

ABSTRACT

Through the use of financial options, an institution such as an insurance company or an asset manager can construct a range of investment outcomes tailored to the needs of a specific investor. The recent historic bull market for stocks allowed many pre-retirees to approach or even exceed their retirement saving goals before the date they planned to stop working. Newly retired investors, or those near retirement, might seek an investment approach that offers greater control over their investment risk. A traditional investments approach uses a portfolio of stocks and bonds, but there are other approaches that could be better suited to an investor's planning goals. Structured investments allow an investor to trade large gains for the avoidance or reduction of losses. Traditional portfolios cannot provide the same protection as a structured financial product provides. To understand the tools that financial engineers use to create a customized, risk-protected portfolio, we provide a few basic facts about the use of financial options.

MANAGING MARKET RISKS IN THE PRE-RETIREMENT YEARS USING DEFINED-OUTCOME INVESTMENTS

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INTRODUCTION

How should a 60-year-old pre-retiree invest their nest egg if they hope to retire in five years? The recent historic bull market for stocks allowed many pre-retirees to approach or even exceed their retirement saving goals before the date they planned to stop working. Newly retired investors, or those near retirement, might seek an investment approach that offers greater control over their investment risk. A traditional investments approach uses a portfolio of stocks and bonds, but there are other approaches that could be better suited to an investor's planning goals.

Through the use of financial options, an institution such as an insurance company or an asset manager can construct a range of investment outcomes tailored to the needs of a specific investor. An investor might want to preserve their recent stock market gains after a historic bull market, or they might want to reduce the possibility that they might need to either work longer or to cut back on their expected lifestyle in the face of investment losses. Structured investments allow an investor to trade large gains (which may have little impact on a retiree's lifestyle) for the avoidance or reduction of losses. Traditional portfolios cannot provide the same protection as a structured financial product provides.

The use of structured investments to produce better outcomes for retirees has been explored by financial economists in the academic literature. Nobel Prize laureates Robert Merton and Myron Scholes found that structured investments "can be used by investors to produce patterns of returns which are not reproducible by any simple strategy of combining stocks with bonds" (Merton, Scholes, and Gladstein 1982, 1). Customizing investment returns through the use of financial options allows investors of varying risk tolerances, and varying tax brackets, to select a more optimal range of outcomes than traditional investments alone can provide.

To understand the tools that financial engineers use to create a customized, risk-protected portfolio, we provide a few basic facts about the use of financial options:

1. There is no free lunch. It is not possible to engineer risk away from a product without also engineering a lower expected return. If an individual invests in a stock index and then buys an option that protects against all downside investment risk, the expected return will be no higher than the risk-free rate.
2. Call options rise in value when returns go up. Put options rise in value when returns fall. Whoever buy the option accesses either the upside through a call option or protection against the downside through a put option.
3. Financial engineering can mix traditional portfolio assets with option strategies by buying or selling put or call options to obtain a desired range of possible investment returns.
4. Buying put options protects against losses. An institution can trade upside gain for downside protection by selling call options and buying put options.

Option trading is often difficult for advisors—and nearly impossible for individuals—to execute efficiently. If an investor decides that the outcomes from an option-protected portfolio are preferable to outcomes from a conventional portfolio, a product created and managed through a financial institution offers that investor a potentially attractive way to customize their retirement investing.

The goal of this paper is to describe the trade-offs between conventional investment portfolios and structured investment products. Using simulations that use a range of possible optimistic and pessimistic investment returns, we provide insight into the ways in which various products adjust market returns for an investor approaching retirement.

UNDERSTANDING ASSET RETURN DISTRIBUTIONS

A particularly important matter for pre-retirees is sequence of returns risk. Two individuals who behave the same way over their careers—saving the same percentage of the same salary for the same number of years—can experience different wealth accumulation outcomes based solely on the specific sequence of investment returns that accompanies their career and retirement. This sequence of returns risk is generally discussed within the context of the retirement phase. But sequence rate risk does exist prior to retirement. Investment losses close to retirement, either through stock market downturns or capital losses on bonds, have the biggest impact on final wealth accumulations because the savings balance is large and the time horizon to retirement is short.

AN INVESTMENTS-ONLY APPROACH

We now return to the 60-year-old pre-retiree who plans to invest their retirement savings for the next five years. Investing in an index of large-cap US stocks such as the S&P 500 involves accepting a certain amount of market risk. Using current five-year capital market assumptions¹, it is possible to show how large their nest egg could be five years from today through a randomized sequence of annual returns over the next five years; this is commonly known as a Monte Carlo analysis.

Since stock returns follow a bell curve-shaped distribution, in exhibit 1 we see that most of the time the pre-retiree is expected to have about \$125 for each \$100 invested today in stocks. In other words, on average a pre-retiree with \$500,000 of savings can expect to have about \$625,000 in five years.

Of course, a normal distribution also means that some returns will be higher and some returns will be lower than the expected return. If returns are random, some will fall on the left tail of the distribution and 21 percent of five-year simulated returns will be negative. One out of twenty simulated pre-retirees will see their savings drop at least 29 percent over a five-year time

1. The 7.4 percent arithmetic returns and 16.8 percent standard deviation are drawn from BlackRock Investment Institute (2021).

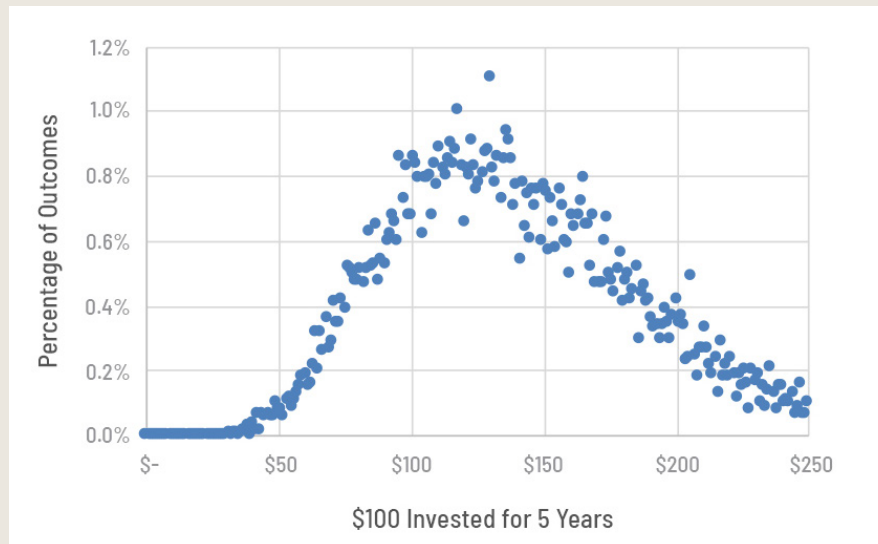


EXHIBIT 1. *Distribution of Five-Year Wealth Amounts from Investing \$100 Today in the S&P 500*

horizon. This is the equivalent of seeing one’s nest egg fall from \$500,000 to \$355,000. One out of every ten will see their savings fall by at least 18 percent, from \$500,000 to \$410,000. Likewise, one in ten will see their savings rise from \$500,000 to at least \$1 million on the right side of the distribution tail.

It is possible to translate this distribution to a range of lifestyles in retirement using an approach popular with many financial advisors known as the 4 percent rule. According to the 4 percent rule, an investor can safely withdraw 4 percent of their initial investment portfolio and increase this amount by the rate of inflation each year for 30 years (Bengen 1994). Though this retirement spending guideline is based on analysis of US historical data, it is challenged in the low interest rate and high stock market valuation environment of the present, as well as by other issues such as investment fees, taxes, a desire to build a margin of safety, and the possibility that retirements will last beyond 30 years.² An alternative to the 4 percent rule is to simply purchase a single-premium immediate income annuity (SPIA) that will provide a fixed nominal income to a retiree for their lifetime.

Consider the possible negative and median outcomes shown in exhibit 2. Assume the investor is a 60-year-

old woman with current financial wealth of \$500,000. The exhibit shows a simple initial income amount using a 4 percent withdrawal rate, and the amount of annuitized lifetime income that can be purchased for a 65-year-old woman.³

A retiree investing \$500,000 in a large-stock portfolio can expect the investment to grow to an average value large enough to provide an annuitized income of \$38,022. However, the investor must also accept the possibility that they could get very unlucky and be forced to live on less than one-third that amount (\$14,927) at the far-left side of the distribution (exhibit 1, or the 1 percent line in exhibit 2). Had the pre-retiree chosen to use the 4 percent rule instead of buying an annuity, their initial income at the 1st percentile would have been just \$10,600.

Would it have been optimal to give up some of the high incomes on the far-right side of the distribution in order to avoid cutting back significantly on an expected lifestyle following a severe bear market? If so, then a product structured to reduce both negative and extreme positive outcomes might make them better off. Many of us would gladly give up the possibility of earning an income higher than we would need in order to reduce the possibility that we would have

2 . For more on the 4 percent rule, see, e.g., Webb (2021).

3 . Quotes were taken on October 7, 2021 from Immediateannuities.com for a 65-year-old woman purchasing a single-premium immediate income annuity.

| INVESTMENT OUTCOME PERCENTILE | ANNUITIZED INCOME | 4 PERCENT WITHDRAWAL | VALUE OF THE INVESTMENT IN FIVE YEARS |
|-------------------------------|-------------------|----------------------|---------------------------------------|
| 1% | \$14,927 | \$10,600 | \$265,000 |
| 5% | \$19,997 | \$14,200 | \$355,000 |
| 10% | \$23,095 | \$16,400 | \$410,000 |
| 25% | \$29,572 | \$21,000 | \$525,000 |
| 50% | \$38,022 | \$27,000 | \$675,000 |
| 75% | \$48,443 | \$34,400 | \$860,000 |
| 90% | \$59,145 | \$42,000 | \$1,050,000 |
| 95% | \$66,468 | \$47,200 | \$1,180,000 |
| 99% | \$81,113 | \$57,600 | \$1,440,000 |

EXHIBIT 2. *Initial Income Distribution at Age 65, \$500,000 Invested in the S&P 500 for Five Years at Age 60*

to cut back in retirement if the market did not provide the returns we hoped for. Others might be willing to give up fewer of the higher-income retirement scenarios in order to avoid the first 10 percent or 20 percent of possible losses.

USING STRUCTURED (ENGINEERED) PRODUCTS TO ADDRESS INVESTMENT RISK

Downside risks are present in both stocks and bonds. The United States has experienced a low-interest-rate environment in recent years, leading to lower returns for fixed income assets. This creates unique challenges for those approaching retirement since the practical impact of low interest rates is an increase to the cost of funding retirement goals. Pre-retirees who are depending on bond funds to maintain the value of their assets may be vulnerable to having their financial plan steered off course by a rise in interest rates during these key pre-retirement years.

Investing only in stocks and bonds creates a limited distribution of outcomes because the only mechanism an investor can use to adjust the distribution of returns is the allocation of their savings placed in those stocks and bonds. Engineered products provide an opportunity to achieve a unique distribution of outcomes.

Of course, any investment choice involves trading off upside gains and downside losses. Engineered products offer a different set of trade-offs that some investors might prefer.

A new category of annuity products provides an alternative for individuals to manage these risks as they approach retirement. These annuities, or defined-outcome funds within an annuity, can allow an investor to design their own distribution of investment outcomes to better manage downside risks, while still providing participation in the market upside. The ability to better manage downside risks can lay a foundation for either needing fewer assets to successfully retire, or to be able to enjoy a higher standard of living from a given asset base.

When considering how much money one will need in retirement, many pre-retirees plan to maintain a lifestyle after they retire that is similar to the lifestyle they had during their working years. They may be willing to take investment risk for higher rewards, but want to protect against a loss in retirement lifestyle. Taking less investment risk to avoid the worst possible outcomes requires that they assume a lower rate of return from their investments. Lower average returns mean that they can expect to spend less in retirement.

For instance, a household seeking to fund a lifestyle with a 90 percent chance of success must focus on spending that could be achieved at the 10th percentile of market performance. By managing downside risks through a more structured approach, financial products can be designed that help a retiree avoid the worst outcomes by giving up a portion of the best outcomes. By using a structured financial product (which is often offered as an annuity or defined-outcome fund) that is designed to avoid the worst possible outcomes, an investor can spend more in retirement because they can limit losses when markets perform poorly. This protection makes it easier to retire successfully following a down market environment. By choosing the mix of downside protection and upside potential, retirees can choose their desired combination of potential gains and losses.

ANALYZING INVESTMENT OUTCOMES

The trade-offs between traditional investments and engineered investments can be analyzed through Monte Carlo simulations to clearly illustrate the risks retirees accept using various traditional and engineered strategies. Our objective is to provide easy-to-understand demonstrations to help pre-retirees and their advisors select an approach that best matches the risks they are willing to accept. This analysis will also incorporate factors such as tax characteristics, trade-offs between downside protection and upside potential (and how returns or credited interest are calculated), fees, flexibility for liquidity, underlying investment choices, and annuitization options.

To better understand how engineered products work, it is important to be aware of a few terms that may be unfamiliar to consumers and advisors, and the mechanisms that underlie how the products impact downside and upside performance relative to an unstructured investment portfolio.

The paper will then compare the cumulative performance of different engineered options or structured products against stocks and bonds held in both taxable and tax-deferred accounts over a five- or ten-year accumulation period in the lead-up to retirement. We

will analyze both the net aftertax performance using current annuity parameters inspired by actual products, and capital market expectations linked to the current market environment.

The investment choices include

- large capitalization US stocks held in a taxable brokerage account,
- large capitalization US stocks held in a tax-deferred retirement account,
- US aggregate bonds held in a taxable brokerage account, and
- US aggregate bonds held in a tax-deferred retirement account.

The annuity choices include

- a fixed index annuity (FIA);
- a registered index-linked annuity (RILA) with a buffer for downside protection, or, similarly, a traditional variable annuity (VA) with an underlying defined-outcome exchange traded fund (ETF) subaccount providing the same structured returns;
- a RILA with a floor for downside protection; and
- a VA with a guaranteed minimum accumulation benefit (GMAB).

The paper will provide clear illustrations of the benefits and the costs of different investment and annuity options as accumulation tools in the years leading to retirement. These simulated wealth outcomes provide insight into the range of potential wealth outcomes, on both the downside and the upside. The ability to protect from downside losses, since returns for the annuity might not follow a traditional bell curve-shaped distribution, may provide a more attractive range of outcomes than investment-only options. We will conclude with guidance about how pre-retirees can choose from different annuity options along with traditional stock and bond investments to find a satisfying balance for their retirement portfolios.

THE INVESTMENT AND ANNUITY OPTIONS

Our discussion of options for the pre-retirement portfolio includes stock and bond indices as asset classes, as well as annuities whose performance is linked to these market indices. As an alternative to investing for retirement in traditional investments, annuities offer the ability to provide tax deferral of gains and more structure on returns. Although every annuity, by definition, must include a means to convert into a guaranteed income stream, this is not the priority for our analysis. We focus on evaluating different tools that can be used to grow assets.

STOCK AND BOND INVESTMENT ASSETS IN TAXABLE AND TAX-DEFERRED ACCOUNTS

Stock and bond capital market assumptions provide the starting point for the analysis. Return expectations impact the range of investment outcomes, as well as the annuity options that link their credited interest to a market index or otherwise include investments within their subaccounts.

This analysis uses 10,000 Monte Carlo simulations for stock and bond returns differentiated between income and price returns. We simulate returns for a five-

ten-year accumulation period, with different capital market expectations for each. Simulations are based on two asset classes: (1) a large-capitalization US stock index, and (2) an aggregate US bond index. Returns and volatilities for these asset classes are taken from BlackRock Investment Institute’s (2021) capital market expectations. We assume the asset classes are not correlated, which is consistent with historical US data. The capital market expectations reflect the lower interest rate environment facing current investors. Exhibit 3 provides these assumptions for both a five-year horizon (exhibit 3a) and a ten-year horizon (exhibit 3b).

To differentiate price returns, we assume a fixed dividend yield of 1.3 percent for stocks, consistent with the current yield on the S&P 500, as well as a coupon rate for bonds reflected by the capital market assumptions (0.9 percent for the five-year scenario and 1.5 percent for the ten-year scenario).

Strategies are simulated with annual return data less any fees deducted at the end of each year. Annual investment fees are assumed at 0.25 percent of the portfolio balance. Taxes are calculated using a 32 percent marginal tax rate for ordinary income and an 18.8 percent tax rate for qualified dividends and long-term capital gains. This rate reflects 15 percent plus the 3.8 percent net investment income surtax.

| | ARITHMETIC MEANS | GEOMETRIC MEANS | STANDARD DEVIATIONS |
|---------------------|------------------|-----------------|---------------------|
| US Large Cap Equity | 7.4% | 6.0% | 16.8% |
| US Aggregate Bonds | 0.9% | 0.8% | 4.7% |

EXHIBIT 3A. Capital Market Expectations: Next Five Years

| | ARITHMETIC MEANS | GEOMETRIC MEANS | STANDARD DEVIATIONS |
|---------------------|------------------|-----------------|---------------------|
| US Large Cap Equity | 7.8% | 6.4% | 16.8% |
| US Aggregate Bonds | 1.5% | 1.4% | 4.7% |

EXHIBIT 3B. Capital Market Expectations: Next Ten Years

Source: BlackRock Investment Institute 2021.

Note: Data are as of June 30, 2021. Return expectations are over five and ten years for gross total nominal returns.

For stocks held in a taxable account, dividends are assumed to be qualified and are taxed on an ongoing basis at the long-term capital gains rate and then reinvested into the account, which raises the cost basis. This annual taxation on the income flow reduces some of the compounding growth potential for the investment. At the end of the deferral period, an account distribution is assumed so that any account gains are also taxed at long-term capital gains rates. Likewise, for bonds in the taxable account, ongoing interest is taxed at ordinary income rates instead of capital gains rates and gains at the end of the deferral period are taxed at long-term capital gains rates.

For stocks and bonds held in the tax-deferred account, the full total returns less investment fees are allowed to accumulate for the entire period. At the end of the accumulation period, the full account gains are distributed and taxed at the ordinary income tax rate.

FIXED INDEX ANNUITY

The first annuity option providing a structured return is a FIA with credited interest that links to the price returns of the stock index. Many financial advisors will use FIAs for clients who are most concerned about a loss in principal. Even if the underlying index declines significantly in value, the FIA owner does not lose money, but instead is simply credited with 0 percent interest. The insurance company invests enough of the initial principal in bonds so that the value of the principal will grow to the projected cash flow need at the end of the term. The remainder can then be used to provide exposure to market upside in the linked index.

For a pre-retiree seeking a high probability of success for meeting a wealth accumulation target, particularly if they are already at or near their savings goal and if they place little value on significant additional growth, the ability to control this downside risk may help ensure that their goal is met.

As well, owners can anticipate credited returns over time that are competitive with bond funds net of taxes and investment expenses. When compared to fixed income options, potential advantages of FIAs include their ability to avoid losses (bonds can lose value when interest rates rise), as well as their tax-deferral proper-

ties relative to assets held in taxable accounts. Since interest on bonds is taxed at a higher rate than are long-term capital gains, the relative benefit of holding fixed income assets within an annuity can be significant.

FIAs offer index-linked interest, but they are not invested directly into the underlying index. They simply pay interest to the owner using a formula linked to the index performance. FIAs protect principal and provide a portion of the gains experienced by the linked index.

The FIA credits interest through a one-year point-to-point crediting design with a cap and an annual reset. The FIA we model uses one-year terms throughout the deferral period with an annual cap on credited interest. Using an average of caps on eight FIAs currently available, we arrive at a 3.3 percent cap for this study. Cap rates must be modest in today's low-interest-rate environment because nearly all of the original principal is needed to invest in bonds that will eventually grow to the initial investment amount, leaving less to use for upside exposure.

An important point about the downside protection of the FIA is its annual reset feature. This means that index returns are assessed on an annual basis without a need to overcome any cumulative losses. If the market was down 40 percent in the previous year, interest is credited at 0 percent and the next year begins with a fresh start. The process described above repeats for each new term. Exhibit 4 illustrates the potential returns of the FIA over a five-year period.

As shown in exhibit 4, FIAs offer protections against loss while forgoing a significant amount of potential upside. Since they protect principal, FIAs may also be used as an accumulation tool in the preretirement transition years to help lock in a wealth accumulation target at the retirement date with low variation in future outcomes (upside and downside). Index returns below 0 percent are credited as a 0 percent return, and index returns above 3.3 percent are capped at this value. The FIA can be treated as an asset class alongside stocks and bonds, but with the unique property that it protects from downside losses. After accounting for its tax deferral, the question becomes whether it provides enough upside exposure to compete with other fixed-income investment opportunities on a risk-adjusted basis.

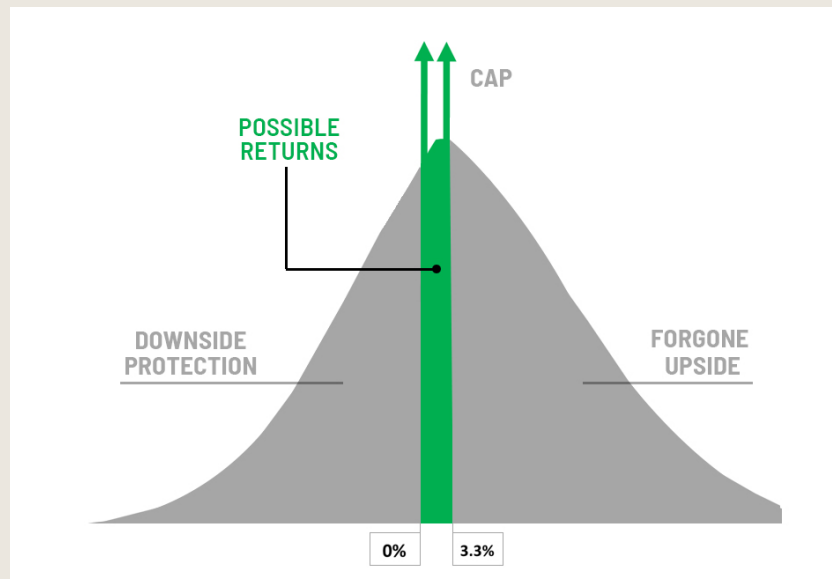


EXHIBIT 4. Annual Return Distribution from a Fixed Index Annuity

REGISTERED INDEX-LINKED ANNUITY WITH A BUFFER AND VARIABLE ANNUITIES WITH A DEFINED-OUTCOME EXCHANGE TRADED FUND

A more recent development is structured annuities that behave a lot like index annuities, but that can experience losses. These annuities are technically a type of VA, and they go by many names including buffered annuities, variable index annuities, and RILAs. We will use the acronym “RILA” to refer to these buffered annuity products. Even more recently, defined-outcome ETFs have been developed that can replicate the return structure of a RILA as a subaccount within a traditional VA to provide a similar return performance along with some additional considerations. We discuss these together.

First, a RILA is designed to credit interest based on structured returns. Its underlying workings will appear similar to a FIA. But a RILA is technically a VA because the structured returns provided do allow for losses. In exchange for accepting the risk of loss, a RILA can also offer more upside exposure than a FIA.

We can observe the risk trade-off through simulations of index returns that are constrained by the structure of the product. We model a RILA with one-year terms that begin and renew with a 10 percent annual buffer and a 10.5 percent annual cap. The cap is determined as the average of five available RILAs at the time of this writing. These parameters are maintained for each one-year term throughout the deferral period. At the end of the deferral period, the assets are distributed from the annuity and the gains are taxed at ordinary income tax rates.

A RILA with a buffer absorbs a portion of any annual losses. Consider if the price returns for the index were at -8 percent for the year. The 10 percent buffer would absorb this loss and any loss up to 10 percent and credit 0 percent for the year. The owner is exposed to only the portion of loss exceeding 10 percent. For instance, if the market index lost 23 percent in a year, the RILA with the 10 percent buffer would credit a 13 percent loss for the year. With this exposure to loss, it costs less for the insurer to provide these protections to the owner. As such, the insurer can offer more upside exposure than with a FIA, which is reflected here with the 10.5 percent cap as compared to the 3.3 percent cap for the FIA as an

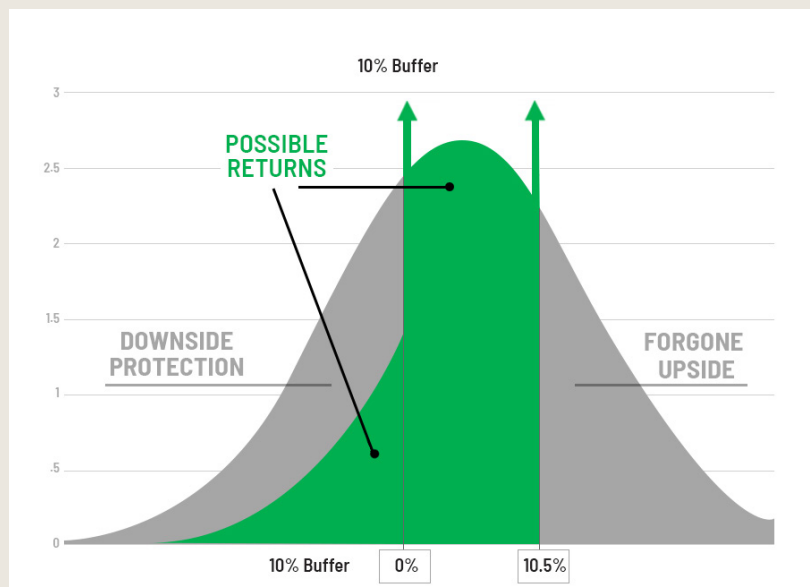


EXHIBIT 5. Annual Return Distribution for a Registered Index-Linked Annuity or Variable Annuity with Defined-Outcome Fund with a 10 percent Buffer

average spread based on current pricing. The annual reset applies here as well with the opportunity to start fresh on a point-to-point basis for each annual term.

The distribution of returns with a 10 percent buffer are shown in exhibit 5. Not only are losses up to 10 percent fully absorbed through the use of a buffer, but, in addition, losses larger than 10 percent are reduced by 10 percent, resulting in a shift of the entire downside portion of the distribution. Since most returns are close to the average in a normal distribution, losses below the buffer are unlikely and the magnitude of the losses are reduced by the buffer amount. Returns above the cap now cluster at the cap percentage (upward arrow at the cap) and returns between -10 percent and 0 percent now cluster at 0 percent. Of course, protection comes at a cost of forgone upside potential above the cap.

The RILA provides another option to move away from the bell curve-shaped distribution of market returns to provide something that is structured to reshape the range of potential outcomes.

One of the most recent of these innovations for structured annuities is to have a traditional VA include an underlying subaccount option that provides the same type of structured returns as a RILA. A reason that someone might consider this option relative to a RILA is that it can allow the investor greater flexibility to change investment strategies. One is not held to the buffer design on an ongoing basis, since different subaccount options can also be used within the annuity and options can be changed more frequently than just at renewal times. At the same time, this VA structure is more likely to have underlying VA fees.

For our analysis, the defined-outcome ETF with the 10 percent buffer in the VA is modeled with identical one-year terms that begin and renew with a 10 percent annual buffer and a 10.5 percent annual cap net of any fees. The distribution and taxation at ordinary income tax rates on policy gains at the end of the deferral period happens after the final cap is applied. The distribution of outcomes should resemble a RILA since the subaccounts are invested in products whose returns are structured in a similar manner.

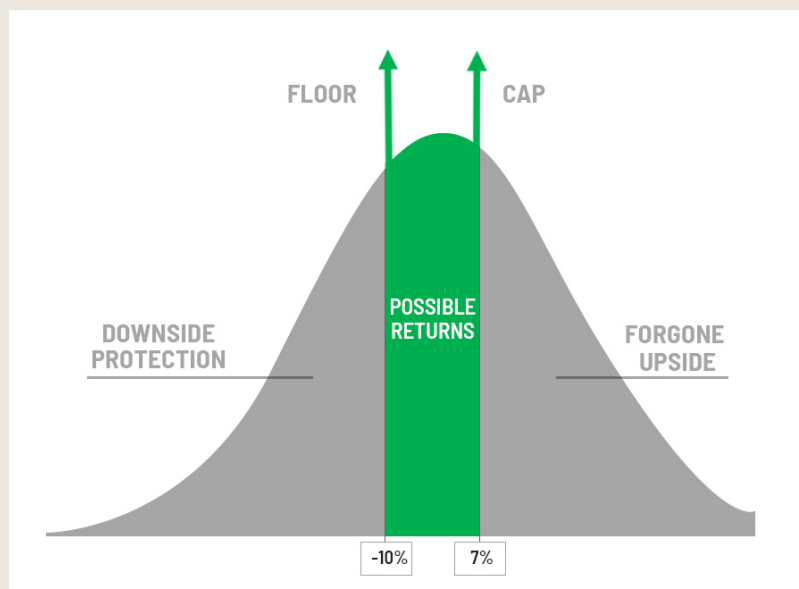


EXHIBIT 6. Annual Return Distribution for a Registered Index-Linked Annuity with Floor and Cap

REGISTERED INDEX-LINKED ANNUITY WITH A FLOOR

Second, a RILA is designed to provide a floor on interest credited each year, rather than to provide a buffer. This is similar to a FIA, which has a floor of 0 percent. But the RILA buffers only a percentage of negative returns. Buffering modest negative returns allows greater potential for upside because options that provide partial protection are less expensive than options that provide full downside protection through the entire left tail of the normal distribution.⁴

The RILA we model has one-year terms that begin and renew with a -10 percent annual floor and a 7 percent annual cap (see exhibit 6). This is based on the average cap for seven products on the market with these features. This floor design has less downside risk than the 10 percent buffer design since the maximum loss with the floor is 10 percent during a given term. The potential loss with the buffer is greater. Compared to a FIA, the potential upside cap of 7 percent is higher because the investor accepts the first 10 percent of investment loss.

These parameters are maintained for each one-year term throughout the deferral period. At the end of the term the assets are distributed from the annuity and are taxed at ordinary income tax rates.

VARIABLE ANNUITY WITH A GUARANTEED MINIMUM ACCUMULATION BENEFIT

Traditional VAs allow for the direct investment of premiums into separate investment subaccounts. VAs position the premiums into subaccounts that allow for investments into different funds that earn a variable rate of return. Like other investments in stocks and bonds, those investment subaccounts are exposed to gains and losses. VAs are also deferred annuities and, as such, provide tax deferral and have gains distributed as ordinary income. Since gains of stock investments that are held for more than one year are taxed at a rate that is currently lower than the marginal income tax rate for most investors, this can reduce aftertax upside compared to a nonqualified stock investment.

An optional GMAB is one way to provide structure on the return experience within a VA. A GMAB promises

4. For an excellent overview of option pricing that affects the characteristics of buffered annuities, see Blanchett (2021).

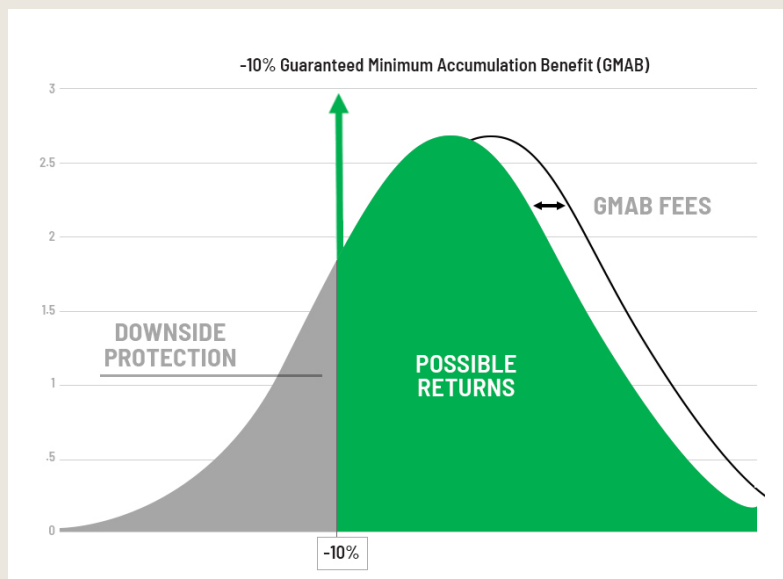


EXHIBIT 7. *Five-Year Return Distribution of a Variable Annuity with a -10 percent Guaranteed Minimum Accumulation Benefit*

that the contract value grows to a minimum value; it is not linked to a lifetime income. Effectively, it allows for the same bell curve-shaped distributions on the underlying returns. But, at the end of the deferral period, the fees paid for the rider support the imposition of a floor on the cumulative accumulation so that the cumulative performance cannot fall below the defined level.

The VA with a GMAB considered here has different parameters based on when a five- or ten-year accumulation period is chosen. For a five-year deferral, a minimum accumulation floor of 90 percent of the initial premium is applied. An annual rider fee of 1.15 percent of this initial premium is deducted each year to support the minimum accumulation benefit, and an 80 percent stock allocation is used for the underlying subaccounts. Additional subaccount fees of 0.25 percent of the contract value are also applied, as with the case for investing stocks and bonds. For a ten-year deferral, the minimum accumulation floor is 105 percent of the premium, while the annual fee is 1.1 percent of the premium and the stock allocation is 80 percent. The floor values for the minimum accumulation are applied after fees have been deducted. The distribution and taxation at ordinary income tax rates on policy gains at

the end of the deferral period happen after the floor is applied.

Exhibit 7 illustrates the return distribution of a VA with a minimum accumulation benefit for a five-year investment period. The GMAB creates a floor that is 90 percent of the original investment and is not reduced by rider fees. The investor captures the full upside of an 80 percent stock portfolio minus the 1.15 percent annual fees.

It is important to note that having a minimum accumulation benefit in place can justify having the pre-retiree use a more aggressive asset allocation than they would otherwise prefer in the absence of downside protection. The accumulation benefit allows for upside market growth to increase the account value while protecting the initial investment even when markets perform poorly. With this downside protection, a retiree could be willing to invest more aggressively within the VA than with an investments-only strategy. This is the justification for assuming an 80 percent stock allocation, which is the highest allowed for the VA. A more aggressive asset allocation can potentially support greater upside potential, and the additional exposure

NET OF FEES AND TAXES
PERCENTILE OF THE DISTRIBUTION

| TOOL/ASSET | 1st | 5th | 10th | 25th | Median | 75th | 90th | 95th | 99th | |
|---|------|------|------|------|--------|------|------|------|------|-------|
| Stocks (Taxable) | -42% | -26% | -16% | 4% | 26% | 55% | 87% | 109% | 160% | 21.7% |
| Stocks (Tax Deferred) | -41% | -25% | -15% | 3% | 22% | 46% | 73% | 92% | 135% | 20.7% |
| Bonds (Taxable) | -20% | -15% | -11% | -6% | 1% | 8% | 13% | 17% | 24% | 45.3% |
| Bonds (Tax Deferred) | -19% | -14% | -10% | -4% | 2% | 7% | 12% | 15% | 21% | 39.8% |
| FIA with Cap | 0% | 2% | 3% | 5% | 7% | 9% | 9% | 12% | 12% | 0.0% |
| RILA with 10% Buffer/ VA with Defined Outcome Funds | -20% | -8% | -2% | 6% | 15% | 23% | 31% | 33% | 42% | 11.9% |
| RILA with 10% Floor | -30% | -20% | -15% | -6% | 3% | 12% | 19% | 23% | 27% | 39.7% |
| VA with GMAB | -10% | -10% | -10% | 1% | 15% | 34% | 53% | 66% | 97% | 24.1% |

EXHIBIT 8. Cumulative Returns over a Five-Year Deferral Period

to equities can more than offset VA fees in scenarios where the markets perform well.

RESULTS: COMPARING TRADITIONAL INVESTMENTS WITH STRUCTURED ANNUITIES

Analyses for the investment and annuity options are conducted for five-year and ten-year accumulation periods. We estimate the cumulative returns net of taxes and fees for stocks, bonds, and the annuity options. Exhibit 8 provides the results for five-year deferrals.

STOCKS (TAXABLE) AND STOCKS (TAX DEFERRED)

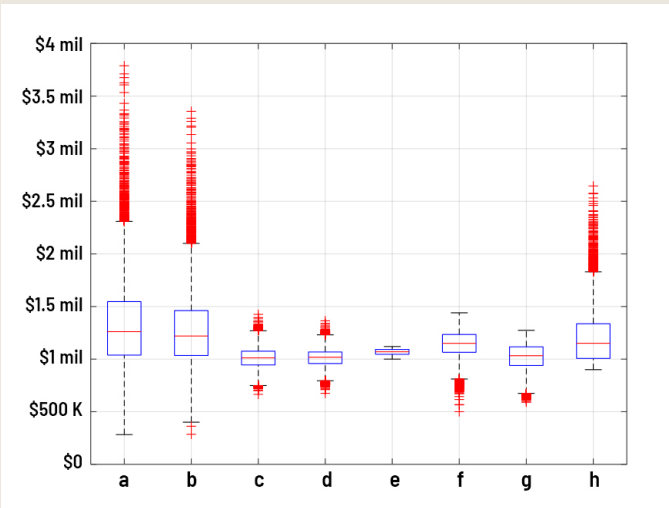
As shown in the introduction, investment in stocks produces a normally distributed range of possible outcomes after five years. An unprotected stock investment allows for the highest potential upside since the distribution is not constrained in order to provide downside protection. Likewise, pre-retirees who hold a stock portfolio must accept the possibility of a significant decline in their nest egg, and more than one in five will see their savings decrease.

BONDS (TAXABLE) AND BONDS (TAX DEFERRED)

Bonds also offer a normally distributed range of possible outcomes, although the potential losses and gains are more muted. At today’s low interest rates, 45 percent of simulated bond portfolios held in a taxable account will have a negative return over five years, net of income taxes and 0.25 percent investment fees. With a tax-deferred account, the situation for bonds improves slightly since only 40 percent of simulated scenarios experience a negative return under the same conditions.

FIXED INDEX ANNUITY WITH CAP

For the FIA, the range of potential outcomes is the smallest. The FIA avoids losses for the owner, though the cumulative net gain after five years is still only 12 percent at the 99th percentile. Nonetheless, comparing the distribution of FIA outcomes with bonds is informative, since the FIA outperforms bonds for more than 75 percent of the distribution. For the top portion of outcomes, bonds do show an edge. Nonetheless, at the median, which reflects an average outcome, the cumu-



Note: a: Stocks (Taxable); b: Stocks (Tax-Deferred); c: Bonds (Taxable); d: Bonds (Tax-Deferred); e: FIA with Cap; f: RILA with 10% Buffer / VA with Defined Outcome Funds; g: RILA with 10 Percent Floor; h: VA with GMAB.

EXHIBIT 9. Cumulative Returns Over a Five-Year Deferral Period

lative performance of the FIA is 7 percent, compared to 1 percent for taxable bonds and 2 percent for bonds held in a tax-deferred account. We do find evidence that FIAs are competitive with bonds on average, with a smaller range of potential outcomes. FIAs can be more appropriate than a conventional investment portfolio of bonds (or a very high allocation of bonds) for investors whose primary goal is capital preservation.

REGISTERED INDEX-LINKED ANNUITY WITH 10 PERCENT BUFFER

Next is the RILA with a buffer, or a VA with a defined-outcome ETF subaccount offering the same return structure. This annuity provides a distribution of outcomes more closely related to stocks, though with less risk and less potential return. With a smaller risk of cumulative loss as well as better performance at the bottom 25 percent of the distribution, the RILA with the buffer does have characteristics that may appeal to those approaching retirement who have a desire for upside growth but some hesitation about having full exposure to the stock market. We can also note that the RILA with a buffer provides higher cumu-

lative net performance than bonds for all but the 1st percentile of the distribution of outcomes. In practice, advisors and clients could shop for available options at any given time to see whether the upside parameters for defined-outcome funds inside a VA are stronger than a RILA. Even if these upside parameters are a bit more modest, investors can also weigh the additional flexibility offered by this strategy relative to a RILA to determine which strategy might provide the best past alternative.

REGISTERED INDEX-LINKED ANNUITY WITH 10 PERCENT FLOOR

Next, for the RILA with a floor, it is interesting to note that this strategy is dominated by the RILA with a buffer at every percentile of the distribution. This suggests that the buffer approach for a RILA has more value as an annuity choice than a product that uses a floor. What this implies with the simulations is that there tend to be more small negative returns than large negative returns when -10 percent is treated as the threshold. The buffered RILA has a stronger opportunity to outperform.

NET OF FEES AND TAXES
PERCENTILE OF THE DISTRIBUTION

| TOOL/ASSET | 1st | 5th | 10th | 25th | Median | 75th | 90th | 95th | 99th | |
|---|------|------|------|------|--------|------|------|------|------|-------|
| Stocks (Taxable) | -42% | -19% | -4% | 25% | 67% | 125% | 197% | 248% | 382% | 11.7% |
| Stocks (Tax-Deferred) | -40% | -18% | -2% | 21% | 56% | 107% | 167% | 211% | 325% | 10.6% |
| Bonds (Taxable) | -24% | -16% | -11% | -3% | 7% | 17% | 26% | 32% | 44% | 32.5% |
| Bonds (Tax-Deferred) | -20% | -12% | -7% | 1% | 8% | 16% | 24% | 29% | 39% | 21.9% |
| FIA with Cap | 5% | 7% | 9% | 12% | 15% | 17% | 20% | 21% | 23% | 0.0% |
| RILA with 10% Buffer/ VA with Defined Outcome Funds | -15% | 1% | 8% | 19% | 33% | 48% | 62% | 70% | 86% | 4.5% |
| RILA with 10% Floor | -34% | -24% | -18% | -5% | 7% | 19% | 30% | 38% | 51% | 32.5% |
| VA with GMAB | 3% | 3% | 3% | 14% | 40% | 76% | 118% | 146% | 219% | 0.0% |

EXHIBIT 10. Cumulative Returns Over a Ten-Year Deferral Period

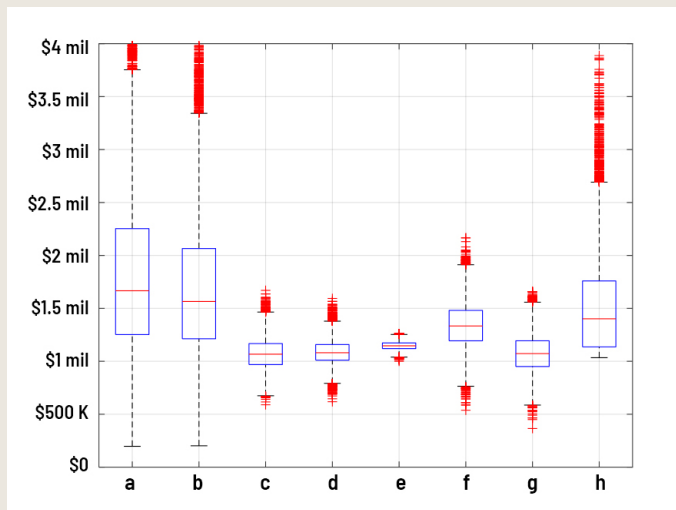
**VARIABLE ANNUITY WITH A GUARANTEED
MINIMUM ACCUMULATION BENEFIT**

The final option in exhibit 8 is the VA with a GMAB. On the upside, this strategy provides an 80 percent stock allocation that would match an equivalent investment-only strategy with the same allocation, except that the VA has a higher fee drag to reduce cumulative performance. Nonetheless, the fee drag pays for a cumulative floor such that the worst-case performance is -10 percent. Though this strategy uses stocks in addition to bonds, it is not riskier than bonds from a downside perspective. Those individuals who are comfortable with this understanding from a behavioral perspective might consider this annuity strategy as an alternative to some bond holdings that are earmarked for longer-term retirement goals and are not needed for potential immediate liquidity. It is also interesting to note that this annuity dominates the RILA with a floor across the full distribution, and the RILA with the buffer across most of the distribution. In the lowest-performing percentiles, the minimum accumulation floor provides more benefit, and then for the top half of the distribution the upside gains are stronger without the cap in

place. It is only at the 5th, 10th, and 25th percentiles that the RILA edges ahead in cumulative performance.

To help provide visual context, exhibit 9 shows the same results using a box-plot chart for the distribution of outcomes with each strategy. With each strategy, the central mark is the median, and the edges of the box are the 25th and 75th percentiles as in exhibit 8. The whiskers extend to the most extreme data points that the algorithm considers not to be outliers, and the outliers are plotted individually.

Shifting to exhibit 10, we can observe cumulative performance over a ten-year period. With the possibility for cumulative market growth over a longer period, the distributions tend to shift toward higher cumulative net returns, though the underlying comparisons among strategies remain consistent. Upside potential is the strongest with stocks, the VA with a GMAB, and the RILA with a buffer or equivalent VA that has a defined-outcome ETF as the subaccount. On the downside, the FIA provides the strongest protection, followed by the VA with GMAB, and the RILA with a buffer. The FIA and the VA/GMAB both provide full protection from loss. The RILA with a floor continues to be dominated by the RILA with a buffer.



Note: a: Stocks (Taxable); b: Stocks (Tax-Deferred); c: Bonds (Taxable); d: Bonds (Tax-Deferred); e: FIA with Cap; f: RILA with 10% Buffer / VA with Defined Outcome Funds; g: RILA with 10 Percent Floor; h: VA with GMAB.

EXHIBIT 11. Cumulative Returns Over a Ten-Year Deferral Period

Again, exhibit 11 provides a visual display for this information to help readers better understand what the distribution of outcomes looks like for these different strategies.

CONCLUSIONS

Traditional stock and bond investments offer a distribution of future investment outcomes that follows a bell curve shape, with a predictable percentage of negative returns that many investors near retirement might prefer to avoid. Financial products that use options to create structured returns offer the potential to produce a more attractive range of investment returns. This paper reviews the simulated returns among four structured annuity products to provide greater insight into the upside and downside trade-offs of various strategies that use buffers and floors to limit negative returns.

The inclusion of a structured annuity impacts the range of wealth outcomes both on the downside and the upside. These annuities also offer tax deferral, unlike investment assets held in taxable accounts that face ongoing taxes on their growth. With the ability to better manage downside risk and avoid capital losses, these annuities offer behavioral benefits to retirees to

help them stay the course with their retirement strategies. A structured approach to returns provides a tool to securely get assets to retirement by managing market volatility and the sequence of returns risk in the pivotal years leading to retirement. This can better set the stage for retirement and for creating more lifetime retirement income from a given asset base. Providing structure over potential gains and losses in the years leading up to retirement could be effective in helping to manage retirement risks.

Our results show that investors who may have already achieved their retirement savings goal five or ten years prior to retirement, or who would like to lock in recent gains to fund essential spending in retirement, might prefer a FIA to a conventional low-risk investment portfolio that has a significant probability of negative returns in today's low-interest-rate environment. Investors who wish to avoid the more extreme downside returns while preserving enough upside potential to achieve a more rewarding retirement on more discretionary retirement expenses might prefer a RILA, a VA with defined-outcome ETF subaccounts, or an annuity with a GMAB. Structured annuity products give investors greater flexibility to choose an investment strategy that best matches their willingness to accept variability in the lifestyle they can create from their retirement nest egg.

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