

VIRTUAL ANNUITY

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Executive Summary

This white paper introduces an innovative financial, not insurance, product called Virtual Annuity (VIRA). VIRA is an SMA/open-end fund that aims to provide retirees with a lifetime steady income stream and long-term care (LTC) protection, the two most important pillars— along with liquidity and flexibility—of financial security in retirement. VIRA has several unique built-in features. First, VIRA is convertible into a single premium immediate annuity (SPIA), essentially guaranteeing a minimum lifetime income stream. In addition, VIRA establishes a dedicated account and a long-term loan program to help ease the financial burden of its holders in the event of LTC or critical illness. Last but not least, VIRA holders have instant access to their money deposited with VIRA at any time without restrictions or charges. In light of the limited investment horizon of prospective VIRA buyers, we develop and implement a tail risk hedging system, a core part of VIRA. VIRA manages AUM with an equity-tilted approach to meet the risk and return preferences of retirees, as revealed in several recent surveys.

Virtual Annuity

1. Demographic, Legal, and Competitive Environment

The current demographic environment in the U.S., which is characterized by a longer life expectancy and an aging population, provides tailwinds for retirement financial service providers. Specifically, the average lifespan in the U.S. increased from 69.8 years in 1960 to 76.60 years in 2021. In addition, the percentage of American families with heads of households 55 years and older grew from 34.1% in 1960 to 46.2% in 2021. The first wave of the 76 million Americans born between 1946 and 1964 are now heading into retirement. The result is a potentially huge demand for financial products to help retirees convert accumulated wealth into regular income.

The SECURE Act of 2019 recently passed by the U.S. Congress has dramatically increased the market for life annuities. This far-reaching bill encourages defined-contribution (DC) pension plans to replicate the feature of traditional pensions in which products are offered with guaranteed income payments. It has created a potential growth opportunity for the life annuity industry amounting to as much as \$11.0 trillion, the outstanding balance of DC pension plans in the U.S. at the end of 2021.

Low interest rates had persisted for most of the past decade until early 2022 thanks to the devastating impact of the COVID-19 crisis on the U.S. economy. The low interest rate environment had placed a significant strain on the balance of annuity issuers and substantial financial constraints on the development of new retirement products. Life insurance companies are not the only option when it comes to retirement products. Asset managers are increasingly

tapping into the retirement investment market as insurers move away from guaranteed products and as digital companies with more customer touchpoints build stronger relationships and find new inroads to engagement, sales, and profits. However, the post-retirement funds offered by asset managers have yet to tap into the life annuity market.

2. Motivation

Steady income in retirement is the most significant issue for older Americans who are not affluent and lack a legacy defined benefit plan. According to the 2022 TransAmerica Employee Retirement Survey, the most frequently cited retirement fears of workers were “outliving savings and investments, a reduction in or elimination of Social Security in the future, and declining health that requires long-term care costs.” A longer life expectancy forces individuals to invest a larger share of their income in order to retain a high quality of life and cover healthcare and long-term care (LTC) costs in old age. These findings support a strong demand for financial products that provide guaranteed income in retirement and protection of accumulated wealth from LTC costs.

Extensive research and various surveys revealed, however, that traditional life annuities remain unpopular among retirees. For example, the 2019 survey conducted by the Insured Retirement Institute reported that only 6% of baby boomers plan to purchase an annuity, although eight in ten believe that it is important for income sources to be guaranteed for life. The annual sales report by Insured Retirement Institute reveals that sales of fixed and variable annuities were \$233 billion in 2021, compared to the combined DC pension plan and IRA assets of \$11.0 trillion held by plan participants and account owners aged 55 or older.

Several studies and surveys have shed light on why retirees shun traditional life annuities. Commonly cited reasons include a large upfront commission, underperformance of annuities relative to stock investment, costly or impossible contract rescission, contract complexities, and the lack of opportunity to pass the money invested in annuities to beneficiaries. A lack of information about direct-sold annuities on the part of retirees may contribute to the view that life annuities involve a large sales commission. Direct-sold annuities are offered by investment companies such as Fidelity and Vanguard, but not by insurance companies. Insurance agents are not involved in direct-sold annuities, and neither sales commissions nor surrender fees are charged. Therefore, the real reasons that near-retirees and retirees avoid life annuities seem loss of control over their retirement money and a lack of capital appreciation potential. As an alternative to life annuities, many mutual fund companies offer post-retirement funds, such as retirement income funds and managed payout funds. However, post-retirement funds hold only \$763 billion in assets in 2020 out of the \$1.7 trillion in target-date funds overall. The problem with post-retirement funds is that their income payouts are neither guaranteed nor stable.

Wiener (2014) defines LTC as “a range of services and supports to meet personal care needs.” According to the Congressional Budget Office (2013), most LTC comprises not medical care, but assistance with the basic personal tasks of daily life, such as eating, dressing, bathing, transferring, and using the bathroom. The U.S. Department of Health and Human Services (HHS) predicts that 70% of those turning age 65 will need some type of LTC. Unfortunately, according to the American Association for LTC Insurance, though the population of people aged 55 and older amounts to 93 million, only 8 million Americans currently have LTC insurance policies. Part of the reason for this is that LTC insurance is unaffordable for most retirees and inaccessible for those with preexisting conditions. The American Association for LTC Insurance

estimates that the annual LTC insurance premium for a couple aged 65 is currently as much as \$7,150 for \$162,000 of coverage for each with a 3% inflation option. LTC without insurance coverage is expensive, and Medicare and most private health insurance plans do not cover LTC costs. In 2021, Genworth estimates of monthly national median costs for home health aides, assisted living, and nursing home living (with a semi-private room option) were \$5,148, \$4,500, and \$7,908, respectively.

The research and survey results discussed above suggest a need for a new retirement financial product that remedies the drawbacks of traditional life annuities and the unaffordability or inaccessibility of LTC insurance.

3. Virtual Annuity

In this section, I introduce an innovative retirement financial product called Virtual Annuity (VIRA). VIRA aims to provide retirees and near-retirees with a lifetime steady income stream and LTC protection, the two most important pillars—along with liquidity and flexibility—of retirement financial security. Since VIRA is an SMA/open-end fund, not an insurance policy, VIRA does not guarantee a lifetime income stream as such. However, VIRA has a built-in option to be converted into an SPIA, it essentially guarantees a minimum lifetime income stream. In what follows, I discuss the structure and built-in features of VIRA in detail.

(1) Structure

VIRA is made up of two sub-accounts: Payout and Reserve Account. The Payout Account is the primary one from which a fixed income is paid out regularly for VIRA holders. VIRA holders themselves may set an annual payout rate between 0 and 5% of the initial money

deposited with the Payout Account as well as the frequency of the payout, both of which they can change at any time. The dollar amount of the annual payout is adjusted by the cost of living. The Reserve Account is the secondary one, the balance of which VIRA holders may elect to convert into an SPIA and/or cover expenses related to LTC or critical illness. When a retiree or near-retiree aged 65 or younger deposits his/her saving with VIRA, 90% is placed in the Payout Account and the remainder in the Reserve Account. For a retiree aged 66 or older, the deposit rate with the Payout Account is reduced by 1% times his/her age in excess of 65. In addition, one-twelfth of 2% of the cost of living-adjusted (COLA) value of the original money deposited is transferred from the Payout Account into the Reserve Account at the end of every month.

VIRA incorporated several protective measures against the risk of ruin, and for LTC or critical illness. If VIRA happens to miss the scheduled payouts due to depletion of the balance in the Payout Account, VIRA holders have an option to convert all or a fraction of the balance in the Reserve Account into an SPIA.¹ This means that VIRA holders are, in effect, guaranteed with a minimum lifetime income stream. Alternatively, VIRA holders may instead transfer up to $90\% - \max(\text{age} - 65, 0)\%$ of the balance in the Reserve Account into the now insolvent Payout Account. The third option is to cancel the VIRA contract outright and withdraw the entire balance in the Reserve Account.

If a VIRA holder needs money to cover LTC or critical illness-related expenses, he/she may be allowed to withdraw up to half the balance in the Reserve Account. If necessary, VIRA may arrange a secured loan on a long-term basis from fellow VIRA holders on the Payout Account balance and/or estate of the borrower. The borrowing VIRA holder is required to make a monthly payment of one-twelfth of 1% of the COLA value of the original money deposited

¹ The SPIA will be administered by a third party life insurance company in partnership with the VIRA provider.

with VIRA until the principal plus interest is completely paid back. For the borrowing VIRA holder, the amount of money transferred annually from the Payout Account to the Reserve Account is reduced from 2% to 1%. From the investment management perspective, the loan made to VIRA holders will be part of the VIRA asset portfolio in the fixed income securities class. Figure 1 exhibits a diagram of the structure and money flow of VIRA.

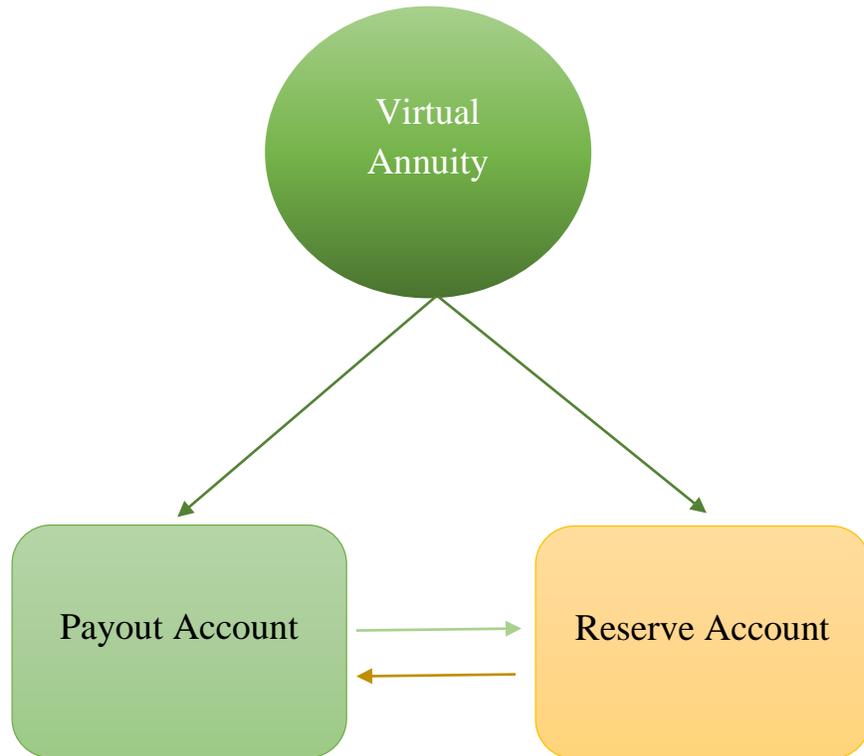
(2) Additional Built-in Features

The following are additional built-in features of VIRA:

- VIRA holders may cancel the contract and withdraw the entire balance in both the Payout and Reserve Accounts at any time without restrictions or charges.
- VIRA holders may withdraw a fraction of the balance in the Payout Account in addition to the scheduled payouts at any time in the same manner they do with a bank checking account. However, VIRA holders may not be allowed to withdraw a fraction or all of the balance in the Reserve Account for purposes other than covering expenses related to LTC or critical illness.
- VIRA holders may convert up to half the balance of the Reserve Account into an SPIA at any time.
- The VIRA holders not in retirement may defer the automatic payout service by electing a zero payout rate initially and request it later. For those VIRA holders, the initial and subsequent monthly transfer of the money from the Payout Account to the Reserve Account will be suspended until they enter the retirement phase.
- If prospective VIRA holders open a VIRA IRA or rollover IRA, VIRA provides the payout service in compliance with required minimum distributions (RMDs). If the RMD is greater than the payout amount selected by VIRA holders, VIRA opens a Roth IRA or

an investment account on behalf of VIRA holders and deposits the excess amount of the RMD into that newly opened account.

Figure 1. Structure and money flow of Virtual Annuity



4. Competing Products

In addition to SPIAs, there are two competing investment products available: retirement income funds and managed payout funds. Several major mutual fund companies such as American Funds, Fidelity, and Vanguard offer either one or both of them. Each of these funds is a fund of funds, provides an income at an irregular rate, and strives to preserve capital. These funds are not popular among retirees and, as a result, have a paltry \$757 billion and \$6 billion in AUM, respectively, as of 2019. A problem with these funds is that they do not create additional value to justify the management fee. As discussed in the previous section, they neither guarantee a lifetime income stream nor provide a fixed income stream. Additionally, retirees themselves can easily replicate the risk and return profile of these funds using a portfolio of low-cost ETFs. When they need money, they can simply sell shares of the ETFs they hold. The following table compares and contrasts VIRA with SPIAs (which are the most closely related to VIRA among various types of annuities), retirement income, and managed payout funds.

Table 1: Comparison between VIRA and competing products

	VIRA	SPIA	Retirement Income Fund	Managed Payout Fund
Product type	SMA/Actively managed open-end fund	Insurance	Fund of funds	Fund of funds
Investment style	Equity-tilted	Fixed income securities-based	Fixed income securities-tilted	Balanced
Lifetime income guarantee	Minimum lifetime income guaranteed conditional on the insurer's financial stability and coverage of the	Guaranteed conditional on the insurer's financial stability and coverage of the guarantee	No	No

	guarantee fund of the annuitant's state	fund of the annuitant's state		
Tail risk hedging	Yes	N/A	No	No
Capital appreciation potential	Yes	None or limited	Limited	Yes
LTC and critical illness protection	Multiple financial hardship protection measures are built in	No*	No	No
Payout rate	Fixed and COLA; VIRA holders themselves set and change the payout rate	Fixed but not COLA unless a COLA rider is added at an extra cost; The annuity issuer sets an irreversible payout rate	Neither fixed nor COLA; The fund company sets a payout rate that varies over time	Neither fixed nor COLA; The fund company sets a payout rate that varies over time
Liquidity	Yes	No	Yes	Yes
Ability to bequeath	Yes	No unless a death benefit rider is added at an extra cost	Yes	Yes
Fees and other expenses	Class A: No load, and an annual expense ratio of 0.45% and 0.15% for the Payout and Reserve Account, respectively Class B: A front-end load of up to 3%, and an annual expense ratio of 0.25% and 0.075% for the Payout and	A sales commission of up to 3%, and annual administrative and other fees of 0.50 to 1.2%**	A front-end load of up to 5.09% or a deferred load of up to 1.48% for load funds, and an average annual expense ratio of 0.47%	A front-end load of up to 5.22% or a deferred load of up to 1.60% for load funds, and an average annual expense ratio of 0.82%

	Reserve Account, respectively***			
AUM	N/A	\$2.7 tril.****	\$757 bil.*****	\$6 bil.*****
Number of annuity companies/funds	1	5,200*****	270*****	28*****

*Some annuities offer an LTC insurance rider.

**Some investment companies, such as Ameritas Life, Fidelity, Schwab, T. Rowe Price, and TIAA-CREF, and Vanguard sell direct-sold annuities with no sales commissions and no surrender fee. See

<https://www.annuity.org/annuities/fees-and-commissions/>

*** subject to change

**** annuity.org

***** IBISWorld

***** MutualFunds.com

***** Morningstar

5. Asset Management

This section discusses how to manage the assets held in VIRA. I start with a discussion of VIRA’s tail risk hedging strategies which are an integral part of asset management. And then I briefly discuss how VIRA allocates the capital under management to various classes of assets. This section ends with an illustration of the results of a Monte Carlo simulation analysis based on a hypothetical asset allocation and implementation of the tail risk hedging strategies. The results show the probability that the Payout Account becomes insolvent with different payout rates over various payout periods, the expected balance of the Reserve Account upon insolvency of the Payout Account, and the expected annuity income if the balance is converted into an SPIA.

(1) Tail Risk Hedging

“Far more money has been lost by investors preparing for corrections, or trying to anticipate corrections, than has been lost in corrections themselves.” – Peter Lynch

There have been 22 market crashes/selloffs since 1817 when the NYSE was created, which means that a market crash/selloff occur every nine years on average in the US stock market. Therefore, market crashes are indeed a rare tail event. Most of the prospective VIRA buyers are expected to be in their 50s and 60s with low risk tolerance. For that cohort of investors, the market crashes they are expected to encounter a few times in the rest of their life could have a lifelong adverse impact on their retirement savings. The reason is that they may not have sufficient investment time to recuperate the capital loss they suffer from a market crash if they maintain a buy-and-hold policy and attempt to ride out the tail event periods. Even the mere possibility of a market crash might have an adverse effect on their unhedged retirement portfolio since the expectation of a severe capital loss might hinder their rational financial decision-making process. For those investors in their 50s and 60s with low tail risk tolerance, therefore, tail risk hedging of their retirement assets is essential to their post-retirement financial welfare. VIRA offers retail investors tail risk hedging that has been available only to institutional investors.

There are two approaches to tail risk hedging: dynamic asset allocation and direct tail risk hedging. Advocates of dynamic asset allocation argue that it is cost effective. Their argument is based on the premise that tail risk hedging not only generates a trading loss because market crashes are a rare event, but also carries an opportunity cost caused by the shift of the capital from the return-generating assets to an unprofitable tail risk hedge portfolio. Such a premise does not consider an equity premium that the shift toward a more conservative asset composition would cause to lose. As Leibowitz and Bova (2010) and Bhansali (2010) suggest, furthermore, a tail risk hedge portfolio provides liquidity to allow investors to take advantage of the opportunities created by market crashes/selloffs.

It took us several years to develop direct tail risk hedging strategies, a core part of VIRA. The strategies require allocating as little as 0.5% of AUM of the Payout Account to a portfolio dedicated to tail risk hedging. The dedicated tail risk hedge portfolio consists of two sub-portfolios: a permanent, passive hedge portfolio and an actively managed one. The former portfolio is designed to generate an income on a regular basis, while the latter one is constructed to incur a trading loss in the absence of market crashes, but yield an outsized trading gain in a tail event. The dedicated tail risk hedge portfolio in isolation is designed to make a non-negative return even if a market crash never happens in the future, which is distinct from most of other tail risk hedging strategies.

Table 2 compares the performance of VIRA with that of S&P 500 TR in the market crash periods of October 2008 through February 2009 and January 2020 through March 2020. When S&P 500 TR made a real return of -51.70% and -19.95%, respectively, during those two periods, the Payout Account of VIRA would have returned 28.45% and -2.37%, respectively, and the Reserve Account COLA 15.32% and COLA 9.90%%, respectively. The impressive performance of AUM of the Payout and Reserve Accounts in such tumultuous periods verifies the effectiveness of VIRA’s tail risk hedging system.

Table 2. Drawdowns in the market crash periods

Market Crash Period	Inflation-Adjusted Drawdowns		
	Payout Account Asset Portfolio	Reserve Account Asset Portfolio	S&P 500 TR
11/2007–2/2009	28.45%	15.32%	-51.70%
1/2020–3/2020	-2.37%	9.90%	-19.95%

(2) Asset Allocation

According to a recent report on retirement assets by the Investment Company Institute (ICI), equities and equity funds account for more than 50% of IRAs and DC plan funds held by individuals in their sixties. In light of the revealed risk and return preferences of prospective VIRA buyers, VIRA takes an equity-tilted approach to managing assets held in the Payout Account. Another reason is that AUM of the Payout Account are protected from stock market crashes by VIRA's tail risk hedging system. In contrast, AUM in the Reserve Account are invested in fixed-income securities, commodities, and other assets deemed to be uncorrelated or negatively correlated with equities. The purpose is to protect AUM in the Reserve Account when the Payout Account goes under due to stock market crashes/selloffs.

The expected return is only part of the equation in asset management. Investment risk is even more important part in light of the objective of VIRA asset management, which is to meet payout obligations and preserve capital. Furthermore, Bhansali, et al. (2014) find that expected maximum drawdown of a portfolio rests mostly on volatility. To control volatility, therefore, VIRA will diversify AUM across asset classes, countries, industries, and factors. In particular, equity investment will be extended to the greater China region and Japanese markets that have historically a low correlation with the US market. Furthermore, VIRA will construct the asset portfolio in the Payout Account such that it resembles the minimum variance portfolio.

In selecting individual stocks, VIRA will give more weight to small-cap, value stocks as opposed large-cap, growth stocks in the equity portfolio of the Payout Account. For last two decades, large-cap, growth stocks have outperformed small-cap, value stocks. Our research indicates, however, that the trend is about to be reversed, and small-cap, value stocks may lead

the stock market over the next decade as was the case in the stagflation period of 1970s. In addition, only the small-cap, value stocks managed to make a positive return in the 2000-2003 Internet bubble burst period. Finally, the oil sector, which represent the value sector as a whole, may reclaim their position in the market, and is expected to outperform over the next decade. We are not the only one who predicts dominance of small-cap stocks over the next decade. According to a report by Markets Insider on November 6, 2022, Bank of America also forecasts outperformance of small caps in next several years of stagflation. Bank of America offers the following reasons: "The profits of smaller companies are more insulated from government taxes, and the trend of localization over globalization favors the smaller cohort, as does fiscal stimulus measures. Small-cap stocks are also price takers not price makers so penalized less by inflation."

(3) Monte Carlo Simulation Analysis

In this section, I conduct a Monte Carlo simulation analysis based on the historical risk and return of several benchmark indexes to estimate the probability of depletion of the balance in the Payout Account and the expected balance in the Reserve Account upon insolvency of the Payout Account.

I consider a newly retired 65-year-old man with a five-year-younger spouse who have joint retirement savings of \$100. Suppose that the couple deposits their retirement savings with VIRA, which are split \$90/\$10 between the Payout Account and the Reserve Account. VIRA would transfer one-twelfth of COLA \$2 from the Payout Account to the Reserve Account every month. The couple is assumed to select one of four different payout rates of 3, 4, 5, and 6% of the COLA value of the money deposited with the Payout Account (\$90). VIRA is assumed to charge an annual management fee of 45 and 15 bps on the balance of the Payout and Reserve Accounts, respectively. Table 3 shows the risk and return statistics of various benchmark indexes that constitute the Payout and

Reserve Account asset portfolios used for the Monte Carlo simulation analysis. The Payout Account asset portfolio consists of small caps, high-dividend yield stocks, Nasdaq 100, and S&P 500 with a weight of 17% each, gold and long-term Treasury bonds with a weight of 13% each, and short-term Treasury bills and a tail risk hedge portfolio with a weight of 5.5% and 0.5%, respectively. Based on the historical risk and return of component assets, the Payout Account asset portfolio has a monthly mean logarithmic real return of 1.02% and a monthly standard deviation of 4.26%. The Reserve Account comprises gold, long-term Treasury bonds, and intermediate-term Treasury bonds, each with a 30% weight, as well as short-term Treasury bills with a 10% weight. As a result, the Reserve Account asset portfolio has a monthly logarithmic real mean return of 0.25% and a monthly standard deviation of 2.23%.

Table 3. Panel A: Payout Account asset portfolio composition

Asset	Weight	Monthly Mean Logarithmic Real Return	Standard Deviation	Estimation Period
Small Caps	17.0%	0.73%	5.95%	12/1956 to 12/2021
High-Dividend Yield Stocks	17.0%	0.67%	5.51%	1/1927 to 12/2021
Nasdaq 100	17.0%	0.91%	6.91%	12/1985 to 12/2021
S&P 500	17.0%	0.59%	5.37%	1/1926 to 12/2021 (S&P 90 prior to 3/1957)
Gold	13.0%	0.31%	5.53%	1/1970 to 12/2021
Long-Term Treasury Bonds	13.0%	0.23%	2.56%	1/1926 to 12/2021
Short-Term Treasury Bills	5.5%	0.03%	0.52%	1/1926 to 12/2021
Tail Risk Hedge Portfolio	0.5%	0.13%	4.28%	1/2007 to 12/2021
Payout Account	100%	1.02%	4.26%	Mean return over the period corresponding to each asset class: SD over 1/2007 to 12/2021

Table 3. Panel B: Reserve Account asset portfolio composition

Asset	Weight	Monthly Mean Logarithmic Real Return	Standard Deviation	Estimation Period
Gold	30%	0.31%	5.53%	1/1970 to 12/2021
Long-Term Treasury Bonds	30%	0.23%	2.56%	1/1926 to 12/2021
Intermediate-Term Treasury Bonds	30%	0.17%	1.36%	1/1926 to 12/2021
Short-Term Treasury Bills	10%	0.03%	0.52%	1/1926 to 12/2021
Reserve Account	100%	0.25%	2.23%	Mean return over the period corresponding to each asset class: SD over 1/1970 to 12/2021

One may notice that the expected monthly logarithmic real return for the Payout Account used in the Monte Carlo simulation analysis is significantly higher than the historical mean return for a traditional 60/40 portfolio. VIRA's tail risk hedge portfolio is the major contributor to enhancing the expected real return. The expected monthly real return without the tail risk hedge portfolio would be 0.68% compared with 1.02% with the hedge portfolio. Although I cannot guarantee the future performance of the tail risk hedge portfolio, I am cautiously confident in VIRA's tail risk hedging strategies.

Following Feldstein and Rangelova (2000), the simulation is based on the premise that the future mean return is itself uncertain, and there is a monthly variant in the actual returns, given an estimated mean return. I proceed with the simulation by drawing a future mean return from a normal distribution of the mean logarithmic real return and standard error for the Payout and Reserve Account asset portfolios. I then randomly generate 144, 180, 240, 300, 360, and 420 monthly returns from a distribution with that mean return and sample standard deviation. I

use these estimated returns to simulate the probability of depletion of the balance in the Payout Account and the expected balance of the Reserve Account after 12, 15, 20, 25, 30, and 35 years of investment and payouts. I repeat this process 10,000 times and tabulate the resulting ruin probability of the Payout Account by the payout rate, and distribution of the balance of the Reserve Account.

Figure 2 exhibits the ruin probability of the Payout Account after 12 to 35 years of investment with the four different payout rates. The graphical representation reveals that the Payout Account with a payout rate of 3% or 4% is most likely to remain solvent with a ruin probability of below 3% after 35 years of payouts. In contrast, the Payout Account with a 6% payout rate stands alone with a ruin probability of as high as 14% in 35 years, separate from the rest of payout rates. This simulation result suggests that a payout rate of 6% or higher is not a viable choice for the couple.

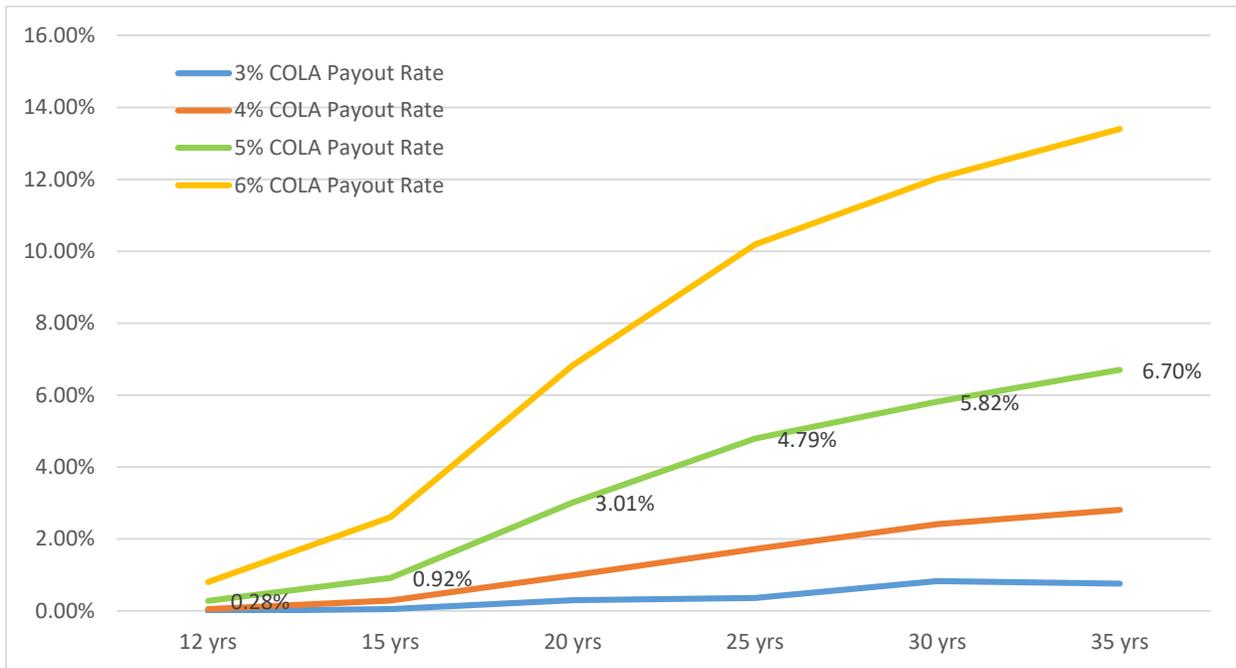
The ruin probability with a 5% payout rate remains below 1% after 15 years and jumps to around 3% in 20 years. Then, it leaps further to 5%, 6%, and 7% in 25, 30, and 35 years, respectively. This suggests that the Payout Account with a 5% payout rate has a fairly good chance of remaining solvent in 20 years. Even if the balance is depleted in the Payout Account in 20 years, Table 4 indicates that the Reserve Account would accumulate a median COLA balance of \$72 by that time. Table 5 shows how much NoneCOLA annual income the couple would have if they chose to convert the balance in the Reserve Account into an SPIA for a joint life couple in various years after the initial investment. According to the table, the couple would have a NoneCOLA annual income of \$7 for the rest of their lives at the ages of 85 and 80.² This

² The NoneCOLA annual income payout is estimated with the annuity calculator wizard provided by immediateannuities.com

means that they would be able to secure a lifetime annual NoneCOLA payout rate of as high as 7%.

The simulation results make evident the advantage of VIRA compared to traditional life annuities. Table 5 shows that the median COLA balance of the Reserve Account could grow to \$94 in 25 years, \$119 in 30 years, and \$148 in 35 years, thanks to the power of compounding. This simulation result suggests that the couple might be able to accumulate enough balance in the Reserve Account to cover LTC or critical illness expenses and/or pass it to their beneficiaries.

Figure 2. Estimated probability of depletion of the balance in the Payout Account by the payout rate



* COLA is short for Cost-Of-Living-Adjusted

Table 4. Summary statistics of the simulated distribution of the balance of the Reserve Account over 12 to 35 years

Years since investment	Mean	SD	Min	Q1	Median	Q3	Max
12 yrs.	\$43.66	\$8.31	\$21.95	\$37.75	\$42.78	\$48.52	\$93.29
15 yrs.	54.40	11.51	25.01	46.13	53.09	61.01	119.75
20 yrs.	74.49	18.21	31.73	61.47	72.02	84.97	166.77
25 yrs.	97.91	26.80	34.49	78.53	94.03	112.77	273.34
30 yrs.	125.37	38.19	42.02	97.88	119.35	146.09	409.27
35 yrs.	157.11	51.83	42.37	120.54	148.06	184.43	522.74

Table 5. Conversion of the balance in the Reserve Account into an SPIA for a joint life couple

	12 yrs.		15 yrs.		20 yrs.	
	COLA Balance	NoneCOLA Annual Annuity Income	COLA Balance	NoneCOLA Annual Annuity Income	COLA Balance	NoneCOLA Annual Annuity Income
Minimum	\$22	\$1.69	\$25	\$2.09	\$32	\$3.18
Median	\$43	\$3.30	\$53	\$4.44	\$72	\$7.15
Maximum	\$93	\$7.15	\$120	\$10.04	\$167	\$16.58
	25 yrs.		30 yrs.		35 yrs.	
	COLA Balance	NoneCOLA Annual Annuity Income	COLA Balance	NoneCOLA Annual Annuity Income	COLA Balance	NoneCOLA Annual Annuity Income
Minimum	\$35	\$4.36	\$42	n/a	\$42	n/a
Median	\$94	\$11.72	\$119	n/a	\$148	n/a
Maximum	\$273	\$34.03	\$409	n/a	\$523	n/a

6. Market for VIRA

VIRA is designed for IRA- and rollover-eligible DC plan account owners in their 50s or older. According to the Investment Company Institute (ICI), IRA and DC plan assets totaled \$13.9 trillion and \$11.0 trillion, respectively, at the end of 2021, and households with a head of household aged 55 or older owned 44% of retirement assets at the end of 2021. Therefore, the potential market size of VIRA is estimated at \$11.0 trillion.

A recent report on IRAs by ICI revealed that, in 2021, three-quarters of traditional IRA-owning households held them through investment professionals such as full-service brokerage and independent financial planning firms. Furthermore, in the same year, 70% of traditional IRA-owning households had a strategy for managing income and assets in retirement. 78% of traditional IRA-owning households with a strategy consulted a professional financial advisor when building retirement income and asset management strategies. These findings suggest that the VIRA provider needs to develop partnerships with investment advisors, financial planners, and wirehouse brokers-dealers to market VIRA.

7. Concluding Remarks

In this paper, I proposed an innovative retirement financial product called VIRA. VIRA attempts to offer its holders a minimum lifetime income guarantee and multiple protective measures for LTC and critical illness, the two essential elements of financial security sought by retirees. In particular, VIRA allows its holders to convert the balance in the Reserve Account into an SPIA when VIRA misses the scheduled payouts. In addition, VIRA helps ease the

financial burden of its holders in the event of LTC or critical illness by establishing a dedicated account and a long-term loan program.

VIRA also addresses the widely cited shortcomings of traditional immediate life annuities. One of the main reasons that retirees are unenthusiastic about traditional life annuities is a lack of the opportunity for appreciation of their retirement assets in value through stock market participation. VIRA takes an equity-tilted approach in the assets held in the Payout Account to meet the risk and return preferences revealed from various surveys of retirees and near-retirees. Like any other investment product, however, the success of VIRA will ultimately depend on its return performance and ability to hedge tail risk.

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