FEBRUARY 2026

Fixed Indexed Annuities– Product Mechanics and Risk Management

American Academy of Actuaries
Life Experience Committee

American Academy of Actuaries
actuary.org

Life Experience and Assumptions Committee

Kyle Wan, MAAA, FSA—Chairperson
Robert Astleford, MAAA, FSA
Mary Bahna-Nolan, MAAA, FSA
Mary Elizabeth Caramagno, MAAA, FSA
Lori Helge, MAAA, FSA
Allen Klein, MAAA, FSA
Leonard Mangini, MAAA, FSA
John R. Miller, MAAA, FSA
Melissa J. Miller, MAAA, FSA
Craig Morrow, MAAA, FSA
Maambo Mujala, MAAA, FSA
Catherine Murphy, MAAA, FCIA, FSA
Marianne Purushotham, MAAA, FSA
Leonard Mangini, MAAA, FSA
Alan Routhenstein, MAAA, FSA
Mary Simmons, MAAA, FSA
Connie Tang, MAAA, FSA
Yuwen Wang, MAAA, FSA
Shuhan Wang, MAAA, FSA
Michael Watanabe, MAAA, FSA
Haofeng Yu, MAAA, FSA

Acknowledgments and Summary

We would like to express our sincere appreciation to Reggie Xu, MAAA, FSA, and Susan Tan, MAAA, FSA, for their contributions in drafting the Investment Strategy and Hedging Considerations section and for their review of the paper. We are also grateful to Beth Keith, MAAA, FSA, Dan Wylam, FSA, and Ryan Stowe, MAAA, FSA, for writing the Design, Pricing & Rate Setting section and providing invaluable support. We extend our thanks to Jason Kehrberg, MAAA, FSA, for his thorough review and the many thoughtful suggestions that helped shape and strengthen this paper.

For more information on the American Academy of Actuaries and resources available on Life-related topics, visit our website. If you have any feedback on this document, please contact the Academy's life policy project manager, Amanda Barry-Moilanen, at barrymoilanen@actuary.org.

The American Academy of Actuaries is a 20,000-member professional association whose mission is to serve the public and the U.S. actuarial profession. For 60 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

This paper was developed thanks to the work of the Academy's volunteers. To learn more about becoming a volunteer, please visit actuary.org/volunteer.

American Academy of Actuaries

AMERICAN ACADEMY OF ACTUARIES
1850 M STREET NW, SUITE 300, WASHINGTON, D.C. 20036
202-223-8196 | WWW.ACTUARY.ORG

February 2026

Any references to current laws, regulations, or practice guidelines are correct as of the date of publication.

Fixed Indexed Annuities—
Product Mechanics and Risk Management

A Resource and Discussion Guide

American Academy of Actuaries Life Experience Committee

February 2026

Limitations

This document is not a promulgation of the Actuarial Standards Board, is not an actuarial standard of practice (ASOP), is not binding upon any actuary and is not a definitive statement as to what constitutes generally accepted practice in the area under discussion. This document should not be treated as guidance but rather it should be read and utilized as a list of considerations and resources on a particular topic. Events occurring subsequent to this publication of the topic may make the practices described or referred to in this document irrelevant or obsolete.

Table of Contents

Introduction

Fixed indexed deferred annuities became very popular in the late 1990s for risk-averse policy owners who wanted returns that reflect the equity markets but did not want to be exposed to the downside risk of equities.[1] In 2023, sales of fixed indexed annuities in the United States reached $95.6 billion, reflecting a 20% increase from the previous year.[2] Many insurance companies are either actively selling these products or considering entering the market. This paper offers actuaries an overview of fixed indexed deferred annuities, covering product features, underlying investments, modeling assumptions, asset liability modeling (ALM) and hedging considerations, and reserve requirements. Additional sources of information are also provided.

Fixed indexed deferred annuities have many of the same features as a fixed deferred annuity, where the policy owner makes a premium payment, a premium charge may be deducted from the amount paid, and the net amount is deposited into a policy account. Surrender charges are typically assessed if the funds are withdrawn prior to the end of the surrender charge period. Other options, such as annuitization, are also generally available. Deposits and future reallocations of account balances often include one or more indexed options and may include a fixed interest option as well. The indexed options are similar to those in a variable annuity in that the amount paid to the policy owner is based on the performance of an outside index, such as the S&P 500 index. However, unlike a variable annuity, there is a minimum guaranteed interest credited rate, such as 0% or 1%, for amounts allocated to an indexed option. This minimum ensures that the policy owner will not experience any loss of principal related to the performance of the index. Fixed indexed deferred annuities are subject to minimum non-forfeiture values.

Typically, to fund guaranteed benefits the insurance company invests most of the premiums received into fixed assets of the general account, similar to how fixed deferred annuity premiums are invested. In addition, for assets supporting the indexed accounts, the insurance company will generally allocate a portion of the premiums to derivatives to hedge the index-linked credits.

1 Chapter 18 of the "Statutory Valuations of Individual Life and Annuity Contracts, Fifth Edition", Volume 1, published by ACTEX Learning.
2 LIMRA: U.S. Annuity Sales Post Another Record Year in 2023

General Description

Index Interest Credit Features

A fixed indexed annuity (FIA) is a type of deferred annuity which offers interest credits based on the performance of an external index, such as the S&P 500.[3] The product is designed to provide principal protection, ensuring that even if the market declines, the credited interest rate will never fall below a predetermined floor (e.g., 0%). At the same time, FIAs offer growth potential when the index rises. Insurance companies use various factors to determine the amount of indexed interest credited to the annuity, including:

- Cap—An upper limit on the amount of index interest that will be credited during the index term.
- Participation Rate—The percentage of the index's return that is credited to the annuity. For example, if an index returns 10% and the participation rate is 80% and the cap is 6%, the amount credited is min [80% x 10%; 6%] = 6%.
- Spread—A percentage that is deducted from the index return. For example, if the spread is 2%, and the index grows by 12%, the contract holder's index credited amount is 10%, assuming a participation rate of 100% and a cap greater than 10%.
- Floor—The minimum guaranteed interest rate, typically 0%, ensuring that the policy owner will not experience loss due to negative index performance.
- Performance Trigger—A method where a predefined interest rate is credited if the index meets or exceeds a trigger threshold. If the index return is below the threshold, no interest is credited.

These mechanisms shape how indexed interest is calculated, allowing for a balance between risk protection and potential returns. Examples of how different crediting methods work are provided later.

In recent years, the FIA market has seen growing innovation, particularly with the introduction of custom indices. These indices typically include built-in volatility control features and provide exposure to a diversified blend of asset classes—such as equities, bonds, and cash—while using tactical asset allocation algorithms to rebalance exposures in response to market signals. This dynamic approach aims to reduce volatility and deliver more stable, consistent returns over time.

3 Index performance usually excludes dividends. While the reference index follows the market, contract holder funds are not directly invested in the stock market.

Additional Features & Benefits

Many companies apply surrender charges during the first five to 10 years of the contract, with the charges decreasing to 0% by the end of the surrender period. In addition to withdrawal charges, a market value adjustment (MVA) may also be applied to withdrawals during the surrender charge period. Depending on market conditions at the time of the withdrawal, the MVA may increase or decrease the withdrawal amount, subject to standard nonforfeiture limits.

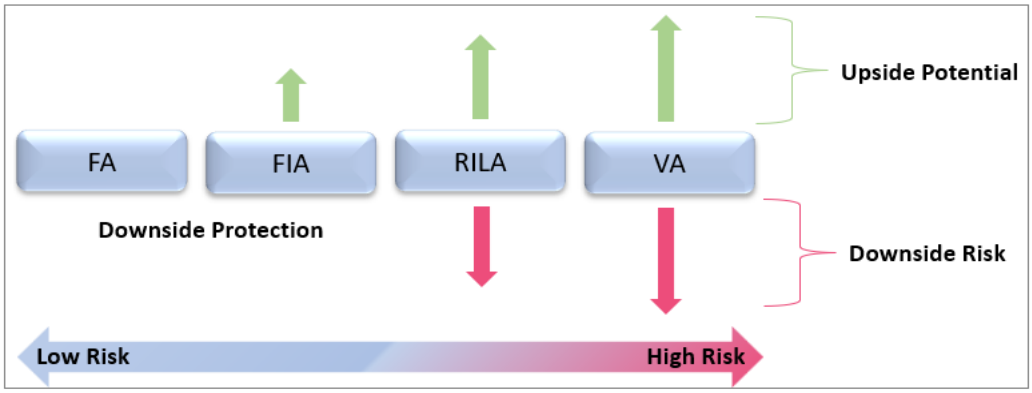
A death benefit is typically paid to beneficiaries upon death of the owner—usually the greater of the contract value or a guaranteed minimum amount (e.g., a percentage of total purchase payments adjusted for any withdrawals and accumulated at the contract's nonforfeiture rate).

Contract holders can receive lifetime income payments through an annuitization option, and/or by purchasing an optional guaranteed lifetime withdrawal benefits (GLWB) rider at an additional cost. Lifetime withdrawal riders are discussed in more detail in the section on FIA mechanics.

Risk-Return Profile of FIAs relative to Other Deferred Annuities

- A fixed annuity (FA) allows the contract holder to lock in a guaranteed rate of interest for a specified period. The guaranteed rate is unaffected by market fluctuations. FAs provide downside protection but limited growth potential (as the contract holder is not participating in the stock market).
- An FIA has the returns based on an outside index, with a minimum interest rate guarantee (e.g. 0%), even if the equity markets go down.
- A registered index-linked annuity (RILA) or index-linked variable annuity (ILVA) offers index-linked interest credits subject to features such as caps, spreads, participation rates, floors, and buffers. A buffer provides a pre-specified level of protection in a market downturn. RILAs offer potential for growth and downside protection.
- A variable annuity (VA) includes subaccounts that are invested directly in the stock market. There are generally no or limited guaranteed returns with the contract value fluctuating based on the performance of the market. VAs offer strong growth potential in conjunction with significant downside risk, although optional guarantees (e.g., GMDBs, GLWBs) are often available, which can mitigate downside risk.

Figure 1: Various Annuities with Risks



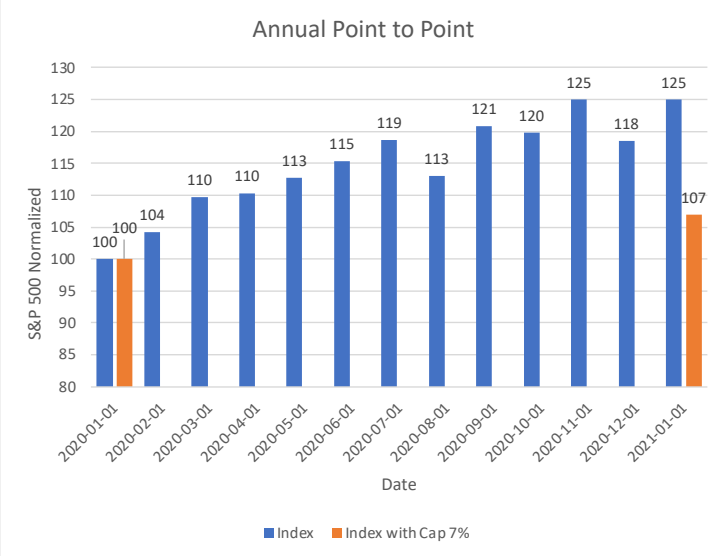
Examples of Index Crediting Methods

FIAs use various methods to determine interest credits. Below are three common crediting strategies, with index terms typically lasting one year, though multi-year strategies are also available. All examples assume that the index crediting period is the calendar year.

Point-to-Point

An annual point-to-point crediting method determines credited rates by comparing the index value at the beginning and end of each index year. The following graph shows how an FIA with a 7% cap and 0% floor would have credited interest in 2021 based on the S&P 500 index.[4]

Figure 2. Credited Interest for Point-to-Point



4 S&P-500-Index

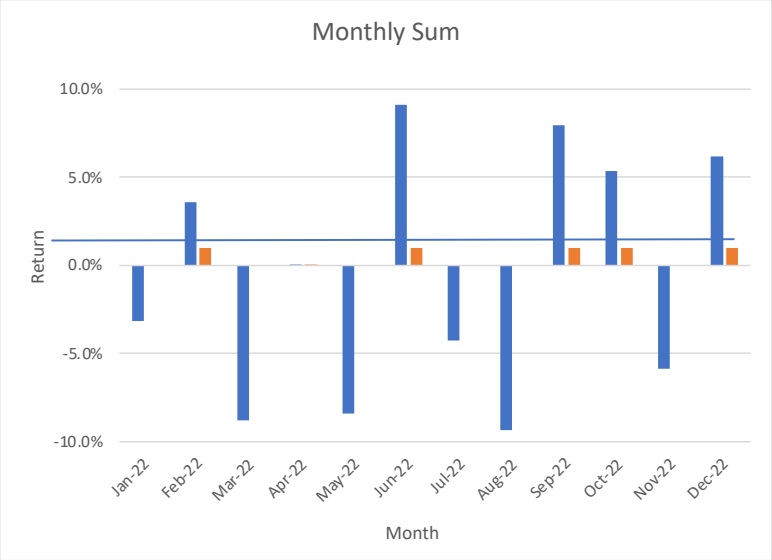
The blue bars show the normalized S&P 500 index. The monthly index is for the purpose of illustration since it is annual point-to-point crediting method. The S&P 500 index is normalized by first setting the S&P 500 index to 100 as of 1/1/2020 and then calculating the ratio of the S&P 500 on the first day of each month to the S&P 500 as of 1/1/2020. For example, the normalized S&P 500 index as of 2/1/2020 was 104, meaning the S&P 500 increased to 104% from 1/1/2020. Similarly, the normalized S&P 500 index as of 3/1/2020 was 110, indicating the S&P 500 increased to 110% from 1/1/2020. If this FIA didn't have a cap, the annual credited rate in 2020 would have been 25%, as the normalized S&P 500 was 125 as of 1/1/2021. However, due to the 7% cap, the credited rate is 7% in 2021. The 0% floor guarantees the credited rate of this product is never less than 0%, even if the S&P 500 return is negative in one year.

Many point-to-point contracts have annual index crediting term periods. Variations in features include daily or monthly averaging or monthly point-to-point crediting strategies.

Annualized Monthly Sum Cap

A monthly sum crediting method determines credited rates by adding monthly returns. The following graph shows the monthly returns of the S&P 500 in 2022 and how the indexed credited rate for 2022 would be determined for a monthly sum product with 1% monthly cap and 0% monthly floor.

Figure 3. Credited Interest for Monthly Sum Cap



The blue bars in the above graph show monthly S&P 500 returns in 2022, while the orange bars show the monthly credited rates. For example, the monthly return in January 2022 was –3.1%. Because the monthly credited rate is floored at 0, the credited rate in January 2022 was 0. The monthly return in February 2022 was 3.6%. Because the monthly credited rate is capped at 1%, the credited rate in February was 1%. The annual credited rate in 2022 was the sum of all monthly credited rates in 2022, totaling 5%. The following table shows the monthly S&P 500 returns in 2022 and how the 5% credit was determined.

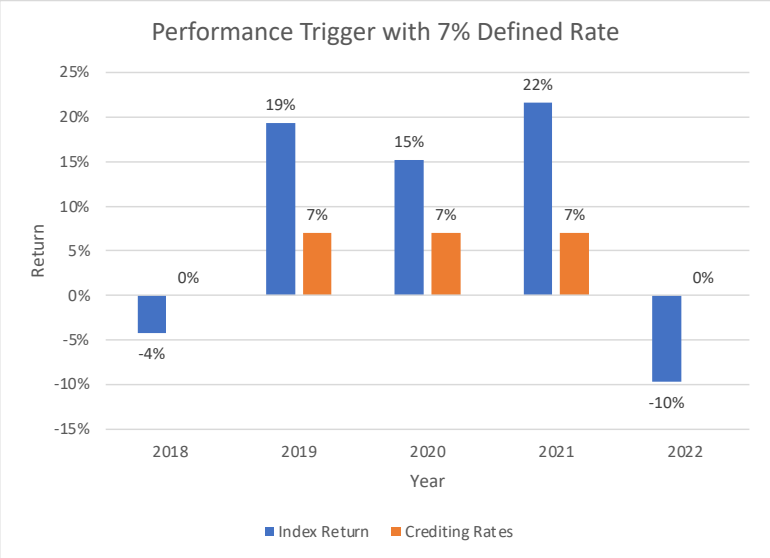
Table 1: S&P 500 Return and Credited Interest for Monthly Sum Cap

Month	S&P 500 Return	Crediting with Cap 1% and Floor 0%
Jan 22	-3.1%	0.0%
Feb 22	3.6%	1.0%
Mar 22	-8.8%	0.0%
Apr 22	0.0%	0.0%
May-22	-8.4%	0.0%
Jun 22	9.1%	1.0%
Jul 22	-4.2%	0.0%
Aug 22	-9.3%	0.0%
Sep 22	8.0%	1.0%
Oct 22	5.4%	1.0%
Nov 22	-5.9%	0.0%
Dec 22	6.2%	1.0%
Sum	-7.6%	5.0%

Annual Performance Trigger with Defined Rate

The performance trigger, with a defined rate crediting method, credits the defined rate when the annual S&P 500 return is positive or zero. The following graph illustrates the annual S&P 500 returns from 2018 to 2022, and the resulting index credited rates when the defined rate is 7%.

Figure 4: Credited Interest for Annual Performance Trigger



The blue bars represent the annual S&P 500 returns from 2018 to 2022, while the orange bars show the annual credited rates. For example, the annual S&P 500 return in 2018 was 4%, which didn't trigger the defined credited rate, resulting in a 0% credited rate for that year. In contrast, the 2019 annual return was 19%, triggering the defined credited rate of 7%.

FIA Mechanics and Riders

Mechanics

The contract value of a FIA is a dynamic calculation that reflects the annuity's value and is used for different purposes throughout the contract's lifetime. It is used to determine amounts available for death benefits, withdrawal and surrender benefits, annuitization amounts, and reserves. The calculation may vary depending on its intended use. For example, the contract value for a death benefit may be based on the full account value without reductions, while the value used for surrenders could be subject to surrender charges and MVA. These distinctions reflect the insurer's pricing and liability management approach under different scenarios.

- Below are some key FIA policy features that influence contract value calculations:

- Account Value—The account value increases with policyholder premiums and interest credits and decreases with withdrawals and expense charges.

- Index Credits—Such credits may need to be projected in determining reserves and hedge targets, for example. These projections often depend on such features as the cap rate, participation rate, spread, and other contractual terms. These may be non-guaranteed elements subject to change during the life of the contract.

- Surrender Charges—These are essentially a charge for early withdrawal of funds. If funds are withdrawn during the surrender charge period, surrender charges are assessed which decrease the amount provided to the policyholder.

- MVAs—These are applied to withdrawal amounts and are designed to adjust such amounts for the value of the underlying assets. The MVAs are based on market conditions and can help maintain a fair value for the policyholder and the insurance company.

- Riders—Riders, such as GLWBs, can materially impact the annuity cost to the insurance company and value to the policyholder depending on such drivers as market conditions and policyholder behavior.

- Nonforfeiture Requirements—As with other fixed annuities, FIAs must comply with nonforfeiture requirements, ensuring a minimum guaranteed value for the contract owner.

- Fees—Rider fees, administrative fees, surrender charges can be categorized as fees.

Regulatory requirements that affect contract values include statutory nonforfeiture and reserve requirements. Other requirements include GAAP accounting pronouncements and guidance and taxation.

Riders

Riders provide additional benefits that can be added to a FIA contract and enhance the annuity's capabilities. They provide additional benefits or protections allowing that can better align an annuity with the owner's financial goals and circumstances. Below is an overview of some common riders:

- GLWBs—The GLWB, often referred to as an income rider, is one of the most popular optional features in FIAs today. It allows policyholders to take withdrawals, subject to certain constraints, that are guaranteed for the remainder of their life (i.e., a lifetime income stream), even if their account balance is reduced to $0. And unlike annuitization benefits, the owner has access to their account balance.

- Guaranteed Minimum Income Benefit (GMIB)—GMIBs provide the annuitant with an option to receive a minimum level of benefits when the contract annuitizes, regardless of how the annuity's value has performed. There is often a waiting period before the GMIB annuitization option can be exercised.

- Guaranteed Minimum Death Benefit (GMDB)—A GMDB rider guarantees that a beneficiary will receive a minimum amount upon the death of the annuitant, even if the annuity's value has decreased.

- Enhanced Benefit Rider—These increase the death benefits and/or living and income benefits and may be linked to the performance of the annuity.

- Long-Term Care Rider—Such riders offer increased benefits for long-term care expenses, providing a safety net for health-related costs.

Assumptions

The actuary must consider various assumptions when modeling cash flows for FIAs. Industry experience studies can offer valuable data and insights to support this process. Even when assumptions are fully derived from company-specific data, for example, it is often prudent to benchmark against industry experience and analyze variances. A wide range of factors can influence policyholder behavior assumptions such as surrender, withdrawal, and annuitization rates, as well as non-elective assumptions such as mortality rates. These factors encompass, among others, age, gender, contract duration, surrender charge levels, qualified/non-qualified status, in-the-money positions concerning specific options (such as annuitization, GLWBs, bonus arrangements), distribution methods, market conditions (including interest and equity markets), and the economic landscape (e.g., recession, competitive environment).

The following observations regarding policyholder behavior with respect to surrenders, withdrawals, and premiums are from recent industry experience studies.

- Surrender Rates—Companies typically model dynamic lapse rates for FIAs due to the sensitivity of lapses related to product design, features, in-the-money status of the index option, interest rate levels, and other factors.
  - Surrender rates generally begin at a low level and then gradually rise throughout the surrender charge period. In the year when the surrender charge expires, surrender rates experience a notable surge, commonly referred to as the "shock lapse" year. After the surrender charge period ends, surrender rates decrease but generally persist at levels higher than those before the shock lapse year.
  - Contracts obtained through independent agents typically encounter higher surrender rates when contrasted with contracts acquired through alternative distribution channels such as banks. Surrender rates experienced by companies with captive agents are typically lower than those where the contract was sold through other distribution channels.
  - Qualified contracts generally exhibit lower rates of surrenders than non-qualified contracts. Tax qualified contracts with required minimum distributions typically experience lower lapses, since one of the selling features of the product was to produce monthly income in retirement.
  - Surrender rates are normally lower for contracts equipped with GLWBs in contrast to those without such benefits.

- Surrender rates are generally lower for GLWB contracts in which the GLWB rider has been activated compared to those where the rider remains inactive. The lowest surrender rates are noted in contracts where the GLWB rider has been activated, and the withdrawal amount falls within 95% to 105% of the maximum available amount before penalties apply.

- Partial Withdrawal Rates—Withdrawal rates may also be dynamically modeled, incorporating cohorts with assumptions that vary based on both attained age and duration.
  - Withdrawal rates generally increase as attained age rises as those who are retiring may be looking for a steady source of income.
  - Withdrawal rates for qualified contracts generally exceed those for non-qualified contracts. This discrepancy becomes more pronounced at older ages (70+) when the required minimum distribution rules come into effect.
  - Contracts equipped with GLWB riders which the contract holder has paid for exhibit higher withdrawal rates compared to those without GLWBs.
  - Among GLWB contracts where the GLWB option has been utilized, the majority of contract holders withdraw between 95% and 105% of the maximum amount available before penalties are applied.

- Premiums—Most contracts involve only first-year or single premiums. However, a small percentage of contracts receive premium deposits after the initial contract year. These subsequent deposits tend to be higher for contracts that do not have a GLWB rider, since the GLWB rider payouts are typically on the initial premium amounts.

FIA mortality studies are less common compared to FIA behavior studies. According to a 2011–2015 SOA study, qualified annuities have lower actual/expected (A/E) ratios compared to non-qualified annuities. This is consistent with other studies on deferred annuitant mortality. However, an anomaly occurred with respect to FIAs without GLWBs. Such FIAs showed increasing A/E ratios relative to account value bands, contrary to the typical trend observed in other products where A/E ratios decrease with larger account sizes. It remains to be seen if this anomaly is observed in future studies as well.

Sources of experience studies are listed in the Sources of Information section.

Asset/Liability Management, Investment Strategy, and Hedging Considerations

Asset/Liability Management Considerations

The risks inherent in FIAs depend on the underlying assets, specific product features, and the insurer's asset and hedging strategies. Common risks include equity risk, interest rate risk, longevity risk, surrender risk, liquidity risk, regulatory risk, credit risk, reinvestment risk, rate setting risk, and operational risk.

Asset liability management (ALM) is a preferred industry tool that helps insurance companies (and their reinsurers, for business assumed from insurers) effectively manage the various risks associated with FIAs, ensure liquidity, and comply with regulations. ALM involves a careful balance of assets and liabilities to optimize risk-adjusted investment returns while providing policyholders with the security and growth potential they seek.

Key considerations when performing ALM for FIAs:

- Duration and/or Cash Flow Match—The great majority of FIA insurers and reinsurers evaluate the impact of interest rate changes on liabilities and underlying assets, quantify the liability duration and expected timing of payouts and surrenders, and then assess the degree of matching between asset and liability durations and/or cash flows.

- Liquidity Management—Most FIA insurers and reinsurers aim to maintain adequate liquidity to avoid the need in best estimate and moderately adverse scenarios to sell complex or higher-yielding assets before maturity. Such a need might arise from adverse policyholder behavior and/or from collateral calls on derivatives, which reflects liquidity risks when companies use derivatives to hedge FIA, and the market moves against a derivative position.[5] Maintaining a portion of the portfolio in cash-equivalent or otherwise highly liquid assets provides the necessary flexibility to address these situations.

5 "Registered Index Linked Annuities"; Society of Actuaries; August 2022.

- Investment Strategy—FIA insurers and reinsurers invest most of the annuity considerations/premiums received in fixed income investments, with the remaining portion allocated to an option/hedge budget to purchase hedges. For FIA fixed income investments most companies utilize asset allocations that reflect their asset managers' relative strengths in alternative assets. ALM challenges for FIA insurers and reinsurers thus can vary considerably depending on existing allocations as well as on reinvestment strategies. The Investment Strategy Considerations section below further elaborates on this topic.

- Use of Derivatives—Derivatives are heavily used in FIA ALM, primarily for hedging liability index credits arising from the index-linked features of the product. Furthermore, derivatives are useful tools for managing duration mismatches and mitigating credit risk. The Hedging Considerations section further below elaborates on this topic.

- Rating Agency, Counterparty, and Economic Capital and Regulatory Requirements and Constraints:
  · Most FIA insurers and reinsurers explicitly reflect reinsurance and regulatory requirements and constraints (e.g., reinsurance contract investment guidelines and regulatory reserves and capital) in their ALM.
  · The adequacy and transparency of reserves and assets supporting reinsured FIA business is a key concern of many U.S. regulators for companies that cede a large portion of their liabilities to non-U.S. reinsurers. Evolving regulatory requirements for statutory reserves, as well as evolving requirements for statutory accounting and risk-based capital for structured securities and alternative assets, can be expected to have an impact on the asset allocation, ALM, and the hedging strategy for many FIA insurers and reinsurers.
  · In addition, some FIA insurers and reinsurers also reflect their enterprise objectives with regards to managing their ratings from rating agencies, as well as the impact of any institutional economic capital metrics that are reflected in internal management reporting.

- Stress Testing and Scenario Analysis—Many FIA insurers and reinsurers regularly conduct stress tests and scenario analyses, using modeling techniques to simulate various market conditions. This process evaluates the potential impact of adverse market scenarios on assets, derivatives and liabilities, allowing for proactive adjustments in strategy.

- Aggregation—If an insurer or reinsurer aggregates its FIA liabilities with one or more other types of annuity or insurance liabilities for ALM purposes, then each of the above FIA considerations would apply for the aggregated ALM segment that includes FIA. For example, aggregating FIA and multi-year guaranteed annuity (MYGA) liabilities may improve capital and liquidity efficiency by aligning duration profiles and simplifying cash flow matching. However, it also requires careful consideration of differences in crediting structures, surrender behavior, and hedging needs.

Investment Strategy Considerations

Investment strategies for FIAs vary based on the insurer's/reinsurer's risk tolerance and holistic reinvestment guidelines, FIA product features (e.g., guarantees), and investment horizon (short-term gain vs. long-term stability), among other factors.

The assets backing FIAs are typically held in fixed-income securities to ensure that expected claims are funded by cash flows from coupons and principal payments. However, insurers and reinsurers may need to liquidate assets before maturity if policyholder behavior leads to earlier-than-expected benefit claims, if there are volatility movements in index performance, or in response to collateral calls on the hedging positions.

Key considerations include asset allocation, duration, credit quality, and risk and cost-adjusted returns.

- Asset Allocation—Determine the right mix between fixed-income securities and equity-like assets.
  - **Bonds** usually take most of the portfolio because they provide predictable cash flows, are considered liquid and have lower risks, and can help insurers and reinsurers meet regulatory capital requirements. These include treasuries, public bonds, private bonds and, emerging markets.
  - **Loans** are another important asset class for FIA portfolios because they provide attractive returns, and broaden diversification benefit due to lower correlations to bonds and equity markets. They include commercial real estate, residential loans, and consumer loans.

- **Structured assets** provide higher yields and diversifications and provide access to niche markets or investment opportunities that may not be available through traditional investments. CLOs, as an example, also allow active management and customization of risk profiles by selecting the tranches that align with risk appetite. They include asset-backed securities such as commercial mortgage-backed securities, collateralized mortgage obligations, residential mortgage-backed securities, and collateralized loan obligations.
- Some insurers and reinsurers include **alternative assets** in the non-indexed portion of their FIA portfolios because alternative assets often offer higher yields, potential for capital appreciation, inflation hedge benefits, and material diversification benefits. Alternative assets may not be suitable for all FIA writers due to regulatory or operational constraints. They include private credit, private equity, real estate, infrastructure, hedge funds, mezzanine funds, and commodities.
- Some companies hold **cash and/or cash-equivalents** in their FIA asset allocation to facilitate liquidity risk, operational risk, and capital management.

- Duration—FIA effective and key rate durations vary based on product design, market conditions, and policyholder behavior assumptions. FIA product designs with generous income benefit features typically involve material long-term income benefit cash flows to be reflected in ALM. Investing assets across different maturities helps match the asset durations to the liability durations and align asset cash flows to fulfill policyholder guarantees, surrenders, and payouts. Some insurers and reinsurers incorporate interest rate derivatives in their asset strategies to better align the portfolio with liability durations.

- Credit Quality—Assets carry default risks, which can be mitigated through investing in higher quality assets and/or assuming a prudently conservative level of defaults when setting credited rates. Below investment grade assets can boost the returns if default risks are managed properly.

- Risk and Cost Adjusted Returns—Many FIA insurers and reinsurers consider capital charges, management fees, trading costs, and any fees associated with the use of derivatives when evaluating ALM risks and returns.

Hedging Considerations

Hedging plays an important role in managing the ALM risks associated with FIAs, particularly the index-linked crediting features of these products, but also for interest rates, credit, and spread risks like those for fixed annuities that are not index-linked. The discussion below will focus first on hedging index-linked market risks for FIAs and then will provide some color on hedging other risks that are applicable for medium-term fixed annuities in general.

Insurers and reinsurers use a variety of derivative instruments and hedging strategies to mitigate index-linked market risks and ensure they can meet policyholder obligations.

Static hedging relies on purchasing index options to hedge liability crediting strategies. This buy-and-hold approach is relatively simple to implement and does not require sophisticated models. Insurers generally aggregate liability data at the policy level into tradable options. The most common method is rule-based cohorting, where the maturities and strikes of the hedge positions are determined based on the weighted average of the guaranteed liability index credit levels. Some insurers employ more advanced machine learning-based clustering algorithms to optimize asset hedge positions. Once the options are purchased, insurers typically hold them until expiration without adjusting. At expiration, the derivatives payoff is expected to offset the liability index credits.

Commonly traded index options include vanilla European call options and call spreads on major stock indices like S&P 500 and/or on customized volatility-controlled indices. Exotic type options (non-vanilla options designed by financial engineers to meet the precise needs of clients) are also popular in FIA hedging, for example Cliquet options (a structured product that consists of a series of forward start options) for monthly sum cap policies, Asian options for averaging policies, and digital options for trigger policies. The majority of FIA programs are hedged statically due to the relative simplicity and relatively low operational risk.

Static hedging also comes with challenges. One key issue is the difficulty and cost of managing policyholder behavior, in particular for any over-the-counter (OTC) options, including both vanilla options and exotic options that are used as part of the hedging strategy. Some insurers and reinsurers implement hedge ratios to account for expected lapses and decrements, but if actual lapse rates deviate from expectations, the rebalancing

cost for OTC options can be high. Additionally, some OTC options to hedge relatively complex crediting strategy features, particularly those multi-year options and products with guaranteed participation or cap rates, may lack liquidity in the OTC market, potentially resulting in higher hedging costs for the insurer.

Dynamic hedging, as an alternative to or to complement static hedging, is used by some insurers and reinsurers. Unlike static hedging, dynamic hedging is an active approach that requires continuous adjustment of hedge positions based on the mismatch between the Greeks (hedge parameters such Delta, Gamma, and so on) of assets and liabilities. Futures, swaps, and exchange-traded options are commonly used in dynamic hedging programs.

FIA insurers and reinsurers may adopt dynamic hedging because they believe it offers lower hedging costs compared to OTC transactions, particularly as product innovations drive more complex crediting strategy features on a broader array of funds. Additionally, dynamic hedging allows companies to quickly adjust positions in response to shifts in market conditions or changes in liability profiles. However, dynamic hedging is significantly more resource-intensive, requiring a higher volume of transactions and greater operational complexity. It also demands a robust infrastructure and models to monitor and manage positions in real time. Furthermore, dynamic hedging costs and breakage (e.g., from program targets and tolerances, execution risks, and model risks) may increase earnings volatility, and these risks should be understood and appropriately reflected in pricing and valuation projections.

The index hedge strategy used by the company, and/or contractual guarantees on some FIA product designs, could expose the insurer or reinsurer to the risk of dramatic increases in index volatility and/or the implied volatility (volatility implied from an option price using the Black-Scholes or a similar model) reflected in the price of index options. Companies using dynamic hedging strategies typically monitor and manage volatility risk on an ongoing basis. However, compared to static hedging programs, dynamic approaches may result in higher residual exposure to implied volatility, particularly during periods of market stress.

Regardless of whether a company uses static or dynamic hedging, in designing the hedging strategy the company decides on whether the notional amount hedged should be calculated with the assumption of 0% surrenders, best estimate surrenders, or somewhere in between. There are pros and cons to each approach, which depend on the company's FIA asset allocation, product features, surrender assumptions, and income benefit commencement assumptions, as well as the company's risk tolerance.

Some companies manage their FIA index risks together with other index-linked insurance and annuity products such as indexed universal life (IUL), RILA, and guaranteed living benefit (GLB) on each of the above (as well as on VA). Their rationale is that the natural offset among certain product types (e.g., FIA and IUL index credit risks are offset to some degree by RILA and GLB) reduces the external derivative positions needed. Some companies that utilize such strategies track the notional positions between products/portfolios for profit and loss (P&L) or other analytical purposes.

Interest rate swaps are key tools for addressing the duration mismatch between assets and medium-term fixed annuity liabilities. Treasury futures and treasury total return swaps are also part of insurers' hedging strategies. A duration mismatch may occur when an insurer or reinsurer invests in short-term floating-rate assets with attractive credit spreads, such as CLOs, rather than longer-term fixed-rate assets that were previously used to pick up additional yield. By using interest rate swaps, companies convert these floating-rate assets into fixed-rate assets, allowing them to better match the duration of their liabilities. To the extent that such synthetic short-term fixed rate assets have durations shorter than liabilities, some companies use additional interest rate derivatives to mitigate reinvestment risk. However, hedging interest rate risk with derivatives introduces liquidity and collateral challenges, and potential earnings volatility. As interest rates move unfavorably for the company, derivatives like interest rate swaps and Treasury futures require additional collateral, which can put a strain on liquidity. Beyond managing duration, some insurers and reinsurers use swaptions (an option to enter into an interest rate swap where a specified fixed rate is exchanged to floating) and other non-linear instruments to hedge disintermediation risk.

Credit risk is another concern, particularly since the assets backing non-indexed medium-term fixed annuities, and the invested assets in excess of the option budget that are backing FIAs and other index-linked annuities, often include corporate bonds or other credit-sensitive investments. To manage this risk, some insurers and reinsurers use credit derivatives like credit default swaps to transfer some of the default risk of the underlying bonds to a third party, providing protection against credit events.

Spread risk is another risk that some companies manage using derivatives. Such risks include the limited availability of medium-term assets with attractive credit spreads, and the uncertainty of future credit spreads upon the reinvestment of the return of principal on shorter-term assets. Some companies use credit default swaps and similar credit-linked derivates to lock in credit spreads for a medium-term to mitigate their spread risk exposure.

Reserves and Regulations

The characteristics of FIA products, along with financial reporting standards and regulatory requirements, are subject to change over time. Actuaries must continually update their knowledge to stay current with these developments.

Statutory Reserves

Statutory reserves for fixed indexed annuities (a.k.a. equity indexed annuities) are determined in accordance with Actuarial Guideline XXXIII (AG33) and Actuarial Guideline XXXV (AG35). AG33 governs the determination of CARVM reserves for annuity contracts. AG35 focuses on how to incorporate the index feature into the AG33 calculation.

AG35 offers various methods for incorporating the equity index feature in the CARVM calculation (called "Type 1" and "Type 2" methods). There are quarterly filing certification requirements related to the method chosen as well as constraints and notification requirements when the method is changed (e.g., changing from a Type 1 method to a Type 2 method).

AG35 requires that reserves for equity indexed annuities be tested for asset adequacy. This is not a standalone adequacy requirement.

At the time of publication for this paper, the NAIC and industry were in the process of developing a principle-based reserve approach for fixed annuity reserves (VM 22), which includes fixed indexed annuities. The effective date for new business was targeted for Jan. 1, 2026, on an elective basis and Jan. 1, 2029, on a required basis.

GAAP Accounting for FIAs

GAAP accounting for FIAs varies depending on product-specific features. It may also differ based on other factors, such as whether the business was directly written or is a reinsured block. The accounting treatment for product embedded features often varies, leading to the products being segmented or "bifurcated" for accounting purposes. For instance, the index feature, withdrawal feature, and the remaining "host" contract may each be accounted for differently.

The following principles generally apply to FIAs, though there are exceptions:

- FIAs without GMDBs are classified as Statement of Financial Accounting Standards No. 97 (FAS 97) investment contracts and FIAs with GMDBs are classified as universal life-type insurance contracts.

- The index feature is considered an embedded derivative. It is fair valued based on expected current and future index credits.

- GLBs and GMDBs are considered market risk benefits (MRBs). Benefits that are associated with MRBs in excess of the account value are held at fair value with an adjustment to reflect explicit fees. If there is not an explicit fee for a MRB, then the MRB is valued using an option-like valuation with a non-zero initial fair value and a host adjustment to offset the initial value.

- Contract cash flows that are not associated with the embedded derivatives and MRBs are considered part of the host contract. The host contract features are discounted using a host accrual rate that is set such that the total liability at issue (which includes the MRBs and embedded derivatives) is equal to the initial premium paid.

- There are other intangible balances associated with FIAs such as deferred acquisition costs (DAC), deferred sales inducements (DSI), and unearned revenue liabilities (URL). Such amounts may be subject to deferral and recognized over the life of contracts.

Fair value liabilities, such as the MRBs and embedded derivatives described above, can lead to volatile GAAP financial results as these balances tend to be sensitive to changes in risk-free rates and equity market movements. Changes in the option budgets may also cause volatility.

Below are illustrative examples of how GAAP balance sheet amounts might be determined (as indicated above, there are exceptions depending on contract specifics).

- Single-Tier Contract: Index credits are applied to both surrender and annuitization options. The contract also includes a GLB rider for an additional (i.e., explicit) fee.
  - The index feature is considered an embedded derivative and is fair valued based on the current index period option value and future years' option budgets. The current index period-option valued using the closed form Black-Scholes formula.
  - The GLB is considered a market risk benefit and is fair valued by discounting at risk-neutral rates the future GLB claims (i.e., claims paid after the account value is $0) less the future ascribed rider fees (ascribed fees may not equal the actual rider fees).
  - The remaining product cash flows, representing payments of remaining guaranteed amounts, discounted at a "host accrual rate."

- Two-Tiered Contract: The first tier, the cash value tier, is not affected by index credits. The second tier, the annuitization tier, includes index credits. The index credits can only be realized through annuitization.
  - This contract does not have an embedded derivative.
  - The cash value tier, unaffected by the index credits, is treated like a "plain vanilla" deferred annuity with the GAAP reserve set equal to the cash value.
  - The annuitization benefit in the second tier is considered a market risk benefit and is fair valued as the present value of future annuitization benefits discounted at risk-neutral rates.

Design, Pricing, & Rate Setting

The FIA product design and distribution are material in the assumptions used for the pricing and rate setting to maintain a viable competitive and profitable product. Design features impacting policy holder behavior include liquidity benefits (such as free partial withdrawals), surrender charges, death benefits, income benefits (including impairment benefits), rider charges, index strategies, and indices. Distribution channels (including commissions if applicable) and involvement can also influence policy holder behavior.

Initial pricing considers various company-specific factors such as profitability, risk assessment, sales volume, distribution channels, operational capacity, and competitive, regulatory, and financial environments. Internal rate of return, return on equity, profit margin, return on assets, value of new business, and break-even year are all profit metrics that can be considered in pricing. Profitability metrics should be evaluated for consistency within cohorts to minimize risk. The pattern of profits over time and the significance of the product's risk should be considered when selecting profit metrics.

Pricing models are developed during the initial product design and modified for product maintenance, such as rate setting and valuation. Documentation of pricing models and assumptions is important for model continuity. Model consideration includes time horizon, granularity, dynamic assumptions, asset return, economic scenarios, capital framework, and taxes. Important assumptions include those listed in the assumptions section—surrender rates, partial withdrawal rates, and mortality). Pricing includes setting assumptions for expenses, discount rates, cohort distributions of expected age, sex, tax status, premium level, and benefit election. Model assumptions include relevant, creditable, company, and industry experience. If no relevant experience is available, the actuary should use professional judgment, which may include a margin for uncertainty. Sensitivity and stochastic analysis should be done and should provide insight into product features or demographics which should be considered for product maintenance and rate setting.

Most companies review FIA non-guaranteed elements on a regular basis (e.g., monthly). The non-guaranteed elements include caps, participation rates, spreads, and performance triggers. In volatile economic and competitive environments, they may review these elements more often. When reviewing non-guaranteed elements for rate setting, the following should be considered: current investment yields, option costs, market volatility, premium volumes, the competitive environment, and profit objectives. Rate setting targets could be the priced product option budget for the index strategies, therefore maintaining the initial product profitability.

Illustrations

NAIC Model Law 245 (Annuity Disclosure Model Regulation) provides minimum standards for the disclosure of annuity information, including illustrations. The regulation requires a disclosure and Buyer's Guide at or within five days of the application. Some of the material requirements include providing guaranteed death benefits and values. Non-guaranteed elements shall be no more favorable than current non-guaranteed elements and shall not include any assumed improvements. An index must be in existence for at least 10 years to be illustrated.

Non-guaranteed illustrations shall be calculated for three different scenarios, with the geometric mean annual effective rate for each scenario.

- Reflecting historical performance for the most recent 10 calendar years
- Reflecting historical performance for the worst 10 continuous calendar years of the last 20 calendar years
- Reflecting historical performance for the highest 10 consecutive calendar years of the last 20 calendar years.

If the annuity includes an MVA, there are additional requirements for illustrating both the upside and downside aspects of the product features.

Nonforfeiture

The NAIC Model Standard Nonforfeiture Law for Individual Deferred Annuities applies to fixed indexed annuities. Fixed indexed annuities may use a nonforfeiture interest rate up to 100 basis points lower than the rate applicable to other fixed deferred annuities to reflect the value of the index benefit. The commissioner may require the actuary to certify that the value of the equity guarantee is at least equivalent to the interest-rate deduction.

Suitability

Model Law 275 (Suitability in Annuity Transactions Model Regulation) requires producers to act in the best interest of the consumer, and insurers to establish and maintain a system to supervise producer recommendations.

Contract State Filing Requirements

New product filing requirements vary by state and may include state-of-domicile approval, an actuarial memorandum, compliance demonstrations, and other requirements. Products can be filed through the Interstate Insurance Compact (IIPRC). The IIPRC limits usually default to the most conservative state variations.

Sources of Information

1. NAIC Model Laws, Regulations, Guidelines and Other Resources, Model Law 245-1 Annuity Illustration, Summer 2021.

2. Peter M. Phillips and Tao Wang, Fair value quantification and valuation, February 2022.

3. American Academy of Actuaries Lifetime Income Risk Joint Committee, "What Are the Various Types of Insured Annuities?" August 2022.

4. Aatman Dattani, Zi Xiang Low, Zohair Motiwalla, Katherine Wang, and Karthik Yadatore, "PBR impact on FIA pricing," Milliman, 2020.

5. Chapter 18 of "Statutory Valuations of Individual Life and Annuity Contracts, Fifth Edition", Volume 1, published by ACTEX Learning.

6. Actuarial Guideline XXXIII: Determining CARVM Reserves for Annuity Contracts with Elective Benefits.

7. Actuarial Guideline XXXV: The Application of the Commissioners Annuity Reserve Method to Equity Indexed Annuities.

8. The Standard Nonforfeiture Law for Deferred Annuities NAIC 805-1.

9. NAIC Model 245: Annuity Disclosure Model Regulation (Summer 2021).

10. NAIC Model 275: Suitability in Annuity Transactions Model Regulation (Spring 2020).

11. SOA 2019-2020 Fixed Indexed Annuity Contract Owner Behavior Study.

12. SOA Fixed Indexed Annuity Experience Study 2016-2018.

13. SOA Fixed Indexed Annuity Experience Study – Policy Years 2013-2015.

14. SOA Deferred Annuity Persistency Report (2006).

15. SOA Variable Annuity Contract Owner Behavior Report (revised1/2024). Although the study excluded fixed indexed annuities, it may provide insight when one is setting withdrawal, lapse, and annuitization assumptions.

16. SOA 2011-2015 Deferred Annuity Mortality Study.

17. SOA 2014-2019 Individual Payout Annuity Mortality Experience Study.

18. SOA 2009-13 Individual payout Annuity Experience Report & Pivot Table.

19. SOA 2005-08 Individual Payout Annuity Experience Report (Supplemental Tables added Jan. 2015).

20. SOA 2000-04 Individual Payout Annuity Experience Report.

21. Book: Options, Future, and Other Derivatives (John C. Hull).

1850 M STREET NW, SUITE 300, WASHINGTON, D.C. 20036

202-223-8196 | **ACTUARY.ORG**