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OVERVIEW

The Retirement Income Security Evaluation Score (RISE Score™) is Milliman FRM's financial advisory software module. This document details the assumptions and methodology underlying the RISE Score™ model in its current application for the Alliance for Lifetime Income's RISE Score™ Tool.

The purpose of the RISE Score™ is to provide financial advisors and consumers with a single, intuitive measure of income security during the retirement planning process. The RISE Score™ can help assess how well their retirement portfolios cover basic living expenses and healthcare costs, demonstrating how risk management of a retirement portfolio can affect income security when protected lifetime income solutions are added to a retirement strategy.

The RISE Score™ is only one piece of information an advisor or consumer would need to consider when recommending or purchasing a protected lifetime income solution. There are other considerations when selecting a protected lifetime income solution that are not captured in the RISE Score™ model or in the Alliance for Lifetime Income's RISE Score™ Tool, including but not limited to the product's issuing company, actual product design and fees, liquidity preferences, financial goals, and health status.

The RISE Score™ model and the Alliance for Lifetime Income's RISE Score™ Tool are not intended to provide a substitute for comprehensive financial planning. The RISE Score™ and the Alliance for Lifetime Income's RISE Score™ Tool are not intended to provide financial or investment advice and are intended for informational and educational use only.

Milliman's RISE Score™

Users of the Alliance for Lifetime Income's RISE Score™ Tool can review their results and gauge the retirement income security level of generic types of protected lifetime income solutions based on the RISE Score™ returned. Such solutions can help to protect a portfolio during adverse market environments and unexpected longevity.

The user's retirement income portfolio, expenses (basic needs and healthcare), and other income are projected over future years using:

- Market returns and inflation from Milliman's proprietary stochastic scenario generator (less assumed fees)
- Longevity scenarios based on an industry accepted annuitant mortality table
- Generic lifetime income solution product types including: annuitization products (such as immediate and deferred income annuities), variable annuities with a living benefit rider and return of premium death benefit, and fixed indexed annuities with living a living benefit rider and return of premium death benefit.

The RISE Score™ can be interpreted much like a credit score on a scale from 0 – 850. The score is comprised of two "subscores": an overall score, which takes into account all simulated scenarios, and an adverse scenario score, which considers the client's portfolio only under the worst 10% of all scenarios. Accordingly, improvement in either or both of the subscores improves the RISE Score™, indicating greater retirement security.

Milliman's RISE Highlights:

- The RISE Score™ uses a proprietary stochastic scenario generator which models interest rates, inflation, equities, and fixed income returns holistically using Milliman's own capital market assumptions and modeling methodology for each asset class. Each scenario represents a projected future path.
- The RISE Score™ incorporates stochastic inflation, rather than a single deterministic inflation rate. Projected medical and non-medical inflation is more realistic when generated stochastically, rather than deterministically, such that inflation will not unreasonably be over or under representative in any given scenario. Instead, it is projected in concert with other asset class returns.
- The RISE Score™ uses stochastic longevity scenarios to calculate the RISE Score™, rather than a single "end of plan" age for longevity.
- The RISE Score™ employs a sophisticated algorithm to determine the amount a retiree would actually withdraw, each year, from their portfolio. Considerations include age at the time of withdrawal, the level of their current portfolio, recent market performance, inflation, and expected future expenses. This process is designed to reflect how a retiree would typically conserve savings during retirement. In other words, they may not always withdraw the maximum amount needed to cover expenses in a given year if it meant they would not have enough to cover expenses in the future.
- The RISE Score™ metric differs from a "Probability of Success" as the final metric. The RISE Score™ considers the magnitude of basic living expenses and healthcare costs covered by lifetime income, social security, pension,

and any other income sources and portfolio withdrawals (e.g. the ratio of expenses to income); it is not a binary measure of whether or not all expenses were covered. More importantly, the score directly incorporates the level of expense coverage achieved in all scenarios relative to expense coverage achieved in adverse scenarios (worst 10%), since the focus is on retirement security. This is translated into the final RISE Score™.

- The RISE Score™ leverages contemporary cloud-computing technology to project and evaluate outcomes under tens of thousands of scenarios in a matter of seconds.

I. Model Inputs: User Interface

Currently, the user specific model inputs will be sent via web service to the RISE Score™ model from the Alliance for Lifetime Income's website for both a financial advisor and consumer version. This data includes the following information:

General Information

- Current age
- Retirement age
- Single / Joint
- Gender
- Effective tax rate during retirement

Retirement Assets

- Retirement assets (which are not modeled in consideration of tax treatment in the RISE Score™ model in its current application for the Alliance for Lifetime Income's RISE Score™ Tool) may include assets entered by the user such as:
    - Employer Retirement Plans
        - 401(k), 403(b), 457, etc.
    - Individual Retirement Accounts
        - Traditional IRA and Roth IRA
    - Annuities & Tax-deferred products
        - Fixed, Indexed, and Variable annuity account balances, prior to receiving any living benefit
    - Future assets
        - Inheritance, Gift, Settlement, Death Benefit, etc.
    - Other taxable and/or tax-free accounts
- Simplified asset class allocation (users can enter an allocation from this subset for other asset classes not modeled in the RISE Score™ model in its current application for the Alliance for Lifetime Income's RISE Score™ Tool that have capital market assumption expectations similar to those documented for these asset classes):
    - U.S. Large Cap Equities
    - U.S. Small/Mid Cap Equities
    - Developed International Equities
    - Emerging Market Equities
    - U.S. Bonds & Cash
- Additonal deposits/contributions prior to retirement

Retirement Expenses

- Basic living expenses
- Healthcare costs

Retirement Income

- Social security
- Pension income
- All other deferred retirement income, which may include income entered by the user such as:
    - Royalties
    - Annuity income or withdrawals
    - Alimony
    - Rental property income
    - Part-time employment
    - Irrevocable trust income
    - Reverse mortgage

The specific model inputs requested from the user are utilized in the model as follows:

- Current age: assumed as the beginning of the projection and incrementally increases by 1 each year, since the model assumes annual time steps. The current age going forward is used to derive any applicable mortality assumption for the dynamic withdrawal algorithm calculation, the longevity scenario set, age-related product features for any annuity product types modeled (such as withdrawal rates and income annuity quotes), and vilality level.
- Retirement age: assumed as the beginning of retirement period at which withdrawals from savings, in excess of other inflation or non-inflation adjusted income, is required to cover inflation or non-inflation adjusted expenses specified by the user. The retirement age is also used to derive the longevity scenarios since the model implicitly assumes that the user lives until at least retirement age. Retirement age also affects any age-related product features for any annuity product types modeled (such as withdrawal rates and income annuity quotes) unless otherwise specified by the user.
- Single/Joint: determines if the profile is a single or joint profile. For joint profiles, upon death along a particular longevity scenario of either the primary or secondary, any assets belonging to the "deceased" are transferred to the living profile. Any joint income or expenses are reduced by 50% when either the primary or secondary "dies" along a longevity scenario. Joint living benefits are not modeled for variable annuities and fixed indexed annuities, and therefore, only the account value transfers to the living profile. Joint deferred/single premium income annuities are assumed to continue annuity payments for the life of both profiles.
- Gender: For the entire projection, gender is used to derive any applicable mortality assumption for the dynamic withdrawal algorithm calculation, the longevity scenario set, age-related product features for any annuity product types modeled (such as income annuity quotes), and vitality level.
- Expected effective tax rate during retirement: This effective tax rate is applied to the pre-tax income items entered by the user, thereby reducing the income modeled by a factor of 1 – effective tax rate. Since income is not a direct factor in our model during the pre-retirement phase, it has no impact on items modeled prior to retirement.
- Current Savings Assets: These assets are projected annually using the market returns simulated in the scenario generator based on the asset allocation entered by the user reduced by a fund fee. These are also the assets from which a lifetime income solution allocation occurs as specified by the user.
- Expected Annual Savings Contributions: These contributions are assumed to increase the current savings assets annually from the current age to retirement age of the profile, and are inflation adjusted if specified by the user.
- Social Security, Pension Income, and Other Income (during retirement): These income items are projected over a longevity scenario for a particular profile, and are inflation adjusted (if specified by the user): entered as of the current date (in current nominal dollars) or as of retirement date (in future real dollars).
- Basic Living and Healthcare Expenses (during retirement): These expenses are projected over a longevity scenario for a particular profile, and are inflation adjusted (if specified by the user): entered as of the current date (in current nominal dollars) or as of retirement date (in future real dollars).
- Annuity Product Allocation: this is assumed as a percentage of the current savings portfolio, such that a modeled annuity purchase occurs immediately in the model.
- Annuity Product Allocation Method: this drives how the annuity product allocation is made from the asset classes of the current savings portfolio; either proportionally across all asset classes or from bonds and cash first, then proportionally from remaining asset classes, as specified by the user.

II. RISE Score™ Model Methodology

The RISE Score™ model is a fully stochastic annual model. The user's retirement asset portfolio is projected assuming returns and inflation from the market scenarios less fund fees and other expenses, applied to the user's current retirement asset portfolio, expenses, and income, over projection ages determined by the longevity scenarios.

The retirement asset portfolio (i.e. the client's current asset portfolio and other sources of income,) plus additional deposits/contributions less any allocations to lifetime income solutions via annuity products is projected through retirement age. Withdrawals to cover retirement expenses are not made to the portfolio until retirement age.

The RISE Score™ model uses a path dependent algorithm to determine the withdrawal made from the retirement savings portfolio to cover expenses in excess of fixed sources of income (social security, pension income, other retirement income, and/or protected lifetime income.) This calculation is designed to mimic how a retiree might conserve savings during retirement. In effect, the dynamic withdrawal calculated maximizes the amount of expenses covered

during retirement over the retirees remaining lifetime rather than covering expenses in a single year. In other words, to reflect that a retiree may not always withdraw the maximum amount needed to cover expenses in a given year if it meant they would not have enough to cover their expenses in the future.

The formulas below show the calculation for the account supportability ratio used to develop the dynamic withdrawal (a value between 0 – 100%, where 100% would be the ratio when the current portfolio value is sufficient to cover future retirement expenses in excess of other fixed sources of income.)

For market and inflation scenario s, longevity scenario l, at each time step t,

$$PV\ Retirement\ Expense\ Shortfall(s,l,t) = \frac{PV\ Expected\ Retirement\ Expenses - PV\ Total\ Income\ from\ Fixed\ Sources}{PV\ Total\ Income\ from\ Fixed\ Sources}$$

$$Account\ Supportability\ Ratio(s,l,t) = Min\left(100\%, \frac{Current\ Portfolio\ Value}{PV\ Retirement\ Expense\ Shortfall}\right)^{1}$$

$$Portfolio\ Withdrawal(s,t) = Min(Portfolio\ Value, Max(0, Account\ Supportability\ Ratio * (Current\ Year's\ Retirement\ Expenses\ in\ excess\ of\ Fixed\ Sources\ of\ Income))^{2}$$

The primary metric underlying the final RISE Score™ is the income-to-expense coverage ratio. For all market and inflation scenarios, longevity scenarios, and time steps,

$$Income\text{-}to\text{-}Expense\ Ratio(all) = \frac{\sum PV\ Portfolio\ Withdrawals\ and\ Fixed\ Sources\ of\ Income^{3}}{\sum PV\ Expected\ Retirement\ Expenses}$$

[1]The minimum of the ratio or 100% is used in this formula so that no additional withdrawals are made beyond what is required to cover retirement expenses in the current year when the current portfolio value is more than sufficient to cover future retirement expenses. In situations where fixed sources of income other than the portfolio withdrawal are greater than the current year's retirement expenses, this excess income is reinvested into the portfolio.
[2]The portfolio withdrawal is a non-zero value, never less than the total portfolio value nor greater than the current year's retirement expenses in excess of fixed sources of income.
[3]The actual income received by the retiree, portfolio withdrawals plus fixed sources of income, are further adjusted in the income ratio calculation to account for the vitality level. In effect, where there are gaps in income, this adjustment in the cash flows underlying the final RISE Score™TM calculation reflects that as retirees age, they are less likely to be able to return to, or desire returning to, the workforce.

The RISE Score™ calculation is comprised of two "subscores": an overall score representing an average, which takes into account all simulated scenarios, and an adverse scenario score representing the worst 10th percentile, which considers the client's portfolio only under adverse conditions. Accordingly, improvement in either or both of the subscores improves the RISE Score™, indicating greater retirement security.

Examples of changes to user inputs that improve the RISE Score™ in most calculations are:

- Increase in retirement assets (current savings amount) for the same overall asset allocation
- Increase in annual contributions
- Decrease in annual expenses
- Increase in other income items (social security, pension, annuity income, etc.)
- Change in asset allocation such that there is an increase in net return on assets for a given unit of market risk
- Change in asset allocation and lifetime income solution allocation such that there is an increase in income generated across all longevity scenarios for a given unit of both net return on assets, market risk, and inflation risk.

The RISE Score™ model, in its current application for the Alliance for Lifetime Income, has numerous limitations and does not consider every possible concern that a retiree may raise during the retirement planning process. These additional concerns include, but are not limited to:

- Liquidity preferences and needs not captured by the RISE Score™ model
- Expense or income not captured by the RISE Score™ model
- Asset class returns that are not captured by the RISE Score™ model, including assumed capital market assumptions that are not representative of a specific individual's asset allocation
- Inflation or growth rates applicable to a specific individual's expenses or income items that are not reasonably captured by the RISE Score™ model and do not represent their specific cash flows
- Taxes are not considered in a detailed manner in the model (for example, tax attributes related to specific savings accounts, tax treatment of withdrawals, specific annuity products, unique tax situations, federal and state marginal income taxes, and capital gains taxes). Taxes are only considered simplistically through an effective marginal tax rate assumption during retirement.
- Current and anticipated health status, where the mortality table assumed in the RISE Score™ model is not representative of a specific individual
- Additional fees or commissions paid for financial advice where the RISE Score™ model is not representative of a specific individual's situation
- Unique circumstances and situations that would affect the RISE Score™

III. Lifetime Income Solutions: Product Design Features and Fees

Products

The insurance products currently modeled are Single and Joint Life only, no period certain:

- Annuitization products, for both immediate and deferred periods without cash refund or death benefit, such as:
  - Deferred Income Annuity (DIA) – single (male and female) and joint life (male primary, female secondary)
  - Single Premium Immediate Annuity (SPIA) – single (male and female) and joint life (male primary, female secondary)
- Variable Annuity (VA) with Living Benefit Rider and Return of Premium Death Benefit – single life only (assumed as primary user)
- Indexed Annuity with Living Benefit Rider and Return of Premium Death Benefit – single life only (assumed as primary user)

The issue age and payout age are inputs to the model from the user interface. We assume no lapses, since the policyholder is expected to continue the guarantee for the duration of their lifetime along a given longevity scenario. The user also indicates the allocation amount to the annuity from their current savings portfolio and how the annuity purchase is made from their current portfolio; either as a proportional percentage across asset classes or proportionally from bonds and cash first, then proportionally from other asset classes.

Annuitization (Income Annuity) Products

The Income Annuity product types are modeled based on a table of purchase rates provided by a third party rate provider (Cannex). These rates are further adjusted for rate competitiveness while still ensuring there are enough quotes to capture the market. Rates are also extrapolated and interpolated between issue ages and deferral periods to create a complete set of quotes from the subset received by Cannex. The max issue and payment age are 85. As of April 1, 2019, the assumed quotes in our model are detailed below for a subset of ages, deferral periods, and genders:

Annual Annuity Payment Assumed for Single Life Males					
Age/Deferral Period	0	10	20	30	40
35	$4,290	$6,547	$10,970	$19,569	$39,579
45	$4,676	$7,682	$13,978	$28,799	$85,290
55	$5,324	$9,602	$20,613	$63,814	$133,902
65	$6,465	$14,000	$44,661	$98,865	$187,303
75	$8,840	$29,878	$69,708	$137,601	$240,143
85	$14,563	$46,926	$97,758	$175,902	$293,037

Annual Annuity Payment Assumed for Single Life Females					
Age/Deferral Period	0	10	20	30	40
35	$4,294	$6,443	$10,814	$19,030	$35,193
45	$4,621	$7,447	$13,317	$26,506	$69,384
55	$5,189	$9,156	$18,807	$52,727	$105,727
65	$6,192	$12,820	$37,806	$79,620	$145,335
75	$8,213	$24,798	$57,551	$109,235	$184,562
85	$12,995	$37,629	$79,543	$138,530	$223,825

Annual Annuity Payment Assumed for Joint Life Male & Female (same age)					
Age/Deferral Period	0	10	20	30	40
35	$4,151	$6,228	$10,122	$17,182	$29,050
45	$4,386	$6,840	$11,660	$22,105	$51,218
55	$4,791	$8,080	$15,208	$38,391	$94,178
65	$5,517	$10,444	$26,666	$63,279	$139,831
75	$7,001	$18,011	$39,319	$90,887	$193,030
85	$10,605	$24,312	$54,613	$122,411	$253,775

Annual Annuity Payment Assumed for Joint Life Male & Female (secondary is 5 years younger)						
Age/Deferral Period		0	10	20	30	40
35	30	$4,109	$6,136	$9,793	$16,246	$26,669
45	40	$4,314	$6,667	$11,158	$20,380	$42,582
55	50	$4,656	$7,639	$13,935	$31,762	$79,884
65	60	$5,291	$9,552	$21,909	$54,472	$122,853
75	70	$6,514	$14,911	$34,379	$80,705	$173,411
85	80	$9,302	$21,511	$49,008	$110,858	$231,515

Annual Annuity Payment Assumed for Joint Life Male & Female (secondary is 5 years older)						
Age/Deferral Period		0	10	20	30	40
35	40	$4,218	$6,423	$10,447	$17,901	$33,458
45	50	$4,498	$7,141	$12,372	$24,423	$69,015
55	60	$4,954	$8,489	$16,782	$48,059	$111,285
65	70	$5,783	$11,497	$30,677	$75,321	$161,556
75	80	$7,501	$19,124	$45,665	$106,913	$219,807
85	90	N/A	N/A	N/A	N/A	N/A

Variable Annuity with Living Benefit Rider

The Variable Annuity product type is modeled with the following product features and assumptions based on observed commission based products sold in the market, which may differ significantly from advisory based products. These features and assumptions cannot be adjusted by the user in the tool utilized by the Alliance for Lifetime Income.

- Guaranteed Lifetime Withdrawal Benefit, assumed to have an
  - Annual Ratchet
  - Simple Bonus/Roll-up of 6%, 10 year period
  - Rider Charge based on Benefit Base of 115 bps
  - Static withdrawal rate (based on the table of withdrawal rates by age below)

Minimum Age	Maximum Age	Withdrawal Rate
0	34	N/A (0%)
35	59	3.75%
60	64	4.5%
65	69	5.25%
70+		6.0%

- Mortality and Expense Charge based on Account Value of 125 bps
- Fund Fee based on Account Value of 75bps
- Account Value assumes an allocation of 70% large cap equities and 30% bonds
- Return of Premium Death Benefit

Fixed Index Annuity with Living Benefit Rider

The Fixed Index Annuity product type is modeled with the following product features and assumptions based on observed commission based products sold in the market, which may differ significantly from advisory based products. These features and assumptions cannot be adjusted by the user in the tool utilized by the Alliance for Lifetime Income.

- Guaranteed Lifetime Withdrawal Benefit, assumed to have an
    - Annual Ratchet
    - Simple Bonus/Roll-up of 7%, 10 year period
    - Rider Charge based on Benefit Base of 100 bps
    - Static withdrawal rate (based on the table of withdrawal rates by age below)

Minimum Age	Maximum Age	Withdrawal Rate
0	49	N/A (0%)
50	54	3.5%
55	59	4.0%
60	64	4.5%
65	69	5.0%
70	84	6.0%
85+		6.5%

- 100% Large Cap Equity index crediting, assuming:
    - 6% cap
    - No premium bonus
- Return of Premium Death Benefit

The RISE Score™ model, in its current application for the Alliance for Lifetime Income, has numerous limitations and does not consider every possible concern that a potential policyholder or advisor may ask when deciding to purchase or recommend an annuity. Other considerations a potential policyholder or advisor may make during their decision process include, but are not limited to:

- Liquidity preferences and needs concerning an annuity that are not captured by the RISE Score™ model
- Asset class returns that are not reasonably captured by the RISE Score™ model or where the capital market assumptions assumed are not representative of a specific individual's asset allocation
- Tax considerations concerning an annuity
- Current and anticipated health status, where the mortality table assumed in the RISE Score™ model is not representative of a specific individual
- Short and long term ability of the issuing company to pay claims
- Additional fees or commissions paid to purchase an annuity where the RISE Score™ model is not representative of a specific product nor individual's situation
- Product features, riders, fund offerings, index offerings, and fees of a specific annuity that may significantly

differ from those detailed in this section
- Unique circumstances and situations

IV. RISE Model Assumptions

The following section discusses the primary assumptions underlying the RISE Score™ model in its current application for the Alliance for Lifetime Income's RISE Score™ Tool.

Any and all assumptions made in the RISE Score™ model, including those detailed in this section and any modeling methodology choices detailed in previous sections, may be significantly different and not suitable fora specific individual's situation.

- Market and Inflation Scenarios
- Fund Fees
- Taxes
- Longevity Scenarios
- Vitality Level

A. Market and Inflation Scenarios

Milliman's FRM (Financial Risk Management) practice has developed a real world economic scenario for use in the RISE Score™ model. This generator has many common features with the generator developed by the American Academy of Actuaries, but enables users to enhance the scenario set in a number of important ways including:

1. Simulation of movements in key economic variables, at any time interval
2. Calibration of simulation parameters, updated quarterly to reflect current/prospective economic conditions
3. Simulation of a larger number of equity indices or interest rates, versus the academy generator
4. Introduction of additional correlations, for example between equities, interest rates, and inflation

In general,

- The interest rate generator underlying the scenario generator uses a three factor lognormal model.
- Bond returns are simulated from the interest rate generator, assuming an additional spread, spread volatility, and duration for each bond index simulated, correlated to equity returns and inflation.
- Equity returns are simulated using a stochastic volatility process with parameters calibrated to recent market data, correlated to inflation and bond returns
- Inflation rates are simulated assuming a long term inflation target, mean reversion strength and volatility of the inflation rate process, correlated to equity and bond returns

Parameters for each scenario generation process are developed from a combination of the most recent historical data (30 years or longer, or the longest available data from scenario generation date), publicly available capital market assumption information, and actuarial judgment.

Interest Rates

Simulation Parameters

The following list summarizes the simulation parameters used in generating stochastic interest rates:

1. An initial yield curve expressed as annual par yield rates out to 30 years
2. A long term target (equilibrium) yield curve, also expressed as annual par yield rates out to 30 years
3. A "grading time" that determines the length of time until the yield curve reaches the target curve (on average)
4. Three lognormal factor volatilities (typically corresponding to the volatilities of three key forward interest rates), expressed as annualized percentage volatility (analogous to traditional quoting convention for swaptions)
5. Factor weightings for each of the interest rate factors
6. Correlations between the factors
7. Floors and caps on basis point volatility for each of the three factor volatilities
8. Floors and caps on rate level

Simulation and Calibration Methodology
The simulation of the interest rate movements uses a three factor lognormal model.

The standard calibration uses historical US CMT rates at liquid tenors, which are bootstrapped into corresponding forward interest rates. In practice, the focus of the calibration is often on the 2y, 10y, and 20y rates due to their equilibrium properties. With this data, the covariance matrix for the changes in the natural log of rates is calculated.

The factor loadings are typically based on three key rates of interest (such as the 1y, 10y, and 30y rates). The factor volatilities, factor weightings, and factor correlations are jointly selected to provide a good fit to the covariance matrix.

The long term target yield curve is based on the NAIC's definition of the mean reversion point of the 20-year Treasury bond rate. For each liquid tenors (1y, 2y, 3y, 5y, 7y, 10y, 20y, and 30y), the target yield consists of 20% of the median over the last 600 months (or longest available history), 30% of the average over the last 120 months, and 50% of the average over the last 36 months.

We set the grading time of the target curve to 16 years. This choice is based on the C3 Phase II model parameters provided by the American Academy of Actuaries.

Equity and Bond Returns

Simulation Parameters
The following list summarizes the simulation parameters used in generating stochastic equity and bond returns:

1. Expected return for each equity index simulated
2. Expected spread, spread volatility, and duration for each bond index simulated
3. Indicator as to whether expected return is a total return expectation or an equity risk premium relative to a reference asset with returns tied to current rate environment
4. Five Heston parameters for each equity index
5. Correlations between equity, bond, and inflation returns

Simulation Methodology
Milliman's equity scenario generator is a stochastic volatility model. The equity return is modeled by a Heston process. The Heston parameters are calibrated to daily total returns over the last 30 years or the longest history available. The maximum likelihood estimate is used to calibrate the model. Correlation between the different fund returns also uses historical data.

Milliman's bond scenario generator uses the expected spread, spread volatility, duration, correlation to equities, and stochastic interest rates.

Inflation

Simulation Parameters
The following list summarizes the simulation parameters used in generating stochastic inflation rates:

1. Current inflation rate
2. Long Term inflation target
3. Mean reversion strength and volatility of inflation rate process
4. Correlations between equity and bond returns

Simulation Methodology
Milliman's inflation rate scenario generator is a mean reverting process, which begins at the current inflation rate and reverts to a long term inflation rate over time. This mean reverting process, combined with correlation to equities and bonds, and inflation rate volatility, drive the stochastic inflation rates.

As of April 2019, the distribution of scenarios utilized by the RISE Score™ model follow the distribution detailed below:

Log Return								
Percentile	U.S. Large Cap Equity	U.S. Small/ Mid Cap Equity	Developed International Equity	Emerging Markets Equity	US Bonds & Cash	Overall Inflation	Non-Medical Inflation	Medical Inflation
1%	-51.59%	-56.32%	-42.37%	-48.26%	-5.56%	-1.20%	-2.20%	0.65%
5%	-26.87%	-29.19%	-26.23%	-26.86%	-3.53%	-0.14%	-1.14%	1.72%
25%	-1.70%	-0.20%	-4.04%	-3.55%	0.01%	1.47%	0.47%	3.32%
50%	10.20%	11.03%	8.34%	9.32%	2.47%	2.50%	1.50%	4.36%
75%	18.80%	19.49%	18.87%	20.91%	5.05%	3.53%	2.53%	5.39%
95%	28.90%	31.43%	31.76%	37.66%	10.02%	5.14%	4.14%	6.99%
99%	39.33%	44.27%	41.31%	52.97%	16.17%	6.20%	5.20%	8.06%
avg	6.77%	7.60%	6.22%	7.80%	2.86%	2.50%	1.50%	4.36%
stdev	18.23%	19.15%	17.89%	20.01%	4.29%	1.60%	1.60%	1.60%

Annualized Return								
Percentile	U.S. Large Cap Equity	U.S. Small/ Mid Cap Equity	Developed International Equity	Emerging Markets Equity	US Bonds & Cash	Overall Inflation	Non-Medical Inflation	Medical Inflation
1%	-40.30%	-43.06%	-34.54%	-38.28%	-5.41%	-1.20%	-2.18%	0.65%
5%	-23.56%	-25.31%	-23.07%	-23.56%	-3.47%	-0.14%	-1.13%	1.74%
25%	-1.69%	-0.20%	-3.96%	-3.49%	0.01%	1.48%	0.47%	3.38%
50%	10.73%	11.67%	8.69%	9.77%	2.50%	2.53%	1.51%	4.45%
75%	20.68%	21.51%	20.77%	23.26%	5.18%	3.60%	2.57%	5.54%
95%	33.51%	36.92%	37.39%	45.74%	10.54%	5.27%	4.22%	7.24%
99%	48.19%	55.69%	51.15%	69.84%	17.55%	6.40%	5.34%	8.40%
avg	8.67%	9.74%	8.07%	10.22%	2.99%	2.54%	1.52%	4.47%
stdev	18.06%	19.12%	18.53%	21.21%	4.52%	1.64%	1.62%	1.67%

Compound Annual Growth Rate (CAGR)								
Percentile	U.S. Large Cap Equity	U.S. Small/ Mid Cap Equity	Developed International Equity	Emerging Markets Equity	US Bonds & Cash	Overall Inflation	Non-Medical Inflation	Medical Inflation
1%	-0.02%	-0.16%	-0.39%	1.38%	0.32%	0.96%	-0.04%	2.85%
5%	1.98%	2.51%	2.05%	3.66%	0.89%	1.38%	0.37%	3.28%

25%	4.91%	5.51%	4.85%	6.38%	1.68%	2.02%	1.00%	3.93%
50%	6.73%	7.81%	6.70%	8.50%	2.41%	2.48%	1.46%	4.40%
75%	8.71%	9.60%	8.71%	10.50%	3.31%	2.94%	1.92%	4.87%
95%	11.24%	12.40%	11.25%	13.48%	5.29%	3.59%	2.56%	5.53%
99%	13.09%	14.09%	12.83%	15.19%	7.88%	4.02%	2.99%	5.97%
avg	6.70%	7.58%	6.68%	8.49%	2.66%	2.48%	1.46%	4.40%
stdev	2.86%	3.06%	2.83%	3.08%	1.44%	0.66%	0.65%	0.67%

THESE RESULTS BASED ON SIMULATED OR HYPOTHETICAL PERFORMANCE RESULTS HAVE CERTAIN INHERENT LIMITATIONS. UNLIKE THE RESULTS SHOWN IN AN ACTUAL PERFORMANCE RECORD, THESE RESULTS DO NOT REPRESENT ACTUAL TRADING. ALSO, BECAUSE THESE TRADES HAVE NOT ACTUALLY BEEN EXECUTED, THESE RESULTS MAY HAVE UNDER-OR OVER-COMPENSATED FOR THE IMPACT, IF ANY, OF CERTAIN MARKET FACTORS, SUCH AS LACK OF LIQUIDITY. SIMULATED OR HYPOTHETICAL TRADING PROGRAMS IN GENERAL ARE ALSO SUBJECT TO THE FACT THAT THEY ARE DESIGNED WITH THE BENEFIT OF HINDSIGHT. NO REPRESENTATION IS BEING MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFITS OR LOSSES SIMILAR TO THESE BEING SHOWN. MILLIMAN DOES NOT MANAGE THE UNDERLYING FUND.

- U.S. Large Cap equity fund modeled represents a broad domestic equity market index for large-sized companies, such as the S&P 500 Index.
- U.S. Small/Mid Cap equity fund modeled represents a domestic equity market index for small and mid-sized companies, such as the S&P 400 Index or the Russell 2000 Index.
- Developed International equity fund modeled represents a broad development international market index, such as the MSCI EAFE Index.
- Emerging Markets equity fund modeled represents a broad developing international market index, such as the MSCI Emerging Markets Index.
- U.S. Bonds and Cash fund modeled represents a combination of cash and cash equivalents, as well as a high quality corporate bond index with a duration of approximately 5 such as the Bloomberg Barclays US Aggregate Bond Index. In aggregate, the fund represents an index with a duration of approximately 3. Returns presented are gross of any assumed fees.

The scenario summary above is over a 50 year projection.

B. Fund Fee

Fund fees are assumed to be 120bps for all asset classes for the savings portfolio. This is comprised of a 75 bps fund fee and a 45 bps advisory fee. This fee model assumes that retirees considering annuity products are receiving paid advice from an advisor and/or through a managed account service. These fees may be substantially different for a specific user, depending on how their funds are actually invested.

C. Taxes

Taxes are only considered in the RISE Score™ model in its current application for the Alliance for Lifetime Income's RISE Score™ Tool through the user entered field for the effective tax rate during retirement. This effective tax rate is applied to the pre-tax income items entered by the user, thereby reducing the income modeled by a factor of 1 – effective tax rate. Since income is not a direct factor in our model during the pre-retirement phase, it has no impact on items modeled prior to retirement. The RISE Score™ model, in its current application for the Alliance for Lifetime Income, does not model tax treatmentbetween different account types or annuity product types as the details necessary to model taxes accurately for this specific use is not collected from the user.

D. Longevity Scenarios

The underlying mortality table used to develop the longevity scenarios (and also that drive the dynamic withdrawal algorithm calculations) is the Society of Actuaries' IAM Basic 2012 table and Scale G2 mortality improvement (applied through 2019, and thereafter, capped at 20 years). There have been no stochastic parameters applied to this mortality table (i.e. there are no random "shocks" to mortality deviating from this table). However, health status specified by the user adjusts these underlying mortality rates by factors of +50% for "Poor", 0% for "Average", -15% for "Very Good", and -30% for "Excellent", thereby extending longevity for "very good" and "excellent" and shortening it for "poor" from the "average" case. These scenarios will be updated based on the most recent mortality table available, as needed.

Limitations in deriving and applying these longevity scenarios include, but are not limited to:

- The assumed mortality table may not be representative of a specific individual's expected lifetime, given their actual current health status and all other factors that affect longevity.
- The assumed mortality table is for annuity policyholders and is not representative of the population mortality, and therefore may not be representative of the user population accessing this tool in its application for the Alliance for Lifetime Income.

E. Vitality Level

The vitality level probabilities are applied to the actual income modeled in the final RISE Score™ calculation after all projections have been performed in the model. This adjusts the final cash flows underlying the RISE Score™ for the probability that an individual would be healthy enough to participate in the labor force, on either a part time or full time basis, to enhance their retirement income in the event of an income gap. This is a factor between 0.6 – 1.0, based on long term care data, by gender, age, and projection period. Limitations in deriving and applying the vitality level participation rates are, but not limited to:

- The assumed table may not be representative of a specific individual's propensity or actual ability to participate in the labor force during retirement, given their actual current health status and all other factors that affect wellness.
- The assumed table was adapted for those of long term care policyholders and is not representative of the population morbidity, and therefore may not be representative of the user population accessing this tool in its application for the Alliance for Lifetime Income.
- The RISE Score™ model in its current application for the Alliance for Lifetime Income's RISE Score™ Tool does not directly model income earned by rejoining the labor force in retirement.

F. Liquidity Adjustment

The liquidity adjustment is applied to the RISE Score™ calculation as a topside adjustment for the illiquid nature of Deferred Income Annuity and Single Premium Income Annuity products. These RISE Score™s are reduced by 5 points for every 10% allocated to an Income Annuity, proportionate to the RISE Score™ prior to this adjustment. As such, a RISE Score™ of 850 will be reduced to 845 when a 10% allocation to an Income Annuity is selected. As another example, a RISE Score™ of 750 with a 20% allocation to an Income Annuity would be reduced to 741. Limitations in deriving and applying the liquidity adjustment described are, but not limited to:

- The liquidity adjustment may not be representative of a specific individual's liquidity preferences and/or volatility of liquidity needs if actual liquidity shocks to the portfolio were modeled.
- The RISE Score™ model in its current applcaition for the Alliance for Lifetime Income's RISE Score™ Tool does not directly model liquidity shocks and preferences to the portfolio.