EXECUTIVE SUMMARY

Target Date Evolution: How Risk-Capacity Analysis Differentiates Fidelity's Glide Path

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The strategic asset allocation (i.e., glide path) of a target date strategy should balance the potential benefits of a portfolio with high expected returns and the costs of potential capital losses at each point in the glide path by targeting an appropriate amount of portfolio volatility across the age spectrum. But how much risk is "appropriate" at each age? Because a target date strategy is designed to be a long-term holding whereby portfolio target dates are aligned with an investor's estimated retirement date, it is important to consider historical patterns of investor behavior, the impact of market corrections, and the investment time-horizon to establish an investor's capacity for risk taking as they move through the glide path. To that end, we have developed a refined assessment of risk capacity that defines a "risk boundary" across the age spectrum. Considerations of observed investor behavior, the impact of extreme market events, and the ever-decreasing investment horizon all serve to inform a targeted quantitative risk assessment applied to the glide path for Fidelity's enhanced target date strategies. We believe this approach to risk capacity is unique to target date strategies in the investment management industry.

Risk considerations in constructing a glide path

In developing an investment strategy that focuses on providing an appropriate level of risk along the glide path, there are three primary factors that must be considered:

- ***Investors have an emotional aversion to losses that is twice as great as the pleasure from similar gains.*** Behavioral economics studies show that wealth outcomes are experienced as losses or gains depending on how they differ from a reference wealth point,[1] which recent research has linked to an investor's expected wealth over time. In the context of target date investing, this result has both intuitive and quantitative appeal. When an investor's portfolio falls short of the level of assets needed to supply adequate income in retirement, the consequences can be significant, particularly during periods of market stress. Because this experience is painful both economically and behaviorally, these outcomes should ideally be avoided more than favorable outcomes in which the portfolio exceeds the target level of assets.

- ***Significant market declines occur more frequently than traditional models predict.*** Traditional quantitative analysis underestimates the frequency of outsized market declines, which suggests that a more robust risk framework is necessary to account for the actual probability of extreme market events. The timing of a negative market event—at what point along an investor's lifecycle a major decline occurs—is critical in determining how risky the event is in the context of the long-term goals, and a finite investment horizon. Indeed, the risk of the subsequent period after a market decline depends in large part on whether the investor's time horizon is long enough for the market and his or her portfolio value to recover.

- ***An investor's time horizon is a critical and ever-changing element that affects the trade-offs between risk and return differently across the age spectrum.*** Our analysis of significant historical market declines shows there can be a long time period for the market to recover. More specifically, one can consider the 20 worst U.S. equity market declines on record since 1900 and the time it took for the index composite to recover back to its pre-decline level in each of the 20 scenarios.[2] Five years after each of the declines, the stock market had not returned to the previous peak, in real (i.e., inflation-adjusted) terms, in 11 of the 20 occasions. By 20 years after the initial decline, the market had recovered back to its pre-decline level in every circumstance. The implication of these outcomes for risk management is that target date strategies must reflect the possibility that an extended recovery period may be needed after significant market events, and that over long time horizons equities have historically resumed their role as a potentially effective source of wealth. These market patterns must be integrated with the evolving investment time horizon of the investor in a target date fund to develop an appropriate risk capacity at each stage of the investor's lifecycle.

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How Fidelity's quantitative risk framework addresses and combines the three factors

To establish an appropriate risk level for the glide path, we must combine and balance the three risk considerations—loss aversion, the frequency of significant market events, and the importance of time horizon—with the need for capital appreciation and income, to help achieve Fidelity's glide path goal of replacing approximately half of one's final preretirement salary as income in retirement.[3] To do so, our risk-capacity analysis addresses the three risk considerations through the following steps:

1. **Loss aversion: defines an investor utility function**
   Loss aversion is based on gains and losses relative to a reference amount. We use reference wealth to represent this amount as an estimated value for target date investors as a population. We build the reference wealth plan around the retirement goal of replacing approximately half of final salary through age 93, inflation adjusted.[4] At each age, the representative investor experiences gains and losses depending on how the current portfolio wealth differs from the "expected wealth" determined by the reference wealth plan. At any time, when the wealth represented by the portfolio's actual value falls below its expected wealth—for instance, during a significant stock market decline—the deviation from this wealth reference point is considered to be "more painful" to investors than the satisfaction generated by a comparable wealth gain. This utility function is defined as satisfaction experienced by an investor at a given age in comparison to the wealth reference point.

2. **Significant market events: evaluates worst-case equity market decline scenarios**
   As a baseline for our risk-capacity framework, we have evaluated the established utility function using actual market performance from the 20 worst periods for U.S. equity returns during the past 100 years.[5]

3. **Time horizon: recognition of how time horizon can influence one's risk capacity**
   Given a long-term need for capital growth earlier in the lifecycle and a need for increased capital protection at later stages, the overall risk is reduced over time in the glide path to connect these two periods. To avoid a large adjustment to the asset allocation over a short age interval—potentially "locking in" substantial losses following a major market decline—the "slope" and shape of the glide path, or the rate at which risk is reduced, must be carefully considered to reduce the risk of "locking in" losses.

Why these risks matter

The overall objective of the glide path is to establish an appropriate age-based asset allocation strategy for achieving the income-replacement goal in retirement. Maintaining an appropriate level of risk consistent with the goal while seeking high investment returns is essential to provide a reasonable likelihood for achieving a desired level of income-replacement throughout retirement. Therefore, a framework for balancing the three key elements outlined above while seeking maximum investment returns is critical to establishing an appropriate asset allocation strategy.

A framework for balancing the need for return with loss aversion, extreme events, and time horizon

Fidelity's quantitative risk framework is designed to evaluate investors' experience and sensitivity to losses, both at the time of a market decline and in subsequent periods. The framework focuses on producing outcomes such that the time to recover from significant market declines is consistent with the objectives and time horizon of the portfolio's particular target date.

Specifically, our risk-boundary framework encompasses the following steps:

- Combine the aforementioned behavioral and investment market elements into a calculation of a hypothetical investor's experience during each of the worst 20 equity-market drawdowns.
- For investors at various ages, evaluate what the portfolio balance, expected cash flows, and experience would have been during a defined time horizon, using a range of potential asset allocation strategies over the horizon.
- Throughout this risk control process, our loss aversion characteristic remains constant, while risk capacity diminishes over time due to an investor's shrinking time horizon.
- For each investor, the utility at the end of each year is calculated by determining whether the portfolio's value is above or below its expected level. The overall utility, or satisfaction, for the investor's experience can be calculated by aggregating the utility values over the relevant horizon.

The expected long-term volatilities of the portfolios associated with this strategy seek to provide a risk boundary along the target date spectrum—the level of expected portfolio volatility, or risk capacity, that our analysis suggests may be appropriate at each stage along the glide path.

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Endnotes

[1] Wealth reference level or wealth reference point: The level or balance of expected assets at any point in the glide path based on the adherence to given assumptions.

[2] Worst equity market periods defined as worst peak to trough declines based on S&P 500 Index total return; specifically, the length of time it took for the index composite to recover back to its pre-decline level on an inflation-adjusted total return basis in each of the 20 scenarios.

[3] The glide path goal of Fidelity's target date strategies is based on a set of assumptions regarding an investor's total savings rate, retirement savings start date, planning horizon, and annual salary increase, among other factors.

[4] See endnote #3.

[5] See endnote #2.