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## A Retirement Path for Any Market

Flexibility and the 4% guideline can help keep your retirement on track.

The U.S. stock market, represented by the S&P 500 Index, has provided substantial returns since the global financial crisis that began in 2007, though it has not been a steady climb the entire time. The S&P has had four corrections—that is, a price decline of at least 10%—since 2008, and all of the pullbacks have been short-lived. But for an investor who has recently retired, or is nearing retirement, the idea of a market decline can lead to concerns about how this may impact retirement savings.

### KEY POINTS

- Individuals nearing or in retirement need to be prepared for a variety of market conditions.
- Our analysis shows that starting with our 4% guideline can help retirees navigate withdrawals even during market declines.
- If investors want to further preserve account balances, they could choose to curtail discretionary spending by making slight adjustments along the way.

“While a down market in the first five years of withdrawing your retirement assets can increase the risk of outliving your savings, it doesn’t mean you won’t be able to reach your retirement goals,” says Judith Ward, CFP®, a senior financial planner with T. Rowe Price. In fact, with a flexible approach to your withdrawal strategy, it’s possible to have your savings support you for a retirement that could last three decades or more, even if you experience a market decline in the first few years.

### A tale of two retirees

To understand the impact a down market might have early in retirement, we examined historical bear markets and analyzed retirees from two different time periods:

- An individual who retired January 1, 1973, the most recent 30-year period that started with a bear market.
- An individual who retired January 1, 2000, who had already lived through two bear markets and is now more than halfway into her retirement years.

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—JUDITH WARD, CFP®  
SENIOR FINANCIAL PLANNER

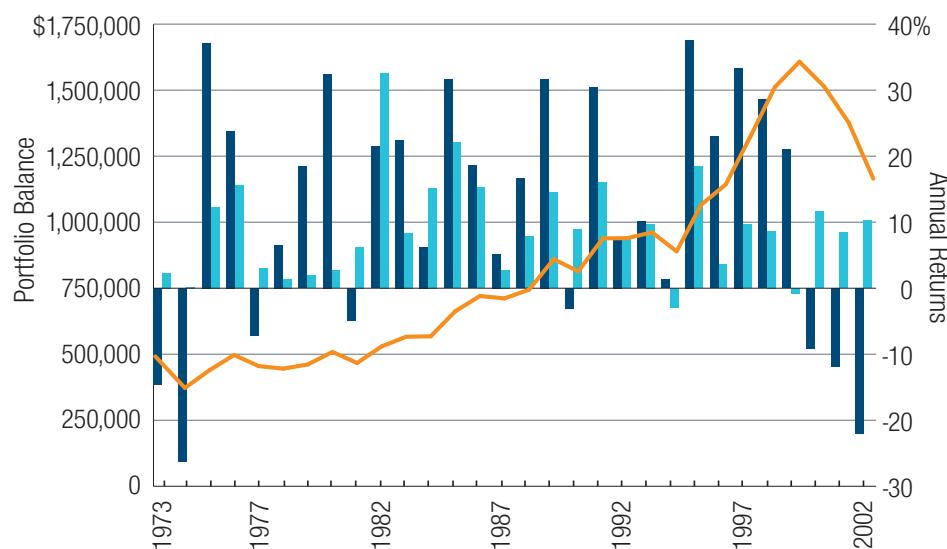
### The 1973 retiree

In 1973, the onset of the oil embargo and energy crisis sparked a recession. The early 1970s were also one of the highest inflationary periods in history, where the price of consumer goods more than doubled in 10 years. We examined how a hypothetical investor who retired on January 1, 1973, with \$500,000 in savings (allocated to 60% stocks and 40% bonds throughout retirement)<sup>1</sup> would have fared if he followed the “4% rule” for retirement withdrawals. The guideline assumes investors start with an initial

### Retiring in 1973

A hypothetical investor who retired in 1973, right into a bear market, still managed to grow his savings over a 30-year retirement with continuous inflation-adjusted spending.

- S&P 500 Index (Right Axis)
- Bloomberg Barclays U.S. Aggregate Bond Index\* (Right Axis)
- Portfolio Balance (Left Axis)



\*Benchmark reflects the Bloomberg Barclays U.S. Government/Credit Bond Index for the period 1973–1975 and the Bloomberg Barclays U.S. Aggregate Bond Index from 1975 to the present.

**Past performance cannot guarantee future results.**

withdrawal amount equal to 4% of the starting portfolio balance (\$20,000 in the first year). This amount is then adjusted each year based on actual inflation<sup>2</sup> to maintain purchasing power over the 30-year time horizon.

The first monthly withdrawal for this investor was \$1,667, but his retirement got off to a rocky start: The S&P 500 Index declined 48% within the first two years. Not only did he watch his portfolio shrink to \$328,500 by September 1974, but inflation was also a huge factor. (See “Retiring in 1973” on page 2.) Inflation jumped from 3.4% in late 1972 to more than 12% by the end of 1974.<sup>2</sup> As a result, when it came to paying for everyday expenses like gas and food, his money had to go further than it used to.

Recovery was just around the corner, however, and the retiree’s account balance began to grow with the help of two subsequent bull markets. His investments recovered to over \$500,000 about 10 years into retirement and hit \$1 million by the end of 1995. Those gains helped the retiree weather the swings of the bear market that started in March 2000. In 2002, at the end of 30 years, the portfolio balance was well above \$1 million, despite the market volatility incurred during those decades.

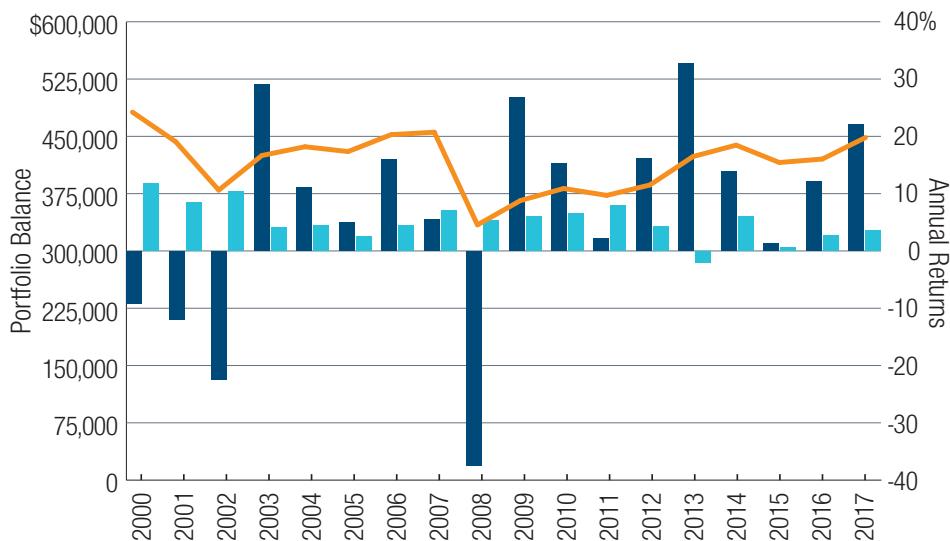
### The 2000 retiree

Now let’s consider a more recent bear market. Using the same assumptions from our first illustration, consider the hypothetical investor who retired in 2000. She encountered one bear market beginning in March 2000 and weathered a second one during the financial crisis of 2008. The S&P 500 lost 49% between March 2000 and October 2002 and just over 56% between October 2007 and March 2009. Unlike the situation for the 1973

### Retiring in 2000

A hypothetical investor who retired in 2000 would have faced two bear markets in the first decade and a half of retirement, but her savings still supported her during these years with continuous inflation-adjusted spending.

- S&P 500 Index (Right Axis)
- Bloomberg Barclays U.S. Aggregate Bond Index (Right Axis)
- Portfolio Balance (Left Axis)



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**78%**  
of investors  
reduce spending  
immediately  
if spending  
exceeds their  
income.

retiree, however, inflation remained low—between 2000 and 2009, it topped out at just 4.1% in 2007 and was 0% in 2008.<sup>2</sup> A strong bond market during this time also helped buoy returns.

This investor's \$500,000 portfolio dropped below \$365,000 in February 2003, just three years into retirement. Her account rebounded to a high of almost \$463,000 in October 2007, just ahead of her second bear market. Her savings approached a low of \$300,000 in February 2009, before nearly nine years of market growth and a strong rebound helped the balance grow to over \$442,000 as of year-end 2017. (See "Retiring in 2000" on page 3.)

This investor is more than halfway into a 30-year retirement horizon. So how well could her assets hold up over the 12 years remaining in her retirement? We used the Retirement Income Calculator and assumed the following:

- An 83 year old living with no spouse/partner in retirement.
- An ending balance of \$442,308 as of year-end 2017.
- A hypothetical portfolio composed of 60% stocks and 40% bonds.

No Social Security or other income was considered, as we were only assessing the impact of withdrawals on personal savings. (See "Retirement Income Calculator Methodology and Assumptions" on page 7.)

As it turns out, her first monthly withdrawal in 2018 would be \$2,837, and she'd increase that amount by 3% each year to match inflation. According to our analysis, she would have a 90% Simulation Success Rate (where she has at least \$1 remaining in the portfolio at the end of her 30-year retirement) based on 1,000 market scenarios.

#### **The role of spending adjustments**

Based on our analysis, these retirees who started with a conservative withdrawal amount were able to maintain their purchasing power over a 30-year retirement without running out of money, even with a bear market in the first few years of retirement—or more than one bear market over a lengthy retirement. The initial 4% withdrawal amount did not guarantee a smooth ride for their portfolio balances in the short term. In some cases, retirees would have watched their portfolio balances lose a third of their values in just a few years.

"It's human nature to adapt and adjust," says Ward. "Most likely, the retirees in our two examples would feel the need to make adjustments when seeing a large decline in their portfolio balances." In fact, a recent study<sup>3</sup> on investor behavior found that:

- 89% of respondents could adjust their lifestyle to their income.
- 60% prefer to adjust spending (either up or down) depending on the market to maintain the value of their portfolio.
- 78% reduce spending immediately if spending exceeds their income.

We looked at the same two hypothetical investors again and assumed they would temporarily adjust their spending once their original portfolio values of \$500,000 dropped by 30%—or below \$350,000.

In the first scenario, the investor who retired in 1973 would make spending adjustments at the end of 1974—due to the nearly 35% decline in his portfolio's value—but only for two years. So instead of having a monthly withdrawal of \$2,035 starting in 1975, the monthly withdrawal would remain at \$1,816 and stay at that amount until the end of 1976. Though forgoing temporary inflation adjustments may not sound like much,

doing so would have translated into a cut in spending because of the higher inflationary environment at that time.

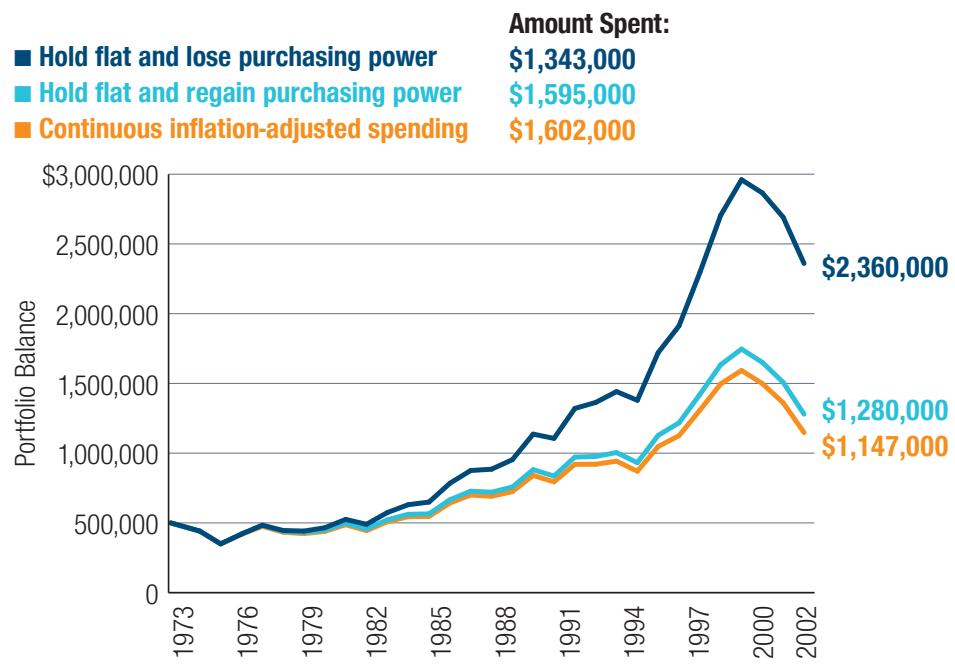
This retiree would never have had to take another cut in income for the remainder of the 30-year retirement period, and by the end of 2002, the portfolio would have grown to over \$2 million. But consider that when this investor resumed taking inflation adjustments in 1977, those adjustments were based on a lower withdrawal amount than if he had never made any reductions in spending. This resulted in a permanent loss of purchasing power. While the investor spent considerably less money over time, he would have likely felt the pinch during high inflationary times. However, he would have had considerably more breathing room and the ability to increase spending later in retirement.

A more realistic second scenario, therefore, might involve the same investor deciding after two years of flat spending to increase annual withdrawals to the same level they would have been if no cuts were made. In that case, he would have had more to spend each year while still regaining full purchasing power over time. In this scenario, the investor's portfolio value would have been almost \$1.3 million after 30 years, and his spending would have been able to keep pace with inflation. (See "Spending Scenarios for the 1973 Retiree" below.)

If we were to apply the same spending scenario to the hypothetical investor who retired in 2000, she wouldn't experience the same loss in purchasing power as the first investor because inflation was relatively mild in the 2000s compared with the 1970s. In fact, she wouldn't need to forgo annual inflation adjustments until 2009, after the second bear market. In our analysis, we assumed her annual withdrawals remained flat for four years until 2013, when the portfolio value returned to above \$400,000.

#### Spending Scenarios for the 1973 Retiree

The outcomes of various spending strategies for a hypothetical investor who retired in 1973.



Past performance cannot guarantee future results.

## Flexibility in Spending for the 2000 Retiree

Spending scenarios for a hypothetical investor who retired in 2000 show the impact of her choices.

	Portfolio balance		Total amount spent over period
	Beginning 2000	Ending 2017	
<b>Continuous spending</b>	\$500,000	\$442,308	\$444,626
<b>Hold spending flat and regain purchasing power</b>	\$500,000	\$448,886	\$440,993
<b>Hold spending flat and lose purchasing power</b>	\$500,000	\$461,235	\$431,254

Past performance cannot guarantee future results.

## An initial 4% withdrawal amount can help weather a variety of market conditions.

If the investor resumed taking inflation adjustments in 2013, her portfolio value at the end of 2017 would have been just over \$461,000. This is compared with a portfolio value of \$442,000 if inflation adjustments had been made since retirement in 2000 and \$449,000 if annual withdrawals were increased in 2013 to the same level they would have been if no cuts were made. The narrow difference reflects the impact that modest inflation can have on spending rates in general. (See “Flexibility in Spending for the 2000 Retiree” above.)

### Approaching the unknown

The future cannot be predicted, and past returns do not guarantee future performance. However, our analysis can give investors some confidence that applying an initial 4% withdrawal amount, and adjusting for inflation, can help them weather a variety of markets in retirement even if a market decline happens early on.

The first five years into retirement may be the most critical time period, especially if markets fall. Try to resist the urge to make drastic changes in portfolio strategy when markets become more volatile, especially early in your retirement horizon. If you do feel the need to make changes, temporary adjustments to spending can help sustain portfolio balances throughout retirement. “A conservative starting point, combined with any temporary adjustments along the way, allows for greater flexibility later in retirement whether or not a market downturn occurs early on,” says Ward. “By following this approach, retirees can weather the markets and truly have a fulfilling and enjoyable next phase of life.” ■

<sup>1</sup>Stock performance based on the S&P 500 Index; bond performance based on Bloomberg Barclays U.S. Aggregate Bond Index. The latter benchmark reflects the Bloomberg Barclays U.S. Government/Credit Bond Index for the period 1973–1975 and the Bloomberg Barclays U.S. Aggregate Bond Index from 1975 to the present.

<sup>2</sup>Consumer price index, seasonally adjusted.

<sup>3</sup>T. Rowe Price 2014 First Look: Assessing the New Retiree Experience.

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### ASSUMPTIONS

The hypothetical examples above are based on the performance of the S&P 500 Index, which tracks the performance of 500 large-company stocks, and the Bloomberg Barclays U.S. Aggregate Bond Index, which tracks domestic investment-grade bonds, including corporate, government, and mortgage-backed securities, for the time periods represented. Indexes are unmanaged, and it is not possible to invest directly in an index. These hypothetical examples are meant for illustrative purposes only and do not reflect an actual investment, nor does it account for the effects of taxes or any investment expenses. Investment returns are not guaranteed, cannot be predicted, and will fluctuate. All investments are subject to risk, including the possible loss of the money invested.

### IMPORTANT INFORMATION

There are inherent risks associated with investing in the stock market, including possible loss of principal, and investors must be willing to accept them. Bond yields and prices will vary with interest rate changes. Investors should note that if interest rates rise significantly from current levels, bond fund total returns will decline and may even turn negative in the short term.

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### Retirement Income Calculator Methodology and Assumptions

#### 1. OVERVIEW

The Retirement Income Calculator allows retirement savers to estimate the durability of their current savings across 1,000 randomly generated market scenarios, and to assess the impact of different savings rates, time horizons, and asset allocations on the projection of retirement income. The projections are used to provide monthly retirement income estimates presented in today's dollars.

The projections generated by the tool regarding the likelihood of various investment outcomes are based on historical performance data of specific asset classes as described below, but are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. The tool presents only a range of possible outcomes. There can be no assurance that the projected or simulated results will be achieved or sustained. The potential for loss (or gain) may be greater than demonstrated in the simulations. Results may vary with each use or over time, depending on changes to your inputs or periodic updates to the underlying assumptions.

The Retirement Income Calculator assesses the adequacy of retirement savings based on an asset allocation you specify or a model asset allocation. T. Rowe Price believes to be generally appropriate for an investor of your age, or the age of your planning partner, if older. You may include a planning partner, such as a spouse, with whom you are jointly planning your retirement.

Although you may input information about outside accounts, other income, and specific expenses into the Retirement Income Calculator, it is not required. Please be sure to take other assets, income, and investments into consideration in reviewing results that do not incorporate that information.

#### 2. DATA USED AND HYPOTHETICAL PROJECTION METHODOLOGY

**Data and Assumptions About You.** In order to determine how likely your current and projected retirement savings are to last through retirement, we use data and assumptions about you, as follows.

We use salary information you provide, a retirement age of 65 (unless you have specified a different age), a planning period in retirement of 30 years (unless you have specified a different planning period), and an assumed annual workplace contribution rate (15% unless you specified a different rate). You may also enter other, non-workplace annual retirement savings. We assume that your salary, workplace contributions, and other savings (if entered) will

increase at a rate to keep pace with inflation (assumed to be 3% based on historical inflation rates) and will stop at retirement.

We use any anticipated retirement income you provide, and you may include Social Security benefits in the analysis, which we estimate based on your stated or assumed retirement age and current salary, but assume benefits begin at retirement. You may input your own Social Security estimate. We assume that you are planning as an individual unless you provide information about a partner. See "Retirement Income and Withdrawal Assumptions" for more information about partners.

If you are an existing T. Rowe Price customer and you log in when using the tool, your birthdate and account balances held under your name and tax ID at T. Rowe Price will be automatically imported into the tool. The tool treats all retirement accounts entered in the "About how much have you saved for retirement so far?" box as tax-deferred and does not distinguish among contribution sources. You may provide data about outside investment accounts through the tool. By logging in, the data you enter into the tool will be saved. For subsequent uses, your updated T. Rowe Price account balances will be available to include through the worksheet link. (Your T. Rowe Price account values will not automatically update unless you choose to do so through the worksheet link.)

**Calculating Hypothetical Future Values of Asset Class Portfolios.** The tool uses Monte Carlo analysis to generate 1,000 hypothetical market scenarios so that users can analyze hypothetical outcomes for specific asset class portfolios under a range of market conditions. (Asset classes used are limited to stocks, bonds, and short-term bonds). Monte Carlo analysis models future uncertainty based on probability. Our Monte Carlo analysis creates potential simulated portfolio values by using asset class portfolio returns selected randomly from a consistent data set composed of over 1 million potential monthly return values, net of inflation.

The data set of potential monthly returns was developed using the following assumptions:

Potential return values, net of inflation, were generated using historical rates of return for each of the three asset classes since inception through 2010, in combination with our long-term view of market conditions. We used the S&P 500 Index for stocks, Bloomberg Barclays U.S. Aggregate Bond Index for bonds, and Bloomberg Barclays U.S. 1-3 Year Government/Credit Bond Index for short-term bonds. These yielded the following long-term annual compound rates of return, net of inflation: for stocks, 4.90%; for bonds, 2.23%; and for short-term bonds, 1.38%.

We adjusted these returns for expenses using the following assumptions: for stocks, 0.70%; for bonds, 0.60%; and for short-term bonds, 0.55%.

We assumed a variability of returns based on historical volatility data from market indices in combination with our long-term view of market conditions: for stocks, 18%; for bonds, 6.5%; and for short-term bonds, 4%.

Finally, we assumed that returns of each asset class would move in correlation to the other asset classes in a manner consistent with historical experience as follows: for stocks to bonds, 0.4; for stocks to short-term bonds, 0.3; and for bonds to short-term bonds, 0.8.

The correlation (which ranges from -1.0 to 1.0) indicates how much the assets move in tandem. The closer the value is to 1.0 indicates the higher the tendency the assets have to move in the same direction.

We use the assumptions above for all retirement accounts.

**Asset Allocation Assumptions.** If you do not enter your own asset allocation, the tool calculates retirement income projections based on a model asset allocation we believe to be appropriate for hypothetical investors of your age, or the age of your planning partner if older. Model asset allocations have been developed based on stock increments from 40% to 90% and are assigned as follows:

**Model Asset Allocations**

Age	Saving or Preparing for Retirement	Retired
47 or younger	90% stock / 10% bond	40% stock / 40% bond / 20% short-term bond
48-55	80% stock / 20% bond	40% stock / 40% bond / 20% short-term bond
56-69	60% stock / 30% bond / 10% short-term bond	40% stock / 40% bond / 20% short-term bond
70-89	40% stock / 40% bond / 20% short-term bond	40% stock / 40% bond / 20% short-term bond
90 or older	40% stock / 40% bond / 20% short-term bond	40% stock / 40% bond / 20% short-term bond

Once an allocation is set in the tool, it will remain until updated via the slider bar. The tool assumes monthly rebalancing. The model asset allocations are based upon analysis that seeks to balance long-term return potential with anticipated short-term volatility. The model reflects our view of appropriate levels of trade-off between potential return and short-term volatility for investors of certain ages.

**Taxable Account Returns.** If you have included taxable accounts as part of the tool's assessment or such accounts become part of the tool's withdrawal assumptions (see below), our model assumes that taxes decrease earnings of that account. Accordingly, the model uses data from the Lipper peer group for each asset class to calculate an assumed percentage of four categories of earnings with different tax impacts: realized short-term capital gains, realized long-term capital gains, qualified dividend payments, and interest or nonqualified dividend payments. The coefficients used to determine the amount by which we assume taxes reduce earnings in taxable accounts (the "tax drag") are: for stocks, 12%; for bonds, 26%; and for short-term bonds, 30.53%. These coefficients are used to reduce monthly return assumptions for your taxable assets in the 1,000 hypothetical market scenarios.

**Retirement Income and Withdrawal Assumptions.** Retirement income projections are presented as a snapshot of the first month in retirement and are displayed in today's dollars. In order to model your retirement income, we start with the assumed value of your account at an asset class level based on the median result from the 1,000 hypothetical return projections and assume withdrawals pro rata across asset classes at the assumed or stated goal level, increased each year for inflation. The figures do not take into account any taxes that may be due upon withdrawal. We assume that required minimum distributions for non-Roth IRAs begin at age 70½ and are made in 12 equal monthly payments. To the extent Social Security payments or required minimum distributions exceed your assumed or stated retirement income goal, we assume the amounts are reinvested in a taxable account.

Our projections also depend on your stated goal:

- **Saving for Retirement.** We assume that you will need 75% of your preretirement salary, and we calculate the percentage of times that your data will generate that amount in our 1,000 market scenarios. We also calculate a projected monthly retirement income amount that leaves at least \$1 of savings in 70% or more of our market scenarios.
- **Preparing for Retirement.** We calculate the percentage of times that the monthly amount you would like to withdraw from your estimated retirement savings leaves at least \$1 at the end of the withdrawal horizon in our market scenarios. We also calculate the monthly withdrawal amount that leaves at least \$1 at the end of the withdrawal horizon in 80% or more of our market scenarios.
- **Living in Retirement.** We calculate the percentage of times that your stated monthly withdrawal amount leaves at least \$1 at the end of the withdrawal horizon in our market scenarios. We also calculate the monthly withdrawal amount that leaves at least \$1 at the end of the withdrawal horizon in 80% or more of our market scenarios.

In withdrawing to meet the income goal, we assume a specific withdrawal sequence from account types. We start with any required minimum distributions. We then move to any taxable accounts, followed by tax-deferred accounts. Finally, we withdraw from any tax-free Roth IRAs.

When a planning partner is included, we follow the same sequence, but take into account the age of the partner.

If you are modeling retirement income with a planning partner, we calculate each person's Social Security benefits separately and assume that the surviving spouse or partner is entitled to receive the higher of the two estimated Social Security benefits through the end of the planning period. If you have entered data concerning a pension benefit, we allow you to determine the amount of the pension that will be paid to your planning partner. Required minimum distributions are calculated using the uniform lifetime table even if your planning partner is a spouse more than 10 years younger than you.

We do not take any taxes into account that may be due upon withdrawal.

We provide an estimate of how much more we think you'll need to save in order to close the gap between what you're projected to have and what we think you'll need. In our market simulations, the additional savings produced an account value (the median result from 1,000 hypothetical return projections) equal to what we think you'll need to save.

**3. LIMITATIONS**

While the Retirement Income Calculator has been designed with reasonable assumptions and methods, the tool provides hypothetical projections only and has certain limitations.

- Failure of the model to accurately project actual market conditions, inflation, or tax rates may result in over- or understatement of projected retirement income.
- The salary, contribution, and other savings growth rate assumption (3%) may not match your circumstances and may result in over- or understatement of retirement savings and income projections.
- At certain salary levels, the failure to incorporate IRS or plan contribution limits may also result in overstated retirement savings and income projections.
- The failure to take into account taxes at distribution may result in overstated retirement income projections. Future spending capacity from the projected income stream will be impacted by taxes.
- The use of current salary to estimate Social Security payments may not represent your situation.
- The assumption that Social Security payments will increase by the amount of assumed inflation may result in overstated retirement income projections.
- If your input includes information about a planning partner that is not your spouse, then assumptions about the transfer of Social Security or pension benefits to a surviving spouse do not apply and may result in overstated projected retirement income for the survivor.
- The model asset allocation displayed may not be appropriate for you if your risk tolerance varies from the assumptions we used in creating the model.

The information provided in this tool is for general and educational purposes only and is not intended to provide legal, tax, or investment advice. This tool does not provide fiduciary recommendations concerning investments or investment management. Other T. Rowe Price educational tools or advice services use different assumptions and methods and may yield different outcomes.

**IMPORTANT: The projections or other information generated by the Retirement Income Calculator regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. The simulations are based on assumptions. There can be no assurance that the projected or simulated results will be achieved or sustained. The charts present only a range of possible outcomes. Actual results will vary with each use and over time, and such results may be better or worse than the simulated scenarios. Clients should be aware that the potential for loss (or gain) may be greater than demonstrated in the simulations.**

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