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Center for Retirement & Policy Studies

Under the Microscope:
Fixed-Indexed Annuities With Guaranteed Lifetime Withdrawal Benefits

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Executive Summary

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In this report, we investigate whether the inclusion of a fixed indexed annuity, or FIA, with a guaranteed lifetime withdrawal benefit, or GLWB, in a retirement portfolio could improve investor outcomes. To conduct our study, we use simulations to compare strategies involving a partial allocation to an FIA with a GLWB against other annuity-based strategies. We also include a portfolio-only strategy as a baseline in our comparison. Our first three findings are based on an analysis of retail FIAs with GLWBs. Our last finding is focused on in-retirement-plan versions of the product.

FIAs with a GLWB can mitigate against portfolio shortfalls, but they may not boost bequests.

We find that FIA with GLWB strategies provide more income than the portfolio-only strategy in cases in which the retiree runs short of money, as the product mitigates against market risk and longevity risk. However, FIAs with a GLWB only boosted bequests in the model runs in which we assumed the insurer did not increase the pricing spread or only increased it slightly. Elaborating on the latter, we ran cases wherein the pricing spread stays constant or increases in the projection. A pricing spread refers to the yield that the insurance company takes from the earned rate of the supporting general account portfolio for overhead costs and profit.

Larger pricing-spread increases are less likely as insurers may damage their reputations, crippling future business. They may also be less likely with GLWB designs in which the withdrawal benefits are not linked to the credited interest rates. Still, these scenarios should not be completely discounted, as the insurer ultimately controls what portion of the general account yield is used to buy options on the underlying index.

The most generous FIAs with a GLWB could provide richer benefits than other annuities if consumers wait to take income.

We find that FIAs with the most generous lifetime benefits may outperform other annuity-based strategies in terms of both shortfalls and bequests. However, other annuities may provide richer benefits than FIAs with a more standard level of lifetime benefits. Those interested in an FIA with a GLWB should compare products to find those offering the richest guarantees.

This finding is based on our sample consumer buying the product before retirement and waiting 10 years before starting lifetime withdrawals—a key assumption as the longer deferral period gives the benefit base time to grow, which substantially boosts the level of guaranteed income. While it ultimately comes down to an individual's specific circumstances and the product details, consumers can likely get richer benefits from single-premium immediate annuities or deferred-income annuities if income is needed relatively soon. It is also harder to misuse an income annuity, as they are irrevocable and do not require a decision to start withdrawals.

Consumers who are likely to lapse are almost certainly better off without an FIA with GLWB.

We study the potential impact of FIA policyholder behavior on the results, reflecting a chance that the owner exits the contract (that is, lapse or surrender) in the analysis. We find that the effectiveness of FIA with GLWB strategies is reduced, as the contract owner pays for a guarantee that they do not use throughout their full retirement. While we focus on lapses herein, incorporating other policyholder behaviors into the analysis would lead to directionally similar results in most cases.

It is important to assess how likely it is for the owner to misuse the product when evaluating whether a GLWB-style product is appropriate. Consumers who are less knowledgeable about the product or who are less prepared for retirement may be more likely to lapse. Further, it is crucial to educate contract owners on the GLWB features and provisions if that is the product of choice.

In-plan FIAs with a GLWB may outperform other in-plan annuities.

We compare the projected performance of an in-retirement-plan FIA with a GLWB to other in-plan annuity strategies. As before, we run a variety of pricing spread scenarios. We find that in-plan FIAs with a GLWB outperform the other annuity-based strategies in most runs. The exception is the case wherein a larger pricing-spread increase occurs. Like we noted above, larger pricing-spread increases are less likely, especially in a retirement-plan setting in which the product will be under regular scrutiny from plan fiduciaries. Still, plan sponsors may want to consider the possibility of pricing-spread increases, as the portion of the general account yield used to buy options is at the discretion of the insurer.

We also run cases considering the possibility of lapses. The results show that the efficacy of the in-plan FIA with GLWB strategy is reduced. Plan sponsors may want to consider how likely it is for retirement plan participants to use the GLWB or otherwise misuse the product. It is very important to provide thorough and comprehensive education to plan participants on the GLWB features and provisions if that type of product is offered in the plan.

Background

Fixed-indexed annuities, or FIAs, are one of the most popular types of annuities, with sales accounting for about 25% of all U.S. individual annuities sold in 2021.[1] They also are relatively new. In 1995 Keyport Life Insurance Company introduced its "Key Index" product, and since then, product designs have proliferated in the marketplace.[2]

FIAs are often sold with a guaranteed lifetime withdrawal benefit, or GLWB, rider. The rider is an income-guarantee mechanism that is added to the base FIA contract. Our focus in this report is on FIAs with a GLWB. We study whether a partial allocation to an FIA with a GLWB can provide value to those who are close to retirement. We start with a discussion of FIA basics, as it is necessary to understand the base contract in order to understand the GLWB rider. We then discuss the features and mechanics of GLWB riders. Next, we introduce our comparative framework before moving into discussion of our findings.

Fixed-Indexed Annuity Basics

FIAs are a type of accumulation-focused fixed deferred annuity in which the rate of return on the account balance, or contract value, depends on the growth rate of an external index, subject to a minimum floor return (typically 0%). Like other fixed deferred annuities, FIAs are tax-deferred products that provide principal protection and minimum interest-rate guarantees. They also often come with a surrender-charge schedule that sets the fees for withdrawing money during the surrender period.

FIA premiums are not directly invested in the underlying index. Instead, the insurance company invests most of the premium in its general account, typically allocating to U.S. government bonds, corporate bonds, mortgages, and other, similar assets.[3] This allows the insurer to meet the principal guarantee. From the leftover money, the insurer will take what it needs to support the product. The remaining assets, referred to as the option budget, are used to purchase derivatives on the underlying index. The payoff from the derivatives is ultimately what is used to credit interest.

As a simplified example of the option budget concept, let us assume that the insurance company can invest in a portfolio of bonds that yields 5% per year. Further, assume that the insurer will take 1.5% of the yield for overhead costs and profit (referred to as the pricing spread). If a consumer purchases an FIA with $100,000 of premium, the insurer will start by investing about $96,618 into said portfolio. This ensures that the principal guarantee is met. The leftover amount of $3,382 ($100,000 minus $96,618) is the option budget and will be used to purchase derivatives on the underlying index.

The option budget fluctuates over time,[4] as it is based on the portfolio yield of the general account assets supporting the product. The option budget is a major determinant of the rate of return credited to the contract value.

[1] US Annuity Third Quarter 2022 Sales Estimates. (2022). LIMRA. Retrieved Jan. 11, 2023, from https://www.limra.com/siteassets/newsroom/fact-tank/sales-data/2022/q3/3q-2022-final-annuity-sales-estimates-final-corrected.pdf

[2] Palmer, B. P. (October 2006). "Equity-indexed Annuities: Fundamental Concepts and Issues." Insurance Information Institute. Retrieved Jan. 10, 2023, from https://www.iii.org/sites/default/files/docs/pdf/EIA_paper.pdf

[3] McMenamin, R. M., Paulson, A. P., Plestis, T. P., & Rosen, R. R. (2013, March). What Do U.S. Life Insurers Invest In? Chicago Fed. Retrieved Jan. 11, 2023, from https://www.chicagofed.org/-/media/publications/chicago-fed-letter/2013/cflapril2013-309-pdf.pdf

[4] The option budget can be relatively stable before the surrender charge period concludes.

Another key driver of FIA performance is the index itself. The S&P 500 index is available with virtually all products. Other prevalent stock indexes, such as the Russell 2000 and MSCI EAFE, are also widely available within FIAs. The movement in the price index is what matters when calculating index returns, meaning that dividends are excluded in the calculation. The impact can be significant. For example, dividends have historically contributed about 32% of the S&P 500 total return,[5] though the portion of the return attributable to dividends has dropped in recent years.

Many FIA providers also offer exotic indexes, which are often custom built for the product by an investment bank or asset manager. These indexes can incorporate both stock and bond performance and frequently use a managed volatility methodology.[6]

There are a variety of interest-crediting-rate methods offered across FIA products. While the return profile differs by method, all credited-rate strategies provide a nominal floor return (typically 0% before any rider fees).[7] We will focus on two methods:

1) **Point-to-point with cap rate.** With this approach, the FIA policyholder gets the return on the underlying index up to the cap that the insurance company specifies up front. The return calculation is based on two points: the index level at the beginning of the term and the level at the end of the term (hence point to point). For example, if the cap is 8%, and the index returns 10%, the credited interest will be 8%.
2) **Point-to-point with participation rate**. The participation rate represents the percentage of the index return that the FIA policyholder receives. So, for example, if the participation rate is 40%, and the index returns 10%, then the policyholder will get 4%.

Broadly speaking, the cap or participation rates are set by the insurer such that the market cost of implementing the strategy via options is equal to the option budget. Using the cap-credited-rate method as an example, the insurer will buy an at-the-money call and sell an out-of-the-money call. Suppose an at-the-money call costs $9,751 (on a $100,000 notional amount) and the option budget is $3,382 (like in our prior example), the insurer will sell a call that costs $6,369 so that their net outlay equals the option budget. The strike price for the out-of-the-money call determines the cap rate and is reset annually.[8]

[5] "S&P 500 Dividend Aristocrats: The Importance of Stable Dividend Income. (n.d.)." S&P Dow Jones Indices. https://www.spglobal.com/spdji/en/research/article/a-fundamental-look-at-sp-500-dividend-aristocrats/

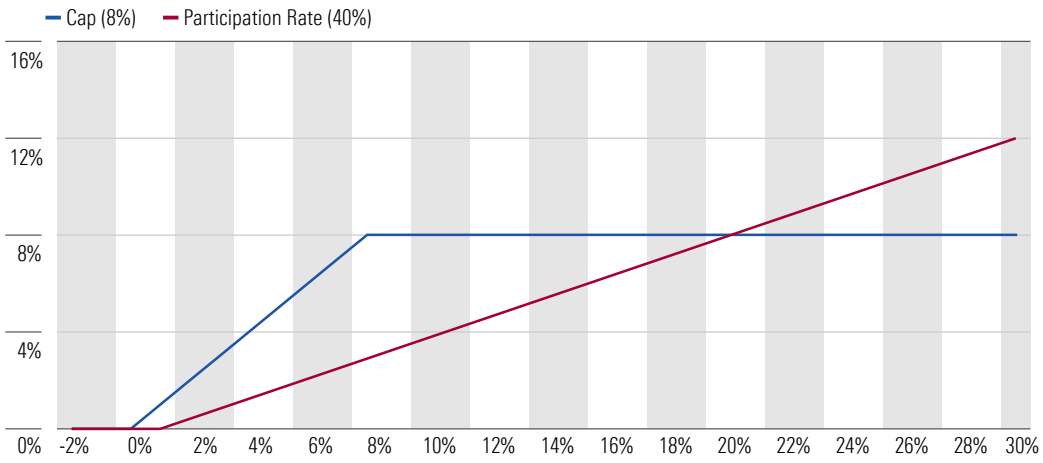
[6] At a high level, a managed volatility index will target a specific level of volatility (such as 5%), investing more aggressively when future volatility is anticipated to be lower than the target and vice versa when future volatility is forecast to be higher than the target.

[7] Insurance companies may offer a floor return of 1% instead of 0% for example.

[8] This is a simplified example. Insurers do not buy derivatives on an individual contract level. Rather, insurers typically purchase hedges for cohorts of contracts with similar issue dates.

Exhibit 1 below shows hypothetical payoffs for the two methods, assuming an 8% cap and 40% participation rate.

Exhibit 1 FIA Annual Point-to-Point Credited-Rate Method Payoff Diagram



Source: Author's calculations.

More complicated credited-rate methods exist. For example, some strategies involve calculations at monthly intervals (monthly sum and annual monthly averaging approaches).[9] Further, most FIAs offer an annual fixed-interest credited-rate method that the policyholder can choose. The latter is tantamount to a one-year guaranteed fixed-interest rate that one can get with a fixed-rate annuity.

The underlying index can have a big impact on the index rates that the insurer offers. This is because the cost of the options varies by index. For example, all else equal, an option on a lower-volatility index will cost less than an option on a higher-volatility index. This is why insurers can offer a 200% participation rate, or something similar, with certain indexes. The liquidity of the options on the index are another factor that impacts cost.

The cap or participation rates offered by the insurer at the point of sale are typically only applicable for a one-year period.[10] For example, an insurer may offer an annual point-to-point cap of 8% for the first year of the contract. In year two, the cap rate may be higher or lower than 8%. The process to set the renewal rates is based on the option budget and the cost of derivatives, subject to any guaranteed minimum cap or participation rates.[11] Because the option budget and the market environment change, renewal rates may not remain in line with prior rates. Further, insurers may have different profit targets or other expenses when setting renewal rates.

[9] Palmer (2006) includes detailed discussion on various credited-rate methods.

[10] Some companies offer cap or participation rates that are guaranteed for more than one year. For example, an insurer might sell an FIA with an annual point-to-point cap credited-rate method in which the cap is set at 8% over a seven-year period. This means the credited interest rate will be capped at 8% annually.

[11] For example, a contract may state that the guaranteed minimum cap rate is 1%.

FIAs allow the policyholder to withdraw from their account balance at any time in the life of the contract. However, there may be a fee. FIAs are commonly sold with a surrender-charge schedule, in which the insurer will assess a fee ("the surrender charge") if the policyholder opts to withdraw more than the "free partial withdrawal" amount (often 10% of their account balance per year) before a certain period has passed. Surrender charges typically decrease over time, going from 7% in year one, for example, to 6% in year two, to 0% in year eight. FIAs may also come with a market-value adjustment, or MVA. This feature adjusts the contract value up or down depending on the movement of interest rates. Typically, the MVA increases (decreases) the amount paid out to the policyholder if interest rates decrease (increase) relative to interest rates at contract inception.[12] MVAs exist to hedge against fixed-income losses during a surrender event.

Although FIAs are becoming more popular, they do have their critics. This may be due in part to consumers being misled by some salespeople. Further, managed volatility indexes have proliferated the marketplace. The rules governing a managed volatility index are typically developed by extensively backtesting historical data, and these backtested returns may be used in product illustrations, setting unrealistic expectations for policyholders. For example, in one product illustration that we reviewed, the annualized rate of return in a "low" market return scenario was over 12%. Product illustrations also assume that the current cap or participation rate stays constant in the projection, whereas the insurer regularly resets them. Critics also cite the complexity of FIAs as a reason to avoid them, as many consumers will not understand the features and choices in a contract. One last criticism we observed frequently in our review is that FIA costs are opaque. Consumers do not have a surefire way to tell what they are paying, and some may not realize they are paying anything at all.

Still, proponents see FIAs as a hybrid product that can help both preretirees and retirees from an accumulation perspective. Further, some proponents emphasize the level of guaranteed income that may be provided by FIAs.

Fixed-Indexed Annuity with a Guaranteed Lifetime Withdrawal Benefit Rider

FIAs with a GLWB rider can be used to generate retirement income. The GLWB rider allows the owner to take withdrawals that are guaranteed for life, even if the contract value of the base policy is $0. The amount that the policyholder can withdraw is referred to as the guaranteed lifetime withdrawal benefit.

One of the main benefits of the GLWB design is that it adds flexibility. Namely, the policyholder maintains access to their contract value throughout their lifetime. This means that they are free to withdraw more than the guaranteed amount, up to the full contract value less any surrender charges, though this lowers the guarantee.

Income annuities (which include single premium immediate annuities, or SPIAs, and deferred income annuities, or DIAs) do not provide this flexibility. Instead, they require the purchaser to "annuitize" their premium. While annuitization does give the purchaser a guaranteed income stream for life, the purchaser can no longer access the wealth they annuitized. Consumers seem to prefer the flexibility of GLWB-style products, as sales of SPIAs and DIAs only accounted for about 3.3% of total annuity sales in 2021.[13]

[12] FIAs also include a guaranteed minimum surrender value, or GMSV, that may nullify surrender charges or an MVA if they reduce the surrender value below this guaranteed value. The GMSV of an FIA is typically 87.5% of all premiums paid less withdrawals, accumulated at a set interest rate. This interest rate is distinct from the rate of return applied to the contract value. The GMSV typically only applies if no interest has been credited due to a series of negative index growth rates. Refer to "Standard Nonforfeiture Law for Individual Deferred Annuities." (2020). NAIC. Retrieved Jan. 11, 2023, from https://content.naic.org/sites/default/files/inline-files/MDL-805_0.pdf

[13] Refer to (LIMRA 2022).

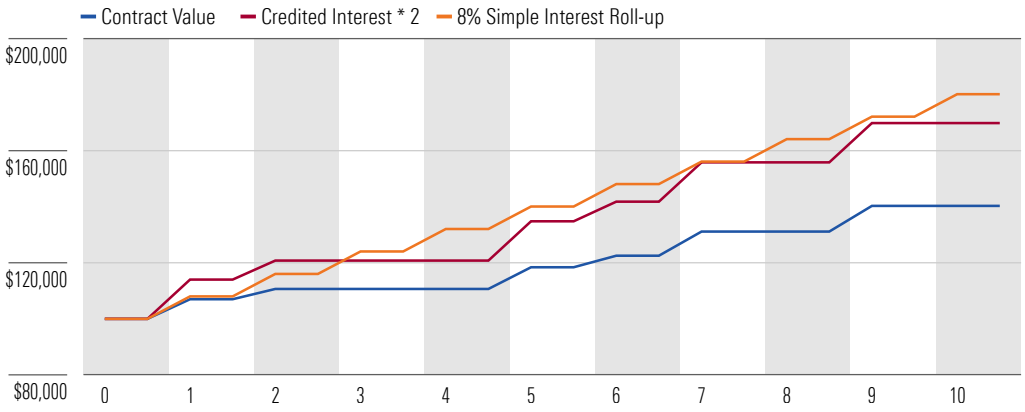
There is no shortage of GLWB designs. In many variations, the insurer determines the guaranteed lifetime withdrawal benefit amount by multiplying the "payout rate" and the "benefit base." The payout rate is a percentage, such as 5%, that the insurance company specifies in the contract. The payout rate typically depends on the age that the owner starts taking the guaranteed lifetime withdrawals and whether the guarantee is based on a single life or two lives. As with income-annuity payout rates, GLWB payout rates tend to increase at older ages and decrease if the guarantee covers a couple rather than an individual. In some GLWB designs, the payout rate is based on the age at contract issue but increases for every year that the policyholder defers election of the lifetime withdrawals.

The benefit base can be thought of as a hypothetical balance the insurer uses to calculate the GLWB amount. It is typically floored at the sum of premium less withdrawals. GLWB riders frequently include a guaranteed minimum roll-up feature, in which the benefit base is guaranteed to increase every year until withdrawals start. The roll-up is either calculated via a simple interest or via a compound interest method. When using the simple interest method, the roll-up is often based on the product of the roll-up interest rate and premium from the first year. For example, if the premium is $100,000 and the simple interest rate is 7%, then the guaranteed roll-up is $7,000 a year. In contrast, with the compounding interest method, the insurer applies the roll-up interest rate to the prior year's benefit base.

Some insurers offer a design in which the benefit base roll-up interest rate is not guaranteed. Rather, it is linked to the growth rate of the contract value, and oftentimes multiplied by a set factor. For example, the benefit base could increase by the interest rate applied to the contract value multiplied by a factor of 1.5 or 2. It is also possible for a GLWB rider to include a ratchet or "step up" feature, in which the benefit base is stepped up to the contract value of the FIA if it is greater than the benefit base.

Exhibit 2 below demonstrates two separate benefit base designs.

Exhibit 2 Illustration of FIA GLWB Benefit Base Designs in Low-Return Environment



Notes: We assume $100,000 is contributed to the fixed-indexed annuity. We use an S&P 500 cap strategy and assume the cap stays constant at 7% for the sake of this example. S&P returns are completely hypothetical. We also assume there is no explicit benefit base charge (the GLWB cost is reflected in the option budget).

Insurers can design riders to provide nominally level withdrawals or withdrawals that can increase over time. In the case of the latter, the rate at which income grows is often the same rate as the contract value. For example, if the credited interest rate is 2%, the guaranteed lifetime withdrawal benefit increases by 2%. Further, the payout rate for GLWB riders in which the guaranteed withdrawal can increase is often lower than the payout rate for riders with level withdrawals.

Insurers can incorporate multiple benefit base increase features into one rider offering. Further, there are rider designs that combine a GLWB with a guaranteed minimum death benefit (typically referred to as a GMDB).[14] There are also designs in which the guaranteed lifetime withdrawals may increase if the purchaser requires long-term services or supports. We leave discussion on these type of designs for future research.

Most of the time, there is an explicit fee for the GLWB rider, which is deducted from the contract value. GLWB fees are often around 1% of the benefit base, and GLWBs with richer benefits may cost more. The GLWB fee is in addition to the pricing spread that applies for the base product. Adding a GLWB rider to the base contract can also impact the caps, participation rates, and other index rates the insurer specifies. This is because the costs to provide the GLWB rider can be deducted from the option budget, instead of being separated out as an explicit charge. Or the cost of the GLWB rider can be split, with part of it specified as an explicit fee deducted from the contract value and the rest deducted from the option budget. This practice appears to be more common when the insurer links the benefit base roll-up interest rate to the credited interest rate or when the withdrawal benefits can increase in retirement.

The costs to provide the GLWB rider can be deducted from the option budget, instead of being separated out as an explicit charge.

The GLWB rider mechanisms we have described are quite similar (and sometimes identical) to the mechanisms behind GLWB riders that are sold with deferred variable annuities, or VAs. However, GLWBs on FIAs tend to offer more guaranteed income than the GLWBs on their VA counterparts. With the VA chassis, there is generally a higher chance the guaranteed income level can grow due to increases to the benefit base.[15] In general, this occurs because there is a wider distribution of potential outcomes with deferred VAs with a GLWB than FIAs with a GLWB, as returns are not capped or floored with VAs.

[14] Pitacco summarizes different GMDB designs. Refer to Pitacco, E. (March 2017). "Life Annuities. Products, Guarantees, Basic Actuarial Models." https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2887359

[15] https://www.soa.org/globalassets/assets/library/newsletters/product-development-news/2016/february/pro-iss-103-baiye.pdf

Our Comparative Framework

To conduct our study, we use a simulation-based model to project retirement outcomes for various lifetime income strategies. We study two different FIA with GLWB product variations. We include strategies involving a partial allocation to a SPIA, a DIA, and a VA with a GLWB. We also run a portfolio-only strategy as a baseline. For the annuity-based strategies, we assume investors allocate 40% of their investable assets into the insurance product, as it is important to retain some flexibility in the portfolio. Also, we count all or a portion of the annuity as fixed-income asset-class exposure. We then invest the rest of the assets in the portfolio more aggressively. We expand on this later in this section.

1) **Portfolio-only.** The baseline strategy does not include an allocation to an annuity. Instead, the investor takes systematic withdrawals and Social Security, which is claimed at retirement (age 65), to fund expenses over their projected lifetime.
2) **Portfolio + fixed single premium deferred income annuity.** The investor uses a portion of their wealth at age 55 to purchase a fixed DIA in which the income payments start at retirement. The investor supplements Social Security (claimed at 65) and DIA income payments with withdrawals from their more-liquid investment portfolio as needed.
3) **Portfolio + fixed single premium immediate annuity**. The investor uses a portion of their wealth at age 65 to purchase a fixed SPIA[16] with income payments starting immediately. The investor takes withdrawals from the investment portfolio to supplement Social Security (claimed at 65) and the SPIA payments. Note that the SPIA payout rates are based on a life with 10-year period certain and a joint and 75% survivor benefit.
4) **Portfolio + VA with GLWB.** The investor allocates a portion of their wealth to purchase a VA with a GLWB at age 55. At retirement, the investor claims Social Security and starts taking the guaranteed living withdrawals. The investor uses their investment portfolio to fund remaining expenses.
5) **Portfolio + FIA with level income GLWB**. The investor uses a portion of their wealth to purchase the FIA at age 55 and starts taking guaranteed lifetime withdrawals at retirement.

   With this FIA variation, we assume the investor chooses an annual point-to-point cap credited-rate method tied to the S&P 500 index. The insurer calculates the guaranteed rollup to the benefit base based on the simple interest method. The guaranteed withdrawals are level in the projection.
6) **Portfolio + FIA with rising income GLWB.** With this strategy, we assume the investor chooses an annual point-to-point participation rate method. The underlying index is an S&P 500 7.5% managed volatility index.

   Unlike the level-income GLWB variation, the benefit base is not guaranteed to roll up based on the simple interest calculation. Instead, the benefit base increases at the same rate that interest is credited to the contract value times a factor of two. Further, the guaranteed lifetime withdrawals increase at the same rate as the contract value (there are no increases once the contract value is $0).

[16] Note that we isolate the amount of wealth that would have been used to purchase an FIA or DIA. We then accumulate it at the same rate of return as the rest of the portfolio and use the balance at 65 to buy a SPIA.

We include the portfolio-only strategy in our analysis because we believe this is the strategy most investors use today. We incorporate the fixed DIA and the VA with GLWB because they are natural comparisons to the FIA with GLWB strategy, as in both cases the income guarantees are bought at age 55. We include the fixed SPIA because it is a key benchmark in any guaranteed income strategy comparison.

While the focus of this report is mostly on retail FIAs[17] with a GLWB, we also study several in-retirement-plan lifetime income strategies, including an in-plan FIA with GLWB, an in-plan deferred-variable annuity with GLWB, an in-plan SPIA, and an in-plan DIA-based strategy. The inputs and parameters for the deferred-variable annuity and in-plan income annuity strategies are the same as in Look and Szapiro (2022).[18] We discuss these strategies in more detail in the Finding Four subsection.

Exhibit 3 details the key characteristics for the FIA with GLWB variations presented above. Note that payout rates are for joint lives. Further, note that we generate runs with higher pricing spreads to show a range of potential outcomes when using an FIA with GLWB.

Exhibit 3: Key Characteristics of Baseline FIA With GLWB Strategies

Characteristic	FIA with Level Income GLWB	FIA with Rising Income GLWB
Credited-rate Method	Annual point-to-point with cap	Annual point-to-point with participation rate
Underlying Index	S&P 500 Index	S&P 500 7.5% Target Volatility Index
Target Pricing Spread[19]	1.5%	2% (pricing spread is higher because benefits are linked to credited interest rates)[20]
GLWB Cost	Annual fee of 1% of the benefit base	Annual fee of 1% of the benefit base
GLWB Payout Rate (Joint Life)	5% of the benefit base if lifetime withdrawals start at age 65	4.15% of the benefit base if lifetime withdrawals start at age 65
Benefit Base Roll-up	8% of premium per year; the benefit base is stepped up to the contract value if it is greater than the benefit base upon initiation of guaranteed withdrawals[21]	2 times credited interest rate per year
Possibility for Guaranteed Withdrawals to Increase	No, guaranteed lifetime withdrawals are fixed	Yes, guaranteed lifetime withdrawals increase at the same rate that interest is credited to the contract value until contract value is $0

[17] We use the term "in-plan FIAs" to identify FIAs that are available through an employer sponsored retirement plan. "Retail FIAs" refer to FIAs that are bought outside of a retirement plan. In general, FIAs offered via a retirement plan have preferable costs and provisions relative to retail FIAs.

[18] Look, S., & Szapiro, A. (September 2022). "The Retirement Plan Lifetime Income Strategies Assessment." Morningstar. https://www.morningstar.com/lp/lifetime-income-strategies-assessment

[19] The pricing spread is deducted from the forecasted general account portfolio yield to calculate the option budget. We floor the option budget at 1%.

[20] Some products in which the benefits are linked to credited interest rates may not target a higher spread. Instead, the payout rates that are offered may be lower. For example, using our above composite, the payout rate could be something like 3.5%.

[21] While we modeled this feature, note that it had very little impact on our results. A ratchet feature is less valuable on an FIA with GLWB than on a VA with GLWB.

The FIA with GLWB variations and parameters we use in this report are based on careful analysis of products available in the marketplace. Specifically, we focused our review on products issued by top sellers of FIAs,[22] and then ran various actual products through the simulation engine described in this section to create the FIA with GLWB composites in the above table. The analysis is based on product data gathered the week of Jan. 9, 2023.

While there are plenty of other designs that may offer more generous or less-generous guarantees, or use different features entirely, we believe our FIA with GLWB variations are a conservative but reasonable representation of what is available in the marketplace. In addition, we report a range of outcomes and study a couple other product variations, which we introduce later. Prospective purchasers should get specific information about products that are being considered.

To compare the strategies above, we use a simulation-based model to project retirement outcomes across 1,000 independent trials. The model is the same microsimulation model used in the Look and Szapiro (2022) report.

The model projects two lives forward (a male and a female), representing a household. Health events, in the form of long-term services and supports, or LTSS, are simulated for each life. Investors are not assumed to pass away at a specific age; instead, the death age is modeled stochastically.

The household's retirement expenses consist of two elements: 1) a deterministic element, representing relatively stable expenses, and 2) a stochastic element, representing LTSS expenses. When only one spouse is alive in the projection, consistent with empirical data, the deterministic expenses are reduced by 30%.[23] All household wealth is assumed to be in a pretax retirement account.

Interest rates and portfolio returns are modeled stochastically based on forward-looking assumptions. Equity returns represent the U.S. large-cap asset class. Bond-fund returns represent the investment-grade bonds asset class. We model inflation as a stochastic process that allows for periods of higher inflation. We use a glide path based on the target strategic equity allocation weights from a variety of fund families. Refer to the Appendix for more detail about our methodology and our forecast return and interest-rate statistics.

To project FIA cash flows, we first forecast the option budget. While approaches vary in the industry, a common method is to model the option budget as the projected book yield of the supporting general account portfolio less a pricing spread,[24] and we do the same. We then use the forecast option budgets to solve for the cap and participation rates. This involves either entering into a bull-call spread for the cap strategy or buying an at-the-money call for the participation rate strategy. Managed volatility index growth rates are forecast based on a stochastic process with a dynamic rebalancing methodology. Refer to the Appendix for more details.

The credited interest rates are then based on the caps and stock index price returns or participation rates and managed volatility index growth rates, depending on the credited-rate method. The FIA guaranteed lifetime withdrawals are projected based on the parameters detailed in Exhibit 3.

[22] U.S. Individual Fixed Annuity Sales Breakout 3rd Quarter 2022 YTD. (2022). LIMRA. Retrieved Jan. 17, 2023, from https://www.limra.com/siteassets/newsroom/fact-tank/sales-data/2022/q3/top-20-2022-q3-fixed-annuity-breakout-rankings-final.pdf

[23] The reduction to expenses after the death of the first spouse is based on analysis of the Consumer Expenditures Survey. We calculated the ratio of total expenses from responders identifying as single and responders identifying as married.

[24] Chang, G. C., Feng, L. F., Matczak, B. M., & Yadatore, K. Y. (2020, January). Fixed indexed annuities with Market Risk Benefits. Milliman. Retrieved Nov. 29, 2022, from https://us.milliman.com/-/media/milliman/pdfs/articles/fixed_indexed_annuities_with_market_risk_benefits.ashx

The DIA payout rate is 9.7%, which is based on actual CANNEX quote data from January 2023. The payout rate is based on a life with 10-year period certain and a joint and 75% survivor benefit.[25] An annuity pricing model is used to estimate the payout rate for the SPIA, as it is not bought at the beginning of the projection.

Our VA with GLWB is based on an analysis of real product data. The benefit base increases every year due to an annual ratchet or due to a guaranteed 6.5% simple interest rollup, whichever is greater. The product fees include a base product fee of 1% of contract value per year and an annual GLWB fee of 1% of the benefit base. The joint GLWB payout rate is 5%, and the guaranteed withdrawals cannot increase after they start. Further, we assume that 60% of the underlying assets are invested in an equity fund. We calculate the GLWB amount from the projected benefit base and payout rate. We use this VA product because the total annual costs, after including our fund fee of 0.39% per year, are close to what the consumer pays for the level income FIA with GLWB.

For the income annuity-based strategies, we quantify the present value of income and count it as fixed-income asset-class exposure in our dynamic rebalancing function.[26] We estimated the effective asset allocation of an FIA with GLWB leveraging the methodology presented by Chen and others (2009).[27] We found that the effective asset allocation of an FIA with GLWB over a longer time horizon was consistent with a 10% equity and 90% bond portfolio. We calculate the value of the FIA with GLWB as the maximum of the present value of GLWB payments and the contract value. We then count 90% of the value as fixed-income asset-class exposure and 10% of the value as equity asset-class exposure. We repeat this analysis for the VA with GLWB. We found that the effective asset allocation was consistent with a 20% equity and 80% bond portfolio. The objective of the rebalancing function is to solve for the equity weight within the investment portfolio such that total portfolio's equity level still follows the glide path. The implication of this methodology is that the remaining funds in the investment portfolio are invested more aggressively than they otherwise would be when an annuity strategy is used.

The projected income, wealth, and expense cash flows are converted from a nominal basis to an inflation-adjusted, or real, basis. The model uses this data to calculate two main metrics:[28]

1) Average funded ratio in shortfall scenarios: We calculate the percentage of lifetime expenses for each trial as the sum of real (that is, inflation-adjusted) income produced by a strategy across all retirement years divided by the sum of real expenses (also across all retirement years). This shows the magnitude of the shortfalls. We then calculate the average funded ratio for scenarios in which a shortfall has occurred. Specifically, we rank the scenarios for each strategy and calculate the average of the worst 100 scenarios. This metric shows the potential impact of a guaranteed income solution with respect to the household's retirement need in cases in which the portfolio runs short of money.

2) Median real bequest: We first calculate the bequest for each trial as the inflation-adjusted amount of wealth (including the deferred annuity account balance, if applicable) that is left over when both members of the household have died. We then report the median bequest from the distribution of outcomes.

More detail about our quantitative framework is provided in the Appendix.

[25] We use a 75% survivor benefit because this lines up with the reduction in expenses upon the first death of the couple.

[26] Refer to Blanchett, D., & Finke, M. (Sept. 22, 2017). "Annuitized Income and Optimal Asset Allocation." Social Science Research Network. Retrieved May 17, 2022, from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3041717

[27] Refer to the section on "effective" asset allocations in Chen, P., Xiong, J., & Idzorek, T. (2010). "Allocation to Deferred Variable Annuities with GMWB for Life." *Journal of Financial Planning*, 23(2), p42-50

[28] Note that we did investigate the distribution of simulated outcomes before concluding that these metrics are appropriate for this report.

We use two hypothetical households for our analysis. Sample household one is used for our analysis of retail FIAs, and sample household two is for our in-plan FIA analysis. All households are assumed to retire at age 65 and claim Social Security at the start of retirement. These inputs were used because they represent, in our view, households that may benefit from an allocation to an annuity. Refer to Exhibit 4 for the specific inputs we use.

Exhibit 4: Hypothetical Participant Inputs

Sample Household	Male Age	Female Age	Ret. Age	Annual Household Salary	Annual Household Contributions[29]	Annual Ret. Need[30]	Qualified Balance at Start
1	55	55	65	$205,000	$30,750	$128,430	$1,350,000
2	50	50	65	$205,000	$40,000	$128,430	$750,000

For the analysis of retail FIAs, we assume that 40% of the household's wealth at age 55 is allocated to annuity-based strategies, and for the workplace analysis, we assume that 40% of the household's contributions are allocated to the annuity if it is part of the strategy. We use a 40% product allocation because it is reasonable and because it represents a meaningful allocation to the guaranteed income product.[31] Note that our findings are robust to similar product allocation percentages and smaller allocations (though of course the deltas would be smaller). However, these findings may not apply at significantly larger product allocations (such as 70%), as the household may not have enough flexibility to meet their retirement needs. These findings may also not apply for households that are less prepared for retirement.

[29] Contributions are assumed to increase by the scenario-specific inflation.
[30] The annual deterministic retirement need is stated in current dollars. The annual retirement need is increased by the scenario-specific inflation.
[31] Note that in both the retail and workplace analysis, the actual product allocation percentage at retirement is well below 40%.

FINDING ONE

FIAs with a GLWB can mitigate against portfolio shortfalls, but they may not boost bequests.

We started our analysis by comparing our two baseline FIA with GLWB strategies against the portfolio-only strategy. We left out the other annuity strategies in this section so that we could focus the discussion on the results for our two FIAs. Also, our FIA with GLWB composites do not have a guaranteed minimum death benefit rider.

We generated results under a variety of FIA pricing-spread assumptions to show a range of potential outcomes. We included a run in which the pricing spread stayed at its initial level in the projection.

Our baseline target pricing-spread assumptions were 1.5% for the level income GLWB and 2% for the rising income GLWB design. These assumptions are in line with two Milliman actuarial FIA white papers.[32, 33] They are also broadly consistent with what various companies appear to be taking based on our analysis of implied pricing spreads of real FIA contracts.[34]

We also included runs in which the pricing spread was assumed to increase from its initial level in the first five years to a higher level in the sixth year of the projection and stay at that level thereafter. We tested cases in which the pricing spread increased by 0.25% and 0.75%. These cases represent a scenario wherein the insurance company opts to increase the pricing spread after some time due to rising costs or a desire to improve profit margins. Insurance companies have discretion when setting renewal rates. While there are minimum guaranteed caps and participation rates, they are often low. For example, in one contract we reviewed, the minimum guaranteed cap rate for an annual point-to-point S&P 500 crediting option was 1%.

Smaller pricing-spread increases of say 25 basis points may occur with some regularity, as some insurers may offer first-year teaser cap or participation rates.[35] Larger pricing-spread increases are less likely because insurers face pressure to credit competitive interest rates in order to protect their reputations. There are also professional standards around setting nonguaranteed rates.[36] Further, while a pricing-spread increase can lead to more short-term profit, it could also increase the long-term cost of a GLWB from the insurer's perspective because the contract value would be depleted faster.[37]

That said, insurers may still opt to increase the pricing spread if other blocks of business are facing losses. Insurers also generally mispriced deferred variable annuities with a GLWB when they were first introduced.[38] While pricing practices have evolved and FIAs with a GLWB do not have the same risk profile, scenarios with larger pricing-spread increases should not be completely discounted. Companies may also decrease the pricing spread, especially if interest rates decrease. We accounted for this by flooring the option budget at 1% in this analysis.

Regarding the results, in all model runs, we found that both FIA strategies provided more income than the portfolio-only strategy in shortfall scenarios (that is, scenarios in which the portfolio runs short of money in the projection). However, including an FIA with GLWB in the portfolio did not always enable our hypothetical household to leave behind a larger legacy. The results are presented in Exhibit 5.

[32] Refer to Chang and others (2020).
[33] Dattani, A., Low, Z. X., Motiwalla, Z., Wang, K., & Yadatore, K. (2020, October). Principle-based reserving impact on fixed indexed annuity pricing. Milliman.com. Retrieved Jan. 9, 2023, from https://us.milliman.com/-/media/milliman/pdfs/2020-articles/articles/10-14-20-pbr-for-non-var-annuities-v1.ashx
[34] We compared the fixed rates offered by various FIA contracts (through Morningstar's Annuity Intelligence Center) to the Moody's Seasoned Baa Corporate yield. The difference between the Baa yield and the fixed rate is a rough estimate of the pricing spread. We conducted this analysis at the same time as when we developed our composites. Note that pricing spreads may vary with the level of interest rates.
[35] Moore notes in her article that it is common practice for indexed annuities sold through independent agents to have first-year teaser rates. Moore, S. (Jan. 4, 2023). MQATMULY. Wink. Retrieved Feb. 6, 2023, from https://www.winkintel.com/2023/01/mqatmuly/
[36] Refer to Actuarial Standard of Practice No. 2. (September 2021). Actuarial Standards Board. Retrieved March 15, 2023, from http://www.actuarialstandardsboard.org/wp-content/uploads/2021/12/asop002_204-2.pdf
[37] While counterintuitive, the largest higher pricing spread may not always maximize insurer profits over the long run. This is because a larger pricing spread will lower the contract value growth rates, meaning that the insurer will be liable for more lifetime withdrawal benefits.
[38] Refer to Milevsky, M. A. M., & Salisbury, T. S. S. (Feb. 24, 2006). "Financial valuation of guaranteed minimum withdrawal benefits." *ScienceDirect*.

Exhibit 5: Average Funded Ratio in Shortfall Scenarios and Median Bequest by Strategy

Strategy	FIA Pricing Spread	Average Funded Ratio in Worst 100 Scenarios	% Difference Against Portfolio Only	Real Median Bequest	% Difference Against Portfolio Only
Portfolio Only[39]	N/A	84.10%	0%	$1,475,688	0%
Portfolio + FIA with Level Income GLWB	Constant	86.75%	2.65%	$1,518,378	2.89%
	Increase by 0.25%	86.73%	2.63%	$1,509,372	2.28%
	Increase by 0.75%	86.73%	2.63%	$1,469,694	-0.41%
Portfolio + FIA with Rising Income GLWB	Constant	86.44%	2.34%	$1,582,505	7.24%
	Increase by 0.25%	86.00%	1.90%	$1,533,595	3.92%
	Increase by 0.75%	84.63%	0.53%	$1,404,394	-4.83%

Table Notes: Results are based on the first household in Exhibit 4. We assumed a 40% product allocation for all annuity-based strategies. We assume there is an annual rider fee of 1% of the benefit base for all FIAs with a GLWB. The baseline pricing spread is 1.5% for the level income GLWB and 2% for rising income GLWB. For runs in which the pricing spread increases, the pricing spread is assumed to stay at the initial level for the first five years of the projection then increase to the ultimate level in year six. Refer to the Comparative Framework section and Appendix for more detail.

The FIA with GLWB strategies provided a boost to the average percentage of lifetime expenses funded in the scenarios in which the investment portfolio ran short of money. This occurred because the withdrawals from the FIA are guaranteed for life, which can mitigate against longevity risk. Moreover, under both designs, the GLWB amount cannot decrease due to poor market returns. Further, recall that our model counts the value of the FIA (the maximum of the guarantee or the contract value) as 10% equity asset-class exposure and 90% fixed-income asset-class exposure and rebalances accordingly. Over longer time horizons, an FIA with a GLWB may provide more value than this benchmark due to the guaranteed withdrawals. When this occurs, our model invests the household's other financial assets more aggressively, which can also lead to lower shortfalls deep in retirement.

When comparing the FIA results, we noted that the shortfall metric was about the same for each level income GLWB pricing-spread run. Further, the average funded ratio when using the level income GLWB design was higher than what was provided by the rising income GLWB across all pricing spreads. This was an expected result as the level income strategy uses the simple interest benefit base design. This means that the guaranteed lifetime withdrawals are not really dependent on the credited interest rates.[40]

The average funded ratio in the worst 100 scenarios for the rising income GLWB was a little lower than the level income GLWBs when the pricing spread was assumed to stay constant, but much lower at higher pricing spreads. This pattern of results occurred because the benefit base rollup rate is dependent on the interest credited to the contract value, meaning that in scenarios with lower credited rates, this GLWB design provided less income.[41]

[39] For context, note that the portfolio only strategy results in an 85% probability of success.
[40] While there is a one-time ratchet at retirement, it was very uncommon for the contract value to be larger than the benefit base.
[41] The rising income GLWB design was particularly sensitive to the assumptions underlying the credited interest rates. We used conservative assumptions for our analysis. Advisors or other analyzing a rising income GLWB product may want to do the same or conduct extensive sensitivity analysis.

Note, however, that the rising income GLWB design with the credited interest multiplier does not underperform the level income design in all shortfall scenarios. There are shortfall scenarios in which the market performs reasonably well, but there is either high inflation or the purchaser (or spouse or both) lives a long time or both high inflation and longevity occur. It is in these cases that the FIA with the credited interest multiplier can generate more income (and sometimes much more) than the simple interest GLWB design. We also conducted a high-inflation sensitivity,[42] noting that only the rising income GLWB design outperformed the portfolio-only strategy. Refer to the Appendix for results.

Still, the implication of these results is that a level income GLWB design in which the benefits are not tied to credited interest rates allows for more certainty when planning for retirement income. To be clear, this is because a portion of the economic value of the rising income GLWB is linked to potential credited interest-rate bonuses. While the economic value of the rising income GLWB should theoretically be the same as the level income GLWB at the point of sale (all else equal), the value of the rising income GLWB can be scaled down if the insurer increases the pricing spread in later years. Again, we think that larger pricing spread increases are unlikely, as insurers may damage their reputation and cripple future business. However, when it comes to FIA caps and participation rates, it is difficult to know whether a rate is competitive, and since option budgets are ultimately at the discretion of the insurer, scenarios with a larger pricing-spread increase are still worth considering.

Consumers, advisors, or other decision-makers should consider the possibility of cost increases when assessing an FIA with GLWB. This is particularly important if the consumer is interested in a rising income design or any design in which the benefits are directly linked to credited interest rates. Prospective purchasers could ask for historical index renewal rate data to see how the terms have changed over time. Insurers who openly share this information or have it easily accessible may be more trustworthy. Consumers could also benefit if FIA issuers disclosed the base contract pricing spreads, like what is done with deferred variable annuities.

Regarding bequests, we observed that both FIA strategies boosted the median legacy when the pricing spread did not increase or increased by 0.25%. However, the portfolio-only strategy came out on top when the pricing spread increased to 0.75%.

Focusing on the former results, we noted that the rising income GLWB strategy provided a larger legacy than the level income GLWB strategy, and both beat out the portfolio-only strategy. As we mentioned earlier, over longer time horizons, an FIA with a GLWB may provide more value than its 10% equity and 90% bond benchmark due to the guaranteed withdrawals. This is especially pertinent for the rising income design. This is because higher index returns increase the guaranteed lifetime withdrawals. Thus, more wealth is kept in the retirement account, which ultimately leads to larger bequests. Another reason FIAs might allow purchasers to leave a larger bequest is that the contract value can grow at a higher rate than the benchmark. General account assets tend to earn a higher return than the bond fund.[43] There can also be benefits from the structured nature of the option payoffs, as negative market returns do not decrease the contract value.

On the other hand, at higher pricing spreads, the FIA with GLWB outperformed its benchmark portfolio much less often, leading to narrower margins or lower bequests than the portfolio-only strategy. Refer to the Appendix for more discussion on the topic of FIA returns.

[42] We generated scenarios in which the normal inflation target was set at 4%, instead of the 2% target used for the baseline analysis, but real returns and index growth rates were kept the same.
[43] Becker and Ivashina found that insurance companies tend to invest in higher-yielding bonds (as long as it makes sense to within the confines of the risk-based capital framework). Refer to Becker, B., and V. Ivashina. 2015. "Reaching for yield in the bond market." *Journal of Finance,* 70:1863–901.

While we estimated the effective asset allocation of an FIA with GLWB, we noted that most consumers will likely count the FIA either as fixed-income asset-class exposure or equity asset-class exposure. The latter may occur because a consumer sees that their product is linked to a stock market index. Consumers who do this may change the risk profile of their total portfolio, either shifting the distribution of outcomes toward capital preservation (if the FIA is counted as equity) or return enhancement (if the FIA is counted as fixed income).[44] Therefore, it is important that salespeople, advisors, or others involved in the sales process explain that the FIA is a hybrid product so that the consumer can adjust the rest of their portfolio accordingly.

Lastly, we conducted a sensitivity test, scaling down the managed volatility growth rates. We focused on this test because managed volatility indexes tend to look beneficial in product illustrations. While the managed volatility growth rates we used in our baseline analysis are comparable with our bond-fund returns, we deemed it prudent to test the impact if a managed volatility index produced lower growth rates than a bond fund with a comparable volatility level.[45]

Exhibit 6: Average Funded Ratio in Shortfall Scenarios and Median Bequest by Strategy – Lower Managed Volatility Index Growth Rates Sensitivity

Strategy	Average Funded Ratio in Worst 100 Scenarios	% Difference Against Portfolio Only	Real Median Bequest	% Difference Against Portfolio Only
Portfolio Only	84.10%	0%	$1,475,688	0%
Portfolio + FIA with Level Income GLWB (baseline)	86.44%	2.34%	$1,582,505	7.24%
Portfolio + FIA with Rising Income GLWB (managed volatility index growth rates multiplied by 0.9	85.76%	1.66%	$1,505,411	2.01%

Table Notes: Results are based on the first household in Exhibit 4. We assumed a 40% product allocation for all annuity-based strategies. Results are based on a 2% pricing spread. Refer to the Comparative Framework section and Appendix for more detail.

[44] We ran the FIA with GLWB as 100% equity asset class exposure and 100% bond asset class exposure. When the FIA with GLWB was considered 100% equity, we noted that the consumer had a much higher average funded ratio in the worst 100 scenarios but much lower bequests. The results when the FIA with GLWB was considered 100% bonds were similar to the results we have presented.

[45] In our baseline analysis, the managed volatility index had a slightly higher average return in our simulations than our bond fund, with a comparable level of volatility. In the sensitivity, the managed volatility index underperforms the bond fund. Refer to the Appendix for more information on our capital market assumptions and statistics.

Intuitively, the results show that lower managed volatility index growth rates lead to slimmer margins between the FIA and the portfolio-only strategy.

Prospective purchasers who want more certainty in retirement income planning may prefer GLWB designs in which the benefits are not linked to the credited interest rates.

Overall, we found that FIAs with a GLWB tended to boost the funded ratio in shortfall scenarios. When the pricing spread stayed constant or increased by 0.25%, FIAs enabled higher bequests. However, this was not the case when the pricing spread increased by 0.75% in future years. Prospective purchasers who want more certainty in retirement income planning may prefer GLWB designs in which the benefits are not linked to the credited interest rates. Nevertheless, there are trade-offs, as this type of GLWB design tends to provide a level benefit that may not be preferred by consumers. We wanted to repeat that consumers, advisors, or other decision-makers should consider the possibility of pricing-spread changes when assessing an FIA with GLWB, especially if the guaranteed withdrawal benefits are linked to the credited interest rates.

Lastly, we want to point out that our analysis is not indicative of all FIAs with a GLWB. While most of the products that we analyzed when creating our two representative composites provided a similar level of shortfall protection and bequest amount, there were outliers with less-generous rates that underperformed the portfolio-only strategy. Therefore, as with any other guaranteed income product, it is important that advisors, investors, and any others involved carefully evaluate the features of the specific product before making the annuity decision.

FINDING TWO

The most generous FIAs with a GLWB could provide richer benefits than other annuities if consumers wait to take income.

After analyzing real-world products available today, we created two additional FIA with GLWB variations—one with the level income design and one with the rising income design—with more generous features than our baseline composites. We generated results over a range of pricing spreads. We compared these variations against a DIA-based strategy, a SPIA-based strategy, and a VA with GLWB strategy. Note that the results for the fixed SPIA strategy are also a function of our projected portfolio returns, as the fixed SPIA is bought at a different time in the projection than the other annuities. We also included the portfolio-only and the baseline FIA with GLWB results in the analysis.

Overall, we found that the most generous FIAs may provide richer benefits than other annuities. The richer version of the level income GLWB especially stood out, as it outperformed the other annuity-based strategies in terms of both shortfalls and bequests in most cases. The richer version of the rising income GLWB produced the largest bequest out of all our runs when the base contract pricing spread stayed constant, and it performed well in the scenario in which the pricing spread increased by 0.25%. It lagged other strategies when the pricing spread increased by 0.75%, but as we discussed earlier, this pricing-spread scenario is less likely than others. We also found that the SPIA and DIA strategies provided richer income benefits than the baseline FIA with GWLB variations, but the VA with GLWB did not.

This finding is predicated on our sample consumer buying the FIA with GLWB at age 55 and deferring guaranteed withdrawals for 10 years. This is an important assumption as the longer deferral period gives the benefit base time to grow, which substantially boosts the level of guaranteed income. That said, we want to emphasize that the number of years that a consumer should defer income is dependent on the age at which they purchased the product. Longer waiting periods may not be optimal if the consumer purchases the product when they are older. In any case, while it ultimately comes down to one's specific circumstances and the product details, consumers can likely get richer benefits from income annuities if income is needed relatively soon. Results are presented in Exhibit 7.

Exhibit 7: Average Funded Ratio in Shortfall Scenarios and Median Bequest by Strategy – FIA With GLWB With Richer Guarantees, VA With GLWB, DIA, and SPIA

Strategy	FIA Base Contract Pricing Spread	Average Funded Ratio in Worst 100 Scenarios	% Difference Against Portfolio Only	Real Median Bequest	% Difference Against Portfolio Only
Portfolio Only	N/A	84.10%	0%	$1,475,688	0%
Portfolio + DIA	N/A	86.87%	2.77%	$1,529,632	3.66%
Portfolio + SPIA[46]	N/A	87.55%	3.45%	$1,608,716	9.01%
Portfolio + VA with GLWB	N/A	86.22%	2.12%	$1,453,049	-1.53%
Portfolio + FIA with Level Income GLWB (baseline)	Constant	86.75%	2.65%	$1,518,378	2.89%
	Increase by 0.25%	86.73%	2.63%	$1,509,372	2.28%
	Increase by 0.75%	86.73%	2.63%	$1,469,694	-0.41%
Portfolio + FIA with Level Income GLWB (10% simple interest)	Constant	88.68%	4.58%	$1,618,969	9.71%
	Increase by 0.25%	88.69%	4.59%	$1,608,768	9.02%
	Increase by 0.75%	88.69%	4.59%	$1,606,159	8.84%
Portfolio + FIA with Rising Income GLWB (baseline)	Constant	86.44%	2.34%	$1,582,505	7.24%
	Increase by 0.25%	86.00%	1.90%	$1,533,595	3.92%
	Increase by 0.75%	84.63%	0.53%	$1,404,394	-4.83%
Portfolio + FIA with Rising Income GLWB (payout rate of 4.45%)	Constant	87.45%	3.35%	$1,678,863	13.77%
	Increase by 0.25%	86.99%	2.89%	$1,624,177	10.06%
	Increase by 0.75%	85.51%	1.41%	$1,482,320	0.45%

Table Notes: Results are based on the first household in Exhibit 4. We assumed a 40% product allocation for all annuity-based strategies. We only ran the three product pricing spreads for sake of brevity. Refer to the Comparative Framework section and Appendix for more detail.

[46] The fixed SPIA does not outperform the more generous FIA with GLWBs because in the shortfall scenarios, there tends to be poor market performance in the years leading up to retirement. This reduces the level of wealth used to buy a SPIA.

The results indicate that FIAs with the richest guaranteed withdrawal benefits can outperform the other annuity-based strategies. Prospective FIA with GLWB buyers should compare products to find those offering the richest guarantees. We noted that this is a similar finding to that of Toland and others (2018).[47]

The main reason the FIA with GLWB provided a higher average funded ratio than the VA with GLWB is the product chassis, as we used a VA design that had similar total costs as the level income FIA with GLWB. With FIAs, the contract value cannot decrease due to market performance. However, with VAs, the insurer has less control over the evolution of the underlying contract value as it fluctuates with the market. This matters because, from a pricing perspective, the insurance company is only responsible for payments to the policyholder once the contract value of the annuity is exhausted. Therefore, all else equal, a guarantee on the VA chassis is more expensive than an equivalent guarantee on the FIA chassis. A more expensive VA with GLWB with proportionally richer benefits could lead to lower shortfalls, though it may also lead to lower bequests. We also noted that the VA with GLWB strategy provided larger bequests than the FIA with level income GLWB strategy on average. More detailed analysis of retail VA with GLWB designs is something we have left for future research.

There are several factors that explain why FIAs with a GLWB can provide richer benefits than income annuities. First, the underlying mortality rates may be different in the pricing calculations because income annuity policyholders tend to have longer life expectancies than FIA policyholders. One reason this may occur, as was pointed out in a Society of Actuaries, or SOA, report on individual payout annuity experience,[48] is because of self-selection by annuitants. The report noted that policyholders may specifically buy the income annuity because they are in good health or otherwise have good reason to believe they will live longer than life expectancy. This self-selection bias may not happen to the same extent with FIAs with a GLWB because they are revocable by design.

GLWB pricing also reflects lapse rates and utilization rates. Lapse rates, which are also referred to as surrender rates, reflect the probability that the owner of the insurance policy will voluntarily terminate their contract with the insurance company.[49] Utilization rates represent the probability that the policyholder will start taking income after specific delay periods. For example, for an issue age of 55, an insurer might assume that 5% of policyholders start taking income right away, 15% wait five years, 75% wait 10 years, and 5% never use the GLWB feature.[50] The pricing would reflect all four of these scenarios. Both factors play a key role in the pricing of GLWBs and effectively increase the guaranteed income because some policyholders will exit the contract or never use the GLWB feature while paying for it. Neither of these concepts are applicable for income annuities, which are irrevocable and will begin income payments at the specified start age.

Another major reason why the richer versions of the FIAs with a GLWB were able to outperform income annuities is our assumption that consumers buy the product when they are 55 years old and wait 10 years before taking guaranteed lifetime withdrawals. This gives the benefit base time to grow, substantially increasing the amount of guaranteed income provided by the GLWB. Another way to think about this is that consumers who do not lapse during the delay period and who utilize the income rider are rewarded with generous benefits.[51]

[47] Toland, T., Nikolic, B., & Dabrowski, S. (October 2018). Guaranteed Income Across Annuity Products: Withdrawal Guarantees Compete with Income Annuities. CANNEX.com. Retrieved Dec. 15, 2022, from https://www.cannex.com/wp-content/uploads/2018/10/Annuity_guarantee_study_2018_FIA_VA_SPIA_DIApdf.pdf

[48] 2009-13 Individual Payout Annuity Experience Report & Pivot Tables | SOA. (Dec. 1, 2016). https://www.soa.org/resources/experience-studies/2016/2009-13-invidual-payout-annuity/

[49] From a life annuity company's perspective, surrender rates have a similar impact to mortality rates, as they both result in the insurer having to pay out the cash surrender value (the contract value less surrender charges).

[50] This example is sourced from: Hayes, R. (November 2020). FIA VM-22 PBR Concept Testing. National Association of Insurance Commissioners. Retrieved Jan. 7, 2023, from https://content.naic.org/sites/default/files/call_materials/FIA%20VM-22%20PBR%20Concept%20Testing%20-%20Subgroup%20Ed%20Session%2020201112.pdf

[51] Refer to Toland and others (2018) for more discussion on potential ways that a consumer could benefit from the disparity in pricing approaches between income annuities and GLWB-type products.

We also wanted to point out that the optimal waiting period before starting lifetime withdrawals varies across product designs. In many products, the benefit base rollup period is 10 years (this is what we assumed for our composites). However, if a product has a rollup feature that is only in effect for seven years, for example, it might be best to start withdrawals in year eight. The policyholder's age at purchase also matters. For example, a consumer who is 65 years old may only want to wait five years before starting income. Generally, the optimal waiting period for older consumers is shorter because any increase in the guaranteed amount is offset by a shorter life expectancy. Therefore, prospective purchasers who are older may want to look for products in which more of the value is reflected in the payout rates instead of benefit base roll-ups. Lastly, note that the optimal waiting period can change based on realized benefit base increases and changes to a consumer's specific circumstances.

At shorter delay periods, the GLWB may not provide nearly as rich a benefit. To illustrate this point, we repeated the above analysis except that the starting ages of both members of the household was increased to 60 and 65 but all other inputs were kept constant (except the account balance). This was done to isolate the impact of the delay period before income starts on the level of guaranteed income provided by different product types. All FIA results are based on the baseline pricing-spread assumption. Results are presented in Exhibit 8.

Exhibit 8: Average Funded Ratio in Shortfall Scenarios by Strategy and Delay Period

		Five-Year Delay Period		No Delay Period	
Strategy		**Average Funded Ratio in Worst 100 Scenarios**	**% Difference Against Portfolio Only**	**Average Funded Ratio in Worst 100 Scenarios**	**% Difference Against Portfolio Only**
Portfolio Only		77.05%	0%	72.89%	0%
Portfolio + DIA		80.76%	3.69%	N/A	N/A
Portfolio + SPIA		80.87%	3.82%	75.95%	3.06%
Portfolio + VA with GLWB		79.64%	2.58%	72.75%	-0.13%
Portfolio + FIA with Level Income GLWB	Baseline	79.59%	2.54%	72.73%	-0.16%
	10% simple interest	80.57%	3.51%	72.73%	-0.16%
Portfolio + FIA with Rising Income GLWB	Baseline	79.18%	2.12%	73.47%	0.58%
	4.45% payout rate	80.23%	3.18%	74.39%	1.50%

Table Notes: Results are based on the first household in Exhibit 4. We assumed a 40% product allocation for all annuity-based strategies. At age 60, the DIA payout rate is 8.12%, and at age 65, the SPIA payout rate is 6.5%. These payout rates are based on analysis of CANNEX data. We used a 1.5% pricing spread for the level income GLWB and a 2% pricing spread for the rising income GLWB. Refer to the Comparative Framework section and Appendix for more detail.

The results show that the FIA with GLWB strategy is much less effective when there is a shorter delay period. In fact, the income-annuity strategies lead to a higher average funded ratio in most of the model runs. To be clear, what is happening is that the guaranteed lifetime withdrawal benefit itself is less rich because there is less time for the benefit base to increase.

While the most generous FIA with GLWB strategies outperformed the VA with GLWB and the income annuity strategies when there was a 10-year delay period, we noted that the DIA and SPIA strategies still performed well, consistently providing more income in shortfall scenarios and higher bequests than the portfolio-only strategy and always eclipsing the FIA with GLWB in the shorter delay period sensitivities. The income annuity strategies also outperformed the baseline versions of the FIA with GLWB strategies. Income annuities can mitigate against both market risk and longevity risk, and policyholders can benefit from mortality credits[52] over longer time horizons.

Some FIAs with a GLWB may provide richer benefits, but consumers must make the right decisions to realize said benefits.

The choice between an FIA with a GLWB and an income annuity should not only include analysis of the income across various scenarios with respect to the investor's particular circumstances but also reflect the likelihood of an investor misusing the product. Some FIAs with a GLWB may provide richer benefits, but consumers must make the right decisions to realize said benefits. It is harder to misuse an income annuity, as they are irrevocable and do not require a decision to start withdrawals.

[52] Mortality credits can be thought of as a credit or an additional "return" that is embedded in the payout rate of the income annuity. Insurance companies put similar annuitants into a group and pay them assuming they live to life expectancy, with annuitants who die earlier helping to fund the payouts for annuitants who die later.

FINDING THREE

Consumers who are likely to lapse are almost certainly better off without an FIA with GLWB.

Next, we studied the potential impact of FIA policyholder behavior on the results, reflecting a chance that the owner would exit the contract (that is, lapse or surrender) in the analysis.[53] We found that the effectiveness of FIA with GLWB strategies was reduced, as the contract owner effectively pays for a guarantee that they do not use throughout their full retirement.

While we focused on lapses herein, incorporating utilization rates or other policyholder behaviors into the analysis, such as taking a partial withdrawal that negates a benefit base increase or taking a partial withdrawal above the guaranteed amount, would lead to directionally similar results in most cases. Also, we are not talking about FIAs without a GLWB.[54]

We ran projections with an annual in-retirement lapse rate of 1.5% and 2.5%. This means that in every year of retirement, there is a 1.5% (or 2.5%) chance that the policyholder exits the contract. These values are based on the lapse rates for GLWB contracts from a fixed-indexed annuity experience study that the SOA and LIMRA jointly conducted.[55,56] We also repeated the analysis using dynamic lapses. A dynamic lapse rate approach involves adjusting the base lapse rate to account for the degree that a guarantee is in the money. If the guarantee is in the money, then the lapse rate is lowered, and vice versa if the guarantee is out of the money (which means that the contract value is worth more than the guarantee). The dynamic lapse rates are calculated under the same approach as Chang and others (2020) with a base rate of 2.5%.[57] We also included a run in which the consumer was assumed to always lapse at retirement. This is to show the potential outcome if a consumer (incorrectly) considers the FIA with GLWB as an accumulation vehicle.

We used the baseline pricing spread in these runs. We did not show other pricing spreads as the results are directionally similar. Refer to the Appendix for more information on lapses. Results are presented in Exhibit 9.

[53] Note that stochastic death ages are still modeled.
[54] Exiting an accumulation FIA after the surrender charge period can be the optimal way to use the product.
[55] Refer to the section on surrender rates by contract year. Fixed Indexed Annuity Experience Study, Policy Years 2016-2018 | SOA. (n.d.). https://www.soa.org/resources/experience-studies/2021/fixed-indexed-annuity-experience-study-policy-years-2016-2018/
[56] Note that the deterministic lapse rates we used are lower than what is assumed in Chang and others (2020).
[57] We do not project lapses before retirement, as the surrender schedule will still be in effect. If we did so, the results would be directionally similar to what we report. We further do not model a market value adjustment. Lapses are projected by generating uniform random value between 0 and 1. If the random value is less than the lapse rate, then a lapse is assumed to have occurred.

Exhibit 9: Average Funded Ratio in Shortfall Scenarios and Median Bequest by Strategy – Retail Annuity Lapse Rates Sensitivity

Strategy	Lapse Scenario	Average Funded Ratio in Worst 100 Scenarios	% Difference Against Portfolio Only	Real Median Bequest	% Difference Against Portfolio Only
Portfolio Only	N/A	84.10%	0%	$1,475,688	0%
Portfolio + DIA	N/A	86.87%	2.77%	$1,529,632	3.66%
Portfolio + SPIA	N/A	87.55%	3.45%	$1,608,716	9.01%
Portfolio + FIA with Level Income GLWB	Baseline	86.75%	2.65%	$1,513,847	2.59%
	1.5% lapse rate	83.82%	-0.28%	$1,513,804	2.58%
	2.5% lapse rate	83.08%	-1.02%	$1,509,099	2.26%
	Dynamic lapse rate	84.60%	0.50%	$1,495,793	1.36%
	100% lapse rate	80.77%	-3.33%	$1,481,114	0.37%
Portfolio + FIA with Rising Income GLWB	Baseline	86.44%	2.34%	$1,582,505	7.24%
	1.5% lapse rate	82.65%	-1.45%	$1,491,681	1.08%
	2.5% lapse rate	82.01%	-2.09%	$1,450,328	-1.72%
	Dynamic lapse rate	83.39%	-0.71%	$1,483,654	0.54%
	100% lapse rate	79.89%	-4.21%	$1,281,944	-13.13%

Table Notes: Results are based on the first household in Exhibit 4. We assumed a 40% product allocation for all annuity-based strategies. Lapse rates are applied on annual basis in the model. Refer to the Comparative Framework section and Appendix for more detail.

Intuitively, the results show that lapsing leads to lower average funded ratios in the worst 100 scenarios and lower bequests relative to the baseline FIA results. When comparing against the portfolio-only strategy, the average funded ratios were lower for all FIA strategies when we used deterministic lapse rates. However, only the rising income GLWB underperformed the portfolio-only strategy in terms of the shortfall metric when we used the dynamic lapse approach. While we did not focus on this, the impact of lapse rates would be directionally similar for the VA with GLWB product.

Actual lapse rates may be higher or lower than what we assumed in this analysis and will depend on contract owner characteristics. Lapse rates may be higher for consumers who are underprepared for retirement, as the consumer may need to access the remaining FIA contract value to fund expenses. Financial literacy may also help predict lapse rates. For example, all else equal, contract owners who do not understand the product are more likely to withdraw the full contract value during a period of market turbulence, despite the product guarantees. On the other hand, contract owners with a higher degree of financial literacy might only lapse when there is a rational reason to do so.

Lapses will also depend on capital market returns and the level of interest rates. In fact, if interest rates rise dramatically, it could be beneficial to lapse. For example, if a consumer enters the contract when the 10-year Treasury is 2%, but 10 years later, the 10-year Treasury is now at 8%, the amount of guaranteed income that one could get from a fixed SPIA would likely be more than what is contractually guaranteed by the FIA with GLWB. Lapsing may also be beneficial for consumers experiencing a health shock, though the FIA with GLWB should generally be used as a last resort.

The flexibility offered by FIAs can be a double-edged sword for some consumers.

Regardless of the lapse rates themselves, the point is that the flexibility offered by FIAs can be a double-edged sword for some consumers. This also applies when a VA with a GLWB is used. Therefore, we want to emphasize again that it is important to assess how likely it is for the owner to misuse the product when choosing between a GLWB-style product and an income annuity. Consumers using a GLWB product need to stick with it in most circumstances. Further, it is crucial to educate contract owners on the GLWB features and provisions if that is the product of choice.

FINDING FOUR

In-plan FIAs with a GLWB may outperform other in-plan annuities.

We compared the projected performance of an in-plan FIA with GLWB strategy against the portfolio-only strategy and against strategies involving an in-plan deferred-variable annuity with GLWB, an in-plan DIA solution, and a fixed SPIA. Like in our retail FIA analysis, we generated in-plan FIA with GLWB results under a variety of different pricing spread assumptions. Overall, we found that in-plan FIAs outperformed the other strategies in terms of both income in shortfall scenarios and bequests in all but the highest pricing-spread run. Further, the in-plan FIA produced lower shortfalls than the portfolio-only strategy in all pricing-spread runs. Still, plan sponsors may want to consider whether their participants are likely to lapse or otherwise misuse the product. Lapse rates in retirement may occur at a higher rate than with retail FIAs if participants are automatically enrolled into the product.

The in-plan strategies we studied were developed based on data and analysis of actual in-plan lifetime income solutions. In-plan FIAs with a GLWB are similar to retail FIAs but differ in that they are designed for regular premium contributions instead of a large upfront premium payment. They can also be embedded within a target-date fund. We noted that the benefits provided by in-plan FIA with GLWB solutions are linked to the credited interest rates, and the guaranteed withdrawals may or may not increase after income starts. The in-plan FIA results are based on our projections of actual products available in retirement plans. We ran our projections across three pricing-spread scenarios like in our retail analysis. In our baseline run, we assumed the pricing spread stayed constant. In our other runs, the pricing spread was assumed to increase after five years to an ultimate level in the sixth year of the projection and stay at that level thereafter. We tested scenarios in which the pricing spread increased by 0.25% and 0.75%.

Lapse rates in retirement may occur at a higher rate than with retail FIAs if participants are automatically enrolled into the product.

The in-plan deferred VA with GLWB is also similar to its retail counterpart. The VA provides guaranteed lifetime withdrawals that are determined by the product of the benefit base and a payout rate. We projected the guaranteed lifetime withdrawals for the VA strategy based on real product data. The in-plan DIA-based solution entails using retirement contributions to purchase a series of DIAs with income starting at retirement. The fixed SPIA strategy involves using the accumulated wealth from the retirement contributions to purchase a fixed SPIA at retirement.[58] We used an annuity pricing model to generate the payout rates. Just like in the retail analysis, the amount of guaranteed income that could be purchased with the fixed SPIA is a function of the projected portfolio returns before retirement.[59] The inputs, parameters, and methodology we used to forecast these three strategies were the same as in Look and Szapiro (2022). Refer to the Appendix for more information.

The results of our analysis are presented in Exhibit 10.

[58] We use the accumulated value of the retirement contributions to purchase the fixed SPIA. This is done so that the same amount of wealth that would have been used to dollar cost average into DIAs or FIAs is allocated to the SPIA purchase.
[59] The fixed SPIA is purchased at different time in the projection than the other annuities.

Exhibit 10: Average Funded Ratio in Shortfall Scenarios and Median Bequest by Strategy – In-Plan Annuity Comparison

Strategy	FIA Pricing Spread	Average Funded Ratio in Worst 100 Scenarios	% Difference Against Portfolio Only	Real Median Bequest	% Difference Against Portfolio Only
Portfolio Only	N/A	78.17%	0.00%	$1,162,231	0%
Portfolio + Dollar Cost Average into DIAs	N/A	79.73%	1.56%	$1,200,668	3.31%
Portfolio + Fixed SPIA	N/A	79.79%	1.62%	$1,219,519	4.93%
Portfolio+ In-plan VA with GLWB	N/A	77.78%	-0.39%	$1,192,174	2.58%
Portfolio + In-plan FIA with GLWB	Constant	80.85%	2.68%	$1,262,393	8.62%
	Increase by 0.25%	80.36%	2.19%	$1,222,884	5.22%
	Increase by 0.75%	79.76%	1.59%	$1,161,132	-0.09%

Table Notes: Results are based on the **second** household in Exhibit 4. We assumed a 40% product allocation for all annuity-based strategies. Note that the pricing spread increases to the ultimate level after five years in the projection. Refer to the Comparative Framework section and Appendix for more detail.

The in-plan FIA with GLWB outperformed the other strategies in terms of both the income and bequest metric in most cases. Further, the in-plan FIA produced a higher average funded ratio metric than the portfolio-only strategy, even when the pricing spread increased by 0.75%. This occurred because enough of the economic value is reflected in the payout rates and not in potential benefit increases linked to the credited interest rates. However, when the pricing spread increased to 0.75%, the median bequest metric did fall below what was provided by the portfolio-only strategy.

Overall, these results indicate that in-plan FIAs with a GLWB offer rich benefits. Nevertheless, plan sponsors may want to consider the possibility of pricing spread increases. As we noted in the retail FIA section of this report, larger pricing spread increases are unlikely to occur, and might be even more unlikely when the product is under regular scrutiny within a retirement plan setting. However, the option budget is still ultimately at the discretion of the insurer. Plan sponsors and plan participants would benefit if the pricing spreads were disclosed.

The key drivers behind why the in-plan FIA generated more income than the income annuity strategies are the same as what we have discussed previously in the retail analysis. Namely, the GLWB pricing reflects that some plan participants will never use the guarantee (lapse rates and utilization rates), and there may be differences in the mortality basis used in pricing. The results are also a function of our assumption to start contributions to the product 15 years before retirement. This gives the benefit base[60] time to grow. In-plan FIAs may not perform as well when there is a shorter deferral period. Also, there are going to be consumers who find FIAs to be more beneficial or less beneficial due to their specific circumstances or characteristics.

[60] In some cases, the benefit base may be equal to the contract value.

The in-plan FIA with GLWB generated more guaranteed income than the in-plan deferred VA with GLWB in many of the simulations. One reason this occurred is because the product costs are not the same. In the case of the VA, the product cost is an explicit 1% of the benefit base (this is the same or close to the fee of real products out there). In the case of the in-plan FIA, there may or may not be an explicit cost, but there is an implicit cost. The implicit cost is the pricing spread that is deducted from the interest earnings of the supporting general account assets when calculating the option budget. The total insurance product costs are higher for the in-plan FIA than for the in-plan VA. The higher cost enables the FIA manufacturers to build in richer guarantees.

Another aspect is the product chassis, which we previously discussed in Finding Two. With FIAs, the contract value cannot go down due to market performance, but it can with VAs. Because of this, a guarantee on the VA chassis is more expensive than an equivalent guarantee on the FIA chassis.

Next, we repeated the lapse-sensitivity analysis for the in-plan FIA. We included two additional higher lapse-rate sensitivities. We did this because lapses may occur at a higher rate in retirement if participants are automatically enrolled into the product. We used a constant pricing spread in these runs. We did not include runs in which the pricing spread increases because the results would be directionally similar. Results are presented in Exhibit 11.

Exhibit 11: Average Funded Ratio in Shortfall Scenarios and Median Bequest by Strategy – In-Plan Annuity Lapse Rates Sensitivity

Strategy	Lapse Scenario	Average Funded Ratio in Worst 100 Scenarios	% Difference Against Portfolio Only	Real Median Bequest	% Difference Against Portfolio Only
Portfolio Only	N/A	78.17%	0.00%	$1,162,231	0%
Portfolio + Dollar Cost Average into DIAs	N/A	79.73%	1.56%	$1,200,668	3.31%
Portfolio + SPIA	N/A	79.79%	1.62%	$1,219,519	4.93%
Portfolio + FIA with Level Income GLWB	Baseline	80.85%	2.68%	$1,262,393	8.62%
	1.5% lapse rate	78.70%	0.53%	$1,165,591	0.29%
	2.5% lapse rate	78.39%	0.22%	$1,154,749	-0.64%
	4% lapse rate	78.07%	-0.09%	$1,149,972	-1.05%
	Dynamic lapse (2% base)	79.26%	1.09%	$1,162,869	0.05%
	Dynamic lapse (4% base)	78.80%	0.63%	$1,156,415	-0.50%
	100% lapse rate	77.70%	-0.46%	$1,120,299	-3.61%

Table Notes: Results are based on the **second** household in Exhibit 4. For all annuity-based strategies, we assumed 40% of contributions are allocated to the annuity. Results are based on a constant pricing spread. Refer to the Comparative Framework section and Appendix for more detail.

The in-plan annuity lapse sensitivity results are directionally similar to the retail results. When lapses were modeled, the FIA with GLWB strategy provided less income in shortfall scenarios and a lower bequest than the in-plan FIA baseline. That said, only a couple of the runs resulted in an average funded ratio that was lower than the portfolio-only strategy. The income-annuity strategies provided a higher average funded ratio than the FIA in most of the lapse sensitivities. While we did not test the impact of lapses on the in-plan VA with GLWB, the results would likely follow a similar pattern as the FIA.

Plan sponsors and plan participants would benefit if the pricing spreads were disclosed.

Given these results, plan sponsors and other decision-makers considering an in-plan GLWB solution may want to think about how likely it is for plan participants to use the GLWB. Lapse rates may be higher if many participants are underprepared for retirement or do not have access to a cash emergency fund. Also, those moving forward with this type of solution (or who have already implemented) may benefit from tracking plan utilization rates and lapse rates over time. Lastly, we want to reiterate that participant education is particularly important with a GLWB solution, as participants are less likely to misuse the product if they understand how to use it.

Conclusion

In this report, we studied whether adding an FIA with a GLWB to a portfolio could improve retirement outcomes. We started by analyzing retail FIAs with a GLWB and noticed that they reduced portfolio shortfalls in most of our runs, but only boosted bequests in scenarios in which we assumed the insurer did not increase the pricing spread or only increased it by 25 basis points (which reduces the option budget). Our baseline portfolio + FIA with GLWB strategy variations outperformed the VA with GLWB strategy but not the DIA and SPIA-based strategies in terms of both our income and bequest metrics. However, richer versions of our FIA with GLWB variations, which were based on real product data, did outperform income annuities in many cases.

To realize the benefits of an FIA with a GLWB, consumers need to properly use the product. This typically entails delaying withdrawals for a set period, such as seven to 10 years. It also requires the consumer to stay in the contract. In fact, consumers who are likely to exit the contract are almost certainly better off without an FIA with a GLWB, as they end up paying for a guarantee they do not use. An income annuity will likely provide richer benefits if the consumer needs to start income in a short period. They are also a simpler product that does not require a decision to start withdrawals.

It is important that advisors, consumers, and any others involved carefully evaluate the features of the specific product before making the annuity decision. It is also critical to assess how likely it is for the owner to lapse when they should not or otherwise misuse the product (for example, by taking partial withdrawals that reduce the value of a guaranteed rollup) when choosing between a GLWB-style product and an income annuity. Further, consumers need to be educated on the GLWB features and provisions if that is the product of choice.

We also studied in-retirement-plan versions of FIAs with a GLWB. Similar to our retail analysis, we found that using one in a portfolio can improve projected outcomes, provided plan participants use them properly. Plan sponsors may want to consider how likely it is for plan participants to use the GLWB or otherwise misuse the product. Again, education is crucial if a GLWB product is chosen.

Finally, we noted that consumers could benefit if FIA issuers disclosed pricing spreads. While not exactly the same, pricing spreads are similar to assets-under-management fees and variable-annuity expense ratios, both of which are disclosed. Insurers could also specify richer guaranteed cap and participation rates in the contracts, or the guaranteed renewal rates could be defined formulaically such that the guarantees are richer but still reasonable from the insurer's perspective if the cost of options goes up. These suggestions could provide prospective buyers with more confidence in the long-term value proposition of an FIA with a GLWB.

Appendix

Appendix 1: Model Methodology

We now discuss our quantitative framework in more detail. We use a Monte Carlo simulation model to project retirement outcomes for our hypothetical household across 1,000 independent scenarios.

The projection starts at age 55 and goes to age 120. The model projects two lives forward (a male and a female), representing a household. Home healthcare, or HHC, and nursing home, or NH, events are independently simulated for each life, with higher probabilities of occurrence at older ages. Death ages are modeled stochastically. We use this approach so that we can model a higher probability of death in the period after the occurrence of an LTSS event.

The Society of Actuaries mortality table used is the Pri-2012 Private Retirement Plan Mortality table with scale MP 2021 generational mortality improvement applied. The probabilities of HHC and NH events are calibrated based on data from Johnson (2019).[61] The result is that, for a given individual, about 48% of the simulations have either a HHC or NH event, with HHC events occurring about twice as often as NH events. Because we simulate higher probabilities of death after an LTSS event, we modify the death ages of scenarios where no HHC or NH events occur such that average death age across our simulations is consistent with the average death age from the Pri-2012 table.

Salary is not modeled stochastically. Instead, we leverage Morningstar salary curve methodology to estimate both forward- and backward-looking real wages. These values are used to estimate Social Security benefits.

The household's retirement expenses consist of two elements: 1) a deterministic element, representing relatively stable expenses, and 2) a stochastic element, representing LTSS expenses. When only one spouse is alive in the projection, consistent with empirical data, the deterministic expenses are reduced by 30%. The deterministic expenses we use in our analysis are provided in Exhibit 4, and the LTSS expenses are based on national median costs from Genworth's 2021 Cost of Care Survey.[62] All household wealth is assumed to be in a pretax retirement account.

Interest rates and portfolio returns are modeled stochastically based on forward-looking assumptions. The projections are monthly (to facilitate modeling of the managed volatility index). We model the yield curve via the approach proposed by Diebold and Li (2006).[63] Bond-fund returns represent the investment-grade bonds asset class and are calculated from bond yields and the change in interest rates. The calculation is the same as used by the American Academy of Actuaries' economic scenario generator.[64]

Equity returns represent the U.S. large-cap asset class and are assumed to follow a lognormal distribution. The volatility input is based on the forecast from a Generalized Autoregressive Conditional Heteroskedasticity, or GARCH, model. We use this approach because it allows us to be consistent with how we forecast the managed volatility index growth rates.

[61] Johnson, R. (April 3, 2019). What Is the Lifetime Risk of Needing and Receiving Long-Term Services and Supports? Office of the Assistant Secretary for Planning and Evaluation. Retrieved June 6, 2022, from https://aspe.hhs.gov/reports/what-lifetime-risk-needing-receiving-long-term-services-supports-0

[62] Cost of Long Term Care by State | Cost of Care Report | Genworth. (Feb. 16, 2022). Genworth. Retrieved June 6, 2022, from https://www.genworth.com/aging-and-you/finances/cost-of-care.html

[63] Diebold, F.X. and C. Li., 2006, "Forecasting the Term Structure of Government Bond Yields," *Journal of Econometrics*, 130, 337-364.

[64] Economic Scenario Generators. (August 2022). Society of Actuaries. Retrieved Dec. 15, 2022, from https://www.soa.org/resources/tables-calcs-tools/research-scenario/

As alluded to in the above paragraph, to project managed volatility index growth rates, we also use a GARCH model to forecast volatility. We use the forecast volatility to dynamically rebalance between stocks and cash to attempt to achieve the target volatility, as done by Papageorgiou and others,(2017)[65] and Li and others (2022).[66] This means that when future volatility is anticipated to be higher than the target, the managed volatility index will allocate more to cash assets. The GARCH model for the stock index used to calculate the managed volatility index growth rates was configured to produce higher volatility forecasts than the GARCH model used to calculate the stock fund returns. This was done because managed volatility indexes may lag the equity index it is tracking. The resulting growth rates are comparable with our projected bond-fund returns, which we deemed reasonable because the level of volatility is similar.

Inflation is modeled with a stochastic regime-switching Ornstein-Uhlenbeck model, inspired by Ahlgrim and D'Arcy (2012).[67] There are two regimes incorporated into the model. The "normal inflation" regime corresponds to a period where inflation is relatively stable and stays near the Federal Reserve's target. The "high inflation" regime represents periods of high inflation, well above the Fed's target. We use a 2% inflation target for most of our analysis and a 4% inflation target for our analysis of lifetime income strategy performance when inflation is consistently higher. Other model parameters are calibrated based on historical data.

Appendix 2 contains a summary of our projected interest rates, fund returns, and inflation rates.

We model the option budget as the projected book yield of the supporting general account portfolio less a pricing spread.[68] The general account portfolio yields are projected assuming that a percentage of the portfolio turns over and is reinvested at the new money rate. The portfolio yield at the start of the projection is assumed to be 5.5%.[69] New money rates are projected as the 10-year Treasury plus a 1.5% asset spread. The asset-spread assumption is intended to be a conservative estimate and is generally in line with the long-term benchmark spread, after reflecting default costs, for principle-based reserving credit rating eight assets as of December 2022.[70] We assume that the turnover period for the portfolio is 10 years, meaning that one tenth of the portfolio is reinvested each year.

The forecast portfolio yield is then calculated as the weighted average of the yields from each bucket of the portfolio. Next, we subtract a pricing spread from the forecast portfolio yield to arrive at the option budget. We vary the pricing spread in our analysis. Note that the benefit base fee that is assessed is in addition to this pricing spread.

The exhibit on the next page shows three sample paths of the option budget over a 20-year period, assuming a 1.5% pricing spread.

[65] Papageorgiou, N., Reeves, J., & Sherris, M. (January 2017). Equity Investing with Targeted Constant Volatility Exposure. Retrieved Jan. 10, 2023, from https://www.semanticscholar.org/paper/Equity-Investing-with-Targeted-Constant-Volatility-Papageorgiou-Reeves/cfe3afc4c7791e05e8ffbbbc1c8788dcac602a97

[66] Li, S., Hardy, H. L., Sherris, M., & Villegas, A. M. (March 2022). A Managed Volatility Investment Strategy for Pooled Annuity Products. MDPI. Retrieved Jan. 10, 2023, from https://www.mdpi.com/2227-9091/10/6/121

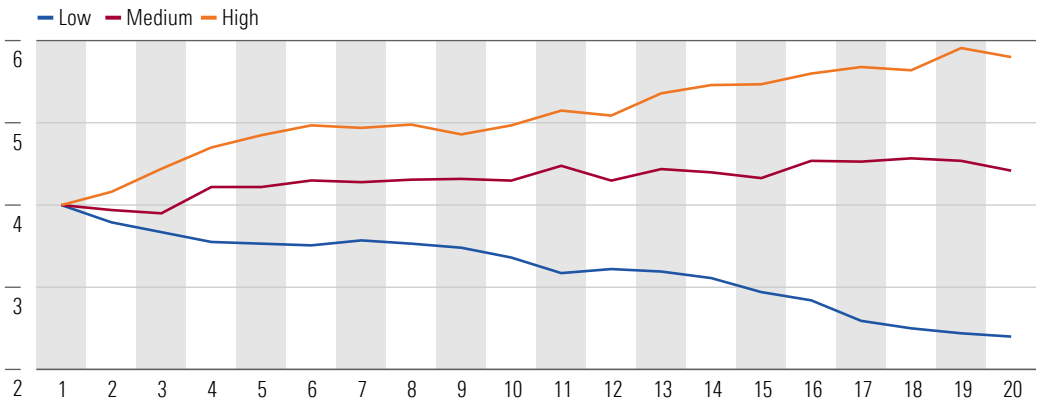
[67] Ahlgrim, K. C., & D'Arcy, S. P. (2012). A User's guide to the inflation generator. Society of Actuaries. Retrieved April 22, 2022, from https://www.soa.org/globalassets/assets/Files/Research/Projects/research-2012-02-effect-deflation-user-guide.pdf

[68] Refer to Chang and others (2020) for more details on the book-yield-less-spread methodology.

[69] This is based on the Moody's Seasoned BAA Corporate Bond Yield in late 2022 and early 2023. Refer to FRED Economic Data. (Feb. 1, 2023). https://fred.stlouisfed.org/series/BAA

[70] PBR Data. (n.d.). https://content.naic.org/pbr_data.htm#collapse-accordion-2171-1

Exhibit 12 Sample Option Budgets



Source: Author's calculations.

Using the forecast option budgets, we solve for the index-strategy rates such that the market costs of implementing the credited-rate strategy is equal to the option budget. For the point-to-point cap method, this entails entering into a bull call spread, or buying an at-the-money call and selling an out-of-the-money call. The strike price for the out-of-the-money call is what is solved for, and it represents the cap rate. For the point-to-point with participation rate method, this involves using the option budget to buy an at-the-money call. The participation rate is equal to the ratio of the option budget to the cost of the call.

We model the option prices with the Black-Scholes equation.[71] Regarding the cap strategy which is linked to the S&P 500 index, we assume a constant dividend yield of 2% when calculating the price of the options. We use a constant volatility measure of 25% to calculate the option values. This input is about 5% higher than the average level of the CBOE's VIX measurement. While implied volatility does change over time and increase during times of market turbulence, this assumption should have a limited impact because the FIA's credited rate is 0% when market returns are negative. Further, because the cap strategy involves both purchasing and writing call options, the net effect of our constant volatility input should be small. For the managed volatility index, we used a constant volatility measure of 9.5% to price the options, which is higher than the target 7.5% volatility. We use the forecast one-year Treasury bill as the discount rate for both the S&P 500 and managed volatility index option calculations. We assume that the transaction costs are 5% of the cost of the strategy. The caps are floored at 1% (we are assuming it is contractually guaranteed).

We use the caps and participation rates and forecast equity index price returns and managed volatility index growth rates to calculate what is credited to the policyholder's FIA contract value.

We assume the fund fee for the investment portfolio is 0.39%, which is based on the median fee for mega plans, according to a Morningstar report on the retirement plan landscape.[72]

Social Security benefits are estimated separately for each member of the household. Specifically, we divide the household salary by two, and then apply our salary curve methodology to estimate historical wages for each individual. We then use this information, along with the individual's birth year, planned retirement age, and other Social Security data to calculate Social Security benefits.

[71] Merton, Robert C. 1973. "Theory of Rational Option Pricing." *Bell Journal of Economics and Management Science,* 4(1): 141–83.

We use a glide path that represents the industry consensus. It is calculated as the average of the target strategic equity allocation weights for the fund families (both CITs and mutual funds) available in Morningstar Direct. Linear interpolation is used to populate the equity weights for points in between the five-year increments. Every year in the projection, the liquid investment portfolio is rebalanced according to the glide path. Further, as outlined in the Comparative Framework section, our rebalancing procedure also counts all or a portion of the annuity as fixed-income asset-class exposure.

Every year in retirement, we add up the guaranteed income from Social Security and annuities (if applicable) and deduct it from the simulated expenses. The investable portfolio is used to fund any leftover amount. The model does calculate both state and federal income taxes, which are added to the next year's required expenses. We also model required minimum distributions. Any required minimum distributions that are not needed to fund expenses are taxed and then reinvested into a brokerage account that follows the same glide path as the pretax retirement account. For simplicity, capital gains are ignored.

Additional information available from the author upon request.

In-Plan Annuity Assumptions

The in-plan deferred-variable annuity, or VA, with GLWB strategy is similar to the in-plan FIA with GLWB strategy. For both strategies, a portion of the household's contributions are allocated to the in-plan deferred annuities, and then, at retirement, the household starts taking the guaranteed lifetime withdrawals. However, with the deferred VA, the contract value can go up or down, depending on the market performance and fees assessed. Further, an annual ratchet is used to calculate the benefit base, which steps the benefit base up to the contract value if it is greater than the benefit base. We used a joint payout rate of 4.5% and a 1% product fee to model the deferred VA with GLWB. Also, the in-plan VA fund fees are assumed to be 0.39%, consistent with our assumption for the investment portfolio. The in-plan FIA with GLWB strategy guaranteed lifetime withdrawals and projected contract values were based on analysis and the features of real product data. Because certain solution-specific information is considered proprietary, we do not disclose the details here.

The in-plan DIA strategy involves using a portion of retirement plan contributions to buy a series of DIAs with income starting at retirement. We use an annuity pricing model to calculate the guaranteed income associated with this strategy. The pricing model uses the Society of Actuaries 2012 Individual Annuity Mortality table with scale G2 generational mortality improvement and a 15% load applied. The discount rate for the annuity factor calculation is the projected Moody's AAA corporate bond yield at the time of purchase. All income-annuity payout rates are based on a life with a 10-year period certain and a joint and 75% survivor benefit. The pricing model was calibrated against CANNEX income-annuity data. An annuity pricing model was used in this analysis because the in-plan analysis projection starts at age 50, but purchases are made over time, instead of at time 0.

[72] Mitchell, L., & Szapiro, A. (2022, March). "Retirement Plan Landscape Report." Morningstar. https://www.morningstar.com/lp/retirement-plan-landscape
[73] We use the state of Virginia for the analysis.

Appendix 2: Capital Market Assumptions

The below table contains the arithmetic means, standard deviations, and correlation coefficients from the simulated paths.

Exhibit 13: Capital Market Assumptions

			Correlation Coefficients			
Strategy	**Mean (Arithmetic)**	**Standard Deviation**	**Bond Fund**	**Equity Fund**	**Managed Vol. 7.5% Index**	**Inflation**
Bond Fund	4.5%	7.5%	1.00	-0.16	-0.18	0.02
Equity Fund	8.3%	18.4%	-0.16	1.00	0.86	0.03
Managed Vol. 7.5% Index	4.8%	7.3%	-0.18	0.86	1.00	0.02
Inflation	2.7%	2.5%	0.02	0.03	0.02	1.00

Further, the arithmetic means from the simulated paths for the 1-year Treasury yield and 10-year Treasury yield are 2.4% and 4%, respectively, and the standard deviations are 2% and 1.1%, respectively.

Appendix 3: High-Inflation Sensitivity

Exhibit 14 contains the results of our high-inflation sensitivity analysis. We generated scenarios in which the normal inflation target was set at 4%, instead of the 2% target used for the base case, but real portfolio returns and index growth rates were kept the same.[74]

Exhibit 14: Average Funded Ratio in Shortfall Scenarios and Median Bequest by Strategy – High-Inflation Sensitivity

Strategy	Average Funded Ratio in Worst 100 Scenarios	% Difference Against Portfolio Only	Median Real Bequest	% Difference Against Portfolio Only
Portfolio Only	84.20%	0%	$1,472,582	0%
Portfolio + FIA with Level Income GLWB	83.42%	-0.78%	$1,425,384	-3.21%
Portfolio + FIA with Rising Income GLWB	84.89%	0.69%	$1,545,261	4.94%

Table Notes: Results are based on the first household in Exhibit 4. We assumed a 40% product allocation for the annuity-based strategies. We used a 1.5% pricing spread for the level income GLWB and a 2% pricing spread for the rising income GLWB.

The results show that only the FIA with rising income GLWB strategy outperformed the portfolio-only strategy. This occurred because this design increases the guaranteed withdrawals at the same rate that interest is credited to the contract value, whereas the other GLWB design provides a level benefit.

[74] We increase the portfolio returns and index growth rates by the difference between the high inflation and base inflation values.

Appendix 4: A Brief Note on the Risk and Return Profile of FIAs

In our analysis, we found that the inclusion of an FIA with a GLWB in a portfolio could boost bequests in some cases. There are a couple of factors behind this worth discussing. First, we assumed that the insurer's general account invested in higher-yielding bonds than the bond fund, which was designed to represent an investment-grade bond fund. There is support for this assumption. Becker and Ivashina (2015) found that insurance companies tend to invest in higher-yielding bonds. In addition, Kirti and Sarin (2020)[75] noted that private-equity-backed insurers—of which many are FIA issuers—tilt bond investments away from corporate bonds toward high-yielding asset-backed securities.

The second factor is the shape of FIA return distribution. The distribution has no left tail, as returns are floored at 0%, and when returns are positive, they are either subject to a cap or scaled by the participation rate. Flooring the credited interest rate at 0% is beneficial as, for example, a 5% reduction in wealth requires a 5.26% return to get back to the original level of wealth.

Taken together, these factors explain why the FIA with a GLWB strategy sometimes outperformed the portfolio-only strategy from a bequest perspective, despite the higher costs.

A sophisticated individual investor could theoretically outperform an FIA by holding the same underlying bonds as the insurer and buying derivatives. We also want to reiterate that the FIA with GLWB strategy did not always boost bequests in the runs in which the insurer lowered the option budget by increasing the pricing spread. We leave further discussion of the risk and return profile of FIAs for future research.

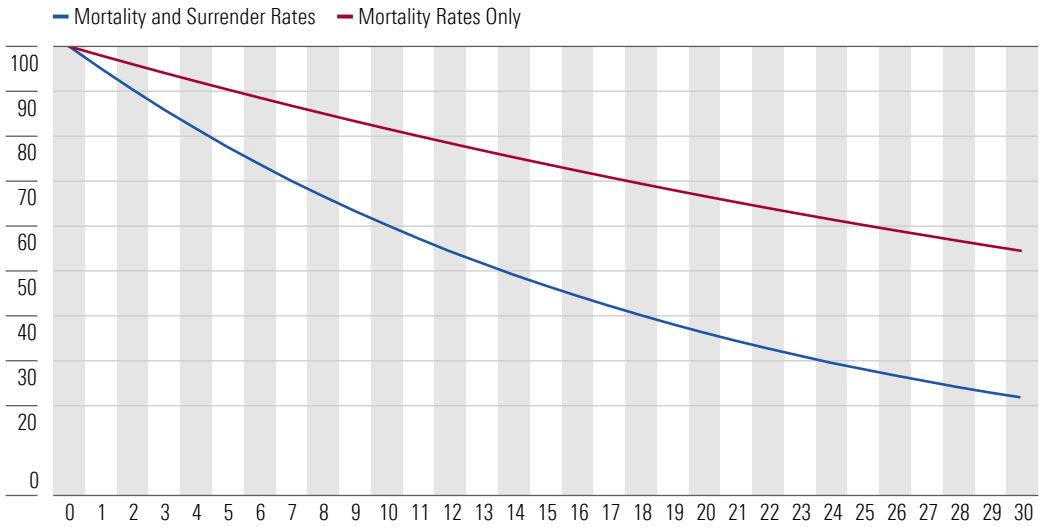
[75] Kirti, D., and Sarin. Natasha (Feb. 14, 2020). What Private Equity Does Differently: Evidence from Life Insurance. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3538443

Appendix 5: A Primer on Lapse Rates

Lapse rates are of central concern to many insurance companies. These rates reflect the probability that the owner of the insurance policy will terminate their contract with the insurance company. These rates are important, as they impact the reserves that the insurance company must hold. Actuaries directly incorporate surrender rates in pricing exercises. In the case of a deferred annuity (that is, an annuity with a contract value), surrender rates have a similar impact to mortality rates, as they both result in the insurer having to pay out the cash surrender value.

To illustrate the concept of lapse rates, we calculated the percentage of policyholders expected to be left in a hypothetical product (that is, alive and still in the contract) over a 30-year period with surrender rates applied and without any surrenders (meaning only mortality rates are applied). Refer to Exhibit 15.

Exhibit 15 Percentage of Policyholders In-Force With and Without Surrender Rates



Notes: Hypothetical example assumes 2% annual mortality rate and 3% annual lapse rate.

Insurers typically incorporate a deterministic base annual lapse rate, but these are often adjusted by a dynamic lapse multiplier. The dynamic lapse multiplier increases or decreases the lapse rate based on some additional criteria. The dynamic lapse multiplier we used in the analysis adjusts the base lapses based on the degree that the GLWB is in-the-money. If the present value of the guaranteed withdrawals is greater than the contract value, the guarantee is deemed in-the-money, and the lapse rate will be reduced. On the other hand, if the guarantee is out-of-the-money, the lapse will be increased.

The dynamic lapse multiplier we use is defined below.

$$\text{Dynamic Lapse Multiplier} = \left(\frac{CV_t}{PV\ of\ GLWB_t} \right)^{0.75}$$

CV_t = contract value at time t

$PV\ of\ GLWB_t$ = present value of guaranteed lifetime withdrawals

Note that typically the CV_t would be replaced with the cash surrender value at time t. The cash surrender value is the net amount that the policyholder would receive after reductions from surrender charges or a market value adjustment, or MVA. We use the contract value because we only model lapses occurring in retirement and do not model an MVA. Otherwise, this is the same approach used in a Milliman actuarial whitepaper on FIAs with a GLWB. Refer to Chang and others (2020) for more discussion.

Disclosures

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