American Century Investments®

Target-Date Risk Dashboard

An Innovative, Custom Solution to TDF Evaluation and Selection

Executive Summary

MULTI-ASSET STRATEGIES

The evaluation and selection of a target-date fund (TDF) strategy to serve as a qualified default investment alternative (QDIA) is arguably one of the most important decisions any plan sponsor makes. We believe the tools currently available to aid in the decision-making process are limited in their ability to differentiate between competing TDF strategies' likelihood of providing a successful retirement for plan participants.

This choice is particularly challenging given strong equity market performance in recent years because TDFs with the most equity risk have been rewarded, while more diversified approaches have been systematically penalized. Rather than naive, backward-looking performance scorecards, we advocate a comprehensive examination of the investment policy (glide path and allocation) risk exposures that affect success in terms of participant outcomes. We hope to advance the cause of TDF evaluation and selection by offering a solution to this challenge—a customizable target-date risk dashboard that incorporates a forward-looking view of potential glide path behavior over a market cycle. We believe this robust evaluation tool can deepen and strengthen a fiduciary's investment selection process, consistent with the duty of plan sponsors and other fiduciaries under ERISA guidelines.

Fiduciaries need forward-looking, risk-based target-date fund evaluation tools.

We believe the fiduciary investment selection process requires a framework focused on participant outcomes and the risks incurred along the way, rather than naïve performance measures.

Current methods of evaluating target-date funds are inadequate.

Popular target-date scorecards are backward-looking, performance-based measures that are captive to recent past performance. They tell us little about the competing risks participants are exposed to over the entire glide path.

Our solution: A customizable target-date risk dashboard.

We provide a forward-looking, risk-based framework for evaluating target-date strategies over the entire glide path through a complete market cycle. We proceed from the view that rather than focus on one risk or one type of participant, target-date strategies should balance the multiple risks that investors face over the entire lifecycle (accumulation and decumulation phases).

Identify and incorporate risk sensitivities specific to each plan in our customizable dashboard.

Because the risk dashboard is customizable, we hope fiduciaries will use this tool as part of their selection process to identify the TDF provider most suited to their unique plan specifications.

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Target-Date Risk Dashboard

An Innovative, Custom Solution to TDF Evaluation and Selection

Backward-looking return rankings are no replacement for forward-looking diagnostics.

The Trouble with TDF Tools

Most current target-date analytical tools and scorecards are inherently backward-looking, and therefore provide limited value to plan sponsors seeking to evaluate potential future TDF performance. We believe these tools and scorecards have a critical flaw—they confuse and conflate target-date performance with the specific market environment in which that performance was produced. In effect, they optimize and orient TDF evaluation and selection around the immediate past market experience.

To the extent the market environment going forward deviates from the one just experienced, point-in-time historical performance and risk measures would be unreliable indicators of future results. The shorter the window of evaluation, the less the analysis reveals about the likely experience of a TDF investor over a long horizon.

Just as important, TDF scorecards built around average returns fail to account for actual investor experience and outcomes, which are influenced to a significant degree by actual account balances, cash flows (contributions and withdrawals), and share price volatility. As a result, scorecards or tools that claim to evaluate competing target-date strategies on short-term returns are likely incapable of assessing risks in a forward-looking way. We see several deficiencies in such approaches:

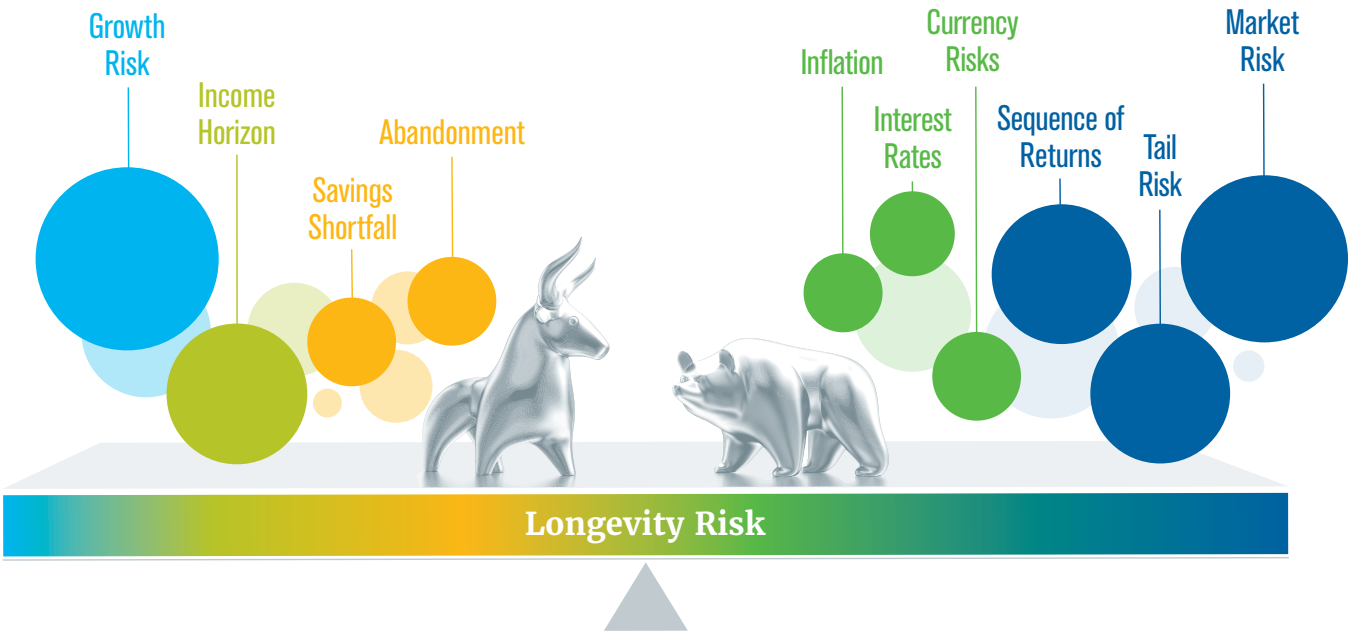
- Most scoring is derived from short-term performance, which indicates little about risk over the entire investment policy. Historically strong equity performance in recent years overwhelms all metrics and measures.
- Many series lack a longer-term performance history or have undergone recent material changes to their glide paths and underlying allocations.
- Relative return rankings exaggerate small differences in TDF performance; fail to account for the divergent paths and investment policies that led to those outcomes; and make no statements about how well TDF investors are served in the competing plans. None of these nuances are captured in relative return rankings.

In developing a new methodology to evaluate target-date options, we have sought to recast the metrics to be forward looking and risk based. We believe this approach can yield a more accurate indicator of future relative risk over a variety of market environments and business cycles. Further, we have developed a customizable methodology that allows sponsors to input their own set of risk/return sensitivities into the calculations to help ensure a better fit for their plan demographics. Lastly, our process is transparent. All assumptions, risk-and-return figures, as well as mathematical calculations are intuitive and readily accessible to users.

This is not American Century Investments' first foray into TDF risk analytics. Nearly a decade ago, we introduced a target-date risk analyzer to provide more informed indicators of long-term relative risk over a variety of market environments and across the entire glide path. As described in this piece, we have now refined our framework of risks to encompass a broadened definition of longevity risk—the key risk that all TDFs seek to address.

FIGURE 1

Target-Date Funds Must Balance Multiple Risks



Longevity Risk Components

Growth
Risk of not meeting an expected return goal

Market
Long-run volatility, sequence-of-returns risk, and tail risk can derail portfolio growth

Macro Scenario
Inflation, interest rate, and currency moves can impact outcomes over short- and long-term horizons

Income Horizon
Risk of investment policy not sustaining a long (30-year) retirement

Behavioral
Savings shortfall, abandonment, returns-chasing, and other behavioral aspects influence investment outcomes

A Better Approach Addresses Competing Risks

We believe TDFs should be animated by the overriding concern of providing the greatest likelihood of a fully funded retirement for the greatest number of plan participants. We call this ultimate concern "longevity risk," which is comprised of subordinate risks prevalent at different times during an investor's life. We group these risks into several categories—growth risk, market risk, macro-scenario risk, income horizon risk, and behavioral risk. We define each risk and its constituent parts in the following pages. Our general conception of these competing risks is illustrated in **Figure 1** above. We also discuss this framework in greater detail in two recent papers, "Beyond Labels: Advancing Your Approach to Target-Date Evaluation and Selection," and "Dynamic Risk Management: Balancing Target-Date Risks for Changing Market Environments."

Different approaches to balancing these risks—of trying to solve for longevity risk—have created the wide range of practitioner asset allocation glide paths available today. We do not assert that any one investment policy can eliminate all risks, but experience, intuition, and analysis tell us that a risk-aware approach is preferable to a glide path attuned to only one type of participant demographic, one kind of market environment, or one source of risk. This philosophy underlies our own approach to glide path design and management.

The beauty of this framework is that it allows users to set their own speed limits.

FIGURE 2

Know the Score: Target-Date Risk Dashboard

The lower the percentile rank, the lower the relative risk in the category.

	Risk Category				Blended Averages	
	Growth	Market	Macro Scenario	Income Horizon	Equal-Weighted	Custom-Weighted[2]
American Century One Choice	69	16	39	5	32	43
American Funds Target Date Retirement	21	79	89	26	54	42
Fidelity Freedom	3	97	11	42	38	33
JP Morgan SmartRetirement	66	29	50	53	49	53
T. Rowe Price Retirement	19	68	39	45	43	37
Vanguard Target Retirement	40	71	71	61	61	53
[2]Custom Weighting per Plan Risk Profile	51.0%	25.5%	8.5%	15.0%		

Legend

1-25	Best Relative Rank
25-50	
51-75	
76-100	Worst Relative Rank

Percentile rankings based on available data for 37 target-date series. 1 is best, 100 is worst. Data as of 3/31/2018.

Source: Morningstar, Fund Prospectuses, American Century Investments.

Percentile rankings for each of the four risk categories are based on glide path analysis conducted by American Century's Multi-Asset Strategies team. Glide path data provided by Morningstar and fund prospectuses. For Income Horizon risk, Monte Carlo simulation is conducted on all glide paths to project the expected annual income for 30 years of retirement at a 90% probability. Simulation is based on glide path allocations from age 20-95, and ACI capital market assumptions, available on request. More details on the calculations are available through your American Century Investments sales or relationship contact.

Introducing the Target-Date Risk Dashboard

Our target-date risk dashboard assigns a percentile ranking for each TDF glide path relative to peers on four dimensions of risk—growth, market, macro scenario, and income horizon. These risk rankings were measured across 37 leading TDF strategies using glide path and allocation data derived from Morningstar and fund prospectuses. The core risk rankings can then be rolled up into one average score and/or a customized score based on weightings determined by plan fiduciaries.

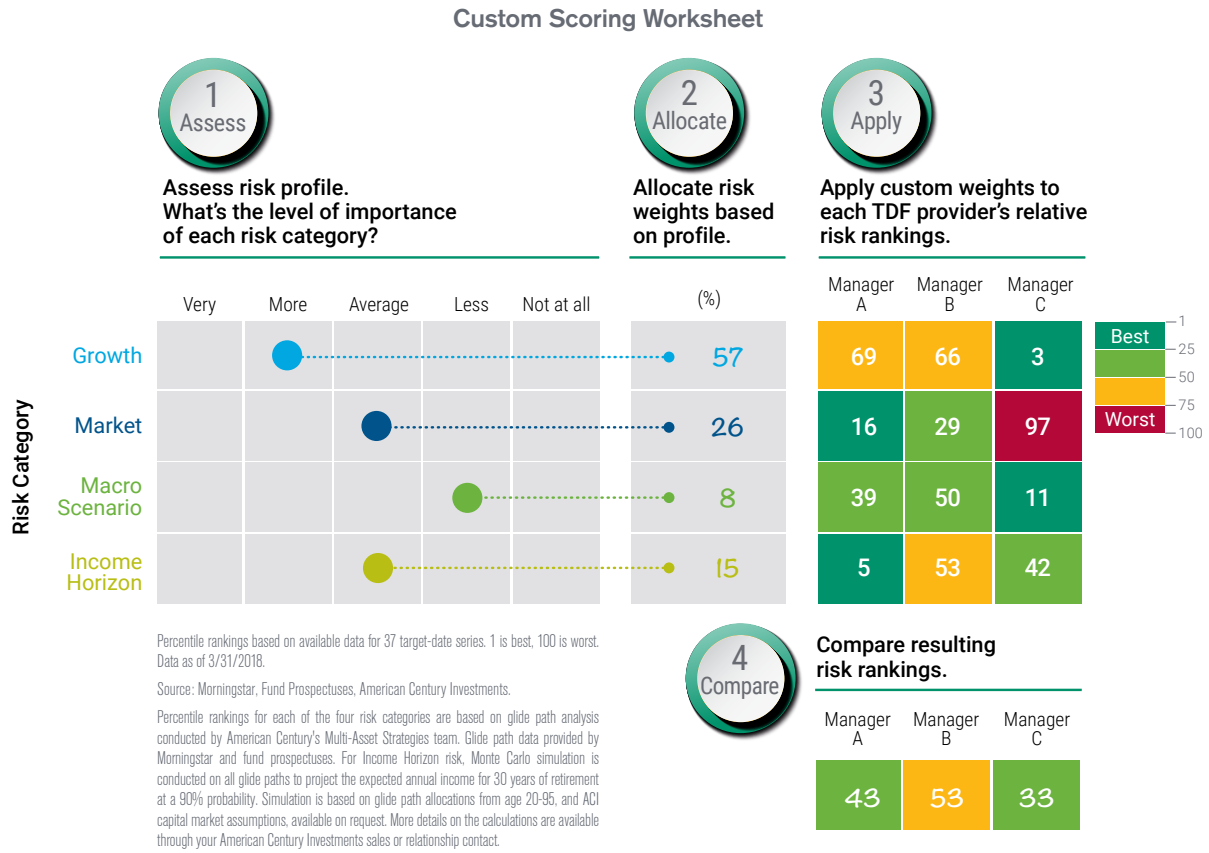
In our framework, the lower the number, the less the risk in that dimension relative to the other TDFs in the universe (1 is the best, 100 is the worst). For example, a low relative risk ranking in terms of growth risk means that relative to competing TDFs, a certain glide path has a higher expected growth potential. **Figure 2** above demonstrates how this looks in practice.

The two columns on the far right reflect combined relative risk rankings. The equal-weighted column shows relative risk ranking across the four dimensions without reference to plan sponsor specifications. The far-right column, the custom-weighted average, reflects inputs and weightings for a hypothetical plan sponsor based on a sample scoring worksheet. The key takeaway is that the weightings in this column are customizable, with the expectation that plan sponsors will size each category and relative risk ranking to match their own exposures and plan demographics.

It is not coincidental that our TDF scores well on average. The balance-of-risks framework on which this dashboard is based is the philosophy that underpins our portfolio construction and management process. It would be surprising if our own lineup did not score well. This demonstrates that we walk the walk and do not merely talk the talk—our portfolios rank precisely as expected on these measures. The beauty of this framework is that customizing the weights allows users to set their own speed limits based on a demographic analysis of their participant base. So, while we show well on our own framework on average, users of the dashboard should input weightings consistent with their own assumptions and beliefs.

No single structure or provider is inherently superior to the others, one size does not fit all.

FIGURE 3



The illustrations in **Figure 3** above are meant to be representative samples of the forthcoming plan diagnostic worksheet and to show how answers from a forthcoming QDIA questionnaire translate to custom risk weightings in our dashboard. The sensibility behind this tool is straightforward. No single structure or provider is inherently superior to the others, one size does not fit all. Ideally, DC plans with their specific needs and characteristics would be matched with the TDF whose unique risk profile most closely matches their own. We believe it is possible to identify a target-date series that closely maps to the goals and associated risks set forth for a given retirement plan.

Methodology and Intuition Behind the Target-Date Risk Dashboard

Readers interested in peeking behind the curtain and looking in detail at the data and process involved in these calculations need only inquire. It should also be noted that this analysis has been informed by and is the culmination of our earlier work on risk assessment in TDFs, including "TDR: A New, Comprehensive Measure of Target-Date Risk" and "Evaluating Target-Date Portfolios: A Practical Approach to Building Family-Wide Measures."

Our work proceeds from these guiding principles:

- Every target-date series can be measured on the key risks in lifecycle investing.
- Criteria and measurement should be intuitive and forward looking.
- Insight into long-term expected behavior of target-date series is preferable to short-term historical performance measures.
- Plan demographic analysis should be used to customize the degree of importance of each measure of risk on our dashboard.

Throughout this analysis we have generally opted to use intuitive, common-sense measures based on publicly available glide path and underlying fund data wherever possible. In cases where a simpler method does not apply, we use reasonable assumptions for capital market forecasts, participant contributions and withdrawals, and other inputs.

Growth Risk Defined

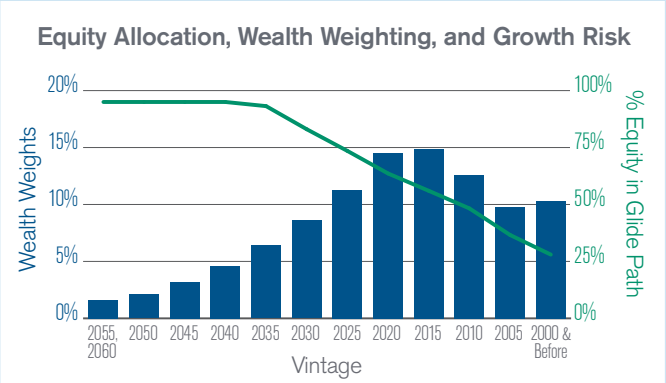
The risk of not meeting an expected return goal.

In the context of our target-date risk dashboard, we seek to answer the question, "How much growth can I expect from one TDF relative

to another?" In this framework, for example, cash has among the highest growth risk (lowest expected return) while emerging markets equity has among the lowest growth risk because of its higher expected long-term returns.

Equity allocation does a good job of predicting the average or expected growth; that is, the mean of the distribution. Our metric is a wealth-weighted average equity allocation because equity exposure matters more when more wealth is at risk. To illustrate this concept, we show wealth weights by vintage for a hypothetical "through" retirement glide path in **Figure 4**. Finally, we should reiterate that expected returns do not equal realized returns—it is possible to have a lower mean return but have a higher probability of success, according to our analysis.

FIGURE 4



Market Risk—Incorporating Volatility, Sequence of Returns, and Tail Risk

The dispersion in outcomes caused by the variability and timing of returns.

We conceive of market risk broadly, incorporating not only long-run volatility but specific events involving sequence of returns and tail risks. These latter considerations are particularly important in the years around the retirement date, when account balances peak and participants begin the transition from contributions to withdrawals. Whereas long-run volatility speaks to the dispersion of outcomes associated with the overall investment policy of the glide path, sequence-of-returns risk reflects dispersion caused by a downturn in the crucial years around retirement, and tail risk captures the potential for a large drawdown up to retirement.

If growth risk is defined by the mean of the wealth distribution at a certain age, then these three market risks seek to define the dispersion around that mean. The tradeoff among risks in our framework is perhaps nowhere as clear as it is in the relationship between growth and market risks because of the strong negative correlation between these two factors.

Long-Run Volatility

In terms of long-run volatility, we found that a simple average of glide path volatility provides a good proxy for dispersion in wealth at a certain age. A poorer ranking on this metric indicates that a greater percentage of participants may miss out on a successful retirement because the range of outcomes is so broad, even in cases where average wealth appears to be satisfactory.

Sequence-of-Returns Risk

For sequence of returns, two variables are key—the level and slope of the glide path. The level refers to the average percentage of equity exposure near retirement, while slope is captured by the average change in percent equity around retirement. Both work toward divesting out of equities, thus making them important in scenarios with a market downturn. This combination of equity losses and equity reduction effectively "lock in" losses and do not offer the opportunity to recover during market rebounds in subsequent years. As a result, providers with a steeper, sloped glide path and/or higher glide path in those years around retirement will demonstrate a higher degree of sequence-of-returns risk on our metrics, all else equal. For interested readers, we have written extensively about this topic in "Importance of Sequence-of-Returns Risk in Target-Date Strategies."

Tail Risk

With respect to tail risk, we proceed from the assumption that investors who experience an unusually adverse market may see their wealth at retirement negatively affected. Therefore, the largest drawdown potential averaged across thousands of simulated participant outcomes should reflect the potential effect of such tail events.

Macro-Scenario Risk—Inflation, Interest Rate, and Currency Risk Considered

The dispersion in outcomes caused by an unanticipated change in macroeconomic conditions.

Macroeconomic effects are in some sense difficult to isolate—changes in inflation, interest rates, and currency values do not occur in a vacuum, but reflect ever-changing relationships driven by policy and regulatory changes, technological advancements, and shifting demographics, to name a few. Given the complex dynamics, our analysis incorporates not only observable relationships but economic intuition about the impact of these factors on various asset classes. Then, using underlying glide path allocations to the various asset classes, we compute an aggregate risk level using a wealth-weighting approach to average the yearly observations. (See the discussion on wealth-weighting in Growth Risk on page 6.)

Inflation Risk

The effect of inflation on financial assets depends to a large degree on the level and direction of inflation—high and rising/high and falling/low and rising/low and falling. Here we aim at capturing the effect of unanticipated, realized inflation shocks on participant wealth.

Interest Rate Risk

For interest rate risk, too, it is important to understand why rates are changing. Rate increases due to excess demand would likely be positive for equities, for example, while rate increases resulting from rising input costs (commodity and wage inflation) would likely be bad for stocks. Ultimately, we narrowed our focus to the effect on the

fixed-income portion of TDFs and ignored equity effects. Note that any risks coming from changes to inflation expectations, as opposed to realized inflation, are captured through their impact on interest rates.

Currency Risk

With respect to foreign exchange (FX) risk on the potential range of outcomes in retirement, we note that a retiree has liabilities in the local currency and hence may have an incentive to reduce FX risk (see our paper "The Case for Home Bias in Target-Date Funds" for a longer discussion). We measure this risk as exposure to non-dollar currency depreciation across the investment policy—the greater the exposure, the greater the currency risk. The diversification benefit from investing in a different market is already captured in the market risk above.

Income Horizon Risk

The risk of the investment policy failing to sustain income over a specified horizon in retirement.

Life spans have increased dramatically in recent decades, reflecting advances in public health, preventive care, and in the diagnosis and treatment of disease. What's more, plenty of perfectly sober analysts suggest we are only at the beginning of a health care technology revolution that will extend lifespans even longer. The central point with respect to our analysis is that the investment horizon for millions of Americans is long and getting longer. Indeed, one recent prominent study of retirement advisers found that they are already using life expectancies of age 94 for women and 91 for men.

Because of the trend toward longer retirements, we define the income horizon as 30 years in our scenario analysis. This metric required a Monte Carlo approach to determine the maximum payout achievable across 90% of simulated retirement outcomes for each TDF, assuming participants stay invested in the series for 30 years of retirement and withdraw the same amount every year (adjusted for inflation).

Of course, not all plans will have the same objectives—we note that some fiduciaries expect most participants to withdraw balances from the plan at retirement, opting for an annuity or other externally managed solution. In these cases, the income horizon weighting on our risk dashboard may warrant a low or even zero weight. But from the point of view of a comprehensive analysis, we have provided a somewhat universal metric for TDF success, an expression of how growth and market risks of a given investment policy interact to determine success or failure over a long horizon. The lower the risk on this metric, the higher the maximum payout achieved with a 90% probability of success at age 95 relative to other TDFs analyzed using the same set of assumptions.

Behavioral Risks

Individual investor behavior, such as a lack of savings or poorly timed buy and sell decisions, for example, can have a meaningful impact on retirement outcomes. Nevertheless, we exclude an explicit behavioral component from our target-date risk dashboard. First, we believe many of the issues in this category relate to plan design, rather than TDF investment policy. For example, automatic enrollment and the use of TDFs as QDIAs capitalizes on investor inertia—the majority of plan participants enrolled in this way simply stay put. Matching funds and annual contribution escalators are meant to incentivize and bolster participant savings. These plan design decisions are crucial to investor success—no glide path can compensate for a total lack of saving. Second, there is no reliable way to measure these effects across TDFs short of elaborate assumptions about behavior and investment performance.

Note, however, that we believe plan sponsors should be cognizant of behavioral risk when evaluating and selecting target-date providers, especially abandonment risk. Abandonment risk is the possibility that participants exposed to losses, particularly when the absolute dollar amounts are large, will abandon their saving and investing plan. This is a much-debated topic difficult to quantify without significant participant-level data across multiple market cycles, data that do not exist yet because of the comparative immaturity of the target-date space and one-way nature of financial markets over the last decade.

We do, however, have data from the 2008–09 financial crisis, where the evidence of abandonment is quite strong for target-date vintages closest to retirement. The existence and magnitude of the abandonment effect depends in large part on how narrowly "abandonment" is defined. If we look strictly at fund flow data from Morningstar for vintages in or near retirement (2000, 2005, and 2010) during the financial crisis, we see significant outflows for extended periods in 2008–10 relative to other years, suggesting either large outright withdrawals or, at the very least, the halting of automatic purchases. However, a Vanguard study using a strict definition of abandonment—looking only at investors who sold out of their TDF entirely after initially being defaulted into the portfolio—found less than 1% of such investors moved out of TDFs in the wake of the financial crisis. Using a less strict definition, a T. Rowe Price study found that roughly five times that number of investors actively traded their account during the peak of the crisis, from mid-2008 to early 2009.

Our own analysis suggests the abandonment effect is real and reduces investor wealth, with the gap between "promised" and "realized" returns proportional to the overall market risk of the investment vehicle in question. In addition, we believe investors are more likely to abandon lifecycle portfolios when losses are large in dollar terms or returns are volatile for an extended period, particularly in the buildup to retirement. But because there is no readily accessible data, we do not include abandonment risk as an explicit ranking category on our target-date risk dashboard. For plan sponsors concerned about this risk, we think it is reasonable to consider abandonment risk as a function of tail risk in our framework.

Conclusion

We believe many current target-date evaluation tools are inadequate due to their overreliance on recent past performance. Short-term performance is not an adequate measure of long-term retirement success for a range of participants retiring over multiple decades. What's more, strong recent equity market returns have biased short-term returns-based scorecards toward the riskiest TDFs and away from more diversified approaches. To address this failing, we provide a comprehensive framework for evaluating target-date strategies in terms of their expected exposure across multiple major risks identified as critical to managing for increased participant success.

This new framework operates on the premise that target-date strategies should balance the multiple risks investors face while saving for retirement and/or spending down their wealth in retirement. As part of this process, we aim to provide fiduciaries with a proprietary diagnostic tool and scoring system to enable them to identify risks most important to their unique participant base. Ultimately, we seek to help plan sponsors make more informed evaluation and selection decisions by determining how well suited a particular TDF is to their particular plan. We believe that we now have the tools at our disposal to allow plan sponsors to make that determination.

Target-Date Fund Additional Information

NAME	TICKER	PROSPECTUS OBJECTIVE	PROSPECTUS NET EXPENSE RATIO	LIQUIDITY	SAFETY	TAX MANAGED	3-YEAR ANNUALIZED STANDARD DEVIATION	AVERAGE ANNUAL TOTAL RETURN 1 YEAR	5 YEARS	10 YEARS
American Century One Choice 2025 I	ARWFX	Asset Allocation	0.59	Daily	No	No	5.84%	8.00%	6.57%	5.98%
American Funds 2025 Trgt Date Retire R5	REDTX	Asset Allocation	0.42	Daily	No	No	6.65%	9.85%	8.80%	6.77%
Fidelity Freedom® 2025	FFTWX	Asset Allocation	0.66	Daily	No	No	7.49%	10.81%	7.87%	6.07%
JPMorgan SmartRetirement® 2025 R5	JNSIX	Asset Allocation	0.56	Daily	No	No	7.04%	10.14%	7.69%	6.84%
T. Rowe Price Retirement 2025	TRRHX	Asset Allocation	0.67	Daily	No	No	7.69%	11.49%	8.80%	7.27%
Vanguard Target Retirement 2025 Inv	VTTVX	Growth and Income	0.14	Daily	No	No	6.84%	10.20%	7.96%	6.48%

Data as of 3/31/2018. Source: Morningstar.

Data presented reflect past performance. Past performance is no guarantee of future results. Current performance may be higher or lower than the performance shown. Investment return and fund share value will fluctuate, and redemption value may be more or less than original cost. To obtain performance data current to the most recent month-end, please call 1-800-345-2021 or visit americancentury.com. Performance reflects Investor Class shares. For information about other share classes available, please consult the prospectus. Data assumes reinvestment of dividends and capital gains.

You should consider the fund's investment objectives, risk, charges and expenses carefully before you invest. The fund's prospectus or summary prospectus, which can be obtained by visiting americancentury.com, contains this and other information about the fund, and should be read carefully before investing.

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