Integrating Whole Life Insurance into a Retirement Income Plan

Emphasis on Cash Value as a Volatility Buffer Asset

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About the authors

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Dr. Pfau was selected for the *InvestmentNews* Power 20 in 2013 and 40 Under 40 in 2014, the *Investment Advisor* IA 25 list for 2014 and *Financial Planning* magazine's Influencer Awards. He is a two-time winner of the *Journal of Financial Planning* Montgomery-Warschauer Award, a two-time winner of the Academic Thought Leadership Award from the Retirement Income Industry Association and a best paper award winner in the retirement category from the Academy of Financial Services.

He also contributes to the curriculum of the Retirement Income Certified Professional (RICP) designation. He is a co-editor of the *Journal of Personal Finance*. He has spoken at the national conferences of organizations such as the CFA Institute, FPA, NAPFA, AICPA-PFP and AFS. He holds a doctorate in economics from Princeton University and publishes frequently in academic and practitioner research journals. He hosts the Retirement Researcher website, and is a monthly columnist for *Advisor Perspectives*, a RetireMentor for MarketWatch, a contributor to *Forbes* and an expert panelist for *The Wall Street Journal*. His research has been discussed in the print editions of *The Economist*, *The New York Times*, *The Wall Street Journal* and *Money*.

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Dr. Finke is a nationally renowned researcher focusing on the value of financial advice, financial planning regulation, investments and individual investor behavior. He was named to the 2012 *Investment Advisor* IA 25 list and the 2013 and 2014 *InvestmentNews* Power 20. His research questioning the 4 percent rule was published in the *Journal of Financial Planning* and won the 2014 Montgomery-Warschauer award for the most influential article. He also won the award with Thomas Langdon in 2013. He was selected to present his research on financial literacy and aging at the 2015 MIT Center for Finance and Policy Conference, and on financial advice and the implications of a low-return environment at the 2013 and 2017 Wharton Pension Research Council conferences.

Dr. Finke has published more than 50 peer-reviewed articles and is widely quoted in many leading consumer publications, including *The Wall Street Journal*, *The New York Times*, *Time* and *Money*. Dr. Finke also writes monthly articles translating academics topics for practitioners in his role as contributing editor for Research on Wealth. Dr. Finke served as president of the American Council on Consumer Interests and is a former editor of the *Journal of Personal Finance*.

Executive summary

We investigate whether more efficient retirement income solutions can be obtained through careful efforts to combine investment portfolios, income annuities, and whole life insurance into an overall retirement income plan. Specifically, this white paper serves as a follow-up to the Pfau article that examines the covered asset strategy, which combines investments with whole life insurance and an income annuity in retirement. In this white paper , we examine another potential role for whole life insurance in retirement, which is to use the cash value of the policy as a buffer asset to help manage market volatility and sequence of returns risk for retirees.

A basic investment portfolio allocates assets between stocks and bonds. Stocks are volatile investments which focus on growth, and bonds are generally used to diversify and reduce overall portfolio volatility. The benefits from investment strategies are liquidity and upside growth potential. But investments alone do not necessarily create an efficient retirement plan. By efficiency, we mean that there may be an alternative way to structure retirement assets and life insurance during working years, to be able to support a higher level of retirement spending, as well as an equal or greater amount of financial assets to be available as part of a legacy.

Actuarial science principles can contribute to better retirement outcomes. Actuarial science allows personal retirement planning to be treated more like a defined-benefit pension plan. These plans can pool financial market risks between different cohorts and can pool longevity risk between different individuals within the same cohort. By including actuarial science, longevity-protected spending can be determined in advance through these pooling mechanisms. In contrast, those relying on their own devices to manage market and longevity risks must behave conservatively regarding market return assumptions and the planning horizon, lest they run out of assets. And even with conservative spending assumptions, investment portfolios do not have guarantees and remain vulnerable to depletion.

To compare with investments, we can think of the combination of whole life insurance and income annuities as "actuarial bonds" with an average maturity equal to life expectancy. These financial products, which invest primarily in a fixed income portfolio, can better hedge a retiree's personal income needs. By combining them, the overall planning horizon can essentially be fixed at something close to life expectancy, as whole life insurance provides a higher implied return when the realized lifetime is short, and income annuities provide a higher return when the realized lifetime is long. This is a more effective way to use fixed income assets than as a portfolio volatility reduction tool.

Another option is to use the cash value as a volatility buffer to help manage sequence risk in retirement. Cash value does not experience downside risk for capital losses in the face of rising interest rates. It is guaranteed to grow and can provide a temporary resource to supplement retirement spending rather than being forced to sell portfolio assets at a loss during poor market environments. With this management of volatility and reduction of the sequence of returns risk triggered by needing to sell assets at a loss to meet spending goals, the volatility buffer has the potential to sustain an increased standard of living from a given base of assets saved for retirement than strategies that rely only on an investment portfolio.

We confirm these statements through case studies with 35-year-old and 50-year-old couples, comparing five retirement scenarios for each couple. The first scenario uses a term life policy to meet life insurance needs until retirement, and otherwise draws retirement income with systematic withdrawals from an investment portfolio. This is the "buy term and invest the difference" strategy that is popular with investment managers. The second scenario maintains a permanent death benefit with whole life insurance and uses a single-life income annuity along with systematic withdrawals from the remaining non-annuitized assets for retirement income. This is the “covered assets strategy.” Retirees may feel more comfortable with the idea of partial annuitization when their household balance sheet also includes whole life insurance in retirement, because the death benefit from the whole life insurance may be viewed as a replacement of the monies used for the income annuity. The third scenario is a pure volatility buffer strategy in which the cash value can be fully used, up to limits to ensure that the policy loan balance does not exceed the total policy cash value, as a temporary source of spending in years after market downturns. The idea is to avoid selling portfolio assets at a loss when they are down and give them more opportunity to recover. The fourth and fifth scenarios combine elements of the covered asset strategy and volatility buffer. The retiree purchases an income annuity with the idea that the death benefit of the whole life policy will return the premium to their heirs, but is also willing to use the cash value as a volatility buffer. Doing this will reduce the death benefit so that it will not truly be a covered asset. In scenario four, a limited volatility buffer is used, as cash value is only treated as a volatility buffer up to the cost basis of the policy. In scenario five, cash value can be fully used as a volatility buffer in the same way as in scenario three.

By tracking the course of income and legacy wealth through age 100 for each scenario, we find that the inclusion of whole life insurance into the financial plan can allow for greater income throughout retirement through the covered asset strategy, through the volatility buffer strategy, or through a combination of the two. Our simulations show that the risk pooling features of the income annuity are essentially a more significant factor in boosting retirement income than is the greater upside potential offered through increased reliance on investments. We also show that the volatility buffer does provide an effective way to help manage sequence of returns risk. Incorporating the whole life insurance, even though it requires larger premiums than term life insurance, supports a higher income level while also supporting a larger legacy. Traditionally there is a tradeoff between enjoying more income and leaving a larger legacy, but this integrated approach allows for increases in both income and legacy. **We can indeed conclude that an integrated approach is a more efficient retirement income strategy.**

We find substantive evidence that an integrated approach with investments, whole life insurance, and income annuities can provide more efficient retirement outcomes than relying on investments alone. Because whole life insurance can play an important role in producing more efficient retirement outcomes, younger individuals planning for both retirement and life insurance needs may view whole life insurance in a new light as a powerful retirement income planning tool. The recent conventional wisdom of “buy term and invest the difference” is less effective than many realize when viewed in terms of the risk management needs of a retirement income plan.

Introduction

How should we invest to create a stable income in retirement? The best way to think of retirement investing for income is to imagine a series of cash flows, drawn from an investment account, that fund spending in the future. If my goal is to spend $80,000 per year, then I need to withdraw $80,000 from my portfolio one year from today, $80,000 in two years, $80,000 in three years, and so on.

One of the most important risks a retiree faces is the possibility that their investment portfolio will fall in value early in retirement. Why is this such a significant risk? First, the retiree's investment portfolio is likely the largest before he or she begins drawing down assets to fund the annual spending goal. Second, the goal spending amount established early in retirement is based on the size of a retiree's nest egg.

Consider the following example. Susan should naturally expect to spend more from a $2.5 million portfolio than Bill can spend from a $2 million portfolio. Since Susan has saved more during her working years, she should expect to spend more in retirement. If Susan and Bill follow the so-called 4 percent rule to fund spending over a 30-year retirement, Susan will spend $100,000 the first year and Bill will spend $80,000.

Example

	Susan	Bill
Initial Nest Egg	$2,500,000	$2,000,000
4% Spending	$100,000	$80,000
1st Year Return	-20%	0%
Year 1	$1,920,000	$1,920,000
Year 2 Spending	$100,000+	$80,000+

None of us knows the so-called sequence of returns on stocks and bonds that we'll receive from the markets during our first year of retirement. We may be fortunate and see substantial growth in stocks and a high yield on bonds. Or we may be unlucky and experience a market correction in our stock portfolio or a spike in interest rates may cause the value of our bond portfolio to fall. This is the essence of market risk. Sometimes markets will give us good news, sometimes we won't be as lucky.

If Susan's $2.5 million portfolio declines by 20 percent the first year and she withdraws $100,000 at the beginning of the year, she will be left with a portfolio of $1.92 million. Bill starts with a $2 million portfolio and withdraws $80,000 to fund spending, but Bill experiences a flat market with a total return of 0 percent. Even with no gains in his portfolio Bill is now in the exact same position as Susan after the first year with a portfolio of $1.92 million. But are Bill and Susan equally likely to run out of money? Unfortunately, even though Susan saved more during her working life she is now in a more dangerous financial position than Bill after only one year.

Susan, who was initially the wealthier retiree, now faces funding $100,000 plus inflation per year for the next 29 years. Bill, the less wealthy retiree, needs to fund only $80,000 per year plus inflation for the same amount of time. Each needs to fund their spending goal with the same $1.92 million portfolio. Clearly, Susan is more likely to run out of money.

Susan has fallen victim to the risk of low or negative portfolio returns early in retirement, commonly referred to as "sequence of returns risk." Simply put, a retiree doesn't know what investment returns the market will provide early in retirement. Stock and bond returns are random, and no one knows if they will be higher or lower than average early in retirement when they will have the biggest impact on a retiree's ability to generate income over their lifetime.

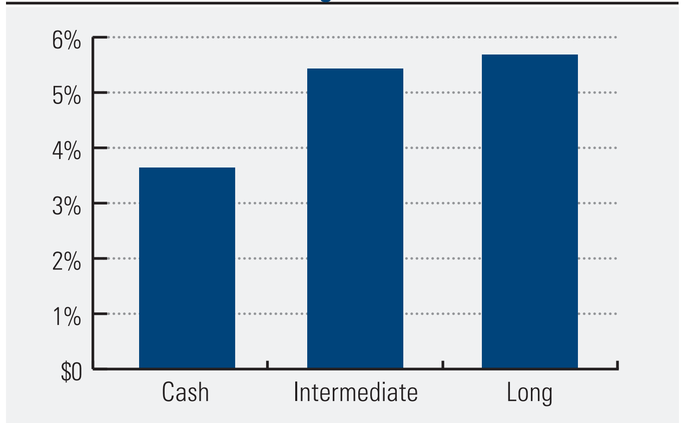
Low returns early in retirement will have a devastating impact on the sustainability of a retirement portfolio. Simulations show that returns in the first decade of retirement have a greater impact on the likelihood that a retiree will run out of money than returns over the subsequent 20 years (Milevsky & Abaimova, 2006). If a retiree can avoid experiencing low returns early in retirement, they may be able to avoid the risk of running out of money late in retirement.

Reducing sequence of returns risk

How can a retiree reduce sequence of returns risk early in retirement? They can hold a greater percentage of investments in safe assets such as bonds or cash. Bonds that have the lowest annual volatility in returns are referred to as cash-like assets (or short-term bonds). A familiar type of short-term bond held by consumers is a 1-year certificate of deposit (CD). Short term means that an investor's cash is returned within a relatively short time period, usually up to two years. Fully liquid investments, like a checking or money-market account, can immediately be redeemed for cash but will have returns that are even lower than a short-term bond fund.

As depicted in **Figure 1**, short-term bonds (cash) also have the lowest historical returns. So there is a clear cost in expected portfolio returns to holding short-term bond investments early in retirement. Bonds that have a higher expected return, those with a longer term until the cash is received, also have a higher historical volatility. Historically, investors have been able to get higher returns for holding longer-term bonds. But they have also faced higher volatility. And volatility early in retirement can be dangerous.

Figure 1: Average returns from 1926–2017 on cash, intermediate-term, and long-term bonds in the U.S.

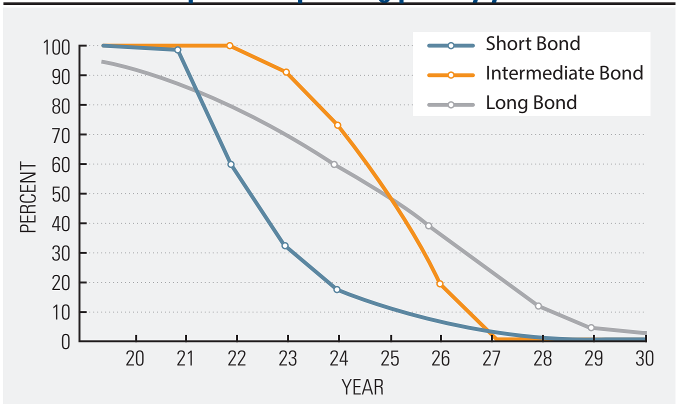


A retiree then faces two options for investing the safe portion of their portfolio early in retirement. Unfortunately, each involves a compromise that can increase sequence of returns risk. Placing assets in short-term bonds essentially locks in lower returns from bond investments early in retirement. But investing in long-duration bonds exposes the retiree to the risk that interest rates will rise early in retirement, which could result in not just low positive returns but a loss in the bond portfolio.

This is illustrated in **Figure 2** using Morningstar projections of future bond returns that begin at today's low rates and are expected to rise in the future. **Figure 2** shows simulations of many possible paths in future bond returns. Although the average yield on bonds is expected to rise slowly, in some simulations interest rates will rise sharply in retirement (and in others interest rates will fall). We do not know exactly what interest rates will look like in the future, but we do know, based on history, that they will likely fall within a specific range and can estimate using a random projection (also known as Monte Carlo analysis) what will happen to a retirement nest egg in all of these plausible scenarios.

Figure 2 follows the common 4 percent rule, in which retirees withdraw 4 percent of their initial retirement savings balance and increase this amount by the rate of inflation each year. The simulation clearly shows that investing in short-term bonds eliminates any chance that the bond portfolio will run out of money in fewer than 21 years. After the 21st year, however, the probability of success falls rapidly. By the 23rd year, there is more than a 50 percent chance that the client will have exhausted their retirement savings.

Figure 2: Probability that a retirement portfolio will be able to fund a 4 percent spending path by year



Longer-term bond investments will last longer, but they are also more risky. A retiree has the best chance that their bonds will be able to fund a 4 percent rule spending goal for more than 25 years if they invest in long-term bond funds. Unfortunately, investing in long-term bonds will also result in the highest probability that they will run out of money before 22 years. Why? In some of the simulations, interest rates will rise quickly early in retirement resulting in an investment loss in the bond portfolio.

The risk of loss in a bond portfolio is the result of a concept known as bond duration. Duration measures the average number of years until an investors cash is returned. Longer duration has historically resulted in higher returns. But longer duration also increases the risk of loss.

A 1 percent increase in interest rates, such as from 3 percent to 4 percent, will result in a loss in bonds that is roughly equal to the duration of the bond. For example, according to Morningstar data the average (median) long-term bond will have a duration of about 11 years. If interest rates rise by 1 percentage point, the long-term bond portfolio will fall in value by 11 percent. If interest rates rise from 3 percent to 5 percent, a $500,000 bond portfolio will fall to less than $400,000. This is the interest rate risk of holding long-term bonds.

The power of smoothing risk in life insurance cash value

Dividends on life insurance cash value have historically resembled the returns on a high quality, corporate long-duration bond portfolio, with one important difference: the annual volatility in these dividends is far lower than the volatility on a long-term bond portfolio. Insurance companies who invest in bonds are able to smooth returns for policyholders in a way that provides a buffer against short-term interest rate volatility. Cash value is not exposed to interest rate risk and capital losses. Thus, it can be viewed as a buffer asset, and buffer assets can be useful to a retiree.

This reduction in risk is particularly valuable for new retirees. As an example, let's consider a new retiree who is investing $500,000 to fund safe spending in retirement. In a short-term bond, such as a 1-year CD paying 1 percent interest, the retiree will withdraw $20,000 at the beginning of the first year and the remaining $480,000 will grow to $484,800.

Had the retiree chosen a longer-duration bond with a 3 percent yield, the balance at the end of the first year would instead be $494,400. By lengthening the duration of cash flows, the retiree is now able to grow their asset base by nearly $15,000, which can replace about 75 percent of the amount withdrawn to fund spending that year. Obviously, getting a higher return on bond investments will stretch out the number of years that the retiree can receive a steady income from these assets.

Illustration of the potential benefit of a term premium for bonds

	Certificate of Deposit	Long-Term Bond
Initial Balance	$500,000	$500,000
Initial spending	$20,000	$20,000
Return in Year 1	$4,800 (1%)	$14,400 (3%)
End of Year Balance	$484,800	$494,400

Of course, with greater expected return comes greater risk. What will happen to a long-term bond portfolio if yields on long-term bonds increase by 1 percent, from 3 percent to 4 percent, during the first year of retirement? If the average duration is 11 years, then the bond portfolio will decline by 11 percent from $480,000 to $432,000. And the next year, the retiree may withdraw $20,500 to keep up with 2.5 percent inflation from this $432,000 portfolio. It is easy to see that losses such as these early in retirement will increase the risk of running out of money even earlier than if the retiree had invested in CDs.

Illustration of the risk of long-term bonds if interest rates rise 1%

	Certificate of Deposit	Long-Term Bond
Initial Balance	$500,000	$500,000
Initial spending	$20,000	$20,000
Return in Year 1	$4,800 (1%)	-$38,000 (-11%)
End of Year Balance	$484,800	$432,000

A retiree who owns a whole life insurance policy pays premiums in excess of the cost of providing life insurance coverage for that year (the mortality charge) during their working years. In other words, they pay more than the cost of obtaining term life insurance during these years in order to fund the cost of maintaining a death benefit over their lifespan. This is the essence of whole life insurance.

The excess premiums are invested by the insurance company to cover the future costs of insuring the retiree. An important option contained in a whole life policy contract is the ability of a retiree to withdraw these excess premium dollars in the form of cash value. This cash value grows over time in retirement when declared dividends are reinvested in the policy at a rate that has historically resembled a safe, longer-duration corporate bond.

A 65-year-old retiree with, for example, $500,000 of cash value in a sample whole life policy whole life policy, paid up at the beginning of retirement, is projected to see their cash value grow to $522,241 at age 66, assuming dividends are declared as projected. Even if interest rates rise during the year, the cash value that the retiree can access to fund spending will remain $522,241.

Cash value has two primary advantages over traditional bond investments in retirement. Cash value is expected to grow at a rate that exceeds short-term bonds, which are held primarily for safety as a cushion (or buffer) against investment losses early in retirement. Cash value can substitute for short-term bonds as a buffer asset while providing growth comparable to long-term bonds.

Cash value also has an important advantage over long-term bonds. Growth will resemble that of long-term bonds during retirement, but the retiree will be shielded from sequence of returns risk through the interest smoothing mechanism provided through the insurer. If interest rates rise, the retiree will be able to access the cash value to fund spending without suffering a significant depletion of their nest egg. As we have seen, a retiree who experiences a loss in their long-term bond portfolio early in retirement is at greater risk of running out of money earlier than the investor who held lower-yield, safer short-term bonds. In essence, cash value provides the buffering benefit of a short-term bond portfolio with the expected growth of a long-term bond portfolio.

Buffer assets and stocks

An additional advantage of buffer assets such as life insurance cash value is their ability to provide a funding "bridge" that allows investors to avoid liquidating assets that have experienced a temporary decline in value. If stocks fall in value early in retirement, an investor can choose to withdraw cash value from the whole life policy to fund their spending goal without selling stocks after they have fallen in value.

The use of buffer assets such as cash value is an effective tool to improve the sustainability of a stock portfolio if stocks are mean reverting. This means that stocks tend to rise and fall predictably during business cycles. A market correction will result in stocks that are priced below their fundamental value, and long-term investors who hold these stocks are rewarded with higher expected returns when stocks recover.

Historical data from 20 countries using over 2,500 combined years of stock returns shows that stock in 18 out of 20 countries, including the United States, exhibit statistically significant mean reversion that rewards investors who hold stocks for a longer period of time (Blanchett, Finke and Pfau, 2013).

Retirees are both long-term and short-term investors. They will sell assets from their portfolio to fund spending in one year, two years, three years in the future and so on. They will also hold assets that they plan to liquidate in 15, 20, or even 30 years in the future.

If retirees face a bear market for stocks early in retirement, they may be forced to liquidate stocks that have fallen below their fundamental value and might otherwise prove essential in funding long-term spending after they subsequently recover in value. The only alternative to liquidating stocks following a decline in stock price is to liquidate one's bond portfolio to fund spending. This again results in the tradeoff between holding safer, short-term bonds to fund immediate spending needs or hold higher-yield, long-term bonds and face the risk that these too will fall in value early in retirement.

Perhaps the greatest risk that retirees face is the possibility that stock prices will fall early in retirement while bond assets also decline due to a rise in interest rates. If this happens, the value of a buffer asset such as cash value life insurance will provide the greatest protection against outliving assets.

In the remainder of the white paper , we will test this for two case studies of couples planning for retirement. For a given base of savings, they will consider alternative ways to allocate between their 401(k), life insurance, and income annuities. We simulate the performance of these retirement income strategies in terms of their potential to support retirement spending and legacy in retirement. The five strategies include: a "buy term and invest the difference" approach; a covered asset strategy; a volatility buffer strategy; and two further strategies combining elements of the covered asset and volatility buffer approaches.

Scenarios

This section provides an explanation about how we will compare life outcomes for households that do and do not purchase a whole life cash value policy to illustrate how the use of cash values can improve the safety of a retirement withdrawal strategy.

Case study: 35-year-olds Steve and Susie

Steve and Susie are a married 35-year-old couple with two children. Steve is employed and Susie is a homemaker. Steve is seeking an additional amount of life insurance death benefit of $400,000 that, along with his other life insurance, will support his family in the event of his death prior to age 65.

Steve presently has $50,000 saved in a 401(k) plan with his employer, which is invested with an equity glide path strategy matching a typical target date fund. The asset allocation glide path is 80 percent stocks for ages 35–44, 65 percent stocks for ages 45–54, 50 percent stocks for ages 55–64, 40 percent stocks for ages 65–74, and 30 percent stocks for ages 75 and older. He would like to plan for retirement at 65, and he believes it will be possible to set aside $18,500 per year from his salary for his life insurance and 401(k) contributions. The $18,500 value represents the 401(k) employee limit, and we assume it grows with inflation over the next 30 years until his planned retirement date, and that the contribution limit is increased with a catch-up of $6,000 in today's dollars after age 50. Steve expects to be in the 32 percent marginal tax bracket in his pre-retirement and post-retirement years.

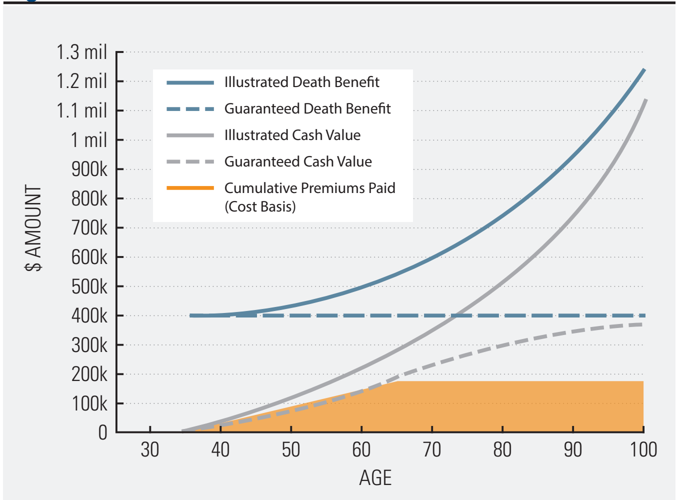
In all scenarios, we assume that Steve is directing at least enough to the 401(k) to satisfy the conditions for the highest possible company match, though we do not specifically model any company match when simulating retirement income. An employer match would increase income proportionately for all our scenarios. More generally, Steve and Susie may also have other resources in retirement which we are not analyzing. We are modeling all of the relevant features about how to make the best investment and insurance decisions for the $18,500 annual set-aside to meet life insurance needs and to obtain the most desirable retirement outcomes from this portion of their household resources.

Steve must decide whether to purchase a term life insurance policy to provide his family with financial protection against the loss of his income, or to purchase a whole life insurance policy which can provide the same protection against his premature death, as well as being integrated into his retirement income strategy. From the savings he can set aside for his insurance and retirement planning needs, he will pay for life insurance premiums and the taxes to cover those premiums (at a 32 percent marginal tax rate), and the remainder will go into his tax-deferred 401(k).

The term life policy he considers is a 30-year policy with a $400,000 death benefit and an annual premium of $539. This is based on a sample whole life policy illustration run in August 2018 for a 35-year-old male with preferred health status. Taxes on the pre-tax income required to cover this premium are $180. After paying the term life premium and taxes, he would contribute the remaining $17,781 per year to his 401(k). Because his insurance premiums are fixed and his savings will grow, the 401(k) contributions will grow to represent an increasing portion of his available pool of funds for investments and insurance over time.

The whole life policy Steve considers also carries an initial death benefit of $400,000 and the whole life insurance annual premium is $5,996. This premium is also based on a sample whole life policy illustration run in August 2018 for a 35-year-old male with preferred health status. It is a limited pay policy with premiums paid through age 65 when the policy has become fully paid up with an endowment age of 100. The nominal values for the death benefit and cash value (both illustrated and guaranteed) are shown in **Figure 3**. Unlike with term insurance, the death benefit has the potential to grow over time. Taxes to cover the whole life premium are $1,999, and so with a whole life policy Steve can contribute $10,505 per year to his 401(k) at age 35. Again, total 401(k) contributions will increase over time as a result of the pool of funds increasing with inflation and the catch-up contribution after age 50, while the whole life premium remains fixed in nominal dollars. While premiums end at age 65, cash value is able to grow sufficiently net of life insurance costs to match the death benefit at age 100.

Figure 3: After-tax whole life insurance values



For investments, the sustainable withdrawal rate method uses 10,000 Monte Carlo simulations for investment returns based on today's lower interest rates, but with built-in provisions to allow interest rates and market returns to trend back toward their higher historical averages over time. The methodology to create these simulations is more technical in nature and is provided in the appendix. We also set mutual fund fees equal to a typical 0.84 percent average portfolio administration cost and add a financial advisory fee of 0.75 percent based on the value of 401(k) assets under management. Therefore, the total fees equal 1.59 percent on all investment assets.

A review of the tax principles used herein is also in order. Investments are made in Steve's tax-deferred 401(k) plan. This means that taxes are not paid initially on the plan contributions, but any withdrawals from the plan will be subject to ordinary income tax rates. At retirement, Steve completes a rollover of his 401(k) to a traditional IRA. This is not a taxable event. With a tax deferred account, the government effectively owns a portion of the account as identified by the tax rate. Taxes are deferred until withdrawals are made. The legacy value of the IRA is in pre-tax terms. Therefore, the after-tax value of the IRA would have to consider ordinary income tax ramifications to determine the actual net after-tax value of these monies.

Life insurance premiums are paid with post-tax funds. But no taxes are due on the death benefit, making it a post-tax number. As well, a life insurance policy can be arranged so that funds can be borrowed from the cash value without being taxed, which does reduce the death benefit on a one-for-one basis for any dollars removed. A common use of life insurance within a retirement income strategy is sourcing the income from the policy's cash value in years after market downturns, in order to avoid selling financial assets at depressed prices. This uses the cash value as a volatility buffer. So that dollars in the 401(k) can be compared on an equal basis to death benefit and cash value numbers in the life insurance, the non-taxed life insurance amounts are inflated upward by the proportion of [1 / (1–tax rate)] to reflect an equivalent value to the 401(k) before taxes are taken into consideration. With a tax rate of 32 percent, pre-tax values are 47 percent larger than their after-tax values.

We are now ready to consider five scenarios for Steve and Susie as follows.

Scenario 1: Investments and term life insurance

The first scenario is the typical "buy term and invest the difference" case. Term insurance is used for economic capital protection during the working years, and its smaller premium allows for a greater amount to be contributed to the tax-deferred account. Financial assets are invested in a target date fund as described before. The term policy expires at Steve's planned retirement age of 65. This scenario represents the "investments only" logic that life insurance is only needed for human capital replacement before retirement, and term insurance fills this role at the lowest cost in order to contribute as much as possible to the 401(k).

With the accumulated investment assets, retirement income will be generated with a systematic withdrawal strategy. Steve seeks annual spending adjustments which match the Consumer Price Index. When it comes to building a retirement income strategy with investments, the starting point is William Bengen's 4 percent rule. Bengen (1994) initiated a line of research in which he found that an investor with 50–75 percent stocks who does not pay any investment management fees could sustain 30 years of inflation-adjusted spending at a level calibrated to 4 percent of the initial retirement date account balance. This finding is based on the worst-case scenario from US history when simulating retirements for hypothetical individuals using all the available rolling 30-year periods. Such systematic withdrawal strategies focus on a total returns investment portfolio perspective. Bengen assumes investors can precisely earn the underlying index returns net of any fees.

However, because most investors must pay investment management fees and will not earn the precise underlying indexed market returns, because 30 years is no longer as conservative of a planning horizon, because the 4 percent rule calls for a higher stock allocation than many retirees will be comfortable using, and because interest rates have rarely been as low as they are today, Bengen's historical simulations do not fully reflect the risks associated with the 4 percent rule spending strategy. But Steve and Susie will not retire for 30 years, and our simulations suggest there is a good chance that interest rates will be higher by the time they retire. Our simulations reflect this, but net of fees and with a 35-year planning horizon, as well as with a lower stock allocation more typical of target-date funds, we estimate that a 2.85 percent withdrawal rate provides a 90 percent chance that the investment portfolio will not deplete in retirement. Steve's strategy is to systematically withdraw 2.85 percent of their accumulated retirement date assets, and to then take withdrawals in subsequent years which reflect this initial level plus cumulative inflation, for as long as assets remain. Their choice of withdrawal rate affords them a 90 percent chance that they will be protected from the combined impacts of sequence of returns and longevity risk. Spending drops to $0 in the 10 percent of cases that the portfolio depletes.

Scenario 2: Investments, single-life income annuity, and whole life insurance

Scenario 2 incorporates whole life insurance into the retirement income plan through the covered asset strategy. The life insurance death benefit can provide the psychological support needed to purchase a life-only income annuity at retirement as part of an integrated plan combining investments, whole life insurance, and income annuities.

Upon reaching age 65 in 30 years, Steve and Susie will consider whether a single-premium immediate annuity (SPIA) might be a worthwhile addition to their retirement income plan. Income annuities offer a variety of options regarding whether income starts immediately or is deferred, whether income covers a single life or joint lives, whether there is a certain payment for a set number of years, whether any cost-of-living adjustments (COLA) will be made to benefits, and whether cash or installment refund provisions are included in the event of an early death. With the whole life death benefit, Steve can consider purchasing a single life-only immediate annuity at 65 on his life. A male life-only income annuity offers the highest payout rate (the most income) because the buyer offers the most "mortality credits" to the risk pool by accepting the higher short-term mortality risk. Steve and Susie can accept this risk because they have the permanent life insurance policy. The death benefit from his whole life insurance policy will replace the annuity income stream upon his death. If desired, Susie could then use part of the death benefit to buy another single-life income annuity.

To make it easier to track results over time, Steve will purchase a SPIA that includes a 2 percent annual COLA matching the assumed inflation rate, so that the annuity income adjusts to keep the purchasing power consistent throughout retirement. With this COLA, portfolio distributions also grow at the same rate of inflation and are comparable. The annuity is purchased with qualified retirement funds after Steve has stopped working and completes a rollover from his 401(k) to a traditional IRA.

Generally, it is difficult to predict what annuity rates will be in 30 years. Those rates will depend on interest rates and mortality projections at that time. Our market return simulations, which are described in the appendix, do allow for interest rates to increase on average from their currently low levels, suggesting on average that SPIA rates will be higher in 30 years than they are today. On the other hand, longevity improvements over the next 30 years will likely create downward pressures on annuity rates separate from any interest rate changes. We assume that these factors offset one another precisely such that SPIA rates in August 2018 will apply in the future as well. At that time, *https://www.immediateannuities.com* reports that a 65-year-old male could obtain a life-only SPIA with a 2 percent COLA offering an initial payout rate of 5.42 percent. This payout is higher than the sustainable spending rate from 401(k) assets because SPIA payouts are calibrated to life expectancy instead of age 100, and because SPIA payouts are based on fixed-income returns rather than the lower implied return required by needing a 90 percent chance that assets remain in a volatile investment portfolio.

At age 65, Steve purchases this income annuity with a premium amount equal to the pre-tax equivalent of the death benefit for the whole life policy at age 65. In simulations where the couple's 401(k) balance has not grown sufficiently to leave at least $100,000 remaining after the annuity is purchased (to provide the couple with a pool of liquid assets to support contingency expenses), then the couple only annuitizes the amount that leaves $100,000 of liquid investable assets (on a pre-tax basis) after the annuity is purchased. The annuity purchase is made with qualified funds inside the traditional Individual Retirement Account (IRA). Annuity income is then fully taxable at income tax rates as it leaves the qualified account.

After annuitization, the remaining portfolio balance will be utilized for retirement spending using a systematic withdrawal strategy that maintains a 90 percent probability that the account does not deplete by age 100. Even so, portfolio depletion is less drastic in this case, since at least the inflation-adjusted annuity income continues for life. Because this strategy, and the rest we will discuss, use whole life insurance with higher premiums, we can expect the 401(k) balance to be less at retirement.

However, the sustainable withdrawal rate for the investment portfolio may be higher because the asset allocation will be different. This is an important methodological point to discuss. With a whole life policy, the cash value is a liquid asset contained outside the financial portfolio. It behaves like fixed income, though it is not exposed to interest rate risk (i.e. the accessible cash value does not decline when interest rates rise). Cash value is not precisely the same as holding bonds in an investment portfolio, as there is not a practical way to rebalance the portfolio between stocks and policy cash value. Nonetheless, Steve will incorporate the cash value into his asset allocation decisions to maintain the overall proportion between stocks and “bonds” for household assets. For example, if the target date fund calls for a 50 percent stock allocation, then the actual stock allocation Steve uses will be 50 percent of the sum of the financial portfolio balance and the pre-tax value of life insurance cash value, divided by the portfolio balance. Though this could conceivably call for a stock allocation of greater than 100 percent when the cash value is large relative to the financial portfolio, we constrain the maximum possible stock allocation for the financial portfolio to not exceed 100 percent. This change in asset allocation, when viewed holistically, allows for a higher distribution rate while maintaining the same probability of success. Scenarios with whole life insurance treat the cash value as part of the fixed income allocation and adjust the stock allocation in the remaining investment portfolio to keep the overall targeted ratio between stocks and bonds at each age. This is important, because otherwise a strategy which combines an investment portfolio with the same asset allocation as before, with a conservatively invested whole life insurance policy, would create a more conservative overall asset allocation from the retirement balance sheet perspective.

Scenario 3: Investments and whole life insurance with full volatility buffer

Scenario 3 also uses whole life insurance with investments, but it does not include an income annuity. The difference for Scenario 3 is that whole life insurance is carried into retirement so that the cash value for this permanent life insurance policy can be used as a volatility buffer asset to help manage the sequence of returns risk for investment portfolio distributions. The cash value was not used in Scenario 2, but it becomes an additional tool in Scenario 3.

Whole life insurance cash value can be used as a volatility buffer to help manage the sequence of returns risk for investment portfolio distributions. Buffer assets held outside the portfolio, such as the cash value of whole life insurance, provide an alternative means to help manage sequence risk. They can be drawn from after a market downturn to avoid selling portfolio assets at a loss. Returns on these assets should not be correlated with the financial portfolio, since the purpose of these buffer assets is to temporarily support spending when the portfolio is otherwise down. The cash value of whole life insurance has this characteristic since it is contractually protected from declining in value. In Scenario 3, investments are combined with whole life insurance and the cash value is available to be used entirely as a volatility buffer to help support the portfolio and maximize retirement spending.

By age 65, the illustrated total net cash value is $290,884, or $427,771 on a post-tax basis. By age 100, the illustrated total net cash value is $1,138,511, or $1,674,281 on a post-tax basis. This cash value is incorporated as a volatility buffer.

With the volatility buffer, the idea is to spend from cash value in years after a market downturn, while spending from the investment portfolio in years after positive market returns. In the first year of retirement, the distribution is taken from the investment portfolio. In subsequent years, whenever the investment return to the portfolio was positive (prior to any distributions), the distribution for the following year is taken from investment assets. However, in years when the portfolio generated a negative return before distributions and investment assets remain, spending is taken from the life insurance cash value. Since proceeds from the cash value are not taxable income, the amount taken from the cash value is reduced to match the portfolio distribution amount net of tax payments. Cash value is taken as partial surrenders up to the level of the cost basis and is then taken as a policy loan for amounts in excess of the cost basis. This avoids the need to pay taxes on the cash value distributions. Once the investment portfolio is depleted, further distributions are not taken from the cash value.

Legacy values at age 100 reflect any remaining investment assets along with the remaining net life insurance death benefit after offsetting cash value surrenders and any loans plus accumulated interest. The accessible cash value and death benefit is reduced by any outstanding distributions and loan interest from the cash value, but the policy would still earn dividends on the gross values of the policy. Distributions from cash value do not reduce the potential to accumulate dividends. We assume that the whole life policy uses non-direct recognition, which means that there is no adjustment to the growth for the cash value that has been used as collateral for loans.

Scenarios 3 and 5 allow more aggressive cash value use through policy loans, and we do have to be careful that interest on the loan balance does not push the loan balance over the limit of the available cash value. Such an outcome must be avoided so that taxes are not triggered to be due on all life insurance policy gains. The maximum amount that can be taken from the cash value in any year is the amount that would not grow with 5 percent interest to exceed the slower growing cash value by age 100 (with an additional $5,000 buffer of protection so that the net cash value does not fall entirely to $0). This process ensures that the loan balance growth stays below the cash value, protecting the policy from "blowing up." In practice, this outcome can be avoided by monitoring the policy and paying down the loan balance if it is approaching too closely to the total cash value limit.

The cash value of whole life insurance can also be used as a buffer asset to help manage the sequence of returns risk exacerbated by taking distributions from a volatile investment portfolio. Maintaining fixed distributions from investments in retirement increases exposure to sequence risk by requiring a higher withdrawal rate from remaining assets when their value declines. Temporarily drawing from the cash value of life insurance has the potential to mitigate this aspect of sequence risk for an investment portfolio by reducing the need to take portfolio withdrawals at inopportune times. By reducing exposure to sequence risk, this can either preserve greater overall legacy wealth, defined as remaining portfolio wealth plus the net life insurance death benefit.

Aggressively using the volatility buffer to support more retirement spending involves making a conscious decision to focus on increasing spending at the potential cost of legacy. It is a probability-based approach that emphasizes whole life insurance as a better alternative than traditional bonds for its investment characteristics, rather than emphasizing the risk pooling actuarial powers of insurance.

The investments-only strategy forces spending to be conservative, feeding instead into a larger legacy, because of its inefficient approach for managing longevity and market risk. Nonetheless, limited use of the volatility buffer may not reduce legacy. Though the volatility buffer reduces the net death benefit, the investment portfolio may ultimately grow by more than the reduction to the death benefit, potentially leaving a larger net legacy. This happy outcome can result from the peculiarities of sequence risk and the ability to avoid selling portfolio assets at a loss. The cash value provides a stable income source not impacted by market volatility. Life insurance also receives tax benefits and the distribution from the cash values can be less since taxes are not paid out of the proceeds. Whether or not this strategy will work more effectively than "buy term and invest the difference" becomes an empirical question to be tested.

Next, Scenarios 4 and 5 also add income annuities into strategies that make use of volatility buffers. In Scenario 3 and 5, the couple spends from the cash value in years after market downturns if the loan balance is not projected to exceed the cash value before age 100 (with an additional $5,000 buffer). This is the full volatility buffer. In Scenario 4, the cash value is used as a volatility buffer in a more limited way up to its cost basis. More details follow.

Scenario 4: Investments, annuity, and whole life insurance with limited volatility buffer

Next, Scenario 4 combines Scenario 2 with a more limited use of a volatility buffer than found in Scenario 3. Scenario 4 maintains investments and whole life insurance and incorporates a single-life income annuity as part of the spending strategy. Scenario 4 follows the previous Scenario 2 except that the cash value is also used on a limited basis (up to the cost basis) to bolster retirement spending. Distributions from the cash value do reduce available remaining cash value and the death benefit on a one-for-one basis, but these distributions may help to preserve investment assets through their role in managing sequence of returns risk.

For the volatility buffer, only the cost basis of the whole life policy is to be used as a volatility buffer. The available cost basis at age 65 and throughout retirement is $179,880 which represents thirty years of the $5,996 annual insurance premiums. Cost basis will be surrendered to meet expenses as needed. This is done in order to avoid taking policy loans that accumulate interest and create risk that the distributions from the cash value plus loan interest will eventually exceed the total cash value available later in retirement when investment assets may not remain to pay down the policy loan. This approach will also help to preserve a larger portion of the whole life death benefit, since the cash value is used in a more limited way. By avoiding policy loans and interest accumulations, this strategy protects the retiree to still have a portion of the death benefit available net of any distributions from the cash value.

Care must be taken with this strategy, because retirees who justify the annuity purchase with the idea that the death benefit will replace that asset may find that they have a smaller net benefit available after using the volatility buffer. This involves making the conscious decision to seek more spending through judicious use of the cash value with an attempt to better preserve the investment portfolio as part of a tradeoff with accepting a smaller net death benefit at the end.

Scenario 5: Investments, annuity, and whole life insurance with full volatility buffer

Finally, Scenario 5 combines Scenarios 2 and 3. An income annuity is purchased up to the value of the whole life death benefit, and the cash value is treated as fully available, up to the limits to avoid causing the loan balance to exceed the cash value, to serve as a volatility buffer for portfolio distributions. Once partial surrenders are used to obtain cash value up to the cost basis, policy loans are taken with the remainder of the cash value serving as collateral to avoid taxes on these distributions. The policy loan rate remains fixed at 5 percent. Because the full cash value can be used as a volatility buffer, this strategy is even more exposed to the claim of double-dipping on the whole life policy than Scenario 4, as the death benefit may no longer be available to replace the assets used to purchase the income annuity. Again, the couple would need to make a conscious decision that they are willing to accept a smaller death benefit in exchange for enjoying a higher retirement lifestyle and a way to potentially manage sequence risk with the volatility buffer.

Results for the case study: 35-year-old couple, Steve and Susie

Table 1 outlines the retirement outcomes for Steve and Susie using the five scenarios we described in the previous section. The first part of the exhibit summarizes how they allocate their savings between insurance and Steve's 401(k) for the three scenarios. Then the outcomes from the Monte Carlo simulations begin. Numbers are reported on a pre-tax basis assuming a combined income tax rate of 32 percent. This means that life insurance values are inflated to their pre-tax values in order to be comparable to the investment numbers. A properly structured life insurance policy will not require taxes to be paid on cash value distributions or the death benefit.

To better understand the impacts of investment volatility on the upside and downside, Monte Carlo simulations are used to create a distribution of outcomes. The exhibit reports the 10th percentile, median, and 90th percentile from this distribution. We can interpret the 10th percentile outcome as a bad luck case with poor investment returns. It is possible that retirement outcomes could be even worse, but generally Steve and Susie could expect better retirement outcomes than seen at the 10th percentile. The median reflects more typical outcomes. It is the midpoint of the distribution, with a 50 percent chance for worse outcomes and a 50 percent chance for better outcomes. These are reasonable outcomes for Steve and Susie to expect. The 90th percentile is a good luck outcome in which investments perform very well, supporting greater spending and larger account balances. These numbers represent the upside potential for when investments perform very well, but Steve and Susie should understand that it is unlikely for them to see such great results for their investments.

Table 1: Case study for 35-year-old couple

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Investments + Term Life	Investments + Single-Life SPIA + Whole Life	Investments + Whole Life with Volatility Buffer (Full Use)	Investments + Single-Life SPIA + Whole Life with Volatility Buffer (Cost Basis)	Investments + Single-Life SPIA + Whole Life with Volatility Buffer (Full Use)
Term Life Premiums	$539	$0	$0	$0	$0
Whole Life Premiums	$0	$5,996	$5,996	$5,996	$5,996
Taxes Paid	$180	$1,999	$1,999	$1,999	$1,999
Age 35 Remaining Contribution to 401(k)	$17,781	$10,505	$10,505	$10,505	$10,505
TOTAL FUNDS	$18,500	$18,500	$18,500	$18,500	$18,500
Age 35 401(k) Balance	$50,000	$50,000	$50,000	$50,000	$50,000

All Subsequent Values are Provided on a Pre-Tax Basis (Assuming a Combined 32% tax rate)

Distribution of 401(k) assets at age 65

	Scenario 1	Scenario 2		Scenario 3		Scenario 4		Scenario 5	
		% change from Scenario 1		% change from Scenario 1		% change from Scenario 1		% change from Scenario 1	
10th Percentile	$889,415	$697,686	-22%	$697,686	-22%	$697,686	-22%	$697,686	-22%
Median	$1,605,781	$1,383,584	-14%	$1,383,584	-14%	$1,383,584	-14%	$1,383,584	-14%
90th Percentile	$3,122,972	$2,731,279	-13%	$2,731,279	-13%	$2,731,279	-13%	$2,731,279	-13%

Illustrated life insurance values at age 65

Cash Value	$0	$427,771		$427,771		$427,771		$427,771	
Death Benefit	$0	$886,341		$886,341		$886,341		$886,341	

Distribution of combined 401(k) and cash value balance at age 65

10th Percentile	$889,415	$1,125,456	27%	$1,125,456	27%	$1,125,456	27%	$1,125,456	27%
Median	$1,605,781	$1,811,355	13%	$1,811,355	13%	$1,811,355	13%	$1,811,355	13%
90th Percentile	$3,122,972	$3,159,050	1%	$3,159,050	1%	$3,159,050	1%	$3,159,050	1%

Sustainable spending rate from 401(k) assets (supporting a 90% chance that investment assets remain at age 100)

	2.85%	3.80%	33%	4.31%	51%	4.55%	60%	5.22%	83%

Distribution of annuity income at age 65

	Scenario 1	Scenario 2		Scenario 3		Scenario 4		Scenario 5	
		% change from Scenario 1		% change from Scenario 1		% change from Scenario 1		% change from Scenario 1	
10th Percentile	$0	$32,395		$0		$32,395		$32,395	
Median	$0	$48,040		$0		$48,040		$48,040	
90th Percentile	$0	$48,040		$0		$48,040		$48,040	

Distribution of systematic withdrawal income at age 65

	Scenario 1	Scenario 2		Scenario 3		Scenario 4		Scenario 5	
10th Percentile	$25,348	$3,800		$30,070		$4,550		$5,220	
Median	$45,765	$18,895		$59,632		$22,625		$25,956	
90th Percentile	$89,005	$70,108		$117,718		$83,945		$96,306	

Number of years of systematic withdrawals that can be supported by the available volatility buffer at the start of retirement

	Scenario 1	Scenario 2	Scenario 3		Scenario 4		Scenario 5	
10th Percentile	0	0	14.2		58.1		81.9	
Median	0	0	7.2		11.7		16.5	
90th Percentile	0	0	3.6		3.2		4.4	

Distribution of total income at age 65

	Scenario 1	Scenario 2		Scenario 3		Scenario 4		Scenario 5	
10th Percentile	$25,348	$36,195	43%	$30,070	19%	$36,945	46%	$37,615	48%
Median	$45,765	$66,935	46%	$59,632	30%	$70,664	54%	$73,996	62%
90th Percentile	$89,005	$118,147	33%	$117,718	32%	$131,984	48%	$144,345	62%

Distribution of legacy wealth at age 100

	Scenario 1	Scenario 2		Scenario 3		Scenario 4		Scenario 5	
10th Percentile	$11,323	$1,808,296	15871%	$678,324	5891%	$1,646,146	14438%	$632,233	5484%
Median	$2,443,433	$2,973,992	22%	$3,220,717	32%	$2,681,034	10%	$2,385,047	-2%
90th Percentile	$12,800,757	$8,249,904	-36%	$10,198,461	-20%	$6,760,326	-47%	$5,789,890	-55%

Distribution of cumulative discounted income between ages 65 and 100

	Scenario 1	Scenario 2		Scenario 3		Scenario 4		Scenario 5	
10th Percentile	$887,191	$1,266,810	43%	$1,052,459	19%	$1,293,060	46%	$1,316,510	48%
Median	$1,601,766	$2,342,723	46%	$2,087,137	30%	$2,473,249	54%	$2,589,853	62%
90th Percentile	$3,115,165	$4,135,157	33%	$4,120,135	32%	$4,619,453	48%	$5,052,091	62%

Discounted lifetime spending power

	Scenario 1	Scenario 2		Scenario 3		Scenario 4		Scenario 5	
10th Percentile	$875,346	$2,128,439	143%	$1,364,353	56%	$2,074,685	137%	$1,600,632	83%
Median	$2,768,186	$3,754,707	36%	$3,625,083	31%	$3,739,059	35%	$3,708,277	34%
90th Percentile	$9,329,310	$8,098,369	-13%	$9,038,869	-3%	$7,842,944	-16%	$7,791,368	-16%

We begin with the distribution of 401(k) assets at age 65. Scenario 1 presents the strategy for buying term insurance and investing the difference in a target date fund. In pre-tax terms at retirement, the wealth accumulation ranges from $889,000 at the 10th percentile to $3.12 million at the 90th percentile, with a median outcome of $1.61 million. Note that these results are presented in terms of nominal dollars to avoid reader confusion about why inflation-adjusted dollars are less than nominal dollars. This decision does not impact any comparisons for the relative outcomes between scenarios. However, readers should understand that the purchasing power of a given amount of income or wealth will be less in the future. For today's 35-year-olds, the real purchasing power of money will be about 55 percent of what it is today at age 65, and about 28 percent of today at age 100 at 2 percent average inflation.

The other four strategies all use whole life insurance, which requires larger premiums than term life insurance. Because less is contributed to the 401(k) plan, less accumulations can be expected at retirement. At the median, the 401(k) balance is 14 percent less when whole life insurance is used. It is 22 percent less at the 10th percentile and 13 percent less at the 90th percentile. The differences vary because the asset allocation effects in which the cash value, though not held within the 401(k), is treated as a fixed-income asset. This results in a higher stock allocation in the 401(k) when whole life insurance is used.

Next in the table is the cash value and death benefit available in the illustrated policy at age 65. These are pre-tax numbers. With a 32 percent tax rate, the numbers reported on the illustration are $290,884 for cash value and $602,712 for the death benefit. These numbers are both $0 in Scenario 1 because the term life insurance policy is ended at retirement.

The next item of note in the table is the combined values of the 401(k) and the cash value balance at age 65. Across the distribution, these combined values are larger in Scenarios 2–5 than in Scenario 1. At the median, the combination is 13 percent larger. There are three basic reasons for this outcome: 1) cash value insurance provides tax advantages, 2) the cost of insurance in whole life insurance is positively impacted because the life insurance company only needs to protect the decreasing net death benefit amount at risk — the difference between the death benefit and the cash value, while the net death benefit amount at risk of a term insurance policy remains level for the specified duration and 3) the insurance company's general account can invest for higher returns than a household investor by seeking greater credit risk through diversification and longer maturity bonds.

The next item in the table is the sustainable spending rate for 401(k) assets that support a 90 percent chance that investment assets remain at age 100. These sustainable withdrawal rates represent a percentage of the 401(k) balance for spending, not the combined value of the 401(k) and the cash value. As already discussed, the sustainable withdrawal rate in Scenario 1 is 2.85 percent. It is less than the traditional 4 percent rule because the assumptions are different: the retiree asset allocation is 30 percent stocks (instead of 50–75 percent stocks), portfolio fees add up to 1.59 percent (instead of 0 percent), and the retirement horizon is 35 years (instead of 30 years). In Scenario 2, the withdrawal rate is 3.8 percent. This is driven primarily by asset allocation. Both the cash value and the premium that goes into the income annuity are counted as fixed-income assets, which dramatically increases the stock allocation for the remaining funds in the investment portfolio, increasing the sustainable withdrawal rate. In Scenario 3, the cash value increases to 4.31 percent. This is a function of the cash value being treated as a fixed income asset, but also because the investment portfolio faces better survival odds when some of its distributions can be skipped. This is what the volatility buffer does in Scenario 3: rather than drawing from the investment portfolio when markets have declined, the retiree instead takes spending from the cash value. Not taking a distribution, especially after a market downturn, can be a very powerful means for managing sequence risk, and the sustainable withdrawal rate supporting the same success rate can be 51 percent higher in this case. In Scenario 4, the withdrawal rate further increases to 4.55 percent. This scenario has a similar asset allocation effect as Scenario 2 as well as the volatility buffer effect of Scenario 3. The use of the buffer is limited in Scenario 4, though. Scenario 5 uses the income annuity and makes full use of the volatility buffer. This increases the sustainable withdrawal rate to 5.22 percent, which is 81 percent higher than in Scenario 1.

Next, the table shows the distribution of annuity income purchased at age 65 for Scenarios 2, 4, and 5. With sufficient assets, an amount matching the death benefit is annuitized, which provides $48,040 of lifetime guaranteed income with a 2 percent annual cost-of-living increase. At the 10th percentile, there were not sufficient assets to annuitize the full amount of the death benefit while preserving at least $100,000 in the 401(k). In this case, $32,395 of lifetime income is possible.

The table then shows the distribution of systematic withdrawal income at age 65. These numbers are calculated by applying the sustainable withdrawal rates to the remaining 401(k) balances after the income annuity is purchased (for the relevant scenarios).

The next set of numbers in the table are the number of years of systematic withdrawals that can be supported by the available volatility buffer at the start of retirement. These numbers are useful to get a sense of how frequently the cash value can be used in support of retirement income. The numbers represent the amount of systematic withdrawal income at age 65 divided by the available cash value with the strategy at 65. For Scenario 3, cash value supports 7.2 years of distributions at the median. The median value increases to 11.7 years in Scenario 4. Though the cash value is used only on a limited basis up to its cost basis, the partial annuitization of assets has led to a much smaller portfolio distribution in this strategy as well. The median number of years in Scenario 5 increases to 16.5 years, because now the full cash value is available to use as a volatility buffer, while the systematic withdrawal amount is also lower due to the annuity purchase.

As we continue down the table, the next numbers are very important. The distribution of total income at age 65 is provided as the sum of the annuity income and the systematic withdrawal income. In Scenario 1, total income ranges from $25,348 at the 10th percentile to $89,005 at the 90th percentile, with a median spending level of $45,765. All of this income results from portfolio distributions. What we can highlight here is that for all of the remaining scenarios that use whole life insurance, sustainable spending power is higher across the distribution of outcomes. Scenario 5 places the most focus on spending with the annuity purchase and the full use of the cash value as a volatility buffer. Median spending is 62 percent larger in this scenario at $73,996. Next, Scenario 4 provides 54 percent more spending than Scenario 1 at the median. This results from using the annuity and partial use of the volatility buffer. Scenario 2, without a volatility buffer comes next, with 46 percent more spending power at the median. Using the income annuity is a powerful driver of increasing retirement spending because it uses risk pooling to support spending rather than requiring extra cautious behavior to sustain assets to age 100 with a 90 percent chance for success. Finally, the pure volatility buffer in Strategy 3 still supports 30 percent higher retirement spending than Scenario 1. This shows the power of the volatility buffer to manage sequence risk and increase spending even without an income annuity.

With higher spending, one might expect a smaller legacy. The next set of numbers address this matter. Legacy wealth consists of the after-tax value of any remaining financial assets in the investment portfolio and any life insurance death benefit less the loan balance growth and partial surrenders of cash value when it is used as a volatility buffer . Any strategy that can support more spending and more legacy is clearly more efficient, but there is an obvious tradeoff in terms of increased spending working to reduce the legacy value of assets.

Nonetheless, at the median, legacy values are higher in Scenarios 2–4 than in Scenario 1, while Scenario 5 resulted in 2 percent less legacy (after providing 62 percent more lifetime spending). Of Scenarios 2–5, Scenario 5 supports the least legacy due to its spending focus. The most legacy is available from Scenario 3, which was the pure volatility buffer. At the median, the cash value volatility buffer helped support 30 percent more lifetime spending and 32 percent more legacy than "buy term and invest the difference." Next, Scenario 2 with the annuity and no volatility buffer supports 22 percent more legacy than Scenario 1 at the median, after supporting 46 percent more lifetime spending. Finally, Scenario 4 supports 10 percent more legacy than Scenario 1 after supporting 54 percent more lifetime spending. At the 10th percentile, strategies with whole life support significantly more legacy than Scenario 1, which is on the verge of depleting investment assets in the following year. At the 90th percentile, Scenario 1 supported more legacy, though it's important to note that this was accomplished in part by providing less retirement spending.

The next set of numbers show the cumulative spending power between ages 65 and 100. These values are discounted by the inflation rate, so they represent the real cumulative purchasing power in retirement. They are all higher than in Scenario 1, reflecting the same percentage differences as the age 65 spending because systematic withdrawal and annuity income are inflation adjusted.

Finally, discounted lifetime spending power is presented to better assess the tradeoff between spending and legacy, especially when higher spending is combined with a smaller legacy. In cases when spending is higher and legacy is less, it can be difficult to compare the tradeoff. This measure provides the discounted lifetime spending power assuming legacy is received at age 100. With the same 2 percent discount rate, it adds the real purchasing power of legacy to the cumulative income measures provided above it. We again see that Scenarios 2–5 are superior at the median outcome, supporting between 31 percent and 36 percent more combined spending and legacy. Meanwhile, at the 90th percentile the discounted lifetime spending power is between 3 percent and 16 percent less for Scenarios 2–5. It is only when investments do very well that the investments-only scenario can offer a better combined outcome. But this may not be important to focus on. Legacy is large for all scenarios at the 90th percentile. Integrated strategies support more legacy wealth for the portion of the distribution when overall legacy wealth is otherwise less, so that each dollar can provide a bigger impact on the lives of beneficiaries.

Generally, various integrated approach using whole life to support an annuity purchase and/or to provide a volatility buffer are able to provide more legacy wealth while also supporting more retirement income. This is the meaning of greater efficiency. Readers may be surprised that it is not at all a clear-cut case that the upside growth potential of investments will be sufficient to beat a more integrated approach using actuarial science.

The implications for 50-year-olds

At 35, Steve and Susie were still far from retirement. How would these strategies work for James and Julie, a couple who is already 50-years-old? We make the following modifications to answer this. James has $700,000 in his 401(k) plan. James determines that increasing his life insurance benefit amount by an additional $500,000 through his projected retirement at age 65 provides the additional protection James and Julie desire. He considers a 15-year term insurance policy with a level annual premium of $1,120. James also considers a limited-pay whole life policy with premiums ending at 65, as illustrated by sample whole life policy in August 2018. He is in the preferred health status. Whole life premiums are $21,225 annually. The couple has $40,000 in today's dollars (which will adjust for inflation) to divide between his 401(k) and insurance policy (and taxes on insurance) over the subsequent 15 years. Otherwise, everything else is the same as with the previous case.

Table 2 provides the basic details for James and Julie. We can observe the similar trends as before, though with just 15 years the cash value has had less opportunity to grow by retirement. Though we do not describe all the numbers in this table, their interpretations are in line with how we interpreted **Table 1**. We find that 50-years-old is not too late to start implementing these integrated planning techniques.

Table 2: Case study for 50-year-old couple

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Investments + Term Life	Investments + Single-Life SPIA + Whole Life	Investments + Whole Life with Volatility Buffer (Full Use)	Investments + Single-Life SPIA + Whole Life with Volatility Buffer (Cost Basis)	Investments + Single-Life SPIA + Whole Life with Volatility Buffer (Full Use)
Term Life Premiums	$1,120	$0	$0	$0	$0
Whole Life Premiums	$0	$21,225	$21,225	$21,225	$21,225
Taxes Paid	$373	$7,075	$7,075	$7,075	$7,075
Age 50 Remaining Contribution to 401(k)	$38,507	$11,700	$11,700	$11,700	$11,700
TOTAL FUNDS	$40,000	40,000	$40,000	$40,000	$40,000
Age 50 401(k) Balance	$700,000	$700,000	$700,000	$700,000	$700,000

All Subsequent Values are Provided on a Pre-Tax Basis (Assuming a Combined 32% tax rate)

Distribution of 401(k) assets at age 65

	Scenario 1	Scenario 2		Scenario 3		Scenario 4		Scenario 5	
		% change from Scenario 1		% change from Scenario 1		% change from Scenario 1		% change from Scenario 1	
10th Percentile	$1,415,613	$949,000	-33%	$949,000	-33%	$949,000	-33%	$949,000	-33%
Median	$2,169,481	$1,634,434	-25%	$1,634,434	-25%	$1,634,434	-25%	$1,634,434	-25%
90th Percentile	$3,321,987	$2,671,974	-20%	$2,671,974	-20%	$2,671,974	-20%	$2,671,974	-20%

Illustrated life insurance values at age 65

Cash Value	$0	$502,463		$502,463		$502,463		$502,463	
Death Benefit	$0	$1,037,351		$1,037,351		$1,037,351		$1,037,351	

Distribution of combined 401(k) and cash value balance at age 65

10th Percentile	$1,415,613	$1,451,463	3%	$1,451,463	3%	$1,451,463	3%	$1,451,463	3%
Median	$2,169,481	$2,136,897	-2%	$2,136,897	-2%	$2,136,897	-2%	$2,136,897	-2%
90th Percentile	$3,321,987	$3,174,437	-4%	$3,174,437	-4%	$3,174,437	-4%	$3,174,437	-4%

Sustainable spending rate from 401(k) assets (supporting a 90% chance that investment assets remain at age 100)

	2.69%	3.72%	38%	4.30%	60%	4.81%	79%	5.67%	111%

Distribution of annuity income at age 65

	Scenario 1	Scenario 2		Scenario 3		Scenario 4		Scenario 5	
			% change from Scenario 1		% change from Scenario 1		% change from Scenario 1		% change from Scenario 1
10th Percentile	$0	$46,016		$0		$46,016		$46,016	
Median	$0	$56,224		$0		$56,224		$56,224	
90th Percentile	$0	$56,224		$0		$56,224		$56,224	

Distribution of systematic withdrawal income at age 65

10th Percentile	$38,080	$3,720		$40,807		$4,810		$5,670	
Median	$58,359	$22,211		$70,281		$28,720		$33,855	
90th Percentile	$89,361	$60,808		$114,895		$78,625		$92,683	

Number of years of systematic withdrawals that can be supported by the available volatility buffer at the start of retirement

10th Percentile	0	0		12.3		97.3		88.6	
Median	0	0		7.1		16.3		14.8	
90th Percentile	0	0		4.4		6.0		5.4	

Distribution of total income at age 65

10th Percentile	$38,080	$49,736	31%	$40,807	7%	$50,826	33%	$51,686	36%
Median	$58,359	$78,436	34%	$70,281	20%	$84,944	46%	$90,079	54%
90th Percentile	$89,361	$117,032	31%	$114,895	29%	$134,850	51%	$148,908	67%

Distribution of legacy wealth at age 100

10th Percentile	$20,244	$2,210,345	10819%	$849,017	4094%	$1,913,746	9354%	$864,629	4171%
Median	$3,296,110	$3,519,374	7%	$3,721,510	13%	$3,058,657	-7%	$2,594,922	-21%
90th Percentile	$13,146,407	$8,436,458	-36%	$10,118,542	-23%	$6,725,556	-49%	$5,531,086	-58%

Distribution of cumulative discounted income between ages 65 and 100

10th Percentile	$1,332,800	$1,740,754	31%	$1,428,246	7%	$1,778,904	33%	$1,809,004	36%
Median	$2,042,566	$2,745,257	34%	$2,459,823	20%	$2,973,044	46%	$3,152,766	54%
90th Percentile	$3,127,650	$4,096,133	31%	$4,021,320	29%	$4,719,742	51%	$5,211,763	67%

Discounted lifetime spending power

10th Percentile	$1,316,590	$2,790,184	112%	$1,816,449	38%	$2,682,186	104%	$2,197,394	67%
Median	$3,618,345	$4,416,707	22%	$4,235,962	17%	$4,414,174	22%	$4,363,038	21%
90th Percentile	$9,510,997	$8,151,564	-14%	$8,902,814	-6%	$7,924,221	-17%	$7,821,038	-18%

Conclusion

Those with a spending emphasis can combine the covered asset strategy with the volatility buffer. Then, the covered asset strategy with an income annuity can better support spending than the volatility buffer strategy on its own. The “buy term and invest the difference strategy” is the least effective of the five scenarios in supporting retirement spending. Meanwhile, for those with an emphasis on legacy, the pure volatility buffer without the annuity supports the most legacy. The annuity and whole life strategy without a volatility buffer is second, and then the joint strategies follow. Again, except for the higher end of the distribution of wealth outcomes, the “buy term and invest the difference strategy” is the least effective at supporting a legacy goal.

As we shift from Scenario 3 to Scenario 5, spending potential increases with offsetting impacts on legacy. But overall, for these three strategies, Scenario 2 with the income annuity and no volatility buffer does support the highest discounted lifetime spending power at the median of outcomes. Adding the limited volatility buffer to the annuity in Scenario 4 comes in second for this criterion, followed by Scenario 5 and Scenario 3. It is hard to overcome the overall power of the income annuity as a way to more efficiently generate retirement income, but the volatility buffer provides a valuable way to improve lifetime financial outcomes relative to “buy term and invest the difference” for retirees who are not compelled to use an income annuity in their planning.

Because the benefits of cash value life insurance are affected in subtle ways by their tax efficiency and resistance to sequence of returns risk, there has not been a clear understanding of how the ownership of whole life insurance affects the retirement income planning problem. This paper explores a more integrated approach which includes investments and whole life insurance. By strategically combining these elements, the potential exists to develop more efficient retirement income strategies that support a higher income level and greater legacy wealth than investment-only strategies.

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Appendix on Capital Market Expectations

The capital market expectations connect the historical averages from Robert Shiller's dataset together with the current market values for inflation and interest rates. This makes allowances for the fact that interest rates and inflation are currently far from their historical averages, but it also respects historical averages and does not force returns to remain low for the entire simulation. Shiller's historical data since 1890 is used to guide the Monte Carlo simulations for investment returns. A Cholesky decomposition is performed on a matrix of the normalized values for the risk premium, bond yields, home prices, bills and inflation. A Monte Carlo simulation is then used to create error terms for these variables, which preserve their contemporaneous correlations with one another. Then the variables are simulated with these errors using models that preserve key characteristics about serial correlation. Though home prices and bills are not used, we present the complete model which also takes them into account.

With the correlated error terms, inflation is modeled as a first order autoregressive process starting from 2 percent inflation and trending toward its historical average over time with its historical volatility. Bond yields are similarly modeled with a first order autoregression with an initial seed value of 2.8 percent. Next, home prices and the risk premium are both modeled as random walks around their historical averages and with their historical volatilities. Bond returns are calculated from bond yields and changes in interest rates, assuming a bond mutual fund with equal holdings of past 10-year Treasury issues. Stock returns are calculated as the sum of bond yields and the equity premium over yields. As a final step to ease explanations in the text by simplifying the calculations of inflation-adjusted numbers, we replace the randomly generated inflation simulations with a fixed inflation rate equal to 2 percent.

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