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TARGET DATE FUNDS: AN ANALYSIS OF STRATEGIES AND PERFORMANCE

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Target date funds (TDFs), which seek to provide a broad demographic of individuals with a long-term retirement investment solution, play a major role in defined contribution (DC) retirement plans, and have also attracted substantial assets from investors in other types of accounts. Further, most DC plan investment menus designate TDFs as the default investment. This paper provides an overview of the strategies and structures of TDFs, as well as current trends among major TDF providers. We also document substantial heterogeneity across TDFs and provide guidance on how to evaluate the quality of TDFs in light of this heterogeneity.

Target date funds (TDFs) have become a core investment choice for U.S. retirement savers. For example, as of June 2024, $3.75 trillion was invested in U.S. TDF mutual funds and TDF collective investment trusts (CITs) (Investment Company Institute, 2024).[1] The popularity of TDFs is not surprising, as they provide a "one-stop" solution that allocates money across different asset classes, including equity and fixed-income securities, as well as across domestic and international investments. After investing in a TDF "vintage," an investor can rely on the fund manager to change the asset allocation—e.g., the allocation to equities versus fixed-income—as the investor approaches and, for some TDFs, goes beyond his target retirement date.[2]

The schedule according to which the manager changes the baseline or strategic asset allocations (SAA) is referred to as a TDF suite's "glide path."[3] In addition to these changes, TDF managers rebalance TDF portfolios to maintain the glide path asset allocation as the returns of asset classes play out differently over time. Other services may be provided by a TDF manager, including the choice of asset class allocation and sub-asset class allocation, the choice between

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active and passive underlying investments, and (in some TDFs) tactically deviating from the glide path as warranted by temporal market conditions [i.e., "tactical asset allocation" (TAA)], as well as (less frequently) allowing a conversion to an annuity at retirement.

TDFs are particularly prominent in defined contribution (DC) plans, such as 401(k) and 403(b) plans, which serve a broad demographic of individuals with wide ranges of investment expertise, income, and wealth. According to BrightScope/ICI's survey of private-sector 401(k) and 403(b) plans with audited Form 5500 filings, as of 2019, 86% of 401(k) plans and 87% of 403(b) plans included TDF investment options, and TDFs represented 27% and 28% of aggregate invested assets across these retirement plans, respectively (BrightScope and Investment Company Institute, 2022, 2023b). Given the important role that TDFs play in U.S. retirement savings, plan investment committees, plan consultants, and plan participants share an interest in understanding how to evaluate the strategies and performance of TDFs. This paper aims to provide a holistic approach to these issues.

Given the differences among TDFs with respect to glide paths, asset class and sub-asset class allocations, selection of underlying funds, and the use (or not) of TAA, it is clear that TDFs vary in their expected risk-return profiles. This variation in risk-return profiles changes over time as market conditions evolve, and as TDF managers react to competition (from other TDF providers) and financial market changes by adjusting various aspects of their TDFs (such as glide paths). In this paper, we document that, consistent with this expectation, there is substantial heterogeneity in the expected risk-return profiles of TDFs. While this variation provides investors—including DC plans—with choices that span wide ranges of risk preferences and investment objectives, this heterogeneity also greatly complicates the evaluation of the quality of TDFs.

Accordingly, this paper's objective is to provide a framework that can be used to characterize and evaluate the quality of TDFs. This framework consists of two broad and interrelated essential elements: (1) identifying the TDF's investment strategies and objectives (its characteristics) and (2) evaluating the TDF manager's ability to effectively implement these investment strategies and objectives (its quality, given its characteristics). As part of the second element, we offer guidance on the evaluation of TDFs' past performance—which is both reported and often relied upon by investors—as well as how such past performance might be compared with benchmarks and comparator groups.[4]

The remainder of this paper is organized as follows. Section 1 provides an overview of related research. Section 2 provides background information on TDFs, including a discussion of some of the features of TDFs and an overview of the rise of TDFs as a fundamental "pillar" of U.S. retirement savings (in addition to Social Security and pension benefits). Section 3 documents heterogeneity across TDFs that complicates their evaluation. Section 4 describes our framework for evaluating TDFs, and Section 5 concludes.

1 Related Literature

To our knowledge, this is the first paper to provide a comprehensive ("holistic") view of the purpose of TDFs, the strategies used by TDFs, and how to evaluate TDF quality. Importantly, our paper adds to the literature on TDFs by providing a framework with which to evaluate TDFs in light of the numerous differences in their characteristics that serve to complicate an assessment of their quality.

The existing literature on TDFs includes high-level guidance from the Department of Labor (DOL) (U.S. Department of Labor, 2013). Among other things, this guidance suggests that plan fiduciaries engage in an objective process for comparing and selecting TDFs that considers information such as performance, investment fees and expenses, and how the TDF's characteristics align with employee demographics. The guidance also highlights the importance of understanding the investment allocation of TDFs (i.e., allocations to asset classes, sub-asset classes, and individual funds) and how these allocations change over time—i.e., the overall strategy of the TDF. Other papers on evaluating TDFs focus on evaluating the performance of TDFs relative to benchmark indices and/or balanced funds (e.g., Johnson and Yi, 2017; Johnson and Kanuri, 2018; Shoven and Walton, 2021), or propose quantitative metrics for evaluating TDFs (Gabudean and Weiss, 2019) and TDF suites (Gabudean, 2015).

Our paper is also related to research on the heterogeneity of TDFs. This literature includes, for example, Elton *et al.* (2015), which explores how TDF features, such as the characteristics of their underlying funds, fees, deviations from glide paths, and investment objectives, vary across and within TDF families from 2004 through 2012. Chang *et al.* (2017) examine how differences in management fees and load fees systematically impact the differences in investment returns of TDFs that existed over the 10 years prior to 2016. Balduzzi and Reuter (2019) document the large differences in the realized returns and *ex ante* risk profiles across mutual fund TDFs with similar target retirement dates, and find that, during the sample period of 2000–2012, much of the heterogeneity in realized returns and risk results from newer and less popular TDFs strategically taking on more risk than TDFs with similar target dates but larger market shares. Similarly, Sherrill (2019) documents substantial differences in asset allocations among same-target-date vintages across different TDF suites, leading to large variations in realized risk and return performance in the cross-section of same-date vintages. Another set of articles focuses on the use of, as well as the benefits of, including specific asset classes, such as commodities, real estate, and private equity, within TDF portfolios (e.g., Drew *et al.*, 2015; Dhillon *et al.*, 2016; Antonelli, 2018, 2022, 2023).

A particularly important stream of research focuses on the construction and performance of TDF glide paths (Donaldson *et al.*, 2019; Pfau and Kitces, 2014; Chen *et al.*, 2015; Singha, 2016; Gabudean *et al.*, 2021; Tsui *et al.*, 2012), including whether glide path asset allocations should remain constant after the target retirement date (i.e., a to-retirement glide path) or continue to adjust after the target retirement date (i.e., a through-retirement glide path) (Weiss *et al.*, 2021; BlackRock, 2014; Erickson and Cunniff, 2015); how often and to what extent glide paths are adjusted or changed (Idzorek *et al.*, 2013); whether multiple glide path options are ideal for diverse populations of investors (Duarte *et al.*, 2022); and what models and assumptions underlie the main glide paths construction approaches and their respective characteristics (Faria, 2021; Estrada, 2020; Levy and Levy, 2022).

The existing literature on TDFs also generally discusses the benefits, limitations, and impacts on the behaviors of participants, in general, of including TDFs in a retirement plan's investment lineup. Benefits of TDFs that have been discussed in the literature include, for example, the effect of TDFs on wealth accumulation (Mitchell and Utkus, 2021).[5] Several studies focus on how the inclusion of TDFs and setting TDFs as the default investment affect participation rates and

portfolio exposures in 401(k) plans (Copeland, 2009; Mitchell and Utkus, 2021).

Clark and Mitchell (2020) find that, among public sector employees, defaulting into TDFs "resulted in higher equity shares, especially for women, younger workers, and low-seniority employees," and also "had a profoundly sticky effect on their subsequent investment behavior." McDonald *et al.* (2019) compare participants who joined plans after target date defaults were adopted to those who joined before. The authors find that participants, especially women, in the former group held significantly fewer different investment fund allocations and held a larger allocation to equities, eliminating the male–female disparities often observed in allocations to equities. Additionally, the authors show that the menu size effect (the average number of funds held by participants increasing with the number of choices offered in the plan, which was significant in the latter group) was effectively eliminated with the introduction of TDF defaults.[6]

Potential limitations of TDFs discussed in the literature include, for example, the potential for inadequate diversification (Dhillon *et al.*, 2016); lack of customization to an individual's particular life circumstances (Johnson and Yi, 2017; Duarte *et al.*, 2022); whether TDFs are a cost-effective retirement savings approach (Elton *et al.*, 2015; Johnson and Kanuri, 2018; Pae and Atra, 2020; Brown and Davies, 2023); whether TDFs are optimal in terms of asset accumulation (Estrada, 2014); and flaws in traditional glide path implementation (Arnott *et al.*, 2013).

2 The Evolution of TDFs' Role in U.S. Retirement Savings

2.1 Description of TDFs

Fund managers offer, and DC plans select, TDF suites, each of which consists of multiple funds with different target years (or vintages). Most TDF suites typically offer vintages at five-year intervals, as well as a vintage for investors that have reached the TDF's terminal asset allocation (i.e., a "retirement income fund"). Each vintage provides an asset allocation mix designed for investors who are expected to retire at or around the target year or, in the case of a retirement income vintage, have reached their terminal asset allocation.[7] Investment objectives generally vary across the vintages included in a TDF suite. For example, relative to vintages close to or in retirement, vintages with target dates relatively far in the future (i.e., for younger participants) typically place a greater emphasis on accumulating wealth and less emphasis on minimizing risk. Conversely, retirement income vintages and vintages with relatively near-retirement dates usually place a greater emphasis on preserving wealth, avoiding large multiple-year downturns, and hedging inflation risk.[8]

TDFs are typically structured as funds-of-funds, meaning that TDFs invest in underlying funds instead of investing directly in individual securities. Some TDF suites invest only in funds advised by the investment advisor that offers the TDF. These funds include TDFs offered by some of the earliest and largest TDF providers, such as Fidelity, Vanguard, T. Rowe Price, and BlackRock. These TDFs are sometimes referred to as "proprietary TDFs." Other TDFs may invest in underlying funds from other providers, such as Schwab's Target Date Series.[9] These TDFs are sometimes referred to as "non-proprietary TDFs" or "open-architecture TDFs." A third category of TDFs, such as those offered by Principal, invest in underlying funds managed by the TDF provider but that employ third-party subadvisors to manage the portfolios of the underlying funds (see, e.g., Principal, 2024; Russell Investments, n.d.). In this case, the funds managed by the TDF provider are

sometimes referred to as "white label funds," as noted above.

2.2 *The rise of TDFs to becoming a fundamental pillar of U.S. retirement savings*

TDFs were first introduced for DC plans in the early 1990s by Wells Fargo (working with Barclays Global Investors) (Hansell, 1994; Balduzzi and Reuter, 2019) to provide investors with a simplified method to accumulate and preserve wealth for retirement in a stand-alone vehicle that automatically rebalances to become more conservative over time. This simplified investment solution often appeals to those investors who wish to simply "set it and forget it" instead of actively managing their retirement savings. TDFs have become an important component of U.S. retirement savings. In particular, the passage of the Pension Protection Act of 2006 (PPA) was an important driver of the growth in TDF assets from 2006 to present.[10] A key objective of the PPA was to increase savings in DC plans by reducing the liability risk to employers of adopting automatic enrollment by providing a safe harbor for plan fiduciaries to invest participant assets in certain types of investment alternatives in the absence of a participant investment decision.[11] Among other things, the DOL's final regulation, effective December 24, 2007, allowed the following three types of investments to be used as long-term "Qualified Default Investment Alternatives" (QDIAs):

(a) "A product with a mix of investments that takes into account the individual's age or retirement date (an example of such a product could be a life-cycle or targeted-retirement-date fund);"
(b) "An investment service that allocates contributions among existing plan options to provide an asset mix that takes into account the individual's age or retirement date (an example of such a service could be a professionally-managed account);"
(c) "A product with a mix of investments that takes into account the characteristics of the group of employees as a whole, rather than each individual (an example of such a product could be a balanced fund)." (U.S. Department of Labor, 2008).

Following the passage of the PPA and the DOL's QDIA regulations, the prevalence of auto enrollment and the use of TDFs as QDIAs in DC plans increased substantially. For example, according to surveys conducted by the Callan Institute, fewer than 40% of DC plans offered automatic enrollment in 2006 (i.e., prior to the effective date of the DOL's new QDIA regulations), compared to 76% as of 2022. The Callan Institute also found that, as of 2006, among plans that had a default investment, 35% used a TDF, compared to 97% in 2022 (Callan Institute, 2012, 2023).

In addition, TDF assets, the number of TDF providers, and the number of TDFs increased dramatically in the years leading up to and following the passage of the PPA and DOL's QDIA regulation. For example, according to reports published by Morningstar covering TDFs, the amount of assets invested in U.S. mutual fund TDFs increased from approximately $69.4 billion at the end of December 2005 to approximately $1.5 trillion at the end of December 2022 (Morningstar, 2010, 2023). In addition, Morningstar publications report that six TDF mutual fund suites existed in 2002, which grew to 42 by the end of 2007 and over 60 by the end of 2018 (Morningstar, 2017, 2019).

Since the PPA's passage, TDFs have also become a primary vehicle through which DC plan participants invest. For example, the BrightScope/ICI Defined Contribution Plan surveys report that the portion of 401(k) plan assets invested in TDFs (including mutual funds, CITs, separate accounts,

and other pooled investment vehicles) increased from 3.1% in 2006 to 28.0% in 2020 (BrightScope and Investment Company Institute, 2023a).

3 Heterogeneity Across TDF Suites

In this section, we document the substantial heterogeneity that exists among TDFs with respect to several attributes important to investors,[12] including, but not limited to, differences in glide paths, asset classes held, the investment style of underlying funds, the role of TAA, and investment fund structure. These differences result in different expected risk-return profiles, which complicates the evaluation of TDFs.

3.1 Variation in glide paths

3.1.1 Description and evolution of glide paths

As discussed above, a TDF's glide path is the schedule of how the TDF's SAA will change over time. As such, a TDF's glide path is indicative of how the TDF's tradeoff between risk and reward is expected to change as investors age toward retirement.

TDF glide paths generally specify asset allocation changes that reduce risk as one goes from TDF vintages meant for investors furthest from their target date to vintages designed for investors near or in retirement. This reduction in risk is typically accomplished through reductions in the TDF's allocations to equities and other relatively risky asset classes and increases in the TDF's allocations to fixed income and other asset classes that reduce portfolio risk.[13]

While most TDF glide paths become more conservative over time, glide paths vary substantially. TDF sponsors typically construct their glide paths based on complex, multi-dimensional models and analyses that consider capital market assumptions (expected returns and risk of different asset classes, as well as the expected correlation of returns across asset classes), as well as expectations of the evolution of investors' human capital, consumption needs, longevity, risk aversion, and investor behavior. Such considerations lead to varying glide paths over time and across TDF managers.

Moreover, fund managers typically regularly review, and often adjust, their TDF's glide path over time (see, e.g., Vanguard, 2022a; State Street Global Advisors, 2023; Browne *et al.*, 2022; Morningstar, 2022; Idzorek, Stempien, and Voris, 2013). Such changes can be in response to a fund provider's evolving views and expectations of capital markets and investor behavior. For example, changes in economic conditions may impact a TDF manager's views on the optimal amount of risk and/or his capital market forecasts. Following the Global Financial Crisis of 2007 to 2009, many TDF managers turned to more conservative or volatility management strategies (Morningstar, 2010). During the more recent bull market since 2009, many TDF managers increased their allocations to riskier asset classes. For example, Morningstar identified 25 TDF suites that changed strategic allocations to equity by more than five percentage points over the 2012 to 2016 period, with TDFs trending to higher equity exposure (Morningstar, 2017). This trend toward higher allocations to equities has continued at least through 2021 (Morningstar, 2022). The implementation of changes in glide paths as market conditions evolve is consistent with academic research (see, e.g., Viceira, 2008).

These differences in investment philosophies and TDF designs, as discussed in greater detail below, contribute to the heterogeneity across TDFs used in the marketplace. Figure 1 plots the glide path allocations to equities for the 48 different TDF

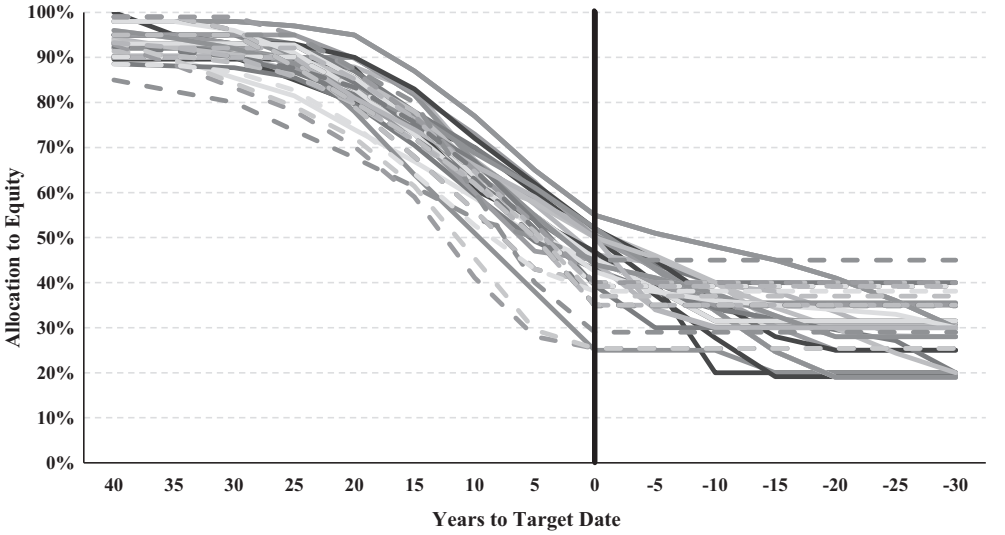


Figure 1 TDF glide paths' equity allocations. As of August 2024.

Notes: (1) Dashed lines indicate to-retirement TDFs and solid lines indicate through-retirement TDFs. Different shadings are used to show variation and are not correlated with glide path characteristics.
(2) The Fidelity Simplicity RMD and Fidelity Managed Retirement suites are excluded from this figure because these suites are specialized TDFs that are designed for individuals at or near retirement.

Source: Morningstar Direct.

mutual fund suites for which Morningstar Direct had the requisite data as of August 2024.

The glide path allocations to equity among the TDFs shown in Figure 1 vary widely: from 80% to 99% as of 30 years before the target date, from 59% to 87% as of 15 years before the target date, from 25% to 55% at the target date, and from 19% to 45% at the terminal asset allocation (also known as the landing point). These glide paths also vary in the timing and pacing of decreased equity exposure, with some glide paths remaining flat at the starting equity allocation for a period of time, and other glide paths decreasing equity exposure earlier and/or at a different rate. These differences reflect differing views on optimal asset allocation that balances various risks (such as market risk, inflation risk, and longevity risk), and differing views on capital markets and labor income assumptions.[14]

The variation in asset allocations across TDF suites results in substantial cross-sectional variation in risk and expected returns, as well as differences in how the funds are expected to perform in specific market environments.

3.1.2 To be "to" or to be "through" : That is the question!

TDFs are frequently categorized as "to-retirement" or "through-retirement."[15] To-retirement TDFs reach their terminal asset allocations at the target year, whereas the asset allocations of through-retirement TDFs continue to adjust for some years after the target year. To illustrate, Figure 2 shows the equity allocation for two glide paths, a to-retirement TDF (BlackRock LifePath Index funds) and a through-retirement TDF (Fidelity Freedom Index funds).

Both to-retirement and through-retirement TDF suites are widely used in retirement plans, indicating that plan sponsors and plan consultants view both glide path structures as reasonable. However, the different glide path structures provide

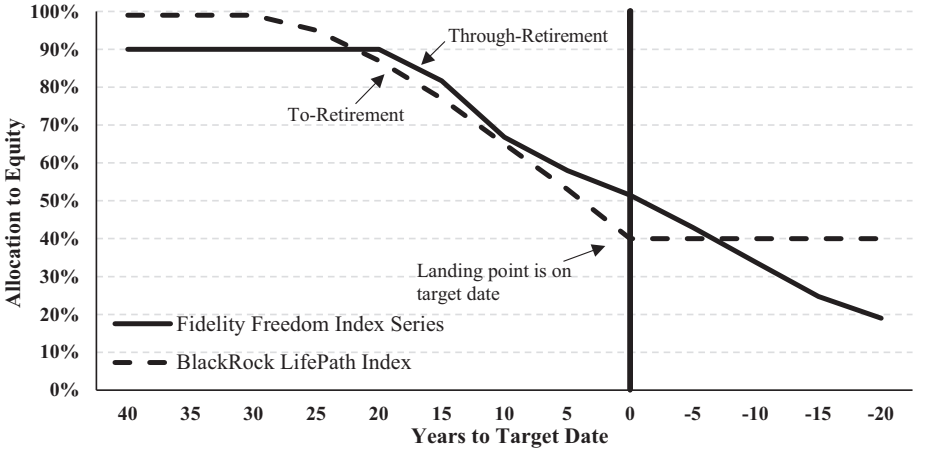


Figure 2 TDF glide paths' allocation to equity: To-retirement versus through-retirement. As of August 2024.

Source: Morningstar Direct.

different solutions to investors' retirement savings needs. For example, relative to to-retirement TDFs, through-retirement TDFs generally have higher allocations to equity and other "risky assets" in the years preceding and following the target retirement date. This higher asset allocation is consistent with a greater focus on long-term expected wealth accumulation during this period, with its commensurate risks; investors more concerned with avoiding short-term fluctuation in portfolio value immediately prior to and during retirement may prefer to-retirement TDFs.[16] In addition, there is variation within to- and through-retirement glide path asset allocations, respectively, as shown in Figure 1, and variation in the terminal asset allocation "landing point" among through-retirement TDFs—from five to 30 years after the targeted retirement date.

From the perspective of a fund evaluator, the choice of to-retirement versus through-retirement TDFs may depend on several factors, including the availability of predictable income from other sources during retirement (e.g., from a pension, annuities, Social Security, and other savings); the likelihood that the investor will remain invested in the TDF after retirement; and, in the case of a DC plan, plan demographics (e.g., average age, risk preferences, and savings behavior). The choice between to-retirement or through-retirement TDFs may also depend on differences in investment philosophies about the relative importance of additional wealth accumulation versus avoiding short-term fluctuations at and after retirement (see, e.g., Erickson and Cunniff, 2015; BlackRock, 2014; Umpierrez, 2021).

Table 1 details some characteristics of the glide paths as of August 2024 for the TDF suites offered by the 10 TDF managers with the most mutual fund TDFs assets under management (AUM) as of December 31, 2023. As shown in the table, seven of the top 10 managers offer only TDF suites with through-retirement glide paths, two of the managers offer only to-retirement glide paths, and one manager offers both types of glide paths. The allocations to equity also vary across the TDF suites and glide paths, with the maximum allocation to equities of the glide paths ranging from 85% to 99%, and the allocation to equity at the target date ranging from 39% to 55%.

3.2 Variation in asset allocations

While TDFs typically invest in equity and fixed income asset classes, TDFs vary substantially

Table 1 Top 10 providers of TDFs by AUM.[a] TDF glide path characteristics.[b] As of August 2024.

Provider	TDF name	AUM (in Millions)[c]	To- or Through-glide path	Maximum allocation to equity	Allocation to equity at target date
Vanguard	Target Retirement	$620,334	Through	90%	50%
Fidelity[d]	Freedom	$192,374	Through	90%	52%
	Freedom Index	$135,588	Through	90%	52%
	Advisor Freedom	$18,473	Through	90%	52%
	Freedom Blend	$13,248	Through	90%	52%
	Flex Freedom Blend	$476	Through	90%	52%
	Sustainable Target Date	$19	Through	90%	47%
American Funds	Target Date Retirement	$272,337	Through	90%	46%
T. Rowe Price	Retirement	$89,894	Through	98%	55%
	Target Retire	$3,735	Through	98%	43%
	Retirement Blend	$1,267	Through	98%	55%
	Retirement Income	$149	Through	98%	55%
Nuveen	Lifecycle Index	$52,337	Through	95%	50%
	Lifecycle	$34,111	Through	94%	45%
BlackRock	LifePath Index	$69,520	To	99%	40%
	LifePath Dynamic	$1,449	To	99%	40%
	LifePath ESG Index	$46	To	99%	40%
JPMorgan	SmartRetirement	$24,816	To	90%	39%
	SmartRetirement Blend	$15,354	To	90%	39%
Principal Funds	LifeTime	$23,118	Through	93%	45%
	LifeTime Hybrid	$4,473	Through	93%	45%
State Street	Target Retirement	$17,337	Through	90%	39%
American Century	One Choice	$12,637	To	85%	45%
	One Choice Blend+	$309	Through	90%	45%

[a]Top 10 providers of TDF suites are limited to include only mutual fund assets as of December 31, 2023. According to Morningstar (2024), if CIT assets were accounted for, flexPATH would be a top ten provider.
[b]Glide path characteristics data are sourced from Morningstar Direct.
[c]AUM values are as of December 31, 2023 and are sourced from Morningstar Direct.
[d]The Fidelity Simplicity RMD and Fidelity Managed Retirement suites are excluded from this analysis because these suites are specialized TDFs that are designed for individuals at or near retirement.

Sources: Morningstar Direct; Morningstar, 2024, p. 15.

with respect to investing in other asset classes, including real estate, commodities, private equity, and/or bank loans (Callan Institute, 2015). TDFs also vary in their allocations across sub-asset classes. For example, TDFs vary in how they allocate their equity holdings by geography (e.g., U.S., international developed markets, emerging markets), firm capitalization (large, mid, small), and investment style (growth, value, blend). TDFs also vary with respect to how fixed income assets are allocated by geography, credit risk, and interest rate risk. Examples of fixed income securities

Table 2 TDF suites' 2025 vintages' asset allocation to U.S. equities and international equities (December 31, 2017).

	U.S. equities	International equities
TDF suites' 2025 vintages – Percent asset allocation to each asset class		
Minimum	10.99%	0.01%
25th Percentile	32.55%	17.01%
50th Percentile	37.24%	19.85%
75th Percentile	41.71%	22.74%
Maximum	46.17%	34.79%
Percentage of Vintages Invested in Asset Class	100%	100%

[a]Data are from Morningstar Direct and include the 2025 vintages of the 34 TDF suites that are used in Table 3. The State Farm LifePath TDF suite does not have a 2025 vintage, and therefore is not present in Table 2, but is present in Table 3.
Sources: Morningstar (2018); Morningstar Direct.

held by TDFs include U.S. government obligations, foreign bonds, U.S. high yield bonds, investment grade U.S. corporate obligations, and foreign fixed income securities.

Table 2 reports asset allocations to U.S. equities and international equities for the 2025 vintages of 35 TDF mutual fund suites as of 2017. This table shows substantial variation in allocations to U.S. equities—11.0% to 46.2%—and allocations to international equities—0.01% to 34.8%.

Morningstar (2018) reports more granular information on the asset allocations of the same 35 TDF mutual fund suites reported in Table 2 as of 2017. These data show that all of these suites invested in taxable bonds and U.S. equities; 97% invested in international equities; 69% invested in sector equities (which includes real estate); 34% invested in commodities; and 6% invested in alternatives (which includes currency, futures, options, and other asset classes) (Morningstar, 2018) (see Table 3).

Table 3 also shows that there is substantial variation in TDF suites' allocations within each asset class. For example, the allocations of the TDF suites (aggregated using an asset-weighted average across all vintages in each suite) to U.S. equities ranged from 22.9% to 57.6%, and allocations to taxable bonds ranged from 17.1% to 48.1%. The inclusion of assets such as real estate and commodities in TDFs also varies across TDFs.[17] For example, 69% of TDFs in Table 3 invested in sector equities (which includes real estate), and the allocations to sector equities among these funds ranged from 0.4% to 8.9%. With respect to commodities, 34% of TDFs in Table 3 invested in commodities, and the allocations to commodities among these funds ranged from 0.2% to 2.8% (Morningstar, 2018).

3.3 Glide path design

TDF providers use sophisticated modeling to determine glide paths; this process often involves large-scale simulations and/or "scenario analyses" that allow for a large number of parameter inputs—within the general categories of capital market assumptions, investor behavior, income needs during retirement, and longevity risk. Managers' forecasts of asset class risks and returns, as well as return correlations among asset classes,

Table 3 TDF suites asset allocation by asset class (*December 31, 2017*).

	U.S. equities	International equities	Sector equity[b]	Taxable bond	Alternative[c]	Commodities
TDF Suites–Percent Asset Allocation to Each Asset Class[a]						
Minimum	22.9%	0.0%[d]	0.0%	17.1%	0.0%	0.0%
25th Percentile	37.3%	21.4%	0.0%	25.7%	0.0%	0.0%
50th Percentile	44.2%	22.6%	1.4%	28.7%	0.0%	0.0%
75th Percentile	47.2%	25.2%	3.5%	35.5%	0.0%	1.1%
Maximum	57.6%	44.9%	8.9%	48.1%	5.1%	2.8%
Percentage of Suites Invested in Asset Class	100%	97%	69%	100%	6%	34%

Notes: [a]Morningstar (2018) reports asset allocation data for 51 target date suites that invested more than 90 percent of their assets in mutual funds or ETFs as of year-end 2017. Data limitations lead us to exclude 16 of these suites. For 15 suites, Morningstar (2018) reports that TDFs invested in "Allocation" funds but does not have data on the asset allocation of the underlying funds. In addition, while Morningstar (2018) includes asset allocation data for the AXA Target Allocation fund, Morningstar Direct does not contain the data used in Table 2 for this TDF suite. For comparison purposes, Tables 2 and 3 are based on the remaining 35 TDF suites.

[b]The "Sector equity" category includes equity in Global and Domestic Real Estate, Health, Technology, Energy, Communications, and Infrastructure as well as many more industry sectors (see Morningstar, 2016, p. 3).

[c]The "Alternative" category includes currency portfolios, futures, options, volatility, and debt (see Morningstar, 2016, pp. 4–5).

[d]The PIMCO RealPath TDF suite is the TDF suite counted as not investing in international equities. This treatment is based on Morningstar (2018), which reports that the TDF suite invested 0.0 percent in international equities. We note, however, the funds' 2017 prospectus indicates that the funds had exposure to international equities stating, "[t]he glide path . . . is also designed to provide investors diversification . . . by emphasizing allocations to . . . which complement exposures from traditional assets, such as U.S. and international equities." See also, the PIMCO RealPath allocation glide path reported in the 2017 prospectus, which shows allocations to "Emerging Markets Equities" and "Non-U.S. Equities" (see PIMCO Funds, 2017, p. 53).

Sources: Morningstar (2016, 2018), Morningstar Direct; PIMCO Funds (2017).

are key inputs to these simulations and the design of TDF glide paths. Managers often begin with an assessment of the current and future potential states of macroeconomic conditions, such as short- and long-term interest rates and the U.S. Government yield curve, the term structure of credit spreads, inflation, economic growth, and demographic information. In generating forecasts of returns, risks, and correlations, it is common to create a probability distribution of outcomes and parameter spaces (i.e., set of possible parameter values) for each investment type that might be used in SAA.[18]

After creating the above parameter spaces, simulations are often used to generate the potential paths of outcomes over long periods of time for a chosen "test glide path" that uses specific sub-asset class weights at each point in the glide path. In doing so, one creates a picture of the distribution of outcomes that are plausible for that particular test glide path. This process can be repeated for many different test glide paths (including different mixtures of sub-asset classes and differences in the timing of allocation changes).

Finally, a decision can be made about which test glide path best serves the needs of the clientele for which the TDF is designed. This design decision considers not only the mean outcomes of different test glide paths, but also the risks associated with each test glide path.[19,20]

3.4 Variation in the use of tactical asset allocation

Beyond the variation in their stated glide paths (i.e., their SAA), TDFs also vary in whether, and to what extent, they employ TAA (i.e., manager discretion to temporarily deviate from the strategic glide path asset allocation in an attempt to increase returns and/or provide downside protection). TAA strategies are used by many TDF investment advisors, and vary across these advisors, with differences in investment

Table 4 Average expense ratios and allocation to actively managed underlying funds for TDFs provided by the 10 largest asset managers by AUM[a] (*December 31, 2018*)

Provider	TDF Suites Name[b]	Average Expense Ratio of Lowest Fee Share Class[c]	Percent in Active Underlying Funds[d]
Vanguard	Target Retirement	0.09%	0%
Fidelity[e]	Advisor Freedom	0.46%	91%
	Flex Freedom[f]	0.00%	90%
	Freedom Blend	0.31%	62%
	Freedom Index	0.08%	0%
	Freedom	0.46%	89%
American Funds	Target Date Retirement	0.38%	100%
T. Rowe Price	Retirement	0.52%	87%
	Retirement Income	0.71%	83%
	Target Retire	0.51%	90%
Nuveen	Lifecycle	0.42%	100%
	Lifecycle Index	0.10%	2%
BlackRock	LifePath Dynamic	0.50%	89%
	LifePath Index	0.11%	0%
	LifePath Smart Beta	0.23%	5%
JPMorgan	SmartRetirement	0.48%	99%
	SmartRetirement Blend	0.29%	36%
Principal Funds	LifeTime	0.69%	83%
	LifeTime Hybrid	0.40%	34%
State Street	Target Retirement	0.09%	0%
American Century	One Choice	0.50%	100%

Notes: [a]Top 10 Providers of TDF suites by AUM are limited to include only mutual fund assets as of December 31, 2023. According to Morningstar (2024), if CIT assets were accounted for, flexPATH would be a top ten provider.
[b]TDF Suites Name is limited to TDF suites present in Morningstar (2019).
[c]The Average Expense Ratio of the Lowest Fee Share Class is derived from Morningstar (2019) (Exhibit 35), which reports data as of December 31, 2018.
[d]Morningstar reports the asset-weighted exposure to actively managed underlying holdings for the "cheapest" share class of each suite in Morningstar (2019), the most recent report in which these data were presented. Data are as of December 31, 2018.
[e]The Fidelity Simplicity RMD suites and Fidelity Managed Retirement suites are excluded from this analysis because these suites are specialized TDFs that are designed for individuals at or near retirement.
[f]The Fidelity Flex Freedom Shares are available only to certain fee-based accounts and advisory programs offered by Fidelity.

Sources: Morningstar Direct; Morningstar (2019, p. 47); Morningstar (2024, p. 15).

philosophies, objectives (e.g., to avoid volatility or to capitalize on short-term opportunities), and capital market assumptions.[21]

Some TDF providers have found that TAA can be used to add value by adjusting the funds' asset allocations to take advantage of attractive valuations or short-term market conditions, or by offering volatility management (see, e.g., T. Rowe Price, 2024; Adams, 2010; Gomes, Michaelides, and Zhang, 2022). Yet, other fund managers find that short-term TAA has little impact on return variability over longer time horizons and instead emphasize the importance of SAA (see, e.g., Vanguard, 2022b).

3.5 Active versus passive underlying funds: Yet another choice to be made

TDFs also differ in the extent to which they invest in actively managed or passively managed underlying funds. Table 4 provides the average (across vintages) allocation to actively managed underlying funds as of 2018 for TDF suites offered by the 10 largest TDF providers.[22] As the table illustrates, some TDFs invest only in passively managed underlying funds, some invest only in actively managed underlying funds, and some TDFs invest in both actively and passively managed underlying funds.

Table 4 also shows that the average (across vintages) expense ratios of the cheapest share class of the TDF suites offered by the top 10 providers are generally lower for TDFs with higher proportions of assets invested in passively managed funds. The table also shows that, among the largest managers of TDF assets, some (e.g., BlackRock, Fidelity, JPMorgan, and Nuveen) offer more than one TDF, including a TDF that invests primarily in actively managed underlying funds as well as a TDF that invests primarily in passively managed funds; some other managers offer only TDFs that invest primarily in actively managed underlying funds (e.g., American Funds, T. Rowe Price); and other managers offer only TDFs that invest primarily in passively managed funds (e.g., Vanguard). Some of these managers also offer TDFs that follow a hybrid approach with substantial allocations to both actively managed and passively managed underlying funds (e.g., Fidelity's Freedom Blend, JPMorgan's SmartRetirement Blend and Principal Funds' LifeTime Hybrid).

3.6 Variation in investment fund structure

In addition, as mentioned above, TDFs are offered through a variety of investment structures, including mutual funds, CITs, variable annuities, and separately managed accounts. These structures differ in their regulations, disclosure requirements, governance structures, and investment restrictions, among other factors. These differences can lead to variation in investment strategies and costs, which in turn can lead to differences in expected returns, risks, and fees.[23]

4 Evaluating the Quality of TDF Suites

As we have discussed above, TDFs vary along many dimensions. Much of this variation reflects differences in investment objectives and investment philosophy. The heterogeneity among TDFs also corresponds to substantial heterogeneity in risk and expected return profiles, as well as in realized returns.[24]

In this section, we provide a framework that can be used to evaluate TDFs in light of this heterogeneity. At a high level, the framework involves two interrelated essential elements. One element involves assessing the high-level structure of a TDF's strategy (e.g., the level and shape of the glide path), while the other element involves evaluating whether the TDF is structured to deliver an attractive combination of risk and expected return, given this investment strategy (e.g., the asset classes and sub-asset classes employed at

different points in the glide path and the use of active versus passive management in underlying funds). Related to this second element is the role of past return performance in judging whether the articulated investment strategy produces results consistent with financial market conditions.

4.1 Overview of the evaluation of investment funds

The goal of evaluating investment funds is to determine whether the fund is expected to provide an attractive combination of risk and expected return, given its investment strategy or goal—sometimes referred to as determining whether the fund is an "economically reasonable" investment. However, as is well understood, the unforeseeable nature of future investment returns creates difficulties in distinguishing portfolio manager skill from movements in security prices caused by unforeseeable events.

There exist some core concepts that apply to assessing investment funds generally, including TDFs.[25] In particular, investment professionals and academics generally evaluate investments by conducting holistic assessments of a variety of qualitative and quantitative factors. Qualitative factors that investment professionals and academics may consider when evaluating investments include, among other things, the size and research capabilities of the investment advisor; the experience of portfolio managers; the quality of the portfolio manager's investment thesis in the context of expected market conditions; the reliance on external investment advice; the reputation, size, and market prevalence of the funds; and industry ratings and awards received by the fund and its advisor.[26]

Quantitative factors that investment professionals and academics may consider include an investment's historical returns relative to an assortment of benchmarks across multiple time horizons, including longer-term horizons that potentially cover a full market cycle. Commonly used benchmarks for evaluating a fund's performance include market indices and peer groups comprising comparable funds. Commonly used quantitative metrics include measures of risk or volatility (e.g., standard deviation of returns, beta, downside deviation, and upside/downside capture) and risk-adjusted returns (e.g., Jensen's alpha, Sharpe ratio, information ratio, Sortino ratio, and Treynor ratio). Different evaluators may place different importance on the different measures depending on the evaluator's priorities (e.g., minimizing volatility or minimizing the risk of large losses). For example, an evaluator interested in a fund that minimizes downside risk may place a greater emphasis on downside deviation and Sortino ratio than on the Sharpe ratio. Factor models of returns can also be used to evaluate expected investment returns (see, e.g., Fama and French, 1992, 1993, 2015; Carhart, 1997).

Quantitative analysis must be carefully designed with scientific principles firmly in mind. Care must be taken to choose appropriate benchmarks against which to assess a fund's quantitative factors. Unless the selected benchmark peer groups or indices appropriately match the risks, investment objective, asset allocation, asset classes, and management style (among other factors) of the evaluated fund, any observed disparity in quantitative metrics could be caused by inherent differences between the fund and the benchmark, as opposed to the skills of the fund manager (see, e.g., Roll, 1978). In addition, the use of reasonable peer groups over multiple time horizons, as opposed to comparisons against a few options over specific years, avoids potential hindsight bias.

Fund evaluations should also consider expense ratios and the nature of the services provided by the TDF. As discussed above, these services

include whether the underlying fund management style is active versus passive, as well as the allocations to asset classes and sub-asset classes. In addition, evaluations should also consider any non-investment services or features associated with the fund. For example, many mutual funds and CITs are available in multiple share classes. In such instances, while all share classes are invested in the same underlying portfolio, the share classes may differ in other pertinent ways, including fees, services, distribution channels, and investment minimums.

4.2 Complications in evaluating TDFs

The evaluation of TDFs is complicated by the heterogeneity discussed in Section 3. Given the variation in TDF characteristics and corresponding variation in risk profiles, it is often challenging to identify a suitable peer group or benchmark index against which to evaluate a particular TDF's historical returns.[27]

With respect to benchmark indices, while there exist off-the-shelf benchmarks—such as the S&P Target Date Indices, Morningstar Lifetime Allocation Indices, and Dow Jones Target Date Indices—because such indices are based on a specific asset allocation (usually the average asset allocation of a set of surveyed TDFs), these indices may not match the risks, asset classes, asset allocations, and management style (among other factors) of some or all of the vintages of a particular TDF suite being evaluated. In such cases, differences in returns between the benchmark index and the TDF suite being evaluated may be attributable to differences in risk and expected return profiles that are expected to generate differences in returns, as opposed to differences in managers' skills. Thus, while a simple comparison of a TDF suite's realized returns to those of off-the-shelf benchmarks may provide a point of reference, such comparisons are usually insufficient to provide a precise quantitative assessment.

The evaluation of TDFs' performance relative to benchmark indices is further complicated by TDFs' dynamic asset allocations (i.e., the shape of the glide path as well as the asset allocation of the fund at each point in the glide path), which may mean that a TDF suite and its set of benchmark indices have similar asset allocations for some vintages and dissimilar asset allocations for other vintages. For example, as of December 2023, the John Hancock Lifetime Blend TDFs and the PGIM TDFs both report the S&P Target Date Indices as a benchmark in their prospectuses (as well as custom benchmarks). Despite having the same prospectus benchmark index, these TDFs had very different equity allocations, and the magnitude of these differences varied by vintage.[28] In addition, TDF glide paths may change over time such that an index that has risks comparable to a particular TDF in one period may not be an appropriate comparator in a later period. The use of TAA further complicates benchmark comparisons.

The need for plan sponsors to select TDFs at the suite level adds further complication to evaluating TDFs that does not exist for evaluating funds that invest in a single asset class, which can be added to or removed from plans independent of the decisions made for other funds. For example, some vintages within a suite may have relatively strong performance, while other vintages within the same TDF suite have relatively weak performance. If TDF vintages were evaluated in isolation, a plan sponsor might prefer, for example, the 2035 vintage of one TDF suite and the 2030 vintage of another suite, a solution that is unavailable in the marketplace.

4.3 Framework for evaluating TDFs

We now propose a framework for evaluating TDFs that accounts for the heterogeneity in strategies

and structures discussed above. Specifically, we explain that the evaluation of whether TDFs are economically reasonable involves two interrelated and essential elements. One element of the evaluation seeks to identify the TDF suite's investment objectives and the associated profile of risks and expected returns, while the other element involves evaluating the TDF manager's ability to implement these investment objectives. The first assessment may be thought of as a consideration of the strategies and goals of the TDF suite, while the second may be thought of as a consideration of the implementation of these strategies and goals.

4.3.1 Evaluating a TDF's investment objectives and associated profile of risk and expected returns

To evaluate a TDF suite, it is important to first review the investment objectives of the TDF suite—for example, the relative focus on wealth accumulation, capital preservation, downside risk protection, inflation protection, and other objectives, at different points on the glide path. Such information is typically reported in documents such as prospectuses (for mutual funds) and offering statements (for CITs), as well on the fund advisor's website.

An evaluation of a TDF should also evaluate its glide path asset allocations relative to its stated investment objectives. An analyst conducting such an assessment may consider, among other things, the glide path's allocations to risky, high-return-seeking assets; the date at which the terminal asset allocation is reached; and which asset classes are used to diversify market risk. An analyst may also assess the TDF's glide path allocation to various asset classes and sub-asset classes, with its stated investment objectives in mind. For example, a TDF with investment objectives focused on inflation protection or diversification might be expected to invest in asset classes such as commodities, real estate, and short-term Treasury Inflation-Protected Securities (TIPS) (see, e.g., Breheny and Cunniff, 2018; Vanguard, n.d.; AllianceBernstein, 2021). It is also relevant to understand whether the TDF manager engages in TAA, and if so, the degree to which the manager may deviate from the glide path asset allocation and the specific objectives for such TAA. Finally, to understand the TDF's investment objectives and associated profile of risks and expected returns, it is important to identify whether the underlying funds are actively managed, passively managed, or a blend of both.

4.3.2 Evaluating a TDF manager's ability to implement the TDF's investment objectives

The second element of evaluating a TDF suite is to assess the TDF manager's ability to implement the TDF's investment objectives. As discussed above in Section 4.1, generally speaking, investment professionals including plan investment consultants, as well as academics, conduct holistic assessments of a range of qualitative and quantitative factors to evaluate the likelihood that TDFs will provide an attractive combination of risk and expected returns at a reasonable cost. In other words, TDF performance evaluation is not restricted to evaluating historical returns relative to benchmarks. It is also appropriate to consider a variety of performance measures that incorporate risk and return metrics over various time periods, as well as qualitative considerations.[29]

4.3.2.1 Qualitative factors

Section 4.1 discusses qualitative factors that investment professionals and academics may consider in evaluating investment funds. With respect to TDFs specifically, qualitative factors may also include the particular TDF manager's experience

in managing TDFs, other multi-asset class portfolios, and/or other funds-of-funds; the experience and quality of the underlying fund managers; the reputation of the TDF manager; the credibility of the TDF manager's glide path philosophy (including the TDF manager's philosophy of participant savings behavior and how that behavior may change over time, views on longevity risk, risk aversion, market expectations, etc.); and the choice of asset classes to achieve diversification goals. As with all investment fund evaluations, assessing difficult-to-measure qualitative factors often involves sophisticated judgment.

4.3.2.2 Quantitative factors

Plan fiduciaries, consultants, and industry analysts often compare the historical returns of investment funds, including TDFs, relative to benchmark indices and peer groups. As we discuss above, the meaningfulness of the information provided by such comparisons is determined in part by the extent to which the risk and expected return profile of the benchmark index or peer funds are similar to the investment objectives of the funds being evaluated.[30] As we discuss below, the dynamic asset allocation of TDFs and the heterogeneity across TDFs complicate the identification of appropriate benchmark indices and peer groups for evaluating TDFs, and it is important to select benchmark indices and/or peer groups that appropriately represent relevant TDF characteristics, such as glide path structure and investment objectives.

4.3.2.2.1. The use of benchmark indices

In the context of a TDF suite, comparisons of performance to benchmark indices involve a suite of benchmark indices that consist of a different vintage index for each TDF vintage. As discussed in the paragraphs that follow, while there exist off-the-shelf TDF indices, the use of custom benchmark indices is also common. Off-the-shelf TDF indices include the S&P Target Date Indices (which include the S&P Target Date Indices, S&P Target Date Through Indices, and S&P Target Date To Indices), Morningstar Lifetime Allocation Indices, and the Dow Jones Target Date Indices. Among other things, it is important that the benchmark indices used to evaluate TDFs match the TDFs' intended relative focus on minimizing various risks versus capturing upside returns. Reflecting these differences, Morningstar provides multiple versions of its Lifetime Allocation Indices, each associated with different relative risks (e.g., conservative, moderate, aggressive) "to provide appropriate target date risk tracks based on an individual's risk capacity and risk preference" (Morningstar, 2015).

S&P has distinct indices for to-retirement and through-retirement TDFs, reflecting that TDFs with to-retirement glide paths generally have different investment objectives and risk profiles than TDFs with through-retirement glide paths (as discussed above). Other indices are designed based on a single glide path structure. For example, the Dow Jones and Morningstar target date indices are based on through-retirement glide paths (S&P Dow Jones Indices, 2023; Morningstar, 2015).

Table 5 replicates a 2017 Morningstar study that identified the published primary prospectus benchmarks of mutual fund TDFs. Morningstar reported that its analysis shows "the lack of uniformity in published benchmarks" for TDFs and "the low adoption rate of industry accepted target maturity benchmarks" (Idzorek and Marinescu, 2017). And, many large TDFs, including the Fidelity Freedom Funds, Vanguard Target Retirement Funds, and BlackRock LifePath Index Funds, report comparisons of the funds' returns to a set of custom composite secondary benchmarks

Table 5 Frequency of mutual fund TDFs using primary prospectus benchmarks in 2017.[a]

Primary prospectus benchmark	Percent of TDFs using benchmark
S&P Target Date Indices	39
Morningstar Lifetime Allocation Indices	7
Dow Jones Target Date Indexes	1
Blended Benchmark	19
S&P 500	14
No Listed Primary Benchmark in Morningstar	9
Other[31]	12

[a]Idzorek and Marinescu (2017), p. 2. Amounts do not sum to 100% due to rounding.

in their prospectuses. A benefit of such custom composite indices is that they provide a benchmark return that closely reflects the expected risks associated with the asset allocation of the TDF being studied. Nonetheless, there are some limitations to using custom composite benchmark indices. For example, when the asset allocation of a custom composite index is based on a TDF's asset allocation, a comparison of the TDF's performance relative to the custom composite benchmark will not provide information on how the choice of the asset allocation affected portfolio returns. That is, in this situation, the asset allocation decision must be evaluated separately.

4.3.2.2.2. The use of comparator groups as benchmarks

Groups of "comparator" or "peer" funds are often used to evaluate an investment fund's performance relative to other funds—by ratings firms such as Morningstar or Lipper, as well as by leading investment consultants. While the formation of peer groups can be relatively straightforward for funds that share a common investment objective and strategy that correspond to an easily identifiable characteristic, such as a Lipper Classification or Morningstar Category, for TDFs, Lipper Classifications and Morningstar Categories only differentiate funds by target vintage, and, as a result, these classifications do not control for many important differences that are expected to affect a TDF's performance. These differences include differences in investment objectives, SAAs, glide path structures, the extent to which a TDF uses actively managed or passively managed funds, the use and objectives of TAA, investment fund structure, and more. Thus, TDF peer groups based solely on Lipper Classifications or Morningstar Categories may include substantially disparate funds and not adequately control for factors that affect the fund's risk and expected return profiles.

There is judgment involved in determining the peer group size. The construction of a peer group involves a tradeoff between identifying a sufficient number of comparators such that the results are not driven by idiosyncrasies of a small number of funds versus identifying comparators with sufficiently similar attributes. For some TDFs, there may not be a sufficiently large number of comparators with similar attributes to create peer groups that will provide meaningful information about a TDF manager's ability to achieve its investment objectives.

Although there is no single appropriate approach to identifying appropriate TDF comparators, one may apply screens to attempt to identify a comparison group of TDF suites. For example, to identify peers for a mutual fund TDF that invests primarily in actively managed underlying funds and has a through-retirement glide path, one could restrict the peer groups to matching vintages of other TDF mutual funds with through-retirement glide paths and that invest primarily in actively managed underlying funds. In some situations, it

may be appropriate to apply additional screens to identify a more similar peer group. For example, some plan consultants group TDFs by whether their glide path asset allocations are conservative, moderate, or aggressive.

4.3.3 Do multiple comparisons over multiple periods

For all investment funds, including TDFs, evaluations of historical performance should generally consider multiple measures of returns, risk, and risk-adjusted returns, and such comparisons are generally most informative when performed over multiple time periods, including longer-term periods that potentially cover a full market cycle. The use of multiple periods is generally informative because the relative, as well as absolute, performance of funds changes with time-varying market conditions (see, e.g., Moskowitz, 2000; Kosowski, 2011; Avramov and Wermers, 2006; Banegas *et al.*, 2013), and because the effect of unforeseeable events (such as a stock market "boom" or "bust") on fund returns often overwhelms the effect of fund manager skills on the observed performance over shorter periods that do not span a full market cycle. The focus on longer-term returns is also consistent with the design of TDFs as long-term investments.

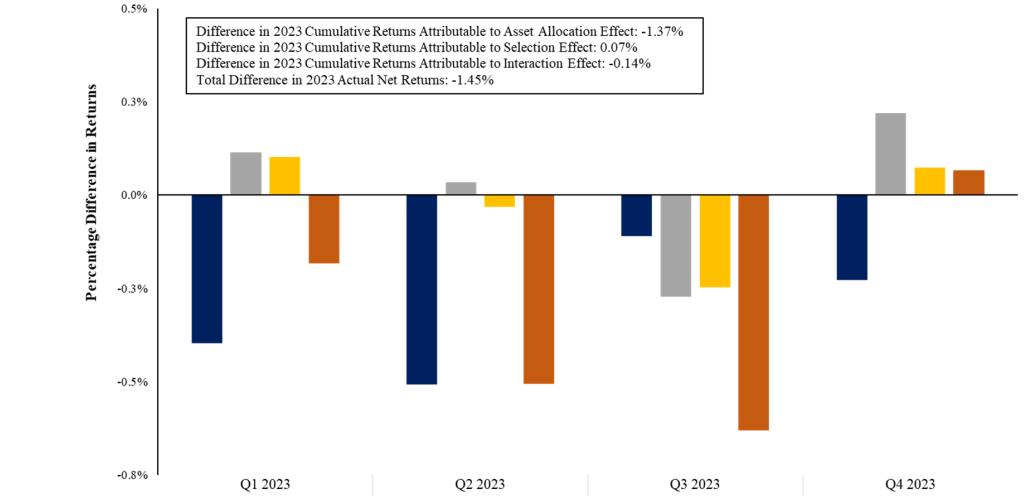
Given the long-term nature of TDFs, which are designed to serve as investors' entire retirement portfolio over their lifetimes, it is particularly important to evaluate TDF performance over longer horizons. While this is clear with a TDF vintage with, for example, a target date 40 years in the future, it is also true for a "shorter-dated" TDF, given that TDF designers generally assume that many plan participants will remain with the vintage long after retirement. In fact, both academic and industry research find that actively managed funds that ultimately outperform their benchmarks often experience a long stretch of underperformance (see, e.g., Tidmore and Hon, 2021; Kowara and Kaplan, 2018).

Many professionals also assess past TDF returns over shorter historical periods. While such periods generally contain limited information on the long-term outlook for a TDF, the information can be useful in assessing whether outcomes are consistent with the articulated strategy of a TDF provider or changes in an investment strategy.

4.3.4 Performance attribution to evaluate the underlying drivers of TDF performance

In many situations, particularly given the lack of perfect benchmarks, it is useful to understand why a TDF's historical returns differed from the returns of a benchmark index or peer group. In such situations, performance attribution analysis can be used to quantify various factors' contributions to a fund's absolute or relative returns.[32] In the case of TDFs, relative performance attribution may be used to quantify how SAA, selection of underlying funds, and TAA (if applicable and data permitting) contributed to the realized difference between a TDF's returns and those of a benchmark index (or of another fund).

For example, Figure 3 shows an example attribution analysis assessing the extent to which asset allocation and the selection of underlying funds explain the differences between the 2023 returns of the 2030 vintages of the BlackRock LifePath Index Funds and Vanguard Target Retirement Funds. Specifically, the analysis disaggregates the quarterly differences between the returns of the BlackRock LifePath Index 2030 Fund and the Vanguard Target Retirement 2030 Fund into (1) the asset allocation effect,[33] (2) the selection effect,[34] and (3) the interaction effect.[35,36] In 2023, the BlackRock LifePath Index 2030 fund's net return was approximately 1.45 percentage points lower than the Vanguard Target Retirement 2030 fund's net return. The attribution



	Q1 2023	Q2 2023	Q3 2023	Q4 2023
Asset Allocation Effect	-0.40%	-0.51%	-0.11%	-0.23%
Selection Effect	0.11%	0.03%	-0.27%	0.22%
Interaction Effect	0.10%	-0.03%	-0.25%	0.07%
Total Return Difference	-0.18%	-0.51%	-0.63%	0.07%

Figure 3 BlackRock LifePath Index 2030 fund attribution analysis relative to the Vanguard Target Retirement 2030 fund. January 2023–December 2023.

Source: Morningstar Direct.

analysis shows that the majority of this return difference resulted from differences in asset allocation (−1.37 percentage points), compared to the selection effect (0.7 percentage points) and interaction effect (−0.14 percentage points).

4.3.5 *Comparison of ex post asset class returns to ex ante expected returns*

At times, to help identify potential drivers of *ex post* TDF performance, it can be useful to use data on industry capital market assumptions to compare *ex ante* expectations of returns in each asset class underlying a particular TDF, compared to *ex post* realized returns. This type of analysis may be useful for understanding the extent to which unexpected events as opposed to manager skill and impacted realized returns. For example, Horizon's annual Survey of Capital Market Assumptions provides information on average 10-year expected returns for various asset classes based on a survey of investment advisors (Horizon Actuarial, n.d.). By comparing these forward-looking expectations of asset class returns to actual realized returns, one can identify which asset classes underlying a TDF deviated from market expectations and unexpectedly impacted *ex post* performance. For example, Horizon's 2014 Survey of Capital Market Assumptions reported an average expected 10-year return for U.S. large cap equity of 7.4 percent per year (Horizon Actuarial, 2014). However, we now know that large cap stocks had higher than expected returns over this period, with the S&P 500 Index realizing compound annual returns of 13.1% over the period from 2015 through 2024. Thus, in hindsight, over this period, TDFs with relatively large allocations to U.S. benefited from the higher than expected returns to this asset class.

5 Conclusion

In this paper, we have described the structure of the TDF industry, with an emphasis on the design and implementation of TDFs, as well as guidance

in evaluating these aspects of TDFs. We recommend that any assessment of a TDF suite should be focused on two broad questions. First, are the strategy and goals of the TDF suite appropriate for the targeted clientele (the end investors)? Such an assessment should consider many aspects that inform about the quality of the TDF's strategies and goals, from the shape of the glide path (the SAA schedule) to the asset allocation schedule embedded in the glide path.

And, second, is the TDF provider capable of implementing these strategies and goals? This second assessment should include an analysis of the research capabilities of the investment advisor, the strategic allocations to sub-asset classes throughout the glide path, the use of TAA, the experience of TDF managers, the choice of a to- versus through-retirement glide path, and the use of active versus passive management by the underlying investment managers. Clearly, the evaluation of TDFs is complex and must be conducted with a large toolkit of scientific approaches.

[1] This amount is limited to mutual funds and CITs. As such, the amount understates total TDF assets. For example, this amount excludes the L Funds which were created for the Thrift Savings Plan, which, as of December 31, 2023, totaled $205.3 billion in assets. (Thrift Savings Plan, 2024).

[2] The investment industry often refers to a single TDF investment offered within a given TDF solution—e.g., the Fidelity Freedom 2055 Fund (FDEEX), which is aimed at an individual who will turn age 65 during or near the year 2055—as a "vintage," and the entire bundle of TDF investments across different retirement ages, e.g., the Fidelity Freedom Funds, as a "suite." In this paper, we often use the term "TDF" to refer to an entire TDF suite (i.e., all vintages in that particular TDF suite).

[3] TDFs are an investment solution that draws heavily on the research on SAA (e.g., Campbell and Viceira, 2002).

[4] While the marketplace often refers to competing TDFs with similar characteristics as "peers," the large amount of heterogeneity among TDFs—even among any pair of TDFs—generally renders the concept of peers imprecise. Here, we refer to "comparators" for TDFs with similar characteristics; nevertheless, we sometimes use the term "peers" or "peer groups" in this paper to conform to industry terminology while recognizing the limitations of the usage of those terms.

[5] Mitchell and Utkus (2021) estimate that adopting low-cost TDFs may raise expected retirement wealth by 50% over a 30-year saving horizon.

[6] These findings are related to the literature on individuals' behavioral biases towards "naïve diversification," or "the *1/n* rule," in which individuals tend to simply divide their contributions evenly among all *n* options available in their retirement savings plan menu (see, e.g., Benartzi and Thaler, 2001, 2007); as well as how setting better selections as defaults can move participants away from suboptimal decisions (see, e.g., Thaler and Benartzi, 2004; Thaler and Sunstein, 2008). These papers provided some of the groundwork for the passage of the Pension Protection Act of 2006 that increased automatic enrollment into employer-sponsored DC plans, and promoted the inclusion of TDFs as QDIAs (U.S. Department of Labor, 2006).

[7] As we will discuss later in this paper, this terminal asset allocation can occur either at the target retirement date or years after that date—depending on the glide path design.

[8] Hedging inflation risk carries increased importance as one approaches retirement—since the potential for wages to compensate for inflation is diminished.

[9] Some DC plans offer customized multi-manager TDFs that allow plans to customize their glide path and to use different managers for different investment strategies. Customized TDFs are often offered under a "white label," under which the fund is given a generic name (e.g., "Lifecycle 2030 Fund"). Morningstar Direct data and the statistics reported in this paper do not include information on such customized TDFs.

[10] The PPA was signed into law in 2006 and "directed the Department of Labor to issue a regulation to assist employers in selecting default investments. . . . The Department [of Labor] issued a proposed regulation on September 27, 2006," and "the Department's Employee Benefits Security Administration promulgated the final regulation on October 24, 2007." The final rule went into effect on December 24, 2007 (see U.S. Department of Labor, 2007, 2008).

[11] Research conducted by the U.S. Department of Labor before the passage of the PPA suggested that approximately one-third of workers did not "participate in their employers' 401(k)-type plans" and that automatic enrollment plans "could reduce this rate to less than 10%" and significantly increase retirement savings (see U.S. Department of Labor, 2008).

[12] Investors, including those in DC retirement plans, widely vary with respect to their investment objectives and risk preferences (see, e.g., Bucciol and Miniaci, 2011). For example, some investors may focus primarily on wealth accumulation, while others may be most concerned with avoiding large losses in their retirement accounts. Given this large variation in investor preferences, it is not surprising that fund managers have created TDFs with a range of expected returns and risks through their varying glide path shapes and choices of asset allocation and other characteristics. Differences in capital market assumptions and strategy choices also contribute to this heterogeneity.

[13] Risk here refers to market risk. It is important to note that higher allocations to bonds may increase other types of risk, such as inflation risk, interest rate risk, or longevity risk.

[14] Another important behavioral risk is "abandonment risk," which is the risk that an investor will leave a TDF (or stop contributing to it) upon the realization of an especially poor period of returns.

[15] Based on data from Figure 1, as reported by Morningstar Direct as of August 2024, approximately 65% of all mutual funds have through-retirement glide paths, while the other 35% have to-retirement glide paths (Morningstar Direct).

[16] Some academic studies in the literature propose that increasing risk exposure during retirement is suitable for some populations (see, e.g., Pfau and Kitces, 2014, p. 1). We are not aware of any TDFs with glide paths that increase risk after retirement.

[17] Including real estate and commodities in TDFs provides additional diversification across asset classes, and this additional diversification can allow TDFs to limit risk across a variety of market conditions while maintaining exposure to investments with higher expected returns (Drew *et al.*, 2015; Antonelli, 2018).

[18] The Black–Litterman Model is an example of an approach that generates "market views" used in designing a SAA scheme (see Black and Litterman, 1991, 1992).

[19] For example, a manager might penalize potential glide paths that fall substantially short of providing sufficient income during retirement and/or consider the effects of potential risks that could arise over the long-term, such as another global financial crisis. The manager may also consider potential changes in investor behavior, for example, a change in the proportion of investors who exit the TDF at the target date or sometime thereafter. These and many other design considerations are important elements in a manager's glide path design process.

[20] Some investors (especially DC plan sponsors) may wish to create a custom TDF that is not tied to using preexisting TDF funds and their glide paths. According to the Callan Institute, as of 2022, among the surveyed plans that used TDFs, 8% used a custom TDF strategy (Callan Institute, 2023). Whether the selected TDF suite is a custom TDF or an "off-the-shelf" TDF suite, the glide path asset allocation decision typically involves factors such as: (i) the appropriate tradeoff between risk and expected return for participants of specific ages, (ii) how the tradeoff between risk and expected returns should vary with age, and (iii) whether a to- versus through-retirement glide path is more appropriate for plan participants.

[21] For example, a 2015 survey conducted by the Callan Institute reports that approximately 59% of TDFs allow "some degree of tactical management in their disclosure documents" (Callan Institute, 2015). Similarly, according to Morningstar, as of 2014, 13 of the 22 TDF suites covered "have varying levels of lattitude [sic] to opportunistically change their series' shorter-term asset allocations" (Morningstar, 2014).

[22] To keep the funds consistent with Table 1, the table focuses on the 10 largest TDF providers based on assets invested in TDFs as of December 31, 2023. However, the data on Average Expense Ratio of Lowest Fee Share Class and Percent in Active Underlying Funds are as of 2018, as this is the last date for which Morningstar reported these data.

[23] For example, mutual funds are regulated by the SEC, are subject to SEC disclosure and reporting rules, and are overseen by a board of mutual fund directors. In contrast, CITs are regulated by the Office of the Comptroller of the Currency (OCC) or state banking agencies and do not have to comply with SEC filing requirements, including the requirement to file prospectuses, proxy statements, and statements of information, and are

not required to report to a board of directors. These differences in regulatory structures are often cited as a reason that CITs often have lower fees than mutual funds. In addition, CITs are offered only to certain qualified retirement plans, whereas mutual funds are available to most retirement plans as well as the general public. CITs also may offer more flexibility in pricing, allowing for the potential of plan-specific custom pricing (Keim, 2021, pp. 1–2; Putnam Investments, 2023, p. 1; State Street Global Advisors, 2023, pp. 1–4). As another example, SEC regulations prevent mutual funds from lending more than 33.33% of a fund's total assets (specifically, Section 18(f)(1) of the Investment Company Act of 1940), whereas CITs have more flexibility with respect to securities lending (see, e.g., Winkler and Hagen, 2023). The extent to which a TDF engages in securities lending may impact fund returns and an evaluation of performance.

[24] While the goal of SAA and TAA is to forecast future returns using market conditions and forecasted conditions, such forecasts have a large amount of uncertainty embedded in them. An example can be drawn from the Black–Litterman Model, where investors create "market views"—which have expected returns, standard deviation of returns, and correlations of returns specified with uncertainty. This uncertainty recognizes that randomness has a huge effect on the returns of even well-designed investment strategies.

[25] *See* Fischer and Wermers (2012) for an extensive discussion of performance assessment and attribution analysis.

[26] The importance of qualitative fund characteristics is demonstrated by the focus that independent third-party investment research companies, as well as large plan consultants, place on such attributes (see, e.g., Pensions and Investments Research Center Database, 2023; Mercer FundWatch, 2021; Peyton, 2018; Morningstar, n.d.; Willis Towers Watson, n.d.; Aon, n.d.; RVK, n.d.).

[27] TDF suites consist of multiple funds (vintages), each of which has its own returns stream to be analyzed, and our discussion of benchmark indices and peer groups in this section generally refers to sets of benchmark indices and sets of peer groups that correspond to each vintage.

[28] For example, as of December 2023, the John Hancock 2060 Lifetime Blend fund's equity allocation was approximately 93%, while the PGIM Target Date 2060 fund's equity allocation was approximately 88% (a difference of 5 percentage points). In contrast, as of the same year, the John Hancock 2030 Lifetime Blend fund's equity allocation was approximately 63%, while the PGIM Target Date 2030 fund's equity allocation was approximately 48% (a difference of 15 percentage points).

[29] Importantly, return underperformance of a TDF suite, relative to its benchmark or the median of its comparators, is not necessarily indicative of poor quality—if it is the result of a well-reasoned strategy that, *ex ante*, provided an attractive risk-expected return outcome. In fact, this is a chief reason why quantitative metrics should not be used in isolation to judge TDF quality.

[30] In some situations, the choice of benchmark indices is limited to broad-based market indices, and such comparisons often provide little information about how a TDF performed relative to its investment objective. For example, the SEC requires the mutual fund prospectuses, annual reports, and semi-annual reports to compare a fund's 10-year performance to a broad-based securities market index (see, e.g., Item 27A(d)(2)(ii) of Form N-1A in United States Securities and Exchange Commission, n.d.). While mutual fund prospectuses and annual reports are required to include a primary benchmark that is a broad-based securities market index, mutual funds may also include a secondary benchmark index that is "more narrowly based. . . that reflect[s] the market sectors in which the Fund invests." (Instruction (7) to Item 27A(d)(2)(iii) in United States Securities and Exchange Commission, n.d.). Similarly, the Department of Labor requires participants in ERISA governed DC plans to receive comparisons of historical investment performance relative to a broad-based securities market index benchmark. (U.S. Department of Labor, 2010). More recently, the passage of the SECURE 2.0 Act in December 2022 requires that the Department of Labor issue regulations within two years after the enactment of the SECURE 2.0 Act providing that "the administrator of a plan may...use a benchmark that is a blend of different broad-based securities market indices. . ." for default asset allocation funds like TDFs (U.S. Department of Labor, 2023, p. 54513).

[31] Other primary prospectus benchmarks included BarCap US Aggregate Bond, Russell 1000, MSCI AC World, MSCI US Broad Market, S&P Global BMI, BBgBarc US Universal TR USD, and Russell 3000.

[32] As discussed above, factor models of returns can also be used to evaluate expected investment returns. To illustrate, we have applied the Fama and French five-factor

model (Rm-Rf, Small Minus Big, High Minus Low Book-to-Market, Term Spread, and Default Spread factors) to the monthly returns of the 2025 vintages of the 41 mutual fund TDF suites for which data were available over the period from 2019 through 2023 (Fama and French, 1993). Our results (untabulated) show that, while none of the TDFs had statistically significant alphas, coefficient estimates vary widely across the funds. This variation is consistent with the TDFs having different risk profiles, and reinforces our above discussion that emphasizes that simple quantitative comparisons across different TDF suites—including the application of multi-factor models—are of limited value in assessing *ex-ante* quality.

[33] In this example, the asset allocation effect is calculated as the returns of a hypothetical portfolio that had the same asset class weights as the BlackRock LifePath Index 2030 fund but that invested in the underlying funds of the Vanguard Target Retirement 2030 fund ("Reweighted Vanguard 2030 Portfolio") minus the returns of the Vanguard Target Retirement 2030 fund. The BlackRock LifePath Index 2030 fund had underlying real estate, TIPs, and cash funds, but the Vanguard Target Retirement 2030 fund did not. For these three asset classes (real estate, TIPS, and cash funds), BlackRock's underlying fund benchmarks were used (FTSE EPRA Nareit Developed TR, ICE US Treasury Inflation Linked TR, and Morningstar USD 1M Cash TR, respectively).

[34] In this example, the selection effect is calculated as the returns of a hypothetical portfolio that had the same asset class weights as the Vanguard Target Retirement 2030 fund but that invested in the underlying funds of the BlackRock LifePath Index 2030 fund ("Reweighted BlackRock LifePath Index 2030 Portfolio") minus the returns of the Vanguard Target Retirement 2030 fund. The Vanguard Target Retirement 2030 fund had an underlying international fixed income fund, but the BlackRock LifePath Index 2030 fund did not. For this asset class, Vanguard's underlying fund benchmark was used (Bloomberg Gbl Agg xUSD Fl Aj RIC TR HUSD).

[35] In this example, the interaction effect is calculated as (BlackRock LifePath Index 2030 fund return + Vanguard Target Retirement 2030 fund return) – (Reweighted Vanguard 2030 Portfolio return + Reweighted BlackRock 2030 Portfolio return).

[36] This analysis is based on the TDF's respective SAA. As such, this analysis does not include any TAA effects.

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