

PURSuing FINANCIAL SECURITY THROUGHOUT RETIREMENT

Achieving financial security in retirement can be like trying to hit a moving target blindfolded. Indeed, while many look forward to retirement, it also can be one of the most complicated stages of life from a financial planning point of view.

That's because many unknowns can upset the best intentions. These include future market returns, health expenses, tax policies, lifestyle changes, estate planning issues, emergencies, and how much of a retiree's assets can be withdrawn annually without jeopardizing future financial security.

T. Rowe Price financial planners say it is critical to start out with a realistic plan that is reviewed regularly and allows for future flexibility.

And that plan starts with determining a reasonable initial withdrawal amount from portfolio assets so that retirees do not overspend in the early years of retirement.

Setting that amount involves contending with three basic risks in retirement: market risk affecting the portfolio value, longevity risk (the number of years the assets must last), and inflation risk affecting purchasing power over time.

With life expectancy steadily increasing, many retirees may live well into their 90s. A 65-year-old today can expect to live, on average, until age 84 for men or age 86 for women, according to the Social Security Administration. And about one of every four 65-year-olds today is expected to live past age 90 and one of 10 past age 95.

Over such long periods of time, inflation could become even more of a threat than market volatility. While inflation has been subdued in recent years, over the long term, it has averaged about 3% annually, which cuts purchasing power almost in half over a 20-year period.

Sustaining Retirement Income

Spending Rates and Asset Allocations Are Key

These tables show the estimated probabilities of maintaining varying withdrawal rates throughout retirement periods of varying lengths with a range of asset allocations. These simulation success rates** can be applied to any size retirement portfolio. The analysis does not take into account taxes.

20-year retirement period				
Initial Withdrawal Amount	Stock/Bond Mix*			
	80/20	60/40	40/60	20/80
Simulation Success Rate**				
7%	50%	44%	35%	27%
6%	71%	69%	62%	50%
5%	89%	91%	91%	88%
4%	98%	99%	100%	100%

25-year retirement period				
Initial Withdrawal Amount	Stock/Bond Mix*			
	80/20	60/40	40/60	20/80
Simulation Success Rate**				
7%	34%	27%	20%	14%
6%	52%	46%	36%	27%
5%	74%	72%	64%	51%
4%	93%	94%	95%	91%

30-year retirement period				
Initial Withdrawal Amount	Stock/Bond Mix*			
	80/20	60/40	40/60	20/80
Simulation Success Rate**				
7%	24%	19%	14%	10%
6%	40%	32%	25%	18%
5%	62%	55%	46%	34%
4%	86%	84%	80%	66%

*The following asset allocations include short-term bonds: 60/40 includes 60% stocks, 30% bonds, and 10% short-term bonds; 40/60 includes 40% stocks, 40% bonds, and 20% short-term bonds; and 20/80 includes 20% stocks, 50% bonds, and 30% short-term bonds. 80/20 does not include short-term bonds.

**T. Rowe Price has analyzed a variety of retirement spending strategies using computer simulations to determine the likelihood of "success" (having at least \$1 remaining in the portfolio at the end of the retirement period) for each strategy, with those probabilities shown as percentages in each grid. The analysis for each retirement strategy is based on running 10,000 hypothetical potential market scenarios that account for a wide variety of return possibilities. The initial withdrawal amount is the percentage of assets withdrawn at the beginning of the first year of retirement. The annual amount withdrawn is increased by 3% each year for inflation. Investment scenarios are based on hypothetical (not historical) annual rates of return for the three asset classes represented in the portfolio mixes. The compound annual growth rate assumptions of 8.0% for stocks, 5.3% for bonds, and 4.4% for short-term bonds are based on T. Rowe Price estimates for future long-term periods. These examples only present a range of possible outcomes. Actual results will vary, and such results may be better or worse than the simulation scenarios. See further disclosures on pages 17 and 18.

Source: T. Rowe Price.

4% Guideline

To help determine a viable withdrawal plan, T. Rowe Price financial planners utilize Monte Carlo simulation analysis.

That analysis projects 10,000 possible market scenarios to determine the probability of success for various initial spending amounts, taking into account potential inflation and the potential variability of market returns, including worst-case scenarios, for a given time horizon and allocation strategy. (A full explanation of this methodology is on pages 17 and 18.)

T. Rowe Price has long concluded that a relatively “safe” initial withdrawal amount is about 4% of portfolio assets the first year of retirement, assuming the amount is increased each year by 3% to account for inflation. For example, with a beginning balance of \$500,000, the first year withdrawal amount is \$20,000.

No analysis can predict the future, of course, but in this one a 4% initial withdrawal amount translates to a high probability that a retirement portfolio of any size will last over a 30-year period using a reasonably diversified

factors: how much they can afford to initially spend, how much they want to initially spend, the likelihood that they will be able to sustain assets in retirement, and the investment risks they are willing to take.

“The 4% guideline serves as a starting point for a withdrawal strategy. It’s a way to put a retirement account balance into the context of a potential 30-year payment stream. But it’s also a flexible guideline that can be adapted depending on the individual and how that person’s retirement strategy progresses. It’s not set in stone. The withdrawal plan should be reviewed at least annually.”

investment strategy—thus balancing the need for income with the desire to avoid outliving assets. (See chart page 14.)

The chart highlights the trade-offs retirees may consider among these

For example, it shows that an investor retiring at 65 with a 20-year retirement horizon, using a balanced portfolio (60% stocks, 30% bonds, and 10% short-term bonds), may have a 69% chance of not running out of money prematurely with a 6% initial withdrawal amount and annual inflation increases.

By contrast, investors may have an extremely high probability (more than 90%) when starting with an initial 4% or 5% withdrawal amount.

What if this investor wanted to project a longer retirement period?

The same strategy—over 25 years—may offer only a 46% chance of not running out of money with a 6% initial withdrawal amount; a 5% rate might provide a better chance.

If the investment horizon were to be extended to 30 years, the investor may have to consider a 4% withdrawal amount to achieve a high probability of not running out of money because, as the chart indicates, there is a big leap between 20- and 30-year retirement horizons.

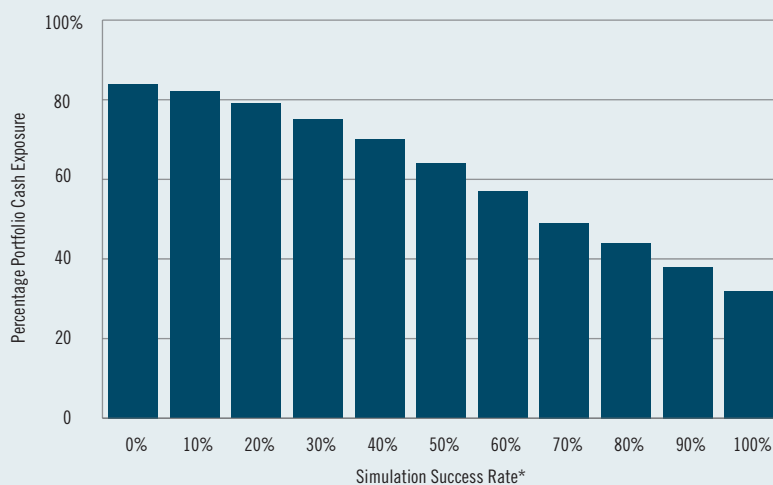
Flexibility

“The 4% guideline serves as a starting point for a withdrawal strategy,” says Judith Ward, CFP®, a senior financial planner with T. Rowe Price. “It’s a way to put a retirement account balance

[Continued on page 16]

Cash Exposure and Retirement Success

This analysis shows that the chances of sustaining income throughout a 30-year retirement period may decline as the cash positions in a retirement portfolio increase.*



*This analysis assumes that the noncash portion of the retirement portfolio is evenly split between stocks and bonds and that the investor withdraws 4.0% of the portfolio assets the first year of retirement and increases that amount by 3% each subsequent year to keep up with inflation. The simulation success rate, based on simulating 10,000 potential market scenarios, represents the chance of sustaining income for a 30-year retirement. Asset classes' underlying annual growth rate assumptions are 8.0% for stocks, 5.3% for bonds, 4.4% for short-term bonds, and 4.0% for cash, which represent T. Rowe Price's estimates for future long-term periods. See further disclosures on pages 17 and 18.

Source: T. Rowe Price.

Financial Security

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into the context of a potential 30-year payment stream.

“But it’s also a flexible guideline that can be adapted depending on the individual and how that person’s retirement strategy progresses. It’s not set in stone. The withdrawal plan should be reviewed at least annually.”

In addition to overspending, another potential threat to an investor’s withdrawal strategy over time is the sequence of market returns, particularly early in retirement.

Encountering a bear market, or even a long stretch of mediocre performance in the early years of retirement, can have a lasting impact on a retiree’s long-term financial security. That is because more assets are at risk early in retirement and, because a retiree may have to sell more shares during this period to meet living expenses, there would be less money invested to benefit from a subsequent market recovery.

Those unfortunate enough to experience a bear market early in retirement may find that they need to temporarily reduce their withdrawal amounts—or forgo annual inflation

adjustments—to get back on track.

An earlier T. Rowe Price analysis has shown that holding withdrawals

more by their spending rates than their asset allocation strategies, so investors should focus on that first. Ms. Ward says.

“This indicates that retirees with long time horizons [about 30 years] should generally have no more than 20% to 30% of their assets in cash and that they should keep at least 30% to 40% in equities, if not more. If they have a much bigger cash position than that and consequently trim their equity exposure, they increase the likelihood of failing to maintain income throughout their retirement years...So for retirees who are not only concerned about having enough to live on for 30 years but also about having more protection from inflation and about meeting emergency expenses, maintaining a meaningful equity exposure makes sense.”

constant with no inflation increases over five years can substantially improve the odds of not running out of money even if a portfolio suffered a 30% decline in the first year of retirement.

Portfolio Strategy

In general, retirees’ chances of running out of money prematurely are driven

But the chart on page 15 shows how portfolio strategy can impact the success rate for maintaining retirement income if the strategy is too conservative.

In this analysis, as a retiree’s cash position increases and the equity allocation drops, the chances of maintaining investable assets over the 30-year projected retirement period declines, assuming a 4% initial withdraw amount.

“This indicates that retirees with long time horizons [about 30 years] should generally have no more than 20% to 30% of their assets in cash and that they should keep at least 30% to 40% in equities, if not more,” says Jerome Clark, manager of the T. Rowe Price Target Date Funds.

“If they have a much bigger cash position than that and consequently trim their equity exposure,” Mr. Clark adds, “they increase the likelihood of failing to maintain income throughout their retirement years.”

A Cushion

For those who want to have more potential purchasing power or create a cushion for emergencies throughout

Final Wealth and Equities

This analysis shows that the probable median wealth after a 30-year retirement may increase with a greater percentage of a portfolio invested in equities.

	Percentages of Portfolios Invested in Stocks and Bonds			
	80/20	60/40	40/60	20/80
Simulation success rates for sustaining retirement income*	86%	84%	80%	66%
Percentage of original portfolio’s purchasing power after 30 years (median wealth)	94%	69%	44%	19%
Median wealth after 30 years based on \$500,000 portfolio at retirement (in current dollars)**	\$467,761	\$343,243	\$218,142	\$93,594

*See notes below the charts on pages 14 and 15 as to simulation success rates and the asset classes’ underlying annual growth rate assumptions. See further disclosures on pages 17 and 18.

**This analysis shows the median percentages of portfolios’ original purchasing power remaining after a 30-year period with a 4.0% annual withdrawal rate (with annual inflation increases of 3.0%). In half the simulated scenarios for each asset allocation, the portfolios ended up with balances that equaled or exceeded the medians. In the other half, the final balances were less than the medians.

Source: T. Rowe Price.

retirement or leave money to heirs, the asset allocation decision becomes more critical—even for those with a conservative initial withdrawal amount.

The chart on page 16 shows how the choice of a portfolio strategy can determine how much of the assets are left at the end of a retirement period.

The top row shows the probability (the simulation success rate) that the investor will not run out of assets in retirement and sustain this income stream, based on various portfolio strategies and assuming a 4% initial withdrawal amount.

Each of the investment strategies with at least a 40% equity exposure provides at least an 80% chance of not running out of money, according to this analysis.

The second row, based on the same analysis, shows the median remaining purchasing power (in today's dollars as a percentage of the initial balance at retirement) for various asset allocation strategies after 30 years of retirement.

Higher equity allocations generally resulted in higher purchasing power as well as a higher simulation success rate.

For example, if an investor retired with \$500,000, with 60% invested in equities, 30% in bonds, and 10% in

short-term bonds, it is likely that, after a 30-year retirement period, the portfolio would still have a median balance of more than \$343,000 in current dollars (or 69% of its original value).

With a 20% equity position, the analysis indicates that the median balance would only be about \$94,000, or only 19% of the original value.

Accumulating more purchasing power has several important benefits. Retirees are likely to have more assets in their investment portfolios throughout retirement to cover special events, medical expenses, or other emergencies; have more assets to generate income if they outlive their projected life expectancies; or accumulate assets to bequeath to heirs.

“So for retirees who are not only concerned about having enough to live on for 30 years but also about having more protection from inflation and about meeting emergency expenses, maintaining a meaningful equity exposure makes sense,” Mr. Clark says.

At the same time, while more equity exposure may produce higher ending balances, retirees also must be willing to experience possibly more short-term market setbacks.

Holistic View

T. Rowe Price financial planners suggest that those who rely on their investment assets as a primary source for retirement income should generally consider a strategy that has at least an 80% chance of not depleting assets if they are retiring in their early to mid-60s with a relatively long time horizon (20 to 30 years).

Many retirees, however, have other sources of retirement income.

Social Security benefits and possible pension income may provide a substantial level of predictable income over a retirement horizon. It is important to consider how these sources of income may support a spending plan, in order to determine how much pressure there may be on retirement savings to meet expenses over time.

By carefully developing a retirement financial plan—and understanding the possible effects of time, spending rate, and investment approach on its potential success—retirees can reduce the financial stress often associated with retirement and avoid having to make undesirable adjustments along the way. 🦋

MONTE CARLO SIMULATIONS EXPLAINED

Monte Carlo simulations model future uncertainty. In contrast to the use of average outcomes, Monte Carlo analyses produce outcome ranges based on probability, thus incorporating future uncertainty.

Material Limitations Include:

- The analysis relies on certain assumptions, combined with a return model that generates a wide range of possible return scenarios for these assumptions. Despite our best efforts, there is no certainty that the assumptions for the model will accurately predict asset class return rates

going forward. As a consequence, the results of the analysis should be viewed as approximations, and investors should allow a margin of error and not place too much reliance on the apparent precision of the results.

- Extreme market movements may occur more often than in the model.
 - Some asset classes have relatively short histories. Actual long-term results for each asset class may differ from our assumptions, with those for asset classes with limited histories potentially diverging more.
 - Market crises can cause asset classes to perform similarly,
- lowering the accuracy of our return assumptions and diminishing the benefits of diversification (that is, using many different asset classes) in ways not captured by the analysis. As a result, returns actually experienced by the investor may be more volatile than those used in our analysis.
 - The analysis does not use all asset classes. Other asset classes may be similar or superior to those used.
 - Income taxes are not taken into account, nor are early withdrawal penalties.
 - The analysis models asset classes,

not investment products. As a result, the actual experience of an investor in a given investment product (e.g., a mutual fund) may differ from the range generated by the simulation, even if the broad asset allocation of the investment product is similar to the one being modeled. Possible reasons for divergence include, but are not limited to, active management by the manager of the investment product or the costs, fees, and other expenses associated with the investment product. Active management for any particular investment product—the selection of a portfolio of individual securities that differs from the broad asset classes modeled in the analysis—can lead to the investment product having higher or lower returns than the range used in this analysis.

Modeling Assumptions:

The primary asset classes used for this analysis are stocks, bonds, and short-term bonds. An effectively

diversified portfolio theoretically involves all investable asset classes including stocks, bonds, real estate, foreign investments, commodities, precious metals, currencies, and others. Since it is unlikely that investors will own all of these assets, we selected the ones we believed to be the most appropriate for long-term investors.

Our analysis uses Monte Carlo simulation to model uncertainty of asset class returns and inflation, which are derived from a structural model built from factors relating to both financial markets and the broad economy. This model generates a wide range of realistic economic scenarios and asset returns. Our approach is to simulate the macroeconomic backdrop with the economy modeled as in-scenario CPI inflation and real GDP growth. Our simulated inflation series exhibits periods of sustained lower, moderate, and higher inflation, as evidenced in historical periods. Asset class returns are functions of the underlying macroeconomic backdrop as well as their own history. Factors driving

the modeled investment returns, including the yield curve, credit spreads, earnings, valuations, and dividends are all informed by the economic environment. Asset class returns, based on underlying factors, embody realistic characteristics for short and long holding periods, including:

- Extreme events,
- Correlations,
- Realistic bull and bear markets in both stocks and bonds,
- Dependence on the underlying economic environment, and
- Nominal and real returns.

From this model, we generate 10,000 scenarios, representing a spectrum of possible monthly outcomes for each variable over a period of 360 months (30 years). Results of the analysis are driven primarily by the assumed long-term, compound rates of return of each asset class in the scenarios. Our corresponding assumptions are disclosed in the table below. Additional investment expenses, such as those in the form of an expense ratio, are not considered. 📊

Asset Class and Inflation Assumptions

	Long-Term Compound Rate of Return	Annual Standard Deviation	Correlation Coefficient		
			Equities	Bonds	Short-Term Bonds
Equities	8.0%	18.0%	1.0		
Bonds	5.3	6.5	0.4	1.0	
Short-Term Bonds	4.4	4.0	0.3	0.8	1.0
Real GDP Growth	3.3	2.1			
Inflation	3.0	3.0			

IMPORTANT: The projections or other information generated by our analysis 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 projections are based on assumptions. There can be no assurance that the projected 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 projected scenarios. Investors should be aware that the potential for loss (or gain) may be greater than demonstrated in the projections.

The results are not predictions, but they should be viewed as reasonable estimates.

Source: T. Rowe Price.

All charts are shown for illustrative purposes only and do not represent the performance of any specific security. Diversification cannot assure a profit or protect against loss in a declining market.