



RETIREMENT INSIGHTS

EXECUTIVE SUMMARY

Breaking the 4% rule

IN BRIEF

- A dynamic model adapts withdrawal rates and asset allocations in response to changes in economic and market environments and shifts in personal circumstances.
- This approach appears to offer greater probability of retirement funding success by measuring the amount of overall satisfaction retirees derive from their withdrawals.
- Understanding the emotional aspects of investing can help draw meaningful—if at times counterintuitive—conclusions about optimal retirement income strategies.
- Case studies suggest the dynamic framework provides a potentially more even balance between generating and withdrawing enough from portfolio assets to maintain sustainable post-retirement living standards, while avoiding the risk of running out of money.

Recent J.P. Morgan research focuses on the potential benefits of a dynamic retirement income withdrawal strategy.

Given the unpredictable nature of future expenses and portfolio values throughout retirement, there is mounting evidence that the static withdrawal rules of thumb that may have worked well enough in the past likely do not offer the most efficient use of retirement assets. The 4% rule in particular has faced increased scrutiny, prompted by the prolonged low interest rate environment and the negative impact fixed withdrawals had on shrinking account balances in the wake of the 2008 financial crisis.

Based on our research, periodically and systematically adjusting withdrawal rates and portfolio asset allocations in response to changes in personal wealth, age, market conditions and lifetime income¹ may significantly enhance the retirement experience, in

¹ The term *lifetime income* refers to any income that is “guaranteed” and will last for life, such as Social Security, pensions and/or lifetime annuities.

terms of both the amount of dollars received and retirees' overall satisfaction with their withdrawals. Retirees can incorporate their unique circumstances and risk profiles when using the dynamic withdrawal strategy to secure their income needs and may better weather the constantly evolving nature of the financial markets, including extreme market events.

Foreword

Over the past decade, retirees have been forced to navigate the dual investment challenges of extremely low interest rates and elevated market volatility. Many have relied on the popular 4% rule to draw down their portfolio assets, but this approach—developed in the very different market climate of the 1990s—has increasingly been called into question in terms of providing a truly sustainable retirement income stream. As a result, the rapidly growing number of investors preparing to enter retirement may wish to consider different withdrawal options.

Our research suggests investors and their financial advisors should look beyond the static rules of the past when seeking to achieve stronger results from retirement income withdrawal strategies. A portfolio-based solution using a more robust withdrawal rate framework may help investors better address their retirement funding needs by embedding market risk, longevity risk and evolving personal investment criteria in a way that a cash-flow-based approach simply cannot.

Key findings

- **Maximizing expected lifetime utility (i.e., potential derived satisfaction) serves as a more effective benchmark of retirement withdrawal success than typical measures, such as probability of failure.** Focusing on utility offers a way to quantify how much satisfaction retirees receive from their portfolio withdrawals. This can help potentially increase investors' level of income when they are most apt to enjoy their retirement dollars, while still avoiding the risk of premature portfolio depletion.
- **A dynamic approach to managing withdrawals and asset allocations provides a more effective use of retirement assets than traditional approaches.** Adapting to changes in economic and market environments and to investors' specific situations over time can help maximize the expected lifetime utility generated by retirement assets. This type of dynamic strategy may help provide greater payout consistency and reduce the likelihood of either running out of money or accumulating excess wealth that is unlikely to be used by the investor.
- **Age, lifetime income and wealth all provide key insights into how to adjust investors' withdrawal strategies throughout retirement.** Holding all other factors constant, higher initial wealth levels suggest individuals lower their withdrawal rates, while also increasing their fixed income allocations. Greater lifetime income, through Social Security, pensions and/or lifetime annuities, allows individuals to increase both their withdrawal rates and equity allocations. Increasing age allows individuals to increase their withdrawal rates, while also decreasing their equity exposure.

Based on this analysis, a dynamic withdrawal model may offer substantial advantages to help investors make the most of their assets throughout their retirement years. For more information about any of the topics covered in this summary, please contact your J.P. Morgan Asset Management representative.

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The need for a new model

Conventional withdrawal approaches have failed to deliver in recent extreme market climates and do not address the emotional and highly personal aspects of retirement.

Shifting the focus to a more pragmatic measure

Most people would agree that a withdrawal strategy should maintain a careful balance between managing lifestyle risk (the risk of maintaining a desired standard of living) and longevity risk—two critical, if at times conflicting, goals. But there is an emotional value to retirement income, as well as a monetary one. As such, we recommend adding a third goal to this list: maximizing how much satisfaction, or utility value, investors receive from their withdrawals. This offers a more holistic perspective around withdrawal planning. For example, the risk of running short of money is easy to grasp, but pulling out too little may also be problematic. Excluding specific bequests and/or the desire to leave a legacy, excess unused wealth at death may only represent assets that could have been utilized to enhance the richness of an individual’s retirement experience, perhaps significantly. Hence, we believe the aim of a withdrawal strategy should be to exhaust retirement assets in the most efficient manner possible, while mitigating the risks of premature portfolio depletion.

Expected lifetime utility: A better quantifier of success

To incorporate the concept of emotional value into the withdrawal process, we apply a metric known as expected lifetime utility. This helps quantify the collective perceived satisfaction of all withdrawals received in retirement. Though arguably somewhat subjective, this measure draws from well-established microeconomic principles that offer important insights into the emotional aspects of investing. Focusing on how much satisfaction retirees

receive from portfolio assets represents a significant paradigm shift that evaluates the maximum potential utility value that can be received each year, while accounting for the probability that a retiree will live long enough to actually obtain it.

A customized solution designed for market realities

J.P. Morgan’s dynamic retirement income withdrawal strategy is unique in the sense that it has been specifically built around the concept of maximizing expected lifetime utility. Unlike the 4% rule or the required minimum distribution (RMD) approach, it accounts for a wide variety of personalized factors, such as age, wealth, lifetime income, life expectancy and risk preferences. These key inputs help determine the appropriate asset allocation strategy and resulting withdrawal rate that can be realistically supported. It also accounts for a broad range of possible market scenarios, including the types of severe downside periods where other withdrawal approaches broke down. The result is a retirement income planning approach designed to help achieve broader investment success across the entire retirement time frame.

Optimizing a post-retirement withdrawal solution

To develop a cohesive framework, J.P. Morgan identified five key factors to address in its dynamic withdrawal model.

Factor 1: Individual preferences for magnitude and timing of withdrawals

Research shows that retirees get less satisfaction from each additional dollar of income withdrawn above a certain point. There is also a time preference for withdrawals made earlier in retirement, whereby income received earlier (e.g., today) is more attractive than income received in the future (e.g., tomorrow).

EXHIBIT 1: OVERVIEW OF VARIOUS RETIREMENT INCOME WITHDRAWAL APPROACHES

Strategy	Primary benefit	Customized to individual	Accounts for market uncertainty	Sets withdrawal rate	Sets asset allocation
4% rule	Strives to preserve purchasing power	No	No	Yes	No
RMD approach	Strives to avoid depleting portfolio assets prematurely	Age only	No	Yes	No
J.P. Morgan Dynamic Strategy	Strives to maximize expected lifetime utility	Age, wealth, lifetime income, risk profile	Yes	Yes	Yes

Source: J.P. Morgan Asset Management. For illustrative purposes only.

Factor 2: Levels of wealth and lifetime income

Retirees with higher initial wealth are better able to withstand negative shocks, such as unanticipated medical, living or travel expenses due to inflation or personal emergencies. Similarly, significant lifetime income lowers the risk of poorer outcomes by securing an income baseline even in scenarios of high longevity and/or poor financial market returns. Thus, downside risk is greater for those with less initial wealth and lower or no lifetime income, relative to those with greater wealth and higher levels of lifetime income.

Factor 3: Current age and life expectancy

Withdrawal utility at a given age is weighted by the probability of survival to that age. For example, a 65-year-old couple’s survival weighted utility for \$1 projected to be withdrawn at age 75 is higher than that of \$1 projected to be withdrawn at age 120. There is a 97% chance that at least one spouse will survive to age 75 but close to 0% odds that at least one spouse will still be alive at age 120.

Factor 4: Market randomness and extreme events

To capture future market uncertainty, the J.P. Morgan Dynamic Model applies a forward-looking simulation that generates 10,000 random equity and bond returns, based on J.P. Morgan’s 2014 Long-Term Capital Market Assumptions and J.P. Morgan’s proprietary Non-Normal Framework² to account for extreme market events.

Factor 5: Dynamic nature of the decision-making process

To help account for the dynamic nature of post-retirement withdrawal planning, retirees can change both their asset

allocations and withdrawal rates each year, in response to their actual experience over the course of the year to improve withdrawal strategy efficiency, compared with more static approaches.

Putting it all together: Framework methodology

The J.P. Morgan Dynamic Model combines these five key factors into a single cohesive framework that arrives at customized recommendations through a complex, integrated analysis of the retiree’s individual investment profile. It then calculates optimal asset allocation and withdrawal rate solutions at each age with the goal of maximizing expected lifetime utility, achieved through a backward induction process, beginning at age 120 and working to age 60.

Implications of a utility-based framework

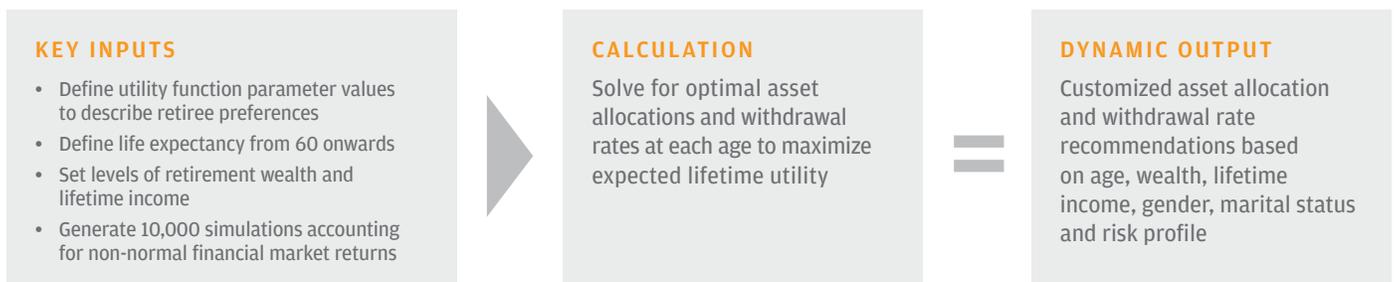
Analyzing model output based on individual changes in age, lifetime income and wealth (holding other factors constant) offers insights into withdrawal and asset allocation decisions.

1. Impact of aging

For a given level of wealth and lifetime income, older retirees may have a higher withdrawal rate recommendation than younger retirees, as there is less time remaining to spend retirement savings. Older retirees should be more conservative in their asset allocations, with higher allocations to fixed income, as there is less time to recoup any potential portfolio losses to finance future withdrawals. **Bottom line: Increasing age allows retirees to increase their withdrawal rates and decrease their equity allocations.**

² For full details about this model, please see J.P. Morgan Asset Management’s “Non-Normality of Market Returns: A Framework for Asset Allocation Decision Making (2009).”

EXHIBIT 2: J.P. MORGAN DYNAMIC MODEL



2. Impact of lifetime income

For a given age and wealth level, withdrawal rates for individuals with higher lifetime income levels should be greater than at lower levels, because the higher secured income floor reduces the likelihood of extremely poor outcomes due to excessive withdrawals. Retirees with higher lifetime income can consider a more aggressive equity allocation, because lifetime income can be considered a bond-like equivalent in their portfolio. This helps build a higher proportional part of their overall income that is protected from potential negative equity returns. **Bottom line: Greater lifetime income allows retirees to increase both their withdrawal rates and equity allocations.**

3. Impact of wealth

For a given age and level of lifetime income, withdrawal rates at higher wealth levels should be less than at lower wealth levels. This is because the actual dollar amount withdrawn is substantially higher and the satisfaction derived from greater withdrawals does not increase proportionally once a reasonable lifestyle level has been achieved.

Utility theory suggests that beyond that point reducing withdrawals by a certain dollar amount carries more distress than the pleasure obtained from increases of a similar amount. This effect is more pronounced for wealthy retirees, as a specific percentage decline leads to a larger dollar and utility reduction than it does for less wealthy retirees. This is distinct from wealthier retirees' *financial ability* to weather volatility in terms of securing a minimum standard of living, and rather focuses on the great *emotional distress* they might experience with larger dollar losses. As such, wealthier retirees should be more conservative in their asset allocations, with larger fixed

income allocations, since poor portfolio returns cause greater emotional distress than commensurate upside performance and will result in a higher dollar loss for a larger portfolio compared to a smaller portfolio. **Bottom line: Higher initial wealth suggests retirees lower their withdrawal rates and increase their fixed income allocations.**

EXHIBIT 3: SUMMARY OF HOW INDIVIDUAL FACTORS MAY AFFECT WITHDRAWALS AND ASSET ALLOCATIONS

Factor	Withdrawal rate	Equity exposure
Increasing age	▲	▼
Higher lifetime income	▲	▲
Higher initial wealth level	▼	▼

Portfolio applications

Understanding how the dynamic model adjusts withdrawal rates and asset allocations as multiple factors change is key.

Multidimensional aspects of model output

Following is a sample J.P. Morgan Retirement Income Withdrawal Table generated by our dynamic framework, which provides suggested allocations and withdrawal rates for different combinations of age, wealth and lifetime income.

Case study: Hypothetical 65-year-old couple with \$1 million in retirement savings and \$50,000 in lifetime income

Recommendation: Next year withdrawal rate of 5.9%
Bond allocation of 17% with remaining 83% invested in equities

EXHIBIT 4: CASE STUDY SAMPLE OUTPUT

Couples (same age)—\$50,000 lifetime income

Optimal withdrawal rate					
Age	Portfolio Value %				
	\$500,000	\$1,000,000	\$1,500,000	\$2,000,000	\$2,500,000
60	5.4	5.3	5.2	5.1	5.0
65	6.1	5.9	5.7	5.6	5.5
70	6.9	6.7	6.5	6.3	6.2
75	8.1	7.7	7.5	7.3	7.2
80	9.8	9.2	8.9	8.7	8.5
85	12.2	11.3	10.8	10.6	10.4
90	15.3	14.1	13.5	13.1	12.9
95	19.2	17.5	16.8	16.4	16.1

Optimal bond allocation					
Age	Portfolio Value %				
	\$500,000	\$1,000,000	\$1,500,000	\$2,000,000	\$2,500,000
60	0	14	26	32	36
65	0	17	28	34	38
70	0	21	31	36	39
75	2	24	33	38	41
80	8	28	35	40	42
85	13	31	38	41	44
90	19	34	40	43	45
95	23	36	42	44	46

Source: J.P. Morgan Asset Management. For illustrative purposes only.

Stronger projected withdrawal outcomes

To evaluate how this output might stand up to the rigors of real-world retirement funding, we compared the customized recommendations of the J.P. Morgan Dynamic Strategy to the static output of the 4% rule and RMD model, assuming a fixed 60% equity/40% bond allocation across retirement for the latter two approaches. For the case study on the previous page, we applied 250,000 simulations across the entire retirement horizon until death. For each simulation, the market return each year drew from the 10,000 possible equity, bond and inflation scenarios, covering the gamut from strong rising periods to severe declines.³

Key findings

The 4% rule generally provided a steady stream of income in real dollar terms during the early years of retirement, but this stability began to break down around age 92, due to skewing factors such as survivorship bias calculated by the model. Indeed, the probability range of potential consumption streams became surprisingly wide in later years, though the median payout remained relatively stable. The real issue with this approach, however, became apparent with the range of potential portfolio values. There were significant risks of excess wealth accumulation in the median case and likelihood of premature depletion of assets in worse-case scenarios. In fact, in the 5th percentile case retirees could exhaust assets by age 92, an unacceptably high probability as there is a significant chance that at least one spouse will survive to that age.

The RMD approach was much more effective at managing payouts than the 4% rule, reducing the likelihood of excess wealth accumulation or premature depletion of portfolio

assets. This was because it incorporates portfolio experience and longevity, increasing payouts with age and increasing wealth. However, similar to the 4% rule, the RMD withdrawal rate is based largely on portfolio value, which can be volatile depending on actual experience. This risk can be seen in the spread between the top and bottom percentiles in the full illustration⁴, which is significantly higher than the J.P. Morgan Dynamic Strategy.

The J.P. Morgan Dynamic Strategy was also much more effective at managing the risk of excess wealth accumulation and premature depletion of portfolio assets compared to the 4% rule. Although payouts were more variable than the 4% rule, they were more consistent than the RMD approach. This is because, unlike the RMD model, the J.P. Morgan Dynamic Strategy actively adapts asset allocation and incorporates risk aversion through a utility function, both of which serve to smooth payouts due to fluctuations in portfolio value over time. In addition, consumption streams received a significant boost in the earlier years of retirement, offering the potential for greater payouts when retirees were most likely to be able to enjoy them.

Conclusion

All in all, the J.P. Morgan Dynamic Strategy offered the most balanced withdrawal solution. This robust model provided significantly less risk of both prematurely running out of money and leaving too much wealth untapped compared to the 4% rule. It also offered a more reliable stream of retirement income compared to the RMD approach, an important consideration for retirees dependent on a steady payout.

For more information about the J.P. Morgan Dynamic Retirement Income Withdrawal Strategy or any of the other topics covered in this paper, please contact your J.P. Morgan Asset Management representative.

³ Detailed charts of the percentile outcomes for withdrawals and portfolio value ranges over time can be found on pages 20-21 in the full report.

⁴ *Ibid.*

EXHIBIT 5: KEY FINDINGS

Strategy	Risks			Benefits
	Variability of income	Excess wealth accumulation	Premature asset depletion	Consumption stream
4% rule	▲ Steady	▼ Significant risk	▼ Significant risk	▲ Steady
RMD approach	▼ High	▲ Low risk	▲ Low risk	▲ Variable, but generally higher than 4% rule
J.P. Morgan Dynamic Strategy	▲ Lower than RMD; higher than 4% rule	▲ Low risk	▲ Low risk	▲ Variable, but with odds of higher payouts earlier in retirement than RMD

Source: J.P. Morgan Asset Management. For illustrative purposes only.



The information and methodologies described herein are proprietary and patent pending to J.P. Morgan Asset Management and affiliates.

Because of the inherent limitations of all models, potential investors should not rely exclusively on the model when making a decision. The model cannot account for the impact that economic, market and other factors may have on the implementation and ongoing management of an actual investment portfolio. Unlike actual portfolio outcomes, the model outcomes do not reflect actual trading, liquidity constraints, fees, expenses, taxes and other factors that could impact the future returns. The model assumptions are passive only—they do not consider the impact of active management. A manager's ability to achieve similar outcomes is subject to risk factors over which the manager may have no or limited control.

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