, the gross unrealized losses related to 834 bonds, 8 common stocks and 5 preferred stocks.

D. INVESTMENTS (CONTINUED)

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

		2022		2021	
NAIC Class	Equivalent Rating Agency Designation	Carrying Value	% of Total	Carrying Value	% of Total
1	Aaa/Aa/A	$ 17,729.1	53.2%	$ 17,466.7	56.1%
2	Baa	13,435.0	40.3%	12,262.9	39.4%
3	Ba	1,473.9	4.4%	761.8	2.4%
4	B	454.6	1.4%	545.3	1.8%
5	Caa and lower	209.4	0.6%	70.9	0.2%
6	In or near default	29.9	0.1%	34.0	0.1%
	Total	$ 33,331.9	100.0%	$ 31,141.6	100.0%

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 (Net of IMR Transfers and Taxes)	Charges for Impairment	Total	Number of Investments with Impairment Charges
2022	$ 8.4	$ (41.0)	$ (32.6)	138
2021	$ 170.7	$ (52.0)	$ 118.7	31
2020	$ 93.0	$ (311.6)	$ (218.6)	156

D. INVESTMENTS (CONTINUED)

The following is a summary of the carrying value and fair value of bonds as of December 31, 2022 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 (in millions):

	2022	
	Carrying Value	Fair Value
Maturity:		
One year or less	$ 662.3	$ 657.9
After one year through five years	5,118.2	4,925.2
After five years through ten years	9,902.5	9,068.6
After ten years	17,648.9	15,308.2
Total bonds by maturity	$ 33,331.9	$ 29,959.9

The table below sets forth the scheduled maturities of MMALIC's bonds as of December 31, 2021 (in millions):

	2021	
	Carrying Value	Fair Value
Maturity:		
One year or less	$ 491.2	$ 506.9
After one year through five years	6,935.6	7,326.4
After five years through ten years	8,000.2	8,747.4
After ten years	5,095.7	5,307.2
Subtotal	20,522.7	21,887.9
Mortgage-backed securities	2,939.4	3,043.8
Asset-backed securities	7,679.5	7,773.1
Total bonds by maturity	$ 31,141.6	$ 32,704.8

The aggregate amount of investment income generated as a result of prepayment penalties and acceleration fees was $0.6 million, $35.9 million, and $28.2 million during 2022, 2021, and 2020, respectively.

Proceeds from sales of bonds were $10,640.3 million, $686.8 million, and $7,642.5 million for 2022, 2021, and 2020, respectively. Gross realized gains of $282.1 million, $87.4 million, and $409.1 million and gross realized losses of $232.4 million, $11.9 million, and $43.7 million were realized on bonds during 2022, 2021, and 2020, respectively. The number of securities disposed of with a callable feature in 2022 and 2021 was 182 and 244, respectively.

MMALIC’s $4,253.5 million investment in MBS represents approximately 13% of the carrying value of its bonds at December 31, 2022. The Company’s indirect exposure to subprime mortgage risk as of December 31, 2022 had a total actual cost and book adjusted carrying value of approximately $551.0 million and $546.9 million, respectively, and a total fair value of approximately $515.7 million. MMALIC’s $2,939.4 million investment in MBS represents approximately 9% of the carrying value of its bonds at December 31, 2021. The Company’s indirect exposure to subprime mortgage risk as of December 31, 2021 included 70 residential MBS with total actual cost and book adjusted carrying values of approximately $123.0 million and $123.3 million, respectively, and a total fair value of approximately $138.6 million.

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.

D. INVESTMENTS (CONTINUED)

The following table shows each loan-backed security with an OTTI recognized in 2022, 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 Income Statement	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
00256DAA0	$ 5,028,172	$ 3,890,891	$ 1,137,281	$ 3,890,891	$ 3,201,439	3/31/2022
05535DBG8	270,320	226,054	44,266	226,054	146,322	3/31/2022
36157NFL3	63,101	48,296	14,805	48,296	65,578	3/31/2022
86358RXZ5	730,465	680,597	49,868	680,597	653,004	3/31/2022
05951KAN3	769,516	727,854	41,662	727,854	725,932	3/31/2022
17309AAD1	1,178,157	1,157,862	20,295	1,157,862	1,143,417	3/31/2022
41161PMV2	381,790	294,193	87,597	294,193	400,491	3/31/2022
65535VNL8	2,434,448	2,223,472	210,976	2,223,472	2,443,775	3/31/2022
74928XBB6	5,618,112	4,942,615	675,497	4,942,615	6,168,357	3/31/2022
05949CHM1	951,691	869,857	81,834	869,857	894,663	3/31/2022
57643MLZ5	391,660	375,540	16,120	375,540	376,146	3/31/2022
59020UV77	84,020	82,288	1,732	82,288	80,945	3/31/2022
863579RP5	736,920	685,020	51,900	685,020	711,770	3/31/2022
885220KW2	2,541,472	2,529,769	11,703	2,529,769	2,530,102	3/31/2022
94984DAC8	474,157	426,688	47,469	426,688	439,204	3/31/2022
07325DAF1	351,756	298,754	53,002	298,754	308,547	6/30/2022
759676AF6	467,062	389,330	77,732	389,330	403,998	6/30/2022
02147WAT6	1,833,809	1,810,984	22,825	1,810,984	1,647,430	6/30/2022
02147XAR8	722,783	716,983	5,800	716,983	616,400	6/30/2022
05951KAN3	727,416	726,755	661	726,755	709,393	6/30/2022
12566UAE4	484,546	479,517	5,029	479,517	428,794	6/30/2022
12566UAN4	745,695	687,455	58,239	687,455	680,275	6/30/2022
12566XAM0	762,429	749,321	13,107	749,321	711,263	6/30/2022
12628LAD2	939,894	917,685	22,210	917,685	775,478	6/30/2022
12668APC3	1,053,742	1,028,969	24,773	1,028,969	1,023,156	6/30/2022
17309BAB3	231,697	229,910	1,787	229,910	212,294	6/30/2022
17309VAH6	883,901	881,260	2,641	881,260	828,464	6/30/2022
225470Q89	639,198	566,017	73,181	566,017	434,433	6/30/2022
32051GSQ9	2,150,300	2,111,315	38,985	2,111,315	2,136,944	6/30/2022
59020UW43	484,507	422,353	62,154	422,353	438,518	6/30/2022
65535VSJ8	1,382,487	1,368,659	13,828	1,368,659	1,226,910	6/30/2022
69337BAH7	1,615,840	1,597,892	17,947	1,597,892	1,468,643	6/30/2022
74923HAQ4	591,952	582,904	9,048	582,904	527,598	6/30/2022
74928RAB0	299,181	295,529	3,652	295,529	312,097	6/30/2022
75115BAC3	1,263,859	1,260,657	3,203	1,260,657	1,287,590	6/30/2022
75116FBH1	1,660,615	1,655,476	5,139	1,655,476	1,511,249	6/30/2022
761118SC3	1,738,294	1,735,436	2,859	1,735,436	1,583,504	6/30/2022
863579J90	408,035	404,919	3,116	404,919	410,645	6/30/2022
87222EAB4	989,431	964,435	24,996	964,435	915,285	6/30/2022
87222EAC2	1,069,037	1,046,433	22,604	1,046,433	954,115	6/30/2022

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Income Statement	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
93934NAC9	550,457	525,641	24,815	525,641	469,111	6/30/2022
058931AT3	1,243,463	1,240,130	3,333	1,240,130	1,198,967	6/30/2022
073880AD8	1,276,813	1,222,687	54,126	1,222,687	1,154,766	6/30/2022
12544DAG4	95,844	90,011	5,833	90,011	85,172	6/30/2022
12545EAK2	1,550,474	1,490,197	60,276	1,490,197	1,329,130	6/30/2022
12638PAB5	744,092	736,605	7,487	736,605	600,312	6/30/2022
1266942H0	606,740	599,651	7,089	599,651	501,690	6/30/2022
126694HP6	655,886	535,926	119,960	535,926	506,396	6/30/2022
12669G3S8	1,421,943	1,403,926	18,017	1,403,926	1,272,912	6/30/2022
12669G4K4	2,882,965	2,860,499	22,466	2,860,499	2,654,538	6/30/2022
16162YAL9	406,596	387,094	19,502	387,094	351,124	6/30/2022
16165MAG3	2,063,370	2,039,505	23,865	2,039,505	1,824,783	6/30/2022
170257AE9	3,090,905	2,877,625	213,279	2,877,625	2,454,654	6/30/2022
17025AAH5	1,119,104	1,045,677	73,427	1,045,677	993,451	6/30/2022
225458L55	554,354	551,293	3,060	551,293	495,964	6/30/2022
362341XC8	963,117	959,504	3,613	959,504	830,593	6/30/2022
46631NAA7	819,190	805,803	13,387	805,803	733,833	6/30/2022
46631NDT3	7,735,758	7,037,790	697,968	7,037,790	7,196,047	6/30/2022
74958YAE2	335,485	319,458	16,027	319,458	327,784	6/30/2022
78473TAJ9	275,754	245,411	30,343	245,411	214,919	6/30/2022
863579XC7	1,415,676	1,337,580	78,096	1,337,580	1,408,287	6/30/2022
86363GAF1	1,733,928	1,673,515	60,413	1,673,515	1,636,845	6/30/2022
94985AAA7	227,339	217,876	9,463	217,876	211,415	6/30/2022
94986CAA2	328,420	320,452	7,968	320,452	302,929	6/30/2022
57430U301	1,330,669	1,004,371	326,298	1,004,371	803,430	9/30/2022
07325DAF1	291,282	290,354	928	290,354	286,720	9/30/2022
3622EAAA8	3,999,702	3,929,491	70,212	3,929,491	3,739,585	9/30/2022
61751DAE4	1,716,986	1,604,835	112,151	1,604,835	2,251,814	9/30/2022
617526AD0	2,717,720	2,314,163	403,557	2,314,163	2,489,016	9/30/2022
86358RXZ5	573,712	503,846	69,866	503,846	532,119	9/30/2022
07386XAH9	1,136,200	1,060,380	75,820	1,060,380	920,227	9/30/2022
12566UAE4	469,028	437,575	31,453	437,575	395,514	9/30/2022
12566UAN4	659,320	581,671	77,649	581,671	613,196	9/30/2022
12566XAM0	724,102	706,097	18,005	706,097	652,607	9/30/2022
12628LAD2	944,313	837,560	106,754	837,560	715,627	9/30/2022
126670JP4	799,425	751,737	47,688	751,737	748,985	9/30/2022
12667F4N2	2,337,848	2,296,401	41,448	2,296,401	2,234,566	9/30/2022
12668APC3	991,327	950,477	40,850	950,477	944,519	9/30/2022
17307GED6	1,519,753	1,448,105	71,648	1,448,105	1,466,554	9/30/2022
17309BAB3	228,895	224,462	4,433	224,462	201,398	9/30/2022
17309VAH6	845,828	839,340	6,488	839,340	792,523	9/30/2022
225470Q89	554,757	534,935	19,822	534,935	418,987	9/30/2022
32051GSQ9	2,037,561	1,989,697	47,865	1,989,697	2,018,934	9/30/2022

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Income Statement	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
46627MAD9	641,414	620,422	20,992	620,422	598,910	9/30/2022
46627MEJ2	1,290,004	1,214,983	75,022	1,214,983	1,045,674	9/30/2022
47232CAH7	1,899,848	1,899,428	420	1,899,428	2,091,390	9/30/2022
576434W59	231,800	180,887	50,912	180,887	133,506	9/30/2022
59020UW43	402,012	374,574	27,438	374,574	282,946	9/30/2022
643529AC4	566,063	512,432	53,631	512,432	615,937	9/30/2022
65535VMJ4	654,212	604,134	50,077	604,134	606,472	9/30/2022
65535VNL8	2,216,330	2,128,294	88,036	2,128,294	2,136,155	9/30/2022
65535VSJ8	1,353,591	1,314,301	39,290	1,314,301	1,150,059	9/30/2022
69337BAH7	1,588,255	1,531,076	57,179	1,531,076	1,357,354	9/30/2022
74923HAQ4	563,728	561,272	2,456	561,272	491,746	9/30/2022
74928RAB0	293,120	262,538	30,582	262,538	285,136	9/30/2022
75116CET9	263,844	166,578	97,266	166,578	229,893	9/30/2022
761118SC3	1,692,139	1,684,385	7,754	1,684,385	1,439,667	9/30/2022
863579J90	399,903	373,319	26,584	373,319	387,475	9/30/2022
87222EAB4	960,274	864,706	95,569	864,706	855,078	9/30/2022
87222EAC2	1,041,136	968,565	72,571	968,565	884,062	9/30/2022
93934FMD1	1,850,357	1,613,441	236,916	1,613,441	1,651,078	9/30/2022
45660LCK3	2,987,283	2,747,927	239,356	2,747,927	2,828,661	9/30/2022
05946XY72	1,121,255	1,064,056	57,199	1,064,056	1,039,216	9/30/2022
05949CHM1	788,146	770,794	17,352	770,794	776,150	9/30/2022
05949CKX3	1,593,696	1,495,795	97,900	1,495,795	1,483,476	9/30/2022
073880AD8	1,165,906	1,163,805	2,101	1,163,805	1,066,603	9/30/2022
12544DAG4	87,957	88,141	(184)	88,141	76,266	9/30/2022
12545EAK2	1,470,040	1,423,980	46,060	1,423,980	1,225,499	9/30/2022
12638PAB5	730,343	719,668	10,676	719,668	561,272	9/30/2022
1266942H0	586,626	561,203	25,423	561,203	472,137	9/30/2022
126694BE7	332,557	306,506	26,051	306,506	311,536	9/30/2022
126694CS5	3,094,276	3,091,476	2,800	3,091,476	2,504,248	9/30/2022
126694HP6	515,419	474,981	40,438	474,981	462,478	9/30/2022
12669DUS5	773,797	772,715	1,082	772,715	742,780	9/30/2022
12669G3S8	1,387,574	1,375,347	12,226	1,375,347	1,217,425	9/30/2022
12669G4K4	2,834,361	2,781,521	52,840	2,781,521	2,545,994	9/30/2022
12669GR45	534,792	525,148	9,644	525,148	485,346	9/30/2022
16162YAL9	380,468	361,472	18,995	361,472	327,514	9/30/2022
16165MAG3	1,961,306	1,944,718	16,588	1,944,718	1,661,310	9/30/2022
170257AE9	2,828,331	2,633,857	194,474	2,633,857	2,354,786	9/30/2022
17025AAH5	996,965	955,555	41,410	955,555	872,118	9/30/2022
2254582Y3	1,262,710	1,223,508	39,202	1,223,508	1,083,348	9/30/2022
362341XC8	925,615	890,329	35,286	890,329	775,076	9/30/2022
41161PCX9	222,673	219,523	3,150	219,523	217,809	9/30/2022
466247UG6	543,666	541,554	2,112	541,554	492,253	9/30/2022
466247ZP1	597,232	578,858	18,375	578,858	551,434	9/30/2022

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Income Statement	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
46628LAB4	52,197	43,653	8,544	43,653	46,321	9/30/2022
46631NAA7	787,350	768,303	19,047	768,303	654,423	9/30/2022
46631NDT3	6,957,695	6,448,656	509,039	6,448,656	6,565,975	9/30/2022
57643MLZ5	322,070	311,840	10,230	311,840	295,793	9/30/2022
59023PAB9	550,151	530,517	19,633	530,517	549,074	9/30/2022
863579RP5	630,863	612,560	18,302	612,560	593,202	9/30/2022
863579XC7	1,202,538	1,169,250	33,288	1,169,250	1,184,462	9/30/2022
86363GAF1	1,622,996	1,511,763	111,233	1,511,763	1,431,479	9/30/2022
885220KW2	2,336,973	2,265,171	71,802	2,265,171	2,217,726	9/30/2022
92979DAC9	2,889,617	2,736,750	152,866	2,736,750	2,880,781	9/30/2022
94984DAC8	391,725	391,939	(214)	391,939	377,184	9/30/2022
94986CAA2	319,103	297,142	21,962	297,142	281,932	9/30/2022
00176BAM54	221,912	204,829	17,083	204,829	145,456	12/31/2022
36157NFL3	34,787	33,507	1,280	33,507	49,479	12/31/2022
3622EAAA8	3,923,762	3,761,791	161,971	3,761,791	3,650,746	12/31/2022
61751DAE4	1,629,194	1,602,771	26,423	1,602,771	1,949,256	12/31/2022
759676AF6	379,733	378,947	785	378,947	359,320	12/31/2022
86358RXZ5	465,267	455,171	10,096	455,171	471,122	12/31/2022
02147XAR8	680,181	643,751	36,430	643,751	528,126	12/31/2022
058933AN2	919,353	889,825	29,529	889,825	821,517	12/31/2022
05951KAN3	696,878	683,150	13,728	683,150	647,406	12/31/2022
07386XAH9	1,011,656	911,593	100,063	911,593	863,150	12/31/2022
12566UAE4	337,542	337,076	465	337,076	317,476	12/31/2022
12566UAN4	576,035	576,010	25	576,010	628,281	12/31/2022
12566XAM0	699,177	699,339	(162)	699,339	655,865	12/31/2022
12628LAD2	834,249	776,091	58,158	776,091	675,639	12/31/2022
126670JP4	743,653	722,674	20,979	722,674	725,258	12/31/2022
12667F4N2	2,266,231	2,246,591	19,640	2,246,591	2,214,064	12/31/2022
12667GAC7	693,373	685,397	7,976	685,397	654,562	12/31/2022
12668APC3	924,868	924,886	(18)	924,886	878,754	12/31/2022
17025RAA3	1,550,324	1,306,829	243,495	1,306,829	1,552,445	12/31/2022
17307GED6	1,443,837	1,417,702	26,135	1,417,702	1,463,475	12/31/2022
17309BAB3	222,437	220,151	2,285	220,151	198,606	12/31/2022
17309VAH6	805,883	803,877	2,006	803,877	758,730	12/31/2022
225470Q89	521,333	522,356	(1,023)	522,356	415,017	12/31/2022
32051GT70	735,886	675,158	60,728	675,158	601,220	12/31/2022
36244SAD0	2,376,922	2,199,302	177,620	2,199,302	2,397,505	12/31/2022
43739EAP2	705,506	689,473	16,033	689,473	669,168	12/31/2022
46627MAD9	604,558	593,543	11,016	593,543	524,404	12/31/2022
46627MCY1	5,194,888	4,953,702	241,186	4,953,702	5,130,647	12/31/2022
46627MEJ2	1,195,047	1,170,943	24,104	1,170,943	982,410	12/31/2022
47232CAH7	1,899,914	1,890,225	9,689	1,890,225	2,006,775	12/31/2022

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Income Statement	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
59020UW43	366,342	237,303	129,039	237,303	284,957	12/31/2022
643529AC4	520,909	520,857	53	520,857	620,443	12/31/2022
65535VSJ8	1,311,192	1,265,976	45,215	1,265,976	1,124,326	12/31/2022
69337BAH7	1,434,530	1,431,323	3,207	1,431,323	1,273,601	12/31/2022
74923GAC7	1,755,192	1,490,490	264,702	1,490,490	1,608,920	12/31/2022
74923HAQ4	552,304	550,690	1,614	550,690	486,284	12/31/2022
74928RAB0	264,408	256,037	8,371	256,037	280,614	12/31/2022
75115BAC3	1,262,630	1,098,615	164,015	1,098,615	1,195,478	12/31/2022
75115DAA3	201,854	200,413	1,441	200,413	189,024	12/31/2022
76110HH85	270,810	243,642	27,169	243,642	261,417	12/31/2022
761118BU1	942,962	855,567	87,395	855,567	916,638	12/31/2022
761118GS1	1,175,777	1,156,524	19,253	1,156,524	1,119,101	12/31/2022
761118SC3	1,633,297	1,616,573	16,724	1,616,573	1,423,542	12/31/2022
761118UG1	524,740	522,750	1,990	522,750	437,178	12/31/2022
76112BNM8	5,289,750	4,895,126	394,624	4,895,126	5,091,696	12/31/2022
863579J90	348,530	349,527	(997)	349,527	353,839	12/31/2022
86360BAJ7	747,131	721,456	25,674	721,456	766,709	12/31/2022
87222EAB4	867,402	838,871	28,530	838,871	817,668	12/31/2022
87222EAC2	977,235	960,878	16,357	960,878	815,432	12/31/2022
93934FMD1	1,598,156	1,599,666	(1,510)	1,599,666	1,669,656	12/31/2022
93934NAC9	495,187	485,595	9,592	485,595	412,326	12/31/2022
026929AA7	1,760,841	1,592,703	168,138	1,592,703	1,705,416	12/31/2022
45660LCK3	2,750,918	2,656,466	94,452	2,656,466	2,796,920	12/31/2022
058931AT3	1,225,723	1,209,276	16,447	1,209,276	1,154,041	12/31/2022
05946XY72	1,048,037	1,046,371	1,666	1,046,371	1,028,271	12/31/2022
05949CKX3	1,262,077	1,203,570	58,507	1,203,570	1,250,063	12/31/2022
07386YAE4	2,032,756	1,895,938	136,818	1,895,938	1,823,359	12/31/2022
073880AD8	1,158,830	1,127,532	31,298	1,127,532	1,051,875	12/31/2022
07401CAS2	3,509,364	3,262,743	246,621	3,262,743	3,195,561	12/31/2022
12543XAD8	1,176,300	1,172,978	3,321	1,172,978	1,091,000	12/31/2022
12545EAK2	1,377,454	1,391,454	(14,000)	1,391,454	1,221,449	12/31/2022
12638PAB5	721,090	711,902	9,188	711,902	552,531	12/31/2022
1266942H0	554,299	556,124	(1,824)	556,124	475,653	12/31/2022
126694HP6	472,556	469,133	3,424	469,133	458,573	12/31/2022
126694UJ5	1,182,995	1,033,719	149,276	1,033,719	1,173,798	12/31/2022
12669DUS5	754,525	753,847	679	753,847	726,499	12/31/2022
12669G3S8	1,273,702	1,267,299	6,403	1,267,299	1,123,086	12/31/2022
12669G4K4	2,695,208	2,679,394	15,815	2,679,394	2,508,614	12/31/2022
12669GR45	521,474	499,857	21,618	499,857	477,045	12/31/2022
16162YAL9	353,219	351,895	1,324	351,895	327,680	12/31/2022
16165MAG3	1,899,055	1,872,274	26,782	1,872,274	1,610,464	12/31/2022
170257AE9	2,539,977	2,557,671	(17,695)	2,557,671	2,070,574	12/31/2022

D. INVESTMENTS (CONTINUED)

CUSIP	Amortized Cost Before OTTI	Present Value of Projected Cash Flows	OTTI Charge Recognized in Income Statement	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
17025AAH5	938,958	899,184	39,774	899,184	873,057	12/31/2022
2254582Y3	244,640	244,638	3	244,638	216,789	12/31/2022
225458L55	544,944	541,599	3,344	541,599	471,470	12/31/2022
225470VF7	1,564,751	1,540,100	24,651	1,540,100	1,484,306	12/31/2022
32051GXQ3	1,362,980	1,279,943	83,036	1,279,943	1,285,425	12/31/2022
362341XC8	884,539	865,321	19,218	865,321	767,933	12/31/2022
36242DQY2	110,190	104,565	5,625	104,565	100,339	12/31/2022
466247J46	80,370	74,449	5,922	74,449	74,585	12/31/2022
466247UG6	541,686	527,981	13,705	527,981	520,360	12/31/2022
466247ZP1	571,804	565,679	6,125	565,679	545,586	12/31/2022
46628LAB4	43,495	42,157	1,338	42,157	44,190	12/31/2022
46630WAB6	922,039	888,065	33,974	888,065	822,318	12/31/2022
46630WAL4	544,230	517,582	26,648	517,582	489,602	12/31/2022
46631NAA7	754,017	754,676	(659)	754,676	639,770	12/31/2022
46631NDT3	6,401,145	6,374,664	26,481	6,374,664	6,427,560	12/31/2022
576433C53	505,306	453,037	52,269	453,037	513,969	12/31/2022
576433D52	534,258	502,735	31,523	502,735	444,494	12/31/2022
57643MLZ5	289,827	286,800	3,026	286,800	270,858	12/31/2022
59020UV77	34,748	33,720	1,027	33,720	33,150	12/31/2022
59023PAB9	513,508	509,687	3,821	509,687	530,373	12/31/2022
74958YAE2	312,432	299,278	13,154	299,278	304,434	12/31/2022
863579RP5	611,800	611,553	247	611,553	595,598	12/31/2022
863579XC7	1,153,338	1,124,061	29,277	1,124,061	1,170,138	12/31/2022
86363GAF1	1,513,354	1,415,604	97,750	1,415,604	1,437,559	12/31/2022
885220KW2	2,124,251	2,082,510	41,741	2,082,510	2,073,599	12/31/2022
94984DAC8	360,258	345,160	15,098	345,160	349,356	12/31/2022
94986CAA2	295,523	289,300	6,223	289,300	276,087	12/31/2022
Total			$ 13,330,036			

D. INVESTMENTS (CONTINUED)

The following table shows each loan-backed security with an OTTI recognized in 2021, 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 Income Statement	Amortized Cost After OTTI	Fair Value at Time of OTTI	Date Reported
675923AG1	$ 22,537,675	$ 22,503,488	$ 34,188	$ 22,503,487	$ 23,304,422	3/31/2021
12641QBX9	671,232	635,668	35,564	635,668	655,103	9/30/2021
36157NFL3	79,086	73,555	5,531	73,555	72,966	9/30/2021
47232VDK5	242,528	153,931	88,597	153,931	251,406	9/30/2021
65535VNL8	2,852,493	2,494,587	357,906	2,494,587	2,676,769	9/30/2021
94985AAA7	285,677	271,708	13,969	271,708	260,990	9/30/2021
05535DBG8	314,225	270,320	43,905	270,320	142,946	12/31/2021
05950TAC9	442,252	369,516	72,736	369,516	412,681	12/31/2021
12669DUS5	995,505	920,453	75,052	920,453	963,480	12/31/2021
41161PMV2	478,307	387,944	90,363	387,944	410,649	12/31/2021
47232CAH7	2,108,386	1,933,527	174,859	1,933,527	2,067,412	12/31/2021
65535VNL8	2,534,050	2,437,293	96,756	2,437,294	2,571,479	12/31/2021
94985AAA7	258,562	257,318	1,244	257,318	246,274	12/31/2021
94986MAF9	1,408,551	1,406,900	1,651	1,406,900	1,561,524	12/31/2021
Total			$ 1,092,321			

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	2022	2021	Increase/ (Decrease)	Gross Restricted to Total Assets	Restricted to Total Admitted Assets
Letter stock or securities restricted as to sale	$ 241.4	$ 1,195.0	$ (953.6)	0.6%	0.6%
FHLB capital stock	48.3	52.5	(4.2)	0.1%	0.1%
On deposit with states	6.3	5.9	0.4	0.0%	0.0%
Pledged as collateral to FHLB (including assets backing funding agreements)	1,102.3	1,256.4	(154.1)	2.9%	2.6%
Pledged as collateral not captured in other categories	167.6	-	167.6	0.4%	0.4%
Total restricted assets	$ 1,565.9	$ 2,509.8	$ (943.9)	4.1%	3.7%

Net investment income consisted of the following for the years ended December 31 (in millions):

	2022	2021	2020
Investment income:			
Bonds	$ 1,436.1	$ 1,240.2	$ 1,390.5
Equity securities	9.3	28.5	77.8
Mortgage loans	116.5	74.6	71.0
Real estate	-	11.9	24.2
Policy loans	4.1	4.7	5.0
Cash and short-term investments	17.5	18.8	37.4
Other invested assets	96.1	75.8	66.3
Derivative instruments	(174.6)	543.7	283.0
Other	2.9	2.0	1.7
Gross investment income	1,507.9	2,000.2	1,956.9
Investment expenses	(35.6)	(49.2)	(48.1)
Ceded investment income	(453.3)	-	-
Net investment income	$ 1,019.0	$ 1,951.0	$ 1,908.8

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 existing market index (generally the S&P 500). The equity index options expire ratably between 2023 and 2029. 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, 2022, MMALIC has entered into nineteen interest rate swaps to mitigate interest rate risk related to certain floating-rate securities included in MMALIC's portfolio of fixed maturity securities. The purpose of each of these swaps is to effectively convert a portion of MMALIC's floating-rate fixed maturity securities to fixed rates by offsetting the variability in cash flows attributable to changes in short-term LIBOR. Under the terms of the swaps, MMALIC receives fixed rate interest payments in exchange for variable interest payments based on short-term LIBOR. The notional amounts of the interest rate swaps generally decline over each swap's respective life (the swaps expire between 2023 and 2042) in anticipation of the expected decline in MMALIC's portfolio of fixed maturity securities with floating interest rates based on short-term LIBOR.

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's futures contracts were all terminated as of the reporting date.

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.

E. OTHER FINANCIAL INSTRUMENTS (CONTINUED)

Net collateral pledged by the counterparties was $131.1 million as of December 31, 2022. In the event of default, the full market value exposure at risk in a net gain position, net of offsets and collateral, was $194.2 million as of December 31, 2022. The statutory net amount at risk, defined as net collateral pledged and statement values excluding accrued interest, was $80.4 million as of December 31, 2022.

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

	December 31, 2022			
	Assets		Liabilities	
	Carrying Value	Notional Amount	Carrying Value	Notional Amount
	(in millions)			
Fixed-indexed options*	$ 846.8	$ 18,948.0	$ 598.6	$ 17,176.5
Interest rate swaps	25.2	1,551.8	95.0	3,930.0
Currency swaps	0.9	38.4	4.8	142.4
Forward contracts	0.1	7.5	2.5	69.0
Total	$ 873.0	$ 20,545.7	$ 700.9	$ 21,317.9

*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 $287.4 million as of December 31, 2022.

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

	December 31, 2022
	(in millions)
Open interest rate swaps in a fixed pay position	$ 3,930.0
Open interest rate swaps in a fixed receive position	1,551.8
Total interest rate swaps	$ 5,481.8

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:

	Year Ended December 31, 2022	
	Net Realized Gains (Losses) on Closed Contracts	Change In Net Unrealized Gains (Losses) on Open Contracts
	(in millions)	
Registered index-linked options	$ (26.1)	$ (86.2)
Interest rate swaps	-	(111.6)
Currency swaps	-	(3.9)
Forward contracts	0.7	(2.4)
Financial futures	3.1	-
Total	$ (22.3)	$ (204.1)

Fixed-indexed options are carried at amortized cost with amortization and expirations recorded in Net investment income. The company recorded gains on expirations of $273.9 million and amortization of $457.1 million in 2022.

E. OTHER FINANCIAL INSTRUMENTS (CONTINUED)

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 and $25.0 million of FHLB Class B membership stock at December 31, 2022 and 2021, respectively. 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.

In 2022, FHLB advanced MMALIC $300.0 million to the FHLB. In 2021, MMALIC repaid $931.0 million to the FHLB. At December 31, 2022 and 2021, MMALIC had $500.0 million and $200.0 million, respectively (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, 2022). The Company paid interest of approximately $8.4 million, $4.4 million, and $11.0 million on FHLB advances in 2022, 2021 and 2020, 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 282,623 shares ($28.3 million) of FHLB activity and excess stock.

The Company posted collateral to the FHLB of assets with a fair value of approximately $1,030.9 million and $1,320.9 million at December 31, 2022 and 2021, respectively. The Company posted collateral to the FHLB of assets with a carrying value of approximately $1,102.3 million and $1,256.4 million at December 31, 2022 and 2021, 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.

E. OTHER FINANCIAL INSTRUMENTS

PRIOR YEAR INFORMATION

MMALIC 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.

At December 31, 2021 and 2020 the Company's notional or contract amounts and fair value of financial instruments and related reserves for fixed-indexed annuities (included in liabilities below) (shown as liabilities below) in the general account are summarized as follows (in millions):

	Equity Index Options		
	Contract or Notional Amount	Fair Value	Liabilities
2021	$ 18,307.1	$ 665.0	$ 22,483.5
2020	$ 21,035.1	$ 785.6	$ 21,249.6

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 existing market index (generally the S&P 500) with a notional value of $19,487.7 million and expire ratably in 2022 and 2023. The Company recognized a change in unrealized loss of ($7.6) million and ($38.2) million on these options in 2021 and 2020, respectively. 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. The liabilities summarized above represent the reserves for MMALIC's fixed-indexed annuities.

As of December 31, 2021, MMALIC has entered into nine interest rate swaps to mitigate interest rate risk related to certain floating-rate securities included in MMALIC's portfolio of fixed maturity securities. The purpose of each of these swaps is to effectively convert a portion of MMALIC's floating-rate fixed maturity securities to fixed rates by offsetting the variability in cash flows attributable to changes in short-term LIBOR. Under the terms of the swaps, MMALIC receives fixed rate interest payments in exchange for variable interest payments based on short-term LIBOR. The notional amounts of the interest rate swaps generally decline over each swap's respective life (the swaps expire between December 2023 and June 2030) in anticipation of the expected decline in MMALIC's portfolio of fixed maturity securities with floating interest rates based on short-term LIBOR ($1,472.0 million and $1,625.0 million notional amount at December 31, 2021 and December 31, 2020, respectively). The Company recognized a change in unrealized loss of ($60.2) million and an unrealized gain of $57.2 million on these interest rate swaps in 2021 and 2020, respectively. The Company terminated three interest rate swaps and recognized realized gains of $16.5 million in 2020. The fair value of the interest rate swaps in an asset position, included in derivative instruments, was $41.9 million and $102.1 million at December 31, 2021 and 2020, respectively. The fair value of the interest rate swaps in a liability position was zero at December 31, 2021 and 2020.

The Company's equity index options and interest rate swaps, fair value hedges that are not accounted for using hedge accounting, are accounted for at fair value with the change in fair value recorded as unrealized capital gains (losses) reported in surplus. The net change in unrealized capital gains (losses) on contracts that do not qualify for hedge accounting, the equity index options and interest rate swaps above, were ($67.7) million in 2021 and $19.0 million in 2020.

E. OTHER FINANCIAL INSTRUMENTS (CONTINUED)

MMALIC receives collateral from certain counterparties to support its purchased call option assets (net of collateral required under put option contracts with the same counterparties). This collateral ($408.3 million at December 31, 2021 and $351.3 million at December 31, 2020) is shown as funds held as collateral in MMALIC's Balance Sheet with an offsetting liability to return the collateral, which is included in liability for funds held as collateral.

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 $25.0 million and $30.0 million of FHLB Class B membership stock at December 31, 2021 and 2020, respectively. 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.

In 2021, MMALIC repaid $931.0 million to the FHLB. In 2020, the FHLB advanced MMALIC $200.0 million and MMALIC repaid $165.0 million to the FHLB. At December 31, 2021 and 2020, MMALIC had $200.0 million and $1,131.0 million, respectively (the maximum amount of borrowings, as permitted by the FHLB, during the reporting period was $981.0 million) in outstanding advances from the FHLB (included in liability for deposit-type contracts), bearing interest at 1.35%. The Company paid interest of approximately $4.4 million and $11.0 million on these advances in 2021 and 2020, respectively. This advance must be repaid in 2025. 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 275,008 shares ($27.5 million) of FHLB activity and excess stock.

The Company also posted collateral to the FHLB of assets with a fair value and carrying value of approximately $1,320.9 million and $1,256.4 million, respectively, as of December 31, 2021. 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.

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 would retain on any single life insurance policy is $250,000.

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 $12.6 billion of statutory annuity reserves at December 31, 2022. The Company's funds held under reinsurance treaties were approximately $12.7 billion at December 31, 2022.

The impact of the Martello Re transaction on MMALIC's income statement for 2022 is as follows (in millions):

		2022
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		(34.6)
Total premiums and other revenues	$	(14,148.2)
Benefits and expenses:		
Policyholders' benefits	$	(470.7)
Surrender benefits		(1,604.8)
Change in policy and contract reserves		(12,416.6)
Other		317.2
Total benefits and expenses	$	(14,174.9)

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 $14.5 million and $16.7 million at December 31, 2022 and 2021, 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.

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 $4.4 million and $4.9 million at December 31, 2022 and 2021, 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.

F. REINSURANCE (CONTINUED)

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 $53.7 million and $52.1 million at December 31, 2022 and 2021, 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 reduces 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. Ceded reserves under this agreement as of December 31, 2021 were approximately $175.9 million which resulted in a $0.2 million decrease in surplus in 2021 (through an after-tax reserve credit). Effective January 1, 2022 the Company has 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 is a decrease to statutory capital of $140.6 million.

The Company entered into a flow coinsurance agreement with Commonwealth Annuity and Life Insurance Company ("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 $1,417.8 million and $1,038.4 million of deferred annuity reserves to Commonwealth under this agreement at December 31, 2022 and 2021, 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 $4.5 billion and $5.2 billion of deferred annuity reserves under this agreement at December 31, 2022 and 2021, respectively.

The Company has reinsured with various insurance companies approximately $18,719.6 million and $6,688.0 million of reserves at December 31, 2022 and 2021, respectively.

The termination of all reinsurance agreements at December 31, 2022 would produce a reduction in statutory surplus of approximately $0.0 million (after tax). The termination of all reinsurance agreements at December 31, 2021 would have produced a reduction in statutory surplus of approximately $139.0 million (after tax).

The effect of reinsurance on premiums and annuity considerations for the years ended December 31 is as follows (in millions):

	2022	2021	2020
Direct premiums and annuity considerations	$ 7,379.8	$ 5,797.3	$ 3,988.6
Reinsurance assumed	6.7	4.2	12.9
Reinsurance ceded	(14,584.8)	(774.5)	(6,717.5)
Net premium and annuity considerations	$ (7,198.3)	$ 5,027.0	$ (2,716.0)

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):

	2022	2021	2020
Direct benefits paid to policyholders and withdrawals on deposit-type contracts	$ 5,063.7	$ 3,959.4	$ 3,301.5
Reinsurance assumed	26.8	26.2	28.2
Reinsurance ceded	(2,862.0)	(798.9)	(283.8)
Net benefits paid to policyholders and withdrawals on deposit-type contracts	$ 2,228.5	$ 3,186.7	$ 3,045.9

G. FEDERAL INCOME TAXES

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

The components of the net deferred tax assets at December 31 are as follows (in millions):

	2022	2021	Change
DTAs resulting in book/tax differences in:			
Ordinary:			
Deferred acquisition costs	$ 61.6	$ 48.4	$ 13.2
Reserves	112.7	159.8	(47.1)
Deferred compensation	0.2	0.3	(0.1)
Accrued expenses	4.6	6.2	(1.6)
Other	8.3	5.2	3.1
Total ordinary DTAs	187.4	219.9	(32.5)
Total DTAs	187.4	219.9	(32.5)
Deferred tax assets nonadmitted	(2.2)	(14.6)	12.4
Admitted DTAs	185.2	205.3	(20.1)
DTLs resulting in book/tax differences in:			
Ordinary:			
Section 807(f) amortization	3.9	4.9	(1.0)
Depreciation/other	4.6	4.4	0.2
Reserve transition adjustment	33.1	44.1	(11.0)
Total ordinary DTLs	41.6	53.4	(11.8)
Capital:			
Unrealized gains	54.9	86.1	(31.2)
Security-related adjustments	16.5	4.1	12.4
Total capital DTLs	71.4	90.2	(18.8)
Total DTLs	113.0	143.6	(30.6)
Total net deferred admitted tax assets	$ 72.2	$ 61.7	$ 10.5
Change in deferred tax assets nonadmitted	$ 12.4	$ (14.6)	

G. FEDERAL INCOME TAXES (CONTINUED)

The results of the admissibility calculations at December 31 are as follows (in millions):

	2022			2021			Change		
	Ordinary	Capital	Total	Ordinary	Capital	Total	Ordinary	Capital	Total
a. Federal income taxes paid in prior years recoverable through loss carrybacks	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
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)	72.2	-	72.2	61.7	-	61.7	10.5	-	10.5
1. Adjusted gross deferred tax assets expected to be realized following the balance sheet date	72.2	-	72.2	61.7	-	61.7	10.5	-	10.5
2. Adjusted gross deferred tax assets allowed per limitation threshold	XXX	XXX	415.6	XXX	XXX	418.2	XXX	XXX	(2.6)
c. Adjusted gross deferred tax assets (excluding the amount of deferred tax assets from (a) and (b) above) offset by gross deferred tax liabilities	41.6	71.4	113.0	53.4	90.2	143.6	(11.8)	(18.8)	(30.6)
d. Deferred tax assets admitted as the result of application of SSAP No. 101	$ 113.8	$ 71.4	$ 185.2	$ 115.1	$ 90.2	$ 205.3	$ (1.3)	$ (18.8)	$ (20.1)

The other admissibility criteria for the Company are as follows (dollars in millions):

	2022	2021	2020
a. Ratio percentage used to determine recovery period and threshold limitation amount	871%	791%	810%
b. Amount of adjusted capital and surplus used to determine recovery period and threshold limitation in the table above	$ 2,770.8	$ 2,788.3	$ 2,865.5

The Company's tax planning strategy had no impact on the adjusted gross DTA and net admitted adjusted gross DTA at December 31, 2022 and does not include the use of reinsurance. 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):

	2022	2021	2020
Current federal income tax expense (benefit) on operations	$ 13.6	$ 45.5	$ (61.9)
Federal income tax expense (benefit) on net realized capital gains	(14.3)	118.3	118.0
Total federal income tax expense (benefit)	$ (0.7)	$ 163.8	$ 56.1
Net DTA(L)	$ 10.5	$ 22.7	$ 3.8
Less: Items not recorded in the change in net deferred tax asset:			
Tax-effect of unrealized gains (losses)	(31.2)	2.1	30.3
Tax-effect of changes in nonadmitted DTA	(12.4)	14.6	(12.4)
Change in net deferred tax asset	$ (33.1)	$ 39.4	$ 21.7

G. FEDERAL INCOME TAXES (CONTINUED)

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):

	2022
Provision computed at federal statutory rate	$ 40.3
Reinsurance items	54.9
OAC 3901-1-67 adoption	(46.2)
Investment items	(10.4)
Nonadmitted assets	(3.6)
Tax credits	(0.1)
Other	(2.5)
Total statutory income tax expense (benefit)	$ 32.4
Federal and foreign income tax expense (benefit)	$ (0.7)
Change in net deferred income taxes	33.1
Total statutory income tax expense (benefit)	$ 32.4

G. FEDERAL INCOME TAXES (CONTINUED)

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):

	2021	2020
Provision computed at statutory rate (operations and realized gains/losses, excluding amortization of IMR)	$ 112.0	$ 54.5
Permanent differences:		
Company-owned life insurance	(1.3)	(1.3)
Dividend received deduction	(0.7)	(7.9)
Stock options	(0.2)	(0.1)
Tax exempt interest	(1.8)	(2.3)
Provision to return adjustments	-	(0.2)
Other	0.6	0.5
Total permanent differences	(3.4)	(11.3)
Timing adjustments:		
Investment differences	(1.4)	30.0
Reserves	43.8	11.1
DAC tax adjustment	8.5	(10.6)
Accounts payable	-	0.2
Provision to return adjustments	(20.0)	(9.3)
Sale of real estate and subs	20.1	-
Other	5.7	0.2
Total timing adjustments	56.7	21.6
Other adjustments:		
Unrealized loss on equity index options	(1.6)	(8.0)
Miscellaneous items	0.1	(0.7)
Total other adjustments	(1.5)	(8.7)
Federal income tax expense on operations and realized gains	$ 163.8	$ 56.1
Federal income tax expense on operations and realized gains	$ 163.8	$ 56.1
Change in net deferred tax assets (excluding unrealized)	(39.4)	(21.7)
Total statutory income tax expense (excluding unrealized)	$ 124.4	$ 34.4

G. FEDERAL INCOME TAXES (CONTINUED)

As of December 31, 2022 and 2021, the Company does not have any operating loss carryforwards available to offset future net income subject to federal income taxes. As of December 31, 2022 and 2021, the Company does not have a pretax 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):

Year	Operations	Realized Gains	Total
2022	$ -	$ -	$ -
2021	$ -	$ 28.9	$ 28.9

As of December 31, 2022, MMALIC's consolidated federal income tax returns for the 2021 through 2022 tax years remain subject to examination by the IRS.

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.

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 $13.1 million in 2022, the net amount received from affiliates was $14.4 million in 2021, and the net amount paid to affiliates was $34.4 million in 2020, included in general insurance expenses in the Statement of Operations.

As of May 28, 2021, 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 $32.8 million in 2022 and $27.5 million during the last seven months of 2021, included in net investment income in the Statement of Operations. Prior to that agreement and to the sale of the Company to MassMutual, the Company and affiliated insurance companies had contracts with American Money Management Corporation ("AMMC"), which, subject to the direction of the Finance Committee, provided for management and accounting services related to the investment portfolios. MMALIC expensed investment management charges related to AMMC of $4.0 million, and $7.6 million in 2021, and 2020, respectively, included in net investment income in the Statement of Operations.

For the first five months of 2021, AFG provided retirement benefits to qualified employees of participating companies through the AFG 401(k) Retirement and Savings Plan, a defined contribution plan. AFG made all contributions to the retirement fund portion of the plan and matched a percentage of employee contributions to the savings fund. Company contributions were expensed in the year for which they were declared. Beginning in June of 2021, the Company participates in the retirement plans of MMALIC. MMALIC sponsors funded (qualified 401(k) thrift savings) and unfunded (nonqualified deferred compensation thrift savings) defined contribution plans for its employees and retirees. The qualified 401(k) thrift savings plan's net assets available for benefits were $37.4 million and $34.8 million as of December 31, 2022 and 2021, respectively. The Company matches a percentage of employee contributions to the qualified 401(k) thrift savings plan. MMALIC expensed approximately $4.0 million, $3.4 million, and $1.8 million in 2022, 2021, and 2020, respectively, for its retirement and employee savings plan.

In contemplation of the sale of MMALIC to Glidepath, effective May 28, 2021, a condition to the sale agreement was that MMALIC sell certain assets to AFG prior to sale, representing approximately $66 million of directly owned real estate and approximately $405 million of Schedule BA assets. The proceeds from these sales were approximately $579 million and the net gain recognized by MMALIC as a result of these sales was approximately $108 million (all on Schedule BA assets) recognized in the accompanying statements of operations statutory-basis.

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 $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. MMALIC paid $32.3 million in 2021 to MMALIS, 97% of which was paid to other broker/dealers as commissions. The remaining 3% of MMALIC commissions were paid to registered representatives of MMALIS. MMALIC paid $7.4 million in 2020 to MMALIS, 96% of which was paid to other broker/dealers as commissions. The remaining 4% 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 no dividends to Glidepath in 2022, and paid $300.0 million in dividends to GAFRI, its former parent, in 2021.

I. ANNUITY RESERVES AND DEPOSIT-TYPE FUNDS

At December 31, 2022, 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	$ 17,148.9	$ -	$ -	$ 17,148.9	42.2%
b. At book value less current surrender charge of 5% or more	7,044.3	-	-	7,044.3	17.3%
c. At fair value	-	-	30.6	30.6	0.1%
d. Total with market value adjustment or at fair value (total of a through c)	24,193.0	-	30.6	24,223.8	59.6%
e. At book value without adjustment (minimal or no charge or adjustment)	14,464.8	-	-	14,464.8	35.5%
2. Not subject to discretionary withdrawal	1,985.4	-	-	1,985.4	4.9%
3. Total (gross: direct + assumed)	40,643.3	-	30.6	40,674.0	100.0%
4. Reinsurance ceded	17,817.8	-	-	17,817.8	
5. Total (net) (3) - (4)	22,825.5	-	30.6	22,856.2	
6. Amount included in A(1)b above that will move to A(1)e in the year after the statement date	$ 2,241.2	$ -	$ -	$ -	

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	118.9	-	-	118.9	6.7%
c. At fair value	-	-	-	-	0.0%
d. Total with market value adjustment or at fair value (total of a through c)	118.9	-	-	118.9	6.7%
e. At book value without adjustment (minimal or no charge or adjustment)	723.0	-	-	723.0	40.5%
2. Not subject to discretionary withdrawal	943.3	-	-	943.3	52.8%
3. Total (gross: direct + assumed)	1,785.2	-	-	1,785.2	100.0%
4. Reinsurance ceded	496.7	-	-	496.7	
5. Total (net) (3) - (4)	1,288.5	-	-	1,288.5	
6. Amount included in A(1)b above that will move to A(1)e in the year after the statement date	$ 2.7	$ -	$ -	$ -	

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	889.6	-	-	889.6	100.0%
3. Total (gross: direct + assumed)	889.6	-	-	889.6	100.0%
4. Reinsurance ceded	109.8	-	-	109.8	
5. Total (net) (3) - (4)	779.8	-	-	779.8	
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	$ 24,113.2
Net supplementary contracts	0.9
Deposit-type funds	779.8
Separate account nonguaranteed liabilities	30.6
Total	$ 24,924.5

I. ANNUITY RESERVES AND DEPOSIT-TYPE FUNDS (CONTINUED)

At December 31, 2021, 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	$ 12,355.1	$ -	$ -	$ 12,355.1	32.8%
b. At book value less current surrender charge of 5% or more	9,743.2	-	-	9,743.2	25.9%
c. At fair value	-	-	52.7	52.7	0.1%
d. Total with market value adjustment or at fair value (total of a through c)	22,098.3	-	52.7	22,151.0	58.8%
e. At book value without adjustment (minimal or no charge or adjustment)	13,781.4	-	-	13,781.4	36.6%
2. Not subject to discretionary withdrawal	1,715.5	-	-	1,715.5	4.6%
3. Total (gross: direct + assumed)	37,595.2	-	52.7	37,647.9	100.0%
4. Reinsurance ceded	6,378.2	-	-	6,378.2	
5. Total (net) (3) - (4)	31,217.0	-	52.7	31,269.7	
6. Amount included in A(1)b above that will move to A(1)e in the year after the statement date	$ 3,198.2	$ -	$ -	$ -	

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	120.2	-	-	120.2	6.5%
c. At fair value	-	-	-	-	0.0%
d. Total with market value adjustment or at fair value (total of a through c)	120.2	-	-	120.2	6.5%
e. At book value without adjustment (minimal or no charge or adjustment)	735.1	-	-	735.1	39.9%
2. Not subject to discretionary withdrawal	988.4	-	-	988.4	53.6%
3. Total (gross: direct + assumed)	1,843.7	-	-	1,843.7	100.0%
4. Reinsurance ceded	1.7	-	-	1.7	
5. Total (net) (3) - (4)	1,842.0	-	-	1,842.0	
6. Amount included in A(1)b above that will move to A(1)e in the year after the statement date	$ 2.9	$ -	$ -	$ -	

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	592.3	-	-	592.3	100.0%
3. Total (gross: direct + assumed)	592.3	-	-	592.3	100.0%
4. Reinsurance ceded	0.2	-	-	0.2	
5. Total (net) (3) - (4)	592.1	-	-	592.1	
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	$ 33,058.1
Net supplementary contracts	0.9
Deposit-type funds	592.1
Separate account nonguaranteed liabilities	52.7
Total	$ 33,703.8

J. LIFE RESERVES

At December 31, 2022, 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, 2022		
	General Account		
	Account Value	Cash Value	Reserve
A. Subject to discretionary withdrawal, surrender values, or policy loans:			
Universal Life	$ 107.6	$ 107.6	$ 107.6
Other Permanent Cash Value Life Insurance	-	51.3	51.3
B. Not subject to discretionary withdrawal or no cash values			
Term Policies without Cash Value	XXX	XXX	209.6
Accidental Death Benefits	XXX	XXX	0.1
Disability - Active Lives	XXX	XXX	0.1
Disability - Disabled Lives	XXX	XXX	3.6
Miscellaneous Reserves	XXX	XXX	5.6
C. Total (gross: direct + assumed)	107.6	158.9	377.9
D. Reinsurance ceded	66.9	97.8	232.1
E. Total (net) (C) - (D)	$ 40.7	$ 61.1	$ 145.8

F.	Amount
Reconciliation to total life reserves:	
Life insurance, total (net)	$ 140.2
Accidental death benefits, total (net)	-
Disability - active lives, total (net)	-
Disability - disabled lives, total (net)	1.5
Miscellaneous reserves, total (net)	4.1
Total	$ 145.8

J. LIFE RESERVES (CONTINUED)

At December 31, 2021, 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, 2021		
	General Account		
	Account Value	Cash Value	Reserve
A. Subject to discretionary withdrawal, surrender values, or policy loans:			
Universal Life	$ 107.3	$ 107.3	$ 110.5
Other Permanent Cash Value Life Insurance	-	52.4	53.7
B. Not subject to discretionary withdrawal or no cash values			
Term Policies without Cash Value	XXX	XXX	254.7
Accidental Death Benefits	XXX	XXX	0.1
Disability - Active Lives	XXX	XXX	0.1
Disability - Disabled Lives	XXX	XXX	4.2
Miscellaneous Reserves	XXX	XXX	4.7
C. Total (gross: direct + assumed)	107.3	159.7	428.0
D. Reinsurance ceded	63.9	93.8	255.3
E. Total (net) (C) - (D)	$ 43.4	$ 65.9	$ 172.7

F.	Amount
Reconciliation to total life reserves:	
Life insurance, total (net)	$ 168.0
Accidental death benefits, total (net)	0.1
Disability - active lives, total (net)	0.0
Disability - disabled lives, total (net)	1.5
Miscellaneous reserves, total (net)	3.1
Total	$ 172.7

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):

	2022	2021
Unrealized gains and losses (excluding subsidiaries)	$ 213.4	$ 678.1
Nonadmitted asset values	$ (31.9)	$ (27.2)
Asset valuation reserve	$ (577.1)	$ (504.1)

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, 2022 and 2021, 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 2023 without prior approval is $283.1 million based on 10% of surplus as regards to policyholders as of the preceding December 31. At December 31, 2022, surplus as regards policyholders was $2,831.1 million, earned surplus was $2,015.9 million, and 2022 net income was $158.0 million.

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, 2022 and 2021, the Company's separate account statement included legally insulated registered index-linked annuity assets of $103.7 million and $67.6 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, 2022.

Net transfers to or (from) the Company's separate account for the years ended December 31, 2022, 2021, and 2020 were ($22.0) million, $36.8 million and $10.6 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, 2022 had a cost of $79.5 million and fair value of $30.6 million. The notional amount of these investments at December 31, 2022 was $3,800.5 million. Investments in the separate account at December 31, 2021 had a cost of $13.5 million and fair value of $52.7 million. The notional amount of these investments at December 31, 2021 was $1,180.6 million.

SUPPLEMENTARY INFORMATION

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
NOTE TO SUPPLEMENTAL SCHEDULE OF SELECTED STATUTORY-BASIS FINANCIAL DATA
AND SUPPLEMENTAL INVESTMENT DISCLOSURES
DECEMBER 31, 2022

Basis of Presentation

The accompanying supplemental schedules and interrogatories present selected statutory-basis financial data as of December 31, 2022 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 2022 Statutory Annual Statement as amended and 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, 2022
(Dollars in millions)

Investment income earned:	
U.S. Government bonds	$ 0.1
Bonds exempt from U.S. tax	-
Other bonds (unaffiliated)	1,429.3
Bonds of affiliates	6.7
Preferred stocks (unaffiliated)	4.3
Common stocks (unaffiliated)	5.0
Common stocks (affiliated)	-
Mortgage loans	116.5
Real estate	-
Policy loans	4.1
Cash, cash equivalents and short-term investments	17.5
Derivative instruments	(174.6)
Other invested assets	99.0
Gross investment income	$ 1,507.9
Real estate owned (book value less encumbrances)	$ -
Mortgage loans - book value:	
Residential mortgages	$ 1,802.7
Commercial mortgages	1,286.1
Total mortgage loans	$ 3,088.8
Mortgage loans by standing - book value	
Good standing	$ 3,088.8
Interest overdue more than 90 days, not in foreclosure	$ -
Other long term assets - statement value	$ 1,363.4
Bonds and stocks of parents, subsidiaries and affiliates - book value	
Bonds	$ -
Common stocks	$ 401.9
Bonds (including short-term investments) by expected maturity - statement value	
Due within one year or less	$ 4,452.0
Over 1 year through 5 years	12,227.3
Over 5 years through 10 years	10,341.3
Over 10 years through 20 years	4,849.9
Over 20 years	3,079.1
Total by maturity	$ 34,949.6
Bonds (including short-term investments) by NAIC designation - statement value	
NAIC 1	$ 18,045.1
NAIC 2	14,733.3
NAIC 3	1,475.9
NAIC 4	454.6
NAIC 5	209.4
NAIC 6	31.2
Total by NAIC designation	$ 34,949.6
Total bonds publicly traded	$ 13,135.3
Total bonds privately placed	$ 21,814.3
Preferred stocks - statement value	$ 185.0
Common stocks - market value	$ 683.3
Short-term investments - book value	$ 389.7
Derivative instruments owned - statement value	$ 172.1
Cash on deposit	$ 65.9
Cash equivalents	$ 1,535.6

(Continued)

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL SCHEDULE OF SELECTED STATUTORY-BASIS FINANCIAL DATA
(CONTINUED)
DECEMBER 31, 2022
(Dollars in millions)

Life insurance in force:		
Ordinary	$	5,091.7
Group life	$	13.8
Amount of accidental death insurance in-force under ordinary policies:	$	83.4
Life insurance with disability provisions in-force:		
Ordinary	$	101.2
Group life	$	-
Annuities:		
Ordinary:		
Immediate - amount of income payable	$	173.4
Deferred - fully paid account balance	$	22,871.8
Deferred - not fully paid - account balance	$	12,078.3
Group		
Amount of income payable	$	73.0
Fully paid account balance	$	104.9
Not fully paid - account balance	$	739.7
Accident and health insurance - premiums in force:		
Ordinary	$	3.2
Claim payments 2022		
Other accident and health:		
2022	$	3.5

See accompanying independent auditor's report.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL INVESTMENT DISCLOSURES
DECEMBER 31, 2022
(Dollars in millions)

1. MMALIC's total admitted assets as reported on page two of its Annual Statement excluding separate account assets are $42,779.3 million.

2. 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
PennyMac Loan Services LLC	$ 433.2	1.0%
Annuity Investors Life Insurance Co	384.8	0.9%
LOAN ASSET ISSUER LLC SER 2021 M-2	242.8	0.6%
Barings Loan Partners CLO ltd 3	191.7	0.4%
NP Inc	169.0	0.4%
Conrex Corp	164.5	0.4%
Morgan Stanley	163.7	0.4%
Bank Of America	158.0	0.4%
Goldman Sachs Group Inc/The	156.2	0.4%
Quontic Bank	141.5	0.3%

3. MMALIC's total admitted assets held in bonds (including short-term investments) 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	$ 18,045.1	42.2%	P/RP-1	$ 4.0	0.0%
NAIC-2	14,733.3	34.4%	P/RP-2	92.6	0.2%
NAIC-3	1,475.9	3.5%	P/RP-3	7.0	0.0%
NAIC-4	454.6	1.1%	P/RP-4	1.4	0.0%
NAIC-5	209.4	0.5%	P/RP-5	79.3	0.2%
NAIC-6	31.2	0.1%	P/RP-6	0.6	0.0%
Total	$ 34,949.6	81.8%	Total	$ 185.0	0.4%

4. Assets held in foreign investments:

	Amount	Percent of Total Admitted Assets
Total admitted assets held in foreign investments	$ 2,003.5	4.7%
Foreign-currency-denominated investments	-	0.0%
Insurance liabilities denominated in that same foreign currency	-	0.0%

(Continued)

(Dollars in millions)

5. Aggregate foreign investment exposure categorized by NAIC sovereign rating:

	Amount	Percent of Total Admitted Assets
Countries rated NAIC-1	$ 689.0	1.6%
Countries rated NAIC-2	1,160.3	2.7%
Countries rated NAIC-3 or below	154.3	0.4%

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	$ 211.9	0.5%
Japan	127.3	0.3%
Countries rated NAIC-2		
United Kingdom	$ 292.2	0.7%
France	178.2	0.4%
Countries rated NAIC-3 or below		
United Kingdom	$ 41.1	0.1%
Bermuda	22.4	0.1%

7. The Company does not have any unhedged foreign currency exposure.

8. The Company does not have any unhedged foreign currency exposure.

9. The Company does not have any unhedged foreign currency exposure.

10. Ten largest non-sovereign (i.e. non-governmental) foreign issues:

Issuer	NAIC Rating	Amount	Percent of Total Admitted Assets
Elis SA	2.C PL	$ 88.0	0.2%
Vodafone Group PLC	2.B FE	62.6	0.1%
Standard Chartered PLC	2.B FE	47.1	0.1%
Vista Malta Finance P.L.C. and/or Owner Trustee	2.A PL	47.0	0.1%
Volkswagen Group of America Finance LLC	2.A FE	42.3	0.1%
Yara International ASA	2.B FE	39.7	0.1%
Viterra Finance BV	2.C FE	39.5	0.1%
WEA Finance LLC	2.B FE	38.7	0.1%
Mercedes-Benz Finance North America LLC	1.G FE	33.9	0.1%
Nippon Life Insurance Co	1.G FE	33.0	0.1%

11. Assets held in Canadian investments are less than 2.5% of the Company's total admitted assets.

12. Following are MMALIC's total admitted assets held in the largest three investments with contractual sales restrictions:

	Amount	Percent of Total Admitted Assets
The Cranemere Group Limited	61.9	0.1%
Lubert-Adler Real Estate Fund VII, LP	30.0	0.1%
Knopp Biosciences LLC C	24.5	0.1%

(Continued)

(Dollars in millions)

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 (AILIC) Common St	$ 384.8	0.9%
Barings Real Estate Debt Income Fund LP	112.7	0.3%
Cranemere Group Limited	61.9	0.1%
FEDERAL HOME LOAN BANK CINCINNATI-R	48.3	0.1%
Nationwide Mutual Ins Co	40.2	0.1%
NexBank Capital Inc Noncumulative Perpet	37.9	0.1%
Lubert-Adler Real Estate Fund VII LP	30.0	0.1%
CGL HOLDINGS - II CORPORATION Common Sto	29.0	0.1%
KNOPP BIOSCIENCES LLC C PERP CONV PFD	24.5	0.1%
Bridge Growth Partners LP	22.4	0.1%

14. Following are MMALIC's largest three investments held in nonaffiliated, privately placed equities:

Name of Issuer	Amount	Percentage of Total Admitted Assets
Cranemere Group Limited	$ 61.9	0.1%
FEDERAL HOME LOAN BANK CINCINNATI-R	48.3	0.1%
Nationwide Mutual Ins Co	40.2	0.1%

15. Assets held in general partnership interests 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
PennyMac Loan Services LLC (Residential)	$ 433.2	1.0%
NP Inc (Residential)	228.5	0.5%
Conrex Corp (Residential)	164.5	0.4%
Quontic Bank (Residential)	141.5	0.3%
Colchis Real Properties Income Fund II LP (Residential)	91.7	0.2%
Deephaven Mortgage LLC (Residential)	85.0	0.2%
Pearl at Dadeland Owner, LLC (Commercial)	82.9	0.2%
Salamander Resort, LLC (Commercial)	76.5	0.2%
Park Meadows Co Partners, LLC (Commercial)	71.6	0.2%
SFR 3-040 LLC (Residential)	57.7	0.1%

17. Following are MMALIC's loan-to-value ratios as determined from the most current appraisal:

Loan-to-Value	Residential		Commercial		Agricultural	
above 95%	$ 25.0	0.1%	$ 30.8	0.1%	$ -	0.0%
91% to 95%	63.8	0.1%	-	0.0%	-	0.0%
81% to 90%	208.2	0.5%	158.7	0.4%	-	0.0%
71% to 80%	731.2	1.7%	220.3	0.5%	-	0.0%
below 70%	774.6	1.8%	876.3	2.0%	-	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.

(Continued)

21. The Company owns $248.2 million in hedging options.

22. The Company’s potential exposure for swaps and forwards is $57.7 million.

23. The Company does not have any futures contracts.

(continued)

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL INVESTMENT DISCLOSURES (CONTINUED)
DECEMBER 31, 2022
(Dollars in millions)

Investment Categories	Gross Investment Holdings* Amount	Gross Investment Holdings* Percentage of Column 1 Line 13	Admitted Assets as Reported in the Annual Statement Amount	Admitted Assets as Reported in the Annual Statement Securities Lending Reinvested Collateral Amount	Admitted Assets as Reported in the Annual Statement Total (Col 3 +4) Amount	Admitted Assets as Reported in the Annual Statement Percentage of Column 5 Line 13
1. Long-Term Bonds:						
1.01 U.S. Governments	$ 98.9	0.2%	$ 98.9	$ -	$ 98.9	0.2%
1.02 All Other Governments	19.2	0.0%	19.2	-	19.2	0.0%
1.03 U.S. States, Territories and Possessions etc., Guaranteed	190.7	0.5%	190.7	-	190.7	0.5%
1.04 U.S. Political Subdivisions of States, Territories and Possessions, Guaranteed	272.7	0.7%	272.7	-	272.7	0.7%
1.05 U.S. Special Revenue and Special Assessment Obligations, etc., Non-Guaranteed	1,691.6	4.1%	1,691.6	-	1,691.6	4.1%
1.06 Industrial and Miscellaneous	27,626.4	66.3%	27,626.4	-	27,626.4	66.3%
1.07 Hybrid Securities	634.2	1.5%	634.2	-	634.2	1.5%
1.08 Parent, Subsidiaries and Affiliates	520.8	1.2%	520.8	-	520.8	1.2%
1.09 SVO Identified Funds	-	0.0%	-	-	-	0.0%
1.10 Unaffiliated Bank Loans	2,277.4	5.5%	2,277.4	-	2,277.4	5.5%
1.11 Total Long-Term Bonds	33,331.9	80.0%	33,331.9	-	33,331.9	80.0%
2. Preferred Stocks:						
2.01 Industrial and Misc. (Unaffiliated)	185.0	0.4%	185.0	-	185.0	0.4%
2.02 Parent, Subsidiaries and Affiliates	-	0.0%	-	-	-	0.0%
2.03 Total Preferred Stock	185.0	0.4%	185.0	-	185.0	0.4%
3. Common Stocks:						
3.01 Industrial and Miscellaneous Publicly Traded (Unaffiliated)	113.6	0.2%	113.6	-	113.6	0.2%
3.02 Industrial and Miscellaneous Other (Unaffiliated)	167.8	0.4%	167.8	-	167.8	0.4%
3.03 Parent, Subsidiaries and Affiliates Publicly Traded	-	0.0%	-	-	-	0.0%
3.04 Parent, Subsidiaries and Affiliates Other	401.9	1.0%	401.9	-	401.9	1.0%
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 Total Common Stocks	683.3	1.6%	683.3	-	683.3	1.6%
4. Mortgage Loans:						
4.01 Farm Mortgages	-	0.0%	-	-	-	0.0%
4.02 Residential Mortgages	1,802.8	4.3%	1,802.8	-	1,802.8	4.3%
4.03 Commercial Mortgages	1,263.4	3.0%	1,263.4	-	1,263.4	3.0%
4.04 Mezzanine Real Estate Loans	22.6	0.1%	22.6	-	22.6	0.1%
4.05 Total Mortgage Loans	3,088.8	7.4%	3,088.8	-	3,088.8	7.4%
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	65.9	0.2%	65.9	-	65.9	0.2%
6.02 Cash Equivalents	1,535.6	3.7%	1,535.6	-	1,535.6	3.7%
6.03 Short-Term Investments	389.7	0.9%	389.7	-	389.7	0.9%
6.04 Total Cash, Cash Equivalents, and Short-Term Investments	1,991.2	4.8%	1,991.2	-	1,991.2	4.8%
7. Contract Loans	31.5	0.1%	31.5	-	31.5	0.1%
8. Derivatives	873.0	2.1%	873.0	-	873.0	2.1%
9. Other Invested Assets	1,363.4	3.3%	1,363.4	-	1,363.4	3.3%
10. Receivables for Securities	142.3	0.3%	142.3	-	142.3	0.3%
11. Securities Lending	-	0.0%	-	-	-	0.0%
12. Other Invested Assets	-	0.0%	-	-	-	0.0%
13. Total Invested Assets	41,690.4	100.0%	41,690.4	-	41,690.4	100.0%

* Gross investment holdings as valued in compliance with NAIC SAP.

See accompanying independent auditor's report.

MASSMUTUAL ASCEND LIFE INSURANCE COMPANY
SUPPLEMENTAL SCHEDULE OF LIFE AND HEALTH REINSURANCE DISCLOSURES
FOR THE YEAR ENDED DECEMBER 31, 2022
(Dollars in millions)

The following information regarding reinsurance contracts is presented to satisfy the disclosure requirements in SSAP No. 61R, *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, 2022
(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. 61R?

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 ☐ No ☒		N/A
Non-proportional reinsurance, which does not result in significant surplus relief	Yes ☐ No ☒		Yes ☐ No ☐ N/A ☒

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