

CHIEF INVESTMENT OFFICE

Pitfalls in Retirement

Spring 2021

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The volatility in stock prices has left many to wonder whether they should adjust their portfolio allocations to help preserve their retirement nest eggs. In weighing this decision, clients should be aware of several basic principles of retirement investing that apply whether markets are up or down, tranquil or stormy.

Newspaper and magazine articles, Internet posts, bestselling books and academic studies bombard us with reminders to save for retirement. But another pressing issue receives less attention: How shall a client invest and spend wisely upon reaching retirement age? As baby boomers reach this age, a growing number seek clarity from advisors on this question. This paper looks at some of the key risks that retirees face and how to address them.

BEWARE THE PITFALLS

Many clients fear outliving their portfolios. Indeed, a key concern for 40% of those surveyed is ensuring that their assets will last a lifetime. Their apprehension reflects an erosion of the "three-legged stool" of retirement: Social Security, employer pensions and personal savings.

- Social Security faces growing stress as the ratio of workers paying into the system to retirees collecting benefits continues to decline. Government will likely contain costs by reducing benefits, raising the retirement age or further taxing benefits.
- Accounting rule changes make traditional defined benefit plans more expensive for employers, hastening their disappearance.
- Historically low interest rates pose a challenge to retirees seeking income.

Faced with these challenges, baby boomers must manage their savings to last a lifetime and, ideally, to leave something for the next generation, if they choose.

Retirement investing is challenging and not well understood. Wealth managers have devised efficient approaches to asset accumulation but have given far less thought to ensuring that retirees don't outlive their savings.

The margin for error is slimmer now than in the past. Yesterday's retirees could count on more generous pension and Social Security benefits. The fraying of these financial safety nets necessitates greater care in retirement investing.

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KEY IMPLICATIONS

In preparing for retirement, investors should be alert to several common pitfalls.

Overspending

New retirees can typically afford to spend about 3% to 5% per year of their life savings.

Excessive conservatism

Allocating a portfolio entirely to bonds and cash might increase a retiree's risk of outliving their wealth.

Longevity and inflation risks

Investors should consider allocating some of their retirement portfolios to investments that can outpace inflation over time.

Abandoning your plan

Investors should work with their financial advisors to craft a retirement plan that helps them pursue their retirement goals.

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¹ Age Wave Merrill, "Finances in Retirement: New Challenges, New Solutions," 2020.

Clients nearing retirement can benefit from avoiding these common pitfalls:

- 1. Overspending
- 2. "Playing it safe"
- 3. Failing to address longevity and inflation risks
- 4. Not adhering to a retirement plan

Pitfall 1: Overspending

Think of your life savings as a personal financial garden whose produce you can harvest to help pay for retirement. You can improve your chances of harvesting a lifetime income that grows with inflation by spending in moderation, diversifying broadly and following a disciplined asset allocation strategy.² Those who draw down their wealth too rapidly risk depleting their savings.

How much may retirees safely spend? Many lack a clear sense. A survey asked preretirees over the age of 55 how much of their retirement savings they can safely spend each year without running the risk of exhausting their assets. Nearly four in 10 said they could spend 7% or more per year, and 15% felt they could spend 10% to 12% annually.³

But, as explained below, the respondents most on target were the one in 10 who estimated sustainable spending rates to be 5% or less. A 5% spending rate would mean that someone with \$500,000 of savings spends \$25,000 the first year of retirement and increases this amount with inflation in subsequent years. This rate may be appropriate for some retirees, but no single rate works for everyone. The sustainable rate of retirement spending depends on numerous factors including:

- The age of the retiree(s)
- Their risk tolerance
- Their asset allocation
- Their desire to leave a sizable beguest

History shows that the sustainability of retirement spending also depends on how markets fare, particularly in the early years of retirement. Consider the hypothetical example of Bobbie, who is 99 years old. Bobbie retired at the end of 1972 at age 50 with \$250,000 invested in a 50–50 stock/bond portfolio. If he had spent 3% of his portfolio the next year and then increased this spending in line with inflation, Bobbie's spending would have grown from \$7,500 in 1973 to \$42,422 in 2020. His portfolio would have lasted until today, four decades later, growing in value from \$250,000 to \$2,000,000 (Table 1).

Table 1: Final Potential Wealth at Various Spending Rates

Start Date	Initial Spending Rate											
Year End		0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1972	Final Portfolio Value	\$10,000,000	\$7,300,000	\$4,600,000	\$2,000,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0
19/2	Years of Spending	48+	48+	48+	48+	38	21	15	12	10	9	8
1074	Final Portfolio Value	\$12,100,000	\$10,100,000	\$8,000,000	\$6,000,000	\$4,000,000	\$1,900,000	\$0	\$0	\$0	\$0	\$0
1974	Years of Spending	46+	46+	46+	46+	46+	46+	44	29	20	16	13

Notes: For details on underlying assumptions, see notes under Exhibit 1. These hypothetical results are for illustrative purposes only and are not meant to represent the past or future performance of any specific investment vehicle. Investment return and principal value will fluctuate, and, when redeemed, the investments may be worth more or less than their original cost. Source: Calculations by the Chief Investment Office.

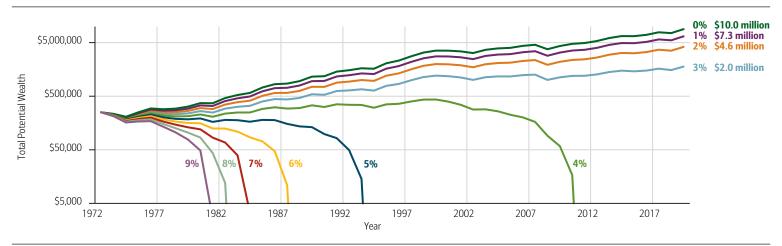
² Diversification and asset allocation do not ensure a profit or protect against loss in declining markets.

³ Fidelity Retirement IQ Survey, March 2017.

⁴ For guidance on sustainable spending rates for retirees based on age and risk tolerance, see "Beyond the 4% rule: Determining sustainable retire spending rates." Chief Investment Office, January, 2021.

The value of Bobbie's portfolio would have evolved differently at other spending rates. At lower rates, it would have appreciated more rapidly (Exhibit 1). But at a spending rate of 5%, it would have been exhausted after 21 years. The higher the spending, the less time the portfolio would have lasted.

Exhibit 1: Bobbie's Portfolio: The Evolution of the Value of a Diversified Retirement Portfolio at Various Spending Rates, 1973–2020



Notes: Assumes a \$250,000 investment that at year-end 1972 was allocated half to U.S. stocks (proxied by the S&P 500 Index) and half to U.S. bonds (1976–2020: ICE BofA U.S. Broad Market Index; 1973–1975: Ibbotson U.S. Intermediate Government Bond Index) and rebalanced annually. It is not possible to invest directly in these unmanaged indexes. Returns are net of annual fees of 1.3%. Annual spending as a percentage of the portfolio for the first year is as indicated in the figure and rises in subsequent years with inflation (CPI-U). Withdrawals are taken at the end of each year. These hypothetical results are for illustrative purposes only and are not meant to represent the past or future performance of any specific investment vehicle. Investment return and principal value will fluctuate and, when redeemed, the investments may be worth more or less than their original cost. **Past performance is no guarantee of future results.** Source: Calculations by the Chief Investment Office.

These results reflect the fact that 1972 was a challenging time to retire. Stocks fell 37% over the following two years. To add insult to injury, inflation over those two years was a cumulative 23%.⁵

Now suppose that Bobbie's cousin Billy had retired two years later, at year-end 1974, with the same size nest egg (\$250,000), also divided 50–50 between stocks and bonds. Billy was far more fortunate than Bobbie. Billy missed the 1973–74 market debacle and earned solid returns at the start of his retirement.

For Billy, like Bobbie, low spending rates were sustainable, and high spending rates were not (Exhibit 2, see next page). But the specific levels of wealth attained by the portfolios were quite different. If Billy had spent at the same initial 3% rate as Bobbie, his wealth at year-end 2020 would be \$6.0 million, as opposed to Bobbie's \$2.0 million (Table 1). Bobbie's retirement portfolio could sustain initial spending rates up to 4%, while Billy's could sustain 6%.

These illustrations give some feel for the spending that a diversified retirement portfolio can sustain. Spending rates of 3% or less are likely sustainable, while those above 5% may not be. Careful research confirms these observations. The sustainability of spending rates within the range of 3% to 5% depends on the period in question as well as the other factors noted above.

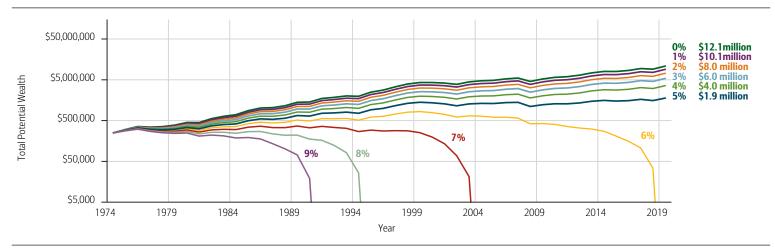
These examples help dispel the misconception that one can "spend" average returns, an example of the "Flaw of Averages." Thus, although a 50-50 stock/bond portfolio earned

⁵ Each increase in prices forces retirees to spend more just to maintain their lifestyles. In fact, from the perspective of sustainability, each 1% increase in prices has the same impact as a 1% decline in the portfolio's value.

⁶ Chief Investment Office "Beyond the 4% rule: Determining Sustainable Retiree Spending Rates." January 2021.

In The Flaw of Averages (p. 11), Sam Savage observes: "Plans based on average assumptions are wrong on average." Nobel laureate William Sharpe has dubbed planning based on averages "financial planning in fantasyland."

Exhibit 2: Billy's Portfolio: The Evolution of the Value of a Diversified Retirement Portfolio at Various Spending Rates, 1975–2020



Notes: For details on underlying assumptions, see notes under Exhibit 1. This example differs from that of Exhibit 1 in that the investment begins at the year-end 1974, not 1972. These hypothetical results are for illustrative purposes only and are not meant to represent the past or future performance of any specific investment vehicle. Investment return and principal value will fluctuate, and, when redeemed, the investments may be worth more or less than their original cost. **Past performance is no guarantee of future results.** Source: Calculations by the Chief Investment Office.

8.4% average annual returns net of fees from 1973 to 2020, its sustainable spending rate was far lower. To be sustainable, spending must be low enough to allow a portfolio the potential to grow with inflation. Even if the portfolio earned 8.4% each year without fail, had Bobbie spent this return, the portfolio's value would have stagnated. From 1973 to 2020, the inflation-adjusted value of the portfolio and the constant income stream it generates would have eroded by 82%.

Pitfall 2: "Playing it safe"

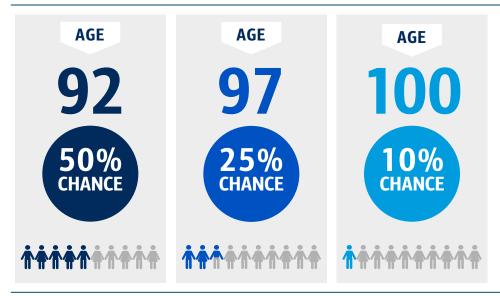
A natural reaction to market turbulence is to "play it safe" by investing all or nearly all of a retirement portfolio in investment grade bonds or highly liquid, lower-risk investments like CDs, money market funds or Treasury bills. But this seemingly conservative approach could actually prove riskier for retirees than holding a more broadly diversified portfolio that includes equities.⁸

New retirees should view themselves as long-term investors. For a 65-year-old couple, there is a 1-in-4 chance of at least one spouse living past 97 and a 1-in-10 chance of at least one spouse living to 100. (Exhibit 3).9 Funding a retirement that might last 30 years or more generally requires the higher long-run returns that equities have historically earned. We believe that stocks will continue to earn higher long-run returns than bonds (Table 2).

⁸ Asset allocation and diversification do not ensure a profit or protect against loss in declining markets.

⁹ Calculations based on Society of Actuaries, 2012 Individual Annuity Mortality Tables, Basic. (Latest available data.)

Exhibit 3: Longevity Risk



Source: Chief Investment Office calculations based on Society of Actuaries, 2012 Individual Annuity Mortality Tables, Basic (most recent data available).

Table 2: Chief Investment Office Asset Class Assumptions

	U.S. Stocks	U.S. Bonds	Cash (U.S.)
Expected Geometric Return	8.4%	3.5%	2.4%
Expected Volatility	18.3%	5.2%	1.7%

Notes: The proxy for U.S. stocks is the S&P 500 Index; for U.S. bonds, it is the ICE BofA U.S. Broad Market Index; for cash it is the ICE BofA U.S. Treasury Bills 3 months Index. These assumptions are provided for informational purposes only. They do not reflect actual investments, and there is no guarantee that these assumptions will be realized. Results are illustrative and assume reinvestment of income and no transaction costs or taxes. One cannot invest directly in an index. Expected geometric return is expressed in terms of compounded average annual returns and calculated using geometric mean of periodic returns. Source: Chief Investment Office, January 2021.

We believe there are solid reasons to expect stocks to outperform bonds and cash over time:

- From 1926 through 2020, U.S. stocks, as represented by the S&P 500 Index, earned an average annual return of 10.3%, compared to 5.3% for U.S. bonds.¹⁰
- Stocks have exhibited superior long-term performance in many other countries as well.¹¹
- Because stocks are riskier than bonds, investors require higher long-term returns from stocks. Absent this "risk premium," investors would shun stocks.

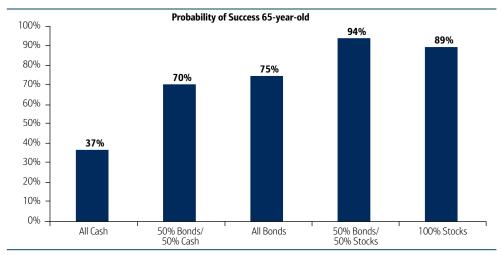
How can retirees harness this uncertain long-run risk premium given that, as John Maynard Keynes observed, "In the long run we are all dead"? Investing patiently and diversifying prudently can help. For example, a portfolio split evenly between stocks and bonds (as presented in Exhibit 1) realized negative returns in just five of the 25 years through 2018 (1994, 2001, 2002, 2008 and 2018) and lost more than 10% in just one year (2008, down 16.2%). Moreover, in each of these four instances, the portfolio recovered from its losses within two years. Of course, past performance is no guarantee of future results.

Many retirees wish to play it safe by avoiding stocks. But a portfolio of bonds and cash, despite producing stable returns year-to-year, may not be the best answer for retirees. A balanced portfolio that holds both stocks and bonds may offer retirees a far better chance of not outliving their wealth. Investors should keep in mind asset allocation and diversification does not ensure a profit or protect against loss in declining markets.

¹⁰ U.S. bonds are represented by: 1976-2020 ICE BofA U.S. Broad Market; (1975-1926) Ibbotson U.S. Intermediate Government Bond Index. Past performance is no guarantee of future results.

¹¹ The U.S. returns data are from Ibbotson Associates. For global returns, see Elroy Dimson, Paul Marsh and Mike Staunton, Triumph of the Optimists; and Credit Suisse, Global Investment Returns Yearbook 2020. Past performance is no guarantee of future results.

Exhibit 4: Probability of a 65-Year-Old Woman Not Outliving Her Wealth for Various Asset Allocations



Notes: Assumes that a 65-year-old female spends 4% of her wealth the first year of retirement and increases this spending in line with inflation in subsequent years. These withdrawals are taken at the end of each year, at which time the portfolio is rebalanced. Planning horizon assumptions Source: IRS single life expectancy table + 5 years (Table I in Appendix B in Publication 590-B at https://www.irs.gov/pub/irs-pdf/p590b.pdf (page 46)). Time horizon is measured in years. Risk and expected returns assumptions for stocks, bonds and cash are as given in Table 2. These hypothetical results are for illustrative purposes only and are not meant to represent the past or future performance of any specific investment vehicle. Investment return and principal value will fluctuate, and, when redeemed, the investments may be worth more or less than their original cost. Source: Analysis by the Chief Investment Office, April 2021.

Consider the hypothetical example of a 65-year-old woman with \$500,000 to invest who wishes to draw 4% income, or \$20,000, next year and amounts that increase in line with inflation in subsequent years. If she invests the portfolio entirely in cash, she will have year-to-year return certainty but, according to our analysis, only a 45% chance of not outliving her wealth. If she instead invests entirely in bonds, this likelihood rises to 74% (Exhibit 4). But if she allocates half the portfolio to bonds and half to stocks and rebalances the portfolio annually, her chances of not outliving her wealth rise to 94%.

Stocks are riskier than bonds with respect to daily or annual portfolio fluctuations. But if you are a retiree, there is another risk to consider: the risk of outliving your wealth. A broadly diversified portfolio that includes both stocks and bonds may reduce this risk.

Pitfall 3: Failing to address longevity and inflation risks

Retirees can be blindsided by unanticipated risks. Many people need to retire sooner than expected or live longer than they imagined. Moreover, inflation can wreak havoc on a retirement plan, especially for those enjoying a long retirement.¹²

Timing of retirement

You may have in mind a retirement date and a plan to save enough by then. But there's a good chance you might retire sooner than intended due to circumstances beyond your control. Roughly 1 in 4 workers plans to retire before age 65, yet more than threequarters (76%) of current retirees ended up doing so. What explains this disconnect?

More than half of those who retire sooner than expected do so because of a health problem or disability; for more than a quarter, the cause is a business downsizing or closure. 13

¹² For a more complete discussion of the key risks retirees face and ways to mitigate these risks, see "Tackling Retirement Risks," Chief Investment Office, Spring 2021.

¹³ Employee Benefit Research Institute. "2017 Retirement Confidence Survey." EBRI also finds that 14% of those who retired earlier than expected cite the need to care for a spouse or other relative. According to a survey by the National Alliance for Caregiving and the AARP 49 million Americans, or about 20% of the population, care for someone who is ill or aged. Caregivers provide 20 hours per week of care on average.

The strong possibility of retiring earlier than expected heightens your need to be well prepared, or even over-prepared. In planning for retirement, save early—and save often. If you find yourself among the many who retire sooner than expected and your wealth must last longer than originally anticipated, you may need to revisit your work options and spending plans.

Length of retirement

Many retirement plans assume a fixed time horizon, such as 30 years. This approach has two basic shortcomings. First, in most cases, the planning horizon takes no account of a client's actual life expectancy. Second, even if the planning process does take the client's life expectancy into account, it may do so incorrectly. How, for example, should you plan for a remaining lifespan that may be 20 years, but may also be 40 years? Heing overly conservative may lead you to continue working longer than necessary in your current position or keep you from enjoying your retirement. But following an overly aggressive approach may cause you to retire too early or spend too freely, placing you at risk of exhausting your wealth.

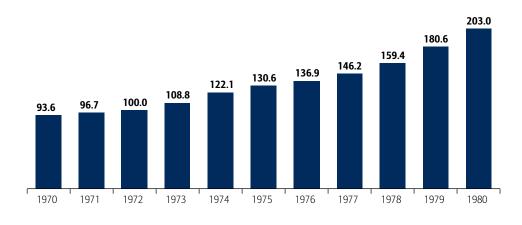
Complicating matters is the difficulty many encounter in estimating their life expectancy. When asked to estimate how long the average person of their gender and age can expect to live, almost 3 in 10 underestimate by five years or more. Twenty-three percent similarly overestimate his or her life expectancy. One reason for these underestimates is a failure to recognize that life expectancy increases with age. Another is that many people estimate their life expectancy based on how long their parents or other close relatives lived. Because life expectancies have grown markedly from one generation to the next, using relatives as a benchmark can lead people to underestimate their life expectancy.

Inflation

When planning for retirement, many do not adequately consider the corrosive long-term impact of inflation. For example, some baby boomers might recall that the price of a first-class postage stamp was 4 cents in 1958. Today it costs 55 cents, a cumulative inflation rate of 1,275%. More generally, according to the Consumer Price Index (CPI-U), a typical basket of goods and services that cost \$10 in 1958 cost \$85 in 2017, an 88% erosion in the purchasing power of the dollar. Uncertainty regarding the ongoing rise of prices is known as inflation risk, another key risk confronting retirees. It is related to longevity risk because the longer a retiree lives, the more acute inflation risk becomes.

Inflation can spike suddenly. In the 1970s from 1972 to 1980, consumer prices more than doubled, imposing a serious burden on those living on a fixed income (Exhibit 5). Adding insult to injury, stocks and bonds have fared poorly in periods of high inflation.

Exhibit 5: Consumer Price Index, 1970-1980



Sources: Bureau of Labor Statistics; Chief Investment Office.

¹⁴ The uncertainty surrounding an individual's lifespan, called longevity risk, is a key risk facing retirees.

¹⁵ Society of Actuaries. "Longevity Perceptions and Drivers: How Americans View Life Expectancy." January 2020.

Over the course of a long retirement, even moderate inflation can have a major impact. Inflation of 2.5% per year will erode purchasing power by 63% over 40 years (Table 3). Three decades of 5% inflation will reduce purchasing power by 77%. Moreover, retirees typically experience higher inflation than the headline CPI-U figure reported in the media. This is because retirees consume a different basket of goods and services from what the general populace does. Notably, medical care expenditures have twice the relative importance for a retiree as for a pre-retiree. From 2000 through 2018, medical care inflation averaged 3.4%, as opposed to 2.0% for CPI-U. Aside from inflation, as people grow older, their healthcare expenses tend to rise. 16

Table 3: Erosion in the Purchasing Power of the U.S. Dollar at Various Rates of Inflation

	Rate of Inflation					
Year	1%	2.5%	5%	7%		
0	0%	0%	0%	0%		
10	9%	22%	39%	49%		
20	18%	39%	62%	74%		
30	26%	52%	77%	87%		
40	33%	63%	86%	93%		

Source: Calculations by the Chief Investment Office. For illustrative purposes only.

Pitfall 4: Not adhering to a retirement plan

People nearing retirement can benefit from sound retirement planning, a process that an advisor can help facilitate. Planning can help offer assurance and comfort to those on track to retire, and guidance on how to improve retirement prospects to those who are not. With a sound strategy in place, clients can make prudent decisions on such matters as when to retire, how much they can afford to spend, and when to start receiving Social Security. Many find that the very process of developing a retirement plan offers a heightened sense of well-being.¹⁷

The need for a retirement plan

One of the greatest threats to a secure retirement is the failure to plan. Yet, remarkably, only 48% of workers surveyed report that they or their spouse have tried to calculate how much money they will need to live comfortably in retirement. Most retirees need income from their retirement savings to fund living expenses, making it crucial to have a sound plan. Moreover, some retirees face challenges such as unexpected healthcare expenses. These concerns distinguish retirement planning from financial planning for other stages of life.

Sticking to a retirement plan

Dalbar produces an annual study gauging the impact of investor behavior on long-term portfolio returns. The study shows that individual equity fund investors realized a 5.04% average annual return in the 30 years through 2019, compared to 9.96% for the S&P 500 Index. 19 It concludes that the benefits of a long-term investment strategy are lost to the average investor, who generally abandons investments at inappropriate times, often in response to bad news.

- ¹⁶ Data on medical and CPI-U inflation and medical care expenditures are from the U.S. Bureau of Labor Statistics. For systematic guidance on planning for healthcare costs in retirement, see Merrill Wealth Management. "Healthcare Costs in Retirement Guide." 2020.
- ¹⁷ In "Annuities and Retirement Well-Being," a chapter in Olivia Mitchell and Stephen Utkus, *Pension Design and Structure:*New Lessons from Behavioral Finance, 2004, Constantijn Panis notes: "Our evidence conclusively shows that satisfaction with retirement was higher among retirees who had engaged in some sort of financial planning activity."
- ¹⁸ Employee Benefit Research Institute. "2020 Retirement Confidence Survey."
- Dalbar, Quantitative Analysis of Investor Behavior, 2020. The study uses data from the Investment Company Institute and Standard & Poor's to compare mutual fund investor returns to appropriate benchmarks. Covering the period from January 1, 1988, to December 31, 2019, the study uses monthly mutual fund sales, redemptions and exchanges to measure investor behavior. These behaviors reflect the "average investor." Based on this behavior, the analysis calculates the "investor return" for various periods. These results are then compared to the returns of relevant indexes. Past performance is no guarantee of future results.

What do we believe gives investors the fortitude to stick with their retirement plans and hold investments despite market turmoil?

Confidence that their plan is well-thought-out and appropriate to helping them pursue their goals. What we believe investors want most is not to beat some market benchmark or to outperform their peers. We believe that investors want to achieve their personal goals, nothing more and nothing less.

To help its clients work toward achieving their goals, Merrill has developed a Goals-Based Wealth Management (GBWM) approach and a related suite of tools, with specific applications for retirees.²⁰ GBWM is designed to offer clients the confidence and courage to stay on course even when markets gyrate.

OVERCOMING THE PITFALLS

Having examined four retirement pitfalls to which many are prone, let's briefly recap and discuss some potential solutions.

Overspending. Most retirees have little idea how much of their savings they can safely afford to spend each year. The answer varies but is generally on the order of 3% to 5%. Spending more could put you at risk of reducing your retirement savings to a level that requires scaling back your lifestyle, perhaps substantially. If this amount seems inadequate, you might examine your spending patterns to identify which expenses are essential and which are discretionary. By eliminating or reducing some of the latter, it may be possible to reduce your spending rate to 3% to 5%.

Another possibility is to delay retirement. This need not mean continuing to work in your current position. It could be a "second act" career that allows you to work in a field or setting more to your liking. Indeed, a majority of older Americans with full-time career jobs move to a different job before exiting the workforce.²¹ Delaying retirement can help compensate for a retirement savings shortfall by providing added income, medical benefits, a shorter retirement to finance out of pocket, more time to save and earn returns, and higher Social Security benefits, which are largely tax-exempt. Your financial advisor can help you weigh these options.

"Playing it safe." You can do this by shunning equities. A well-diversified portfolio with appropriate allocations to stocks, bonds and cash investments has the potential to keep pace with inflation and grow in value. Investing a retirement portfolio entirely in bonds and cash may be counterproductive. If market fluctuations leave you uncomfortable, it may make sense to limit your equity exposure. But doing so may mean lower long-run returns, necessitating a lower spending rate. Your Financial Advisor has tools to help you determine what strategic asset allocation is most appropriate for your situation.²²

Longevity and inflation risks. These risks are important examples of the subtle factors that can undermine your retirement security. Your financial advisor can help you craft a strategy that addresses these risks. This might include allocating some of your retirement portfolio to investments that can outpace inflation over time. Another possibility to consider is allocating some portion of your retirement savings to an immediate annuity, which can provide an income for life, regardless of how long you live.²³

Staying with your plan. People are much more likely to adhere to a retirement plan if they feel comfortable with it. Your financial advisor can help you structure your retirement portfolio in a way that helps you pursue your long-term financial goals, providing you the fortitude to stick with your plans even when markets turn stormy.

Just as you will get more out of retirement by staying physically fit, staying financially fit and avoiding these pitfalls can help you get more out of retirement. Your key to a secure retirement is a plan that helps you meet your financial goals.

²⁰ For some of the technical foundations of this approach and a case study of its application, see "Portfolio Selection in Goals-Based Wealth Management," Journal of Wealth Management, Summer 2011 (most recent available).

²¹ Michael Giandrea, Kevin Cahill and Joseph Quinn. "Bridge Jobs: A Comparison Across Cohorts." Research on Aging, September 2009, pp. 549-76.

^{22 &}quot;Beyond the 4% rule: Determining sustainable retiree spending rates." Chief Investment Office, January, 2021, provides guidance on optimal equity allocations for retirees of various ages.

²³ "Goals-Based Wealth Management with Guaranteed Lifetime Income Through an Annuity." Chief Investment Office, Summer 2020.

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Index Definitions

Securities indexes assume reinvestment of all distributions and interest payments. Indexes are unmanaged and do not take into account fees or expenses. It is not possible to invest directly in an index. Indexes are all based in U.S. dollars.

S&P 500 Index is a stock market index that measures the stock performance of 500 large companies listed on stock exchanges in the United States. It is one of the most commonly followed equity indices.

Consumer Price Index (CPI) measures the change in the price of goods and services from the perspective of the consumer.

ICE BofA Global Broad Market tracks the performance of investment grade securitized and collateralized debt, including mortgage backed, asset backed, commercial mortgage backed, covered bond, and US mortgage pass-through securities publicly issued in the major domestic and euro-bond markets. Qualifying securities must have an investment grade rating (based on an average of Moody's, S&P and Fitch).

ICE BofA US 3-Month Treasury Bill Index is comprised of a single issue purchased at the beginning of the month and held for a full month. At the end of the month that issue is sold and rolled into a newly selected issue. The issue selected at each month-end rebalancing is the outstanding Treasury Bill that matures closest to, but not beyond, three months from the rebalancing date. To qualify for selection, an issue must have settled on or before the month-end rebalancing date.

Ibbotson US Intermediate Government Bond Index is an unmanaged index representing the U.S. intermediate-term government bond market. The index is constructed as a one bond portfolio consisting of the shortest-term non callable government bond with less than 5 years to maturity.

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