

Vanguard Target Retirement Funds and Trusts

Quarterly Review | June 30, 2023



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Quarterly Perspective

International bonds continue to deliver

Brian M. Miller, CFA
Senior Investment
Specialist



In our conversations with clients, there is one asset class that tends to receive the greatest amount of skepticism: international bonds. We find that this asset class is often misunderstood and underutilized in investor portfolios despite representing the largest component of the global bond market.

Within our Target Retirement Funds, we view international bonds primarily as a portfolio diversifier, allowing us to reduce portfolio risk relative to a U.S.-only bond allocation. But this asset class has recently been beneficial from a returns perspective as well. For example, international bonds returned –12.72% in 2022 compared to –13.07% for U.S. investment-grade bonds. Year to date, international bonds continue to outperform U.S. investment-grade bonds, returning 3.56% versus 2.12%.*

As we highlighted in a recent Quarterly Spotlight article, “[\(Re\)validating the Case for International Bonds](#),” Vanguard upholds its belief that maintaining a meaningful allocation to international bonds can be beneficial for target-date fund (TDF) investors. We initially added international bonds to the Target Retirement Funds sub-asset allocation in 2013 and further increased exposure in 2015. Since then, our

updated research has continued to reaffirm our allocation to the asset class.

Nobel-Prize-winning economist Harry Markowitz called diversification “the only free lunch in finance.” There is general agreement throughout the investment industry that broad diversification—across asset classes, geographies, and sectors—is a key determinant of long-term investment success. For this reason, investors have traditionally included international equities in their portfolios. Yet, despite the additional diversification benefits, we find that international bonds are still often excluded. We believe that the “free lunch” of diversification should extend to international bonds as well.

While misunderstood, international bonds continue to show why they deserve a place in a well-designed TDF asset allocation.

*U.S. bonds are represented by the Bloomberg Barclays U.S. Aggregate Bond Index. International bonds are represented by the Bloomberg Barclays Global Aggregate ex-USD Index. Past performance is no guarantee of future returns. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

Performance of key Vanguard index funds

Fund name (inception date)	3Q 2022	4Q 2022	1Q 2023	2Q 2023	1-year
Vanguard Total Bond Market Index Fund (09/18/1995)	–4.65	1.67	3.16	–0.90	–0.89
Vanguard Total International Bond Index Fund (05/31/2013)	–3.28	–0.02	3.54	0.18	0.31
Vanguard Total Stock Market Index Fund (07/07/1997)	–4.46	7.16	7.15	8.42	18.94
Vanguard Total International Stock Index Fund (11/29/2010)	–10.52	14.72	6.65	2.61	12.33
Vanguard Short-Term Inflation-Protected Securities Index Fund (10/17/2012)	–2.64	1.27	2.28	–0.69	0.14

Source of performance figures: Vanguard, Institutional share class, as of June 30, 2023.

The performance data shown represent past performance, which is not a guarantee of future results. Investment returns and principal value will fluctuate, so investors' shares, when sold, may be worth more or less than their original cost. Current performance may be lower or higher than the performance data cited. For performance data current to the most recent month-end, visit our website at www.institutional.vanguard.com. Standard performance of the funds can be located on page 31 of the Quarterly Review.



Meaningful vs. marketing

Assessing changes in glide-path design

As target-date funds (TDFs) continue to grow and become a critical component of the retirement saving landscape, the need for a systematic, empirical approach to building, revalidating, and evolving glide paths is vital.

We continually see providers make marginal changes to their TDF series glide path or sub-asset allocation that may seem innovative and impactful on the surface, but we find that the actual impact of these changes on investors' retirement outcomes is often negligible at best. Many of these changes represent creative marketing but are not necessarily meaningful with respect to achieving long-term retirement success.

Any change Vanguard makes to its glide path represents our belief in that change having a consistent, positive impact on investor outcomes. In this article, we outline how we assess potential changes to our glide path and sub-asset allocation to separate what's meaningful from what's simply marketing.



How we define success for a TDF

Before diving in, though, it is important to understand the intent and objective of a TDF as well as the typical end investor.

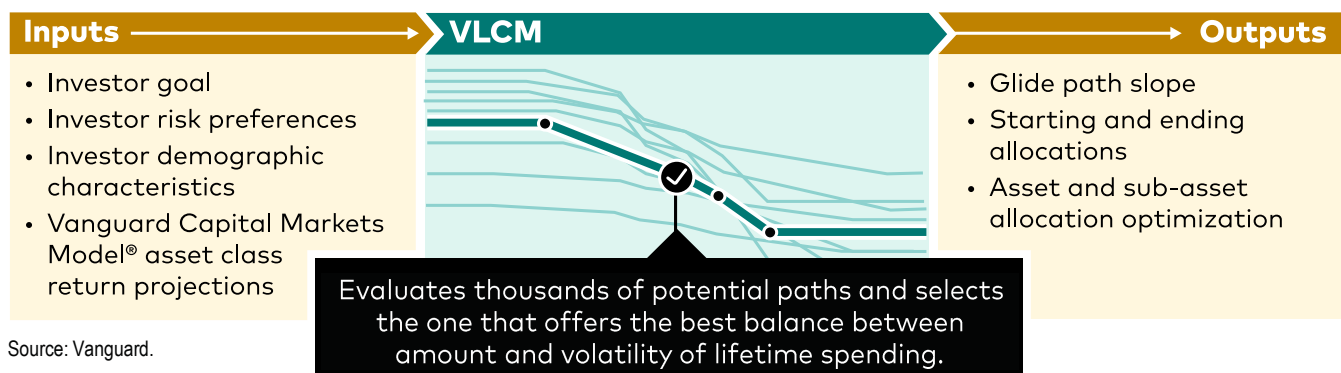
TDFs are designed to help address a particular challenge facing many retirement investors: constructing a professionally built portfolio that has an appropriate mix of higher- and lower-risk assets given the investor's time horizon, retirement goals, and other considerations. We select the optimal glide path by assessing the trade-offs between the expected lifetime spending that a glide path will fund and the uncertainty of market risk toward that spending. **Simply put, the goal of a TDF is to give investors the best chance of building up enough wealth during their working years so that they have the income needed to maintain their lifestyle in retirement.**

Additionally, we believe it is critical to understand the characteristics and behaviors of the typical end investor. In the case of a TDF, the end investor is usually someone who has been defaulted into an investment plan or who has a default mindset. These two inputs function as a starting point that allows us to evaluate potential changes to the Vanguard glide path.

Assessing impact on investor outcomes: Quantitative and qualitative perspectives

With the objective and typical end investor of a TDF in mind, we then move to examining potential changes through both quantitative and qualitative lenses. The quantitative metrics allow us to better determine whether a change to the glide path provides meaningful improvements to investor outcomes and consistent net-of-fees value. The qualitative metrics let us go a step further and consider the characteristics and preferences of the end investor.

FIGURE 1.
The Vanguard Life-Cycle Investing Model (VLCM) framework



Source: Vanguard.

Questions to consider for a glide-path change:

1. What is the impact on long-term investment outcomes?
2. Does it add consistent value net of fees, and what is the measure of value?
3. Is the position sized appropriately to have a meaningful impact?
4. Will investors understand the change?

Looking first through a quantitative lens, the Vanguard Life-Cycle Investing Model (VLCM) provides a robust framework for assessing any potential changes or additions to the glide path. The VLCM generates two goals-based metrics—certainty fee equivalent (CFE) and probability of success—which together provide relative and client-centric benchmarks. Figure 1 shows how the use of the VLCM enables cost-benefit analysis of glide-path customization by inputting an investor's specific characteristics and retirement goals to evaluate and choose the optimal glide path for that investor.

Using VLCM calculations, we quantify the benefits of an optimized glide path through the CFE or “equivalence payment.” This is the annual fee (in basis points) that an investor is willing to pay relative to one glide path over another. The higher the equivalence fee, the greater the benefit of striking the right risk-return balance that aligns with the investor's goal. We use this metric to provide an additional frame of comparison between our TDFs and other potential glide-path options.



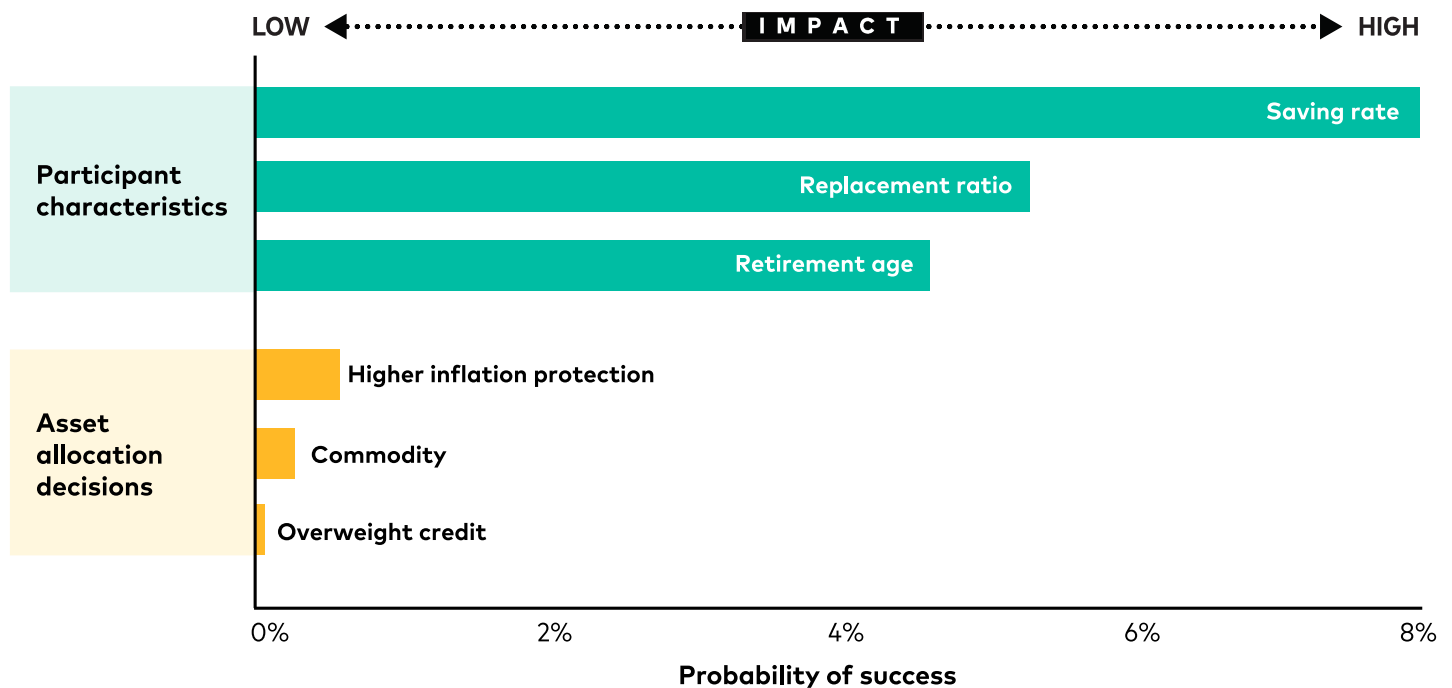
Next, we calculate a distribution of outcomes related to the projected wealth and spending of an investor by modeling returns under different market scenarios. We also layer expectations regarding the investor’s earnings and replacement ratio to determine their retirement spending expectations. We use this information to calculate the probability of success, which is the likelihood that the TDF will match or exceed the investor’s expected spending goals in retirement. We also use the VLCM framework to assess the impact on probability of success of certain investor characteristics relative to sub-asset-class decisions.

Overall, as Figure 2 shows, sub-asset allocation changes, such as adding commodities or increasing credit exposure, tend to have a much lower impact on the probability of success than changes in participant characteristics, such as increasing the saving rate, lowering the replacement ratio (spending less), or delaying retirement.

Ultimately, we are looking for changes that exhibit a high CFE benefit (which we define as >10 bps) and a meaningful improvement to the probability of success relative to the existing glide path and underlying sub-asset allocation.

Two additional factors play a role in our quantitative assessment of a change: the expected size of the position and the implementation costs associated with making and managing the change over time. Oftentimes, we see asset classes or portfolio tilts included in a TDF that are too small to make any meaningful impact on long-term results. If the change is truly impactful, it should be sized accordingly. Additionally, by including real-world projected implementation costs, we can better assess how these costs might erode the projected value that we see in our modeled simulations.

FIGURE 2. The impact of select changes on probability of success



Notes: The chart shows the impact of each population characteristic changing from low (25th percentile of broad population data) to medium (50th percentile). Vanguard Capital Markets Model® simulations are as of December 2019.

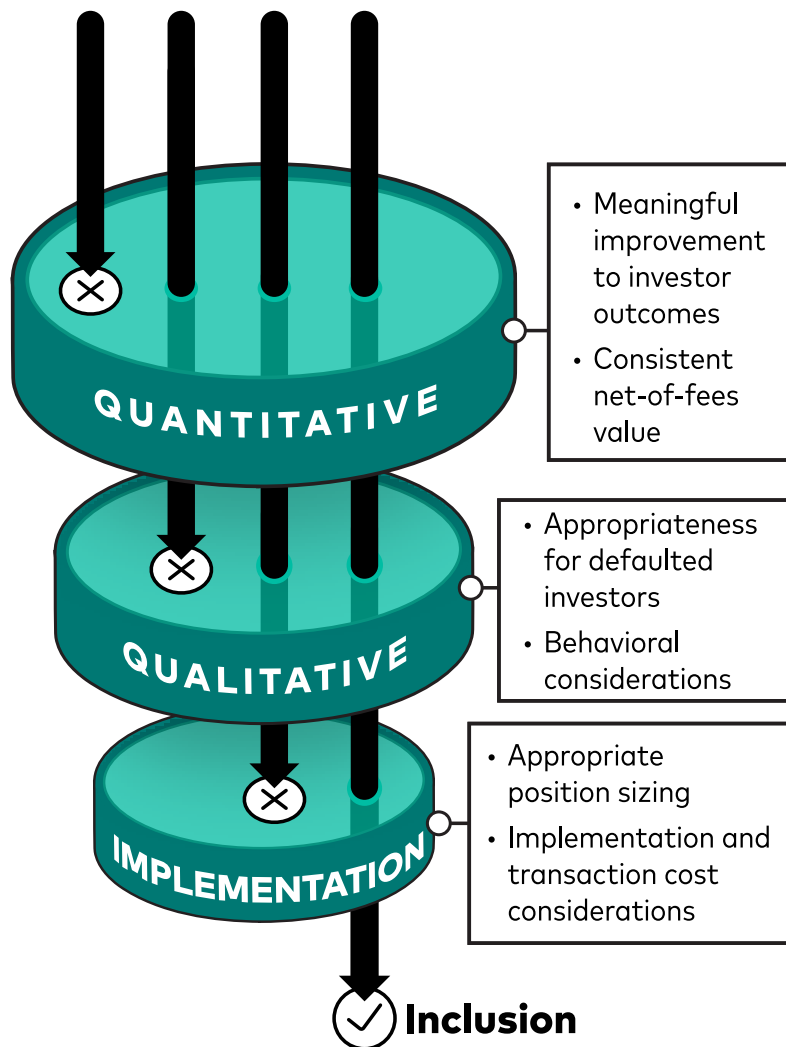
IMPORTANT: The projections and other information generated by the VCMM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from VCMM are derived from 10,000 simulations for each modeled asset class. Results from the model may vary with each use and over time. For more information, please see the important information section.

Source: Vanguard.



FIGURE 3.

A high bar for change: Considerations for asset allocation adjustments



Lastly, we also assess the qualitative impact of changes or additions to the glide path. This is to ensure that each change meets the criteria that Vanguard believes are crucial in evaluating investments for use in TDFs—especially for TDFs that are part of a qualified default investment alternative (QDIA). These considerations include the potential for increased complexity, lack of transparency, and reduced liquidity.

Meaningful changes for improved outcomes

At Vanguard, we aim to take a thoughtful, measured approach to any changes we make to our TDF glide path. Since the series inception in 2003, we have adjusted our glide path and sub-asset allocation only five times. This is not due to a lack of research. In fact, it is quite the opposite, as we have analyzed virtually every asset class and exposure over the years. Instead, it is a recognition that TDFs, given their typical use as a QDIA, simply require a high bar for change. This is why we rely on multiple metrics that are qualitative, quantitative, and practical to ensure that any changes we make are meaningful and provide actual long-term value for our investors.



About the SAAC

The Vanguard Strategic Asset Allocation Committee (SAAC) is a multiasset oversight committee composed of global investment leaders from across the firm.

The members of the SAAC are responsible for the investment methodology behind our single-fund solutions, including Vanguard LifeStrategy® Funds, Target Retirement Funds, 529 plans, and model portfolios.

The SAAC meets regularly to review its investment methodology, debate investment strategies, and coordinate any changes with Vanguard Advice Policy Committee, thereby ensuring a consistent approach in our single-fund solutions and advice offers.



From left to right:

Greg Davis, CFA, Global Chief Investment Officer

Joseph Davis, Ph.D., Global Chief Economist and Global Head of Investment Strategy Group (Committee Chair)

Roger Aliaga-Diaz, Ph.D., Chief Economist, Americas, Head of Portfolio Construction (Committee Vice-chair)

Matthew Brancato, CFA, CPA, Head of Institutional Investor Services



Dan Reyes, CFA, Head of Portfolio Review Department

Joel Dickson, Ph.D., Head of Enterprise Advice Methodology

Ryan Ludt, European Regional Head of Investment Management Group

Kaitlyn Caughlin, CFA, CFP®, Global Head of IMG Risk Management



Duncan Burns, Head of Investments, Asia-Pacific, and of Investment Strategy Group, Asia-Pacific

Qian Wang, Ph.D., Chief Economist, Asia-Pacific, Investment Strategy Group

Brian Wimmer, Head of Multi-Asset Solutions (nonvoting member)

Ian Kresnak, CFA, Chief of Staff for SAAC, Investment Strategy Group (nonvoting member)

Additional perspectives from the SAAC

A primary responsibility of the SAAC is to oversee the policy allocation of Vanguard's suite of multiasset portfolios, including a formal annual review. The SAAC has also been tasked with establishing the investment methodology and portfolio construction approaches that are most appropriate for various objectives. Since its founding in 2013, the SAAC has held research meetings to discuss investment topics, seeking the best outcomes for our clients through constant debate. These meetings, often showcasing the latest research by Vanguard Investment Strategy Group, have centered on a wide range of subjects. A summary of past topics is provided below.

- 2013**
 - Hedging currency exposure in a multiasset portfolio
 - Role of commodity futures
 - Minimum-volatility equity strategies
- 2014**
 - Equity home bias by country
 - Glide-path construction methodology
 - Inflation protection
- 2015**
 - Approaches to retirement income
 - Factors and strategic asset allocation
 - Fixed income glide-path allocations
- 2016**
 - Time-varying risk premia and asset allocation
 - Expansion of the Vanguard Capital Markets Model®
 - Inflation-hedging strategies over multiyear horizons
- 2017**
 - Long-run equilibrium risk-free rates and the equity risk premia
 - Diversified versus concentrated active equity portfolios
 - Global methodology for non-market-cap-weighted ETF model portfolios
- 2018**
 - Role of private real estate in portfolios
 - Vanguard Life-Cycle Model (VLCM) and glide-path outcomes
 - Inflation protection in a 529 college savings plan
- 2019**
 - Vanguard Asset Allocation Model (VAAM) and optimal allocations to active and passive strategies
 - VAAM-based investment methodology for ETF-model portfolios
 - Return-targeting and time-varying asset allocation
- 2020**
 - VLCM-derived glide paths for 529 college savings plans
 - Role of private equity in multiasset portfolios
- 2021**
 - A systematic framework for validating TDF glide paths
- 2022**
 - *Vanguard's Approach to Target Date Funds*
 - *Revalidating the Case for International Bonds*
- 2023**
 - Coming soon: Hybrid Target Date funds

Source: Vanguard.



TDF industry and market overview

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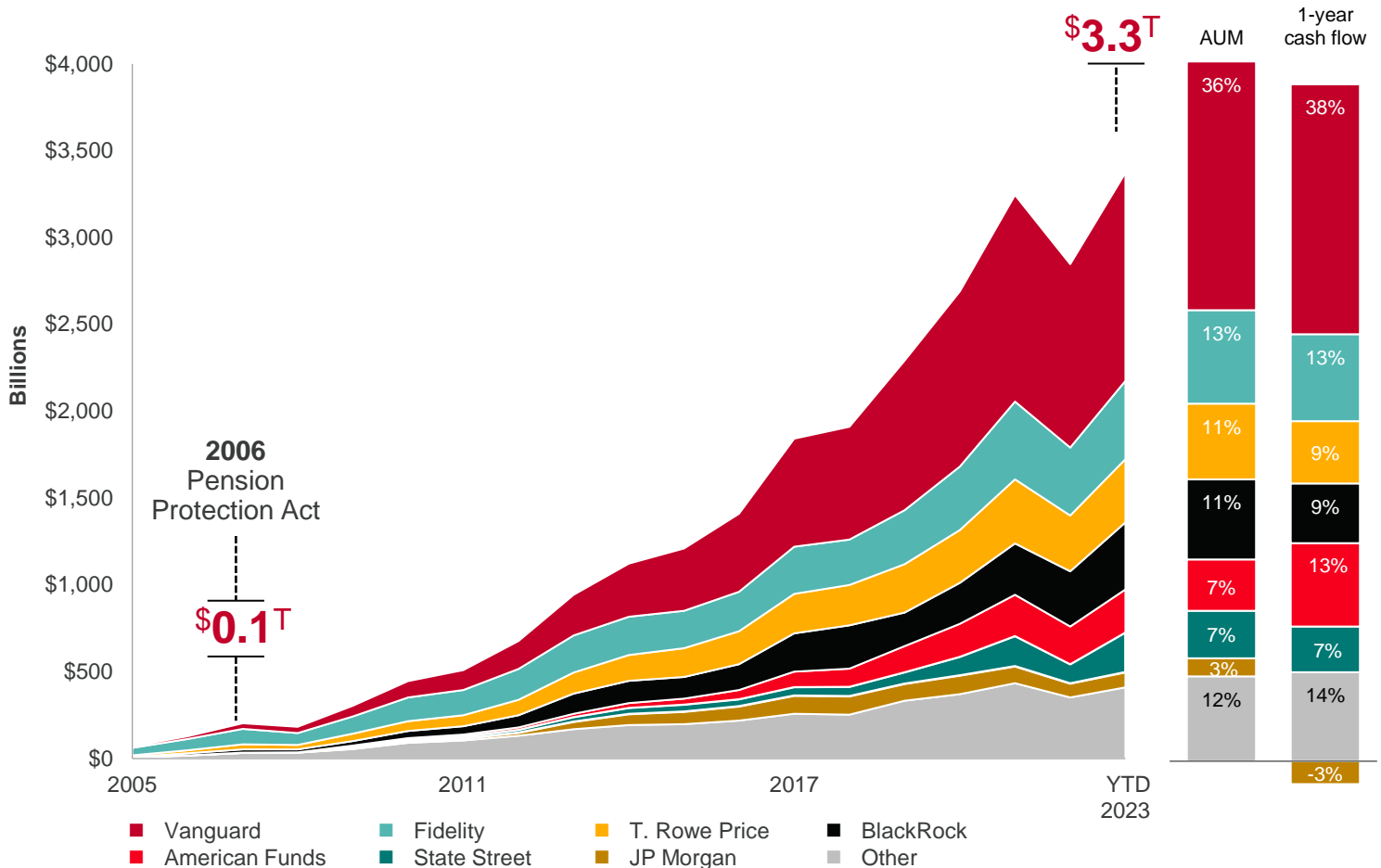
Industry growth and market share

Market environment



Industry growth and market share

Figure 10.1 Growth of target-date fund industry assets and market share



According to data from Morningstar combined with Vanguard’s funds and trusts data, TDF industry assets exceeded \$3.37 trillion as of the end of Q2 2023. Vanguard continued to lead the industry in cash flow and assets under management, receiving more than one-third of every dollar invested in a TDF.

The industry’s top providers, Vanguard, Fidelity, BlackRock, T. Rowe Price, JPMorgan, American Funds, and State Street, hold a cumulative 88% share of all industry assets, or more than \$2.96 trillion, as of June 30, 2023.

We estimate that as of the end of June, the target-date fund industry experienced a 5.0% organic growth rate over the last 12 months.*

Sources: Vanguard, Morningstar, as of June 30, 2023. Industry estimates are based on mutual fund and CIT data reported in Morningstar. CIT data is self-reported and is updated in Morningstar as it is received. Public company data also used prior to 2020.

* Organic growth measured as current period’s net new flows divided by prior period’s ending assets.



Market environment

Figure 11.1 Index returns ranked by performance

2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	3Q 2022	4Q 2022	1Q 2023	2Q 2023
CRSP 33.6	REIT 30.4	REIT 2.5	HYB 17.1	FTSE 27.4	IAGG 3.2	CRSP 30.8	CRSP 21.0	CRSP 25.7	COM 16.1	CASH 0.3	FTSE 14.1	CRSP 7.2	CRSP 8.4
FTSE 15.6	CRSP 12.6	IAGG 1.3	CRSP 12.7	CRSP 21.2	CASH 1.9	REIT 25.8	FTSE 11.2	REIT 43.1	CASH 1.5	STPS -1.2	EMB 8.0	FTSE 6.4	REIT 2.7
HYB 7.4	IAGG 9.1	EMB 1.3	COM 11.4	EMB 9.2	STPS 0.6	FTSE 21.8	AGG 7.5	COM 27.1	STPS -2.7	AGG -2.0	CRSP 7.2	HYB 3.6	FTSE 2.5
REIT 2.5	EMB 7.1	AGG 0.5	EMB 9.2	HYB 7.5	AGG 0.0	HYB 14.3	HYB 7.1	FTSE 8.8	HYB -11.2	IAGG -2.1	REIT 5.2	IAGG 3.2	HYB 1.8
IAGG 1.3	AGG 6.0	CRSP 0.4	REIT 8.6	REIT 5.1	HYB -2.1	EMB 14.1	EMB 5.6	STPS 5.3	IAGG -12.7	HYB -3.5	HYB 4.2	AGG 3.0	EMB 1.4
CASH 0.1	HYB 2.5	CASH 0.0	IAGG 4.9	AGG 3.5	EMB -3.9	AGG 8.7	STPS 5.1	HYB 5.3	AGG -13.0	EMB -4.1	COM 2.2	REIT 2.7	CASH 1.3
STPS -1.6	CASH 0.0	STPS 0.0	FTSE 4.7	IAGG 2.6	REIT -4.6	IAGG 8.1	IAGG 4.7	CASH 0.1	FTSE -16.1	CRSP -4.4	AGG 1.9	STPS 2.2	IAGG 0.4
AGG -2.0	STPS -1.1	FTSE -4.3	STPS 2.8	STPS 0.9	CRSP -5.2	COM 5.4	CASH 0.6	AGG -1.5	EMB -17.1	REIT -5.1	STPS 1.3	EMB 2.1	STPS -0.7
EMB -6.3	FTSE -3.4	HYB -4.5	AGG 2.6	CASH 0.8	COM -13.0	STPS 4.9	COM -3.5	EMB -1.8	CRSP -19.5	COM -6.9	CASH 0.9	CASH 1.1	AGG -0.8
COM -9.5	COM -17.0	COM -24.7	CASH 0.3	COM 0.7	FTSE -14.6	CASH 2.3	REIT -7.6	IAGG -2.1	REIT -24.5	FTSE -8.4	IAGG 0.1	COM -5.4	COM -2.6

Index returns	Average annualized returns						
	3 months	1 year	3 years	5 years	10 years		
Target Retirement Fund building blocks	CRSP	CRSP U.S. Total Market Index	8.41	18.94	13.77	11.31	12.29
	FTSE	FTSE Global All Cap ex U.S. Index	2.53	12.51	7.61	3.66	5.09
	AGG	Bloomberg U.S. Aggregate Bond Index	-0.84	-0.94	-3.96	0.77	1.52
	IAGG	Bloomberg Global Agg ex U.S. Float Adj RIC Cap Index (Hedged)	0.37	0.45	-3.31	0.38	2.24
	STPS	Bloomberg U.S. 0-5 Year TIPS Index	-0.68	0.11	2.34	2.73	1.72
Other indexes	CASH	3-Month T-Bill	1.25	3.75	1.32	1.56	0.97
	HYB	Bloomberg U.S. Corporate High Yield Index	1.75	9.06	3.13	3.36	4.43
	EMB	Bloomberg USD Emerging Market Gov RIC Cap Index	1.43	7.09	-2.94	0.66	2.58
	REIT	MSCI U.S. REIT Index	2.66	-0.09	8.88	4.55	6.39
	COM	Bloomberg Commodity Index	-2.56	-9.61	17.82	4.73	-0.99

Past performance is no guarantee of future returns. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

Sources: Vanguard, Bloomberg Live, and Morningstar, as of June 30, 2023.

Note: Beginning 3Q 2021, the benchmark shown for the EMB category changed from Bloomberg Emerging Markets Sovereign Index USD to Bloomberg USD Emerging Market Gov RIC Cap Index.



Vanguard fund construction and performance

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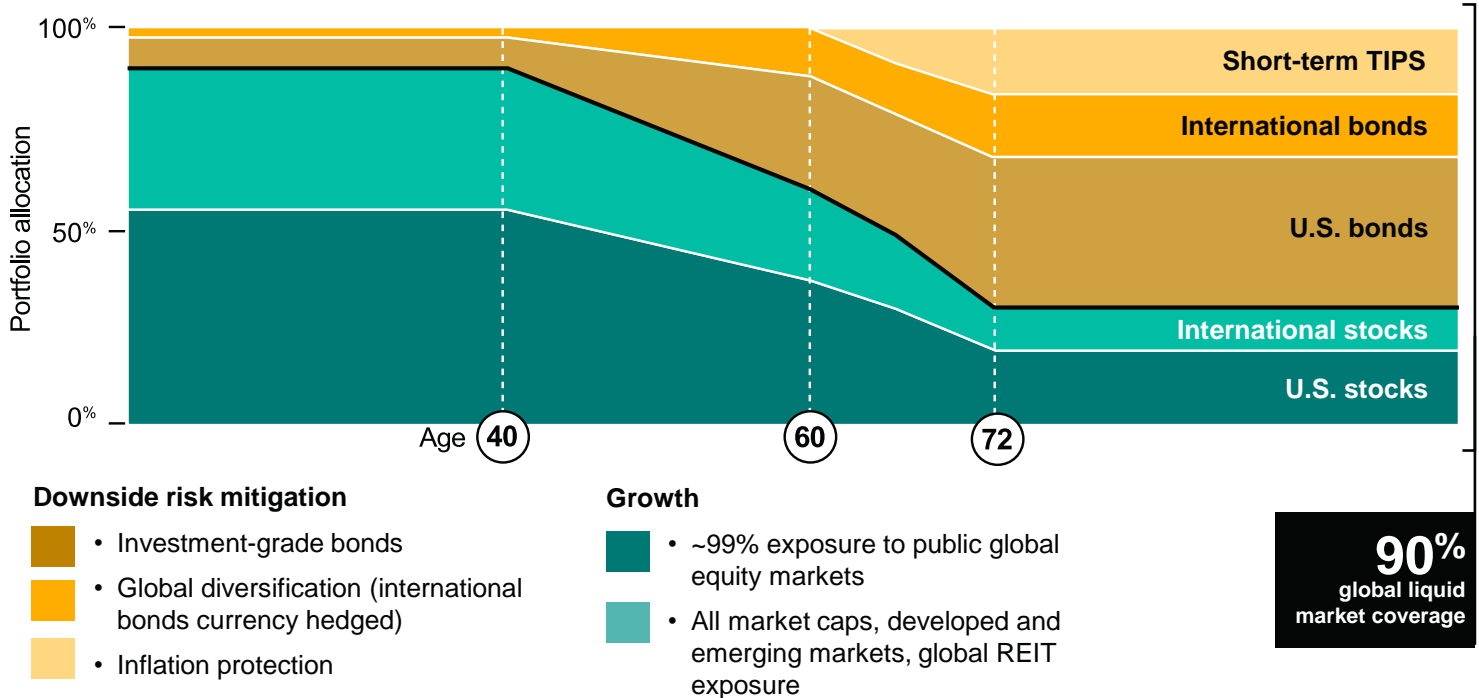
Evolution of Vanguard's glide-path design

Vanguard fund performance and attribution

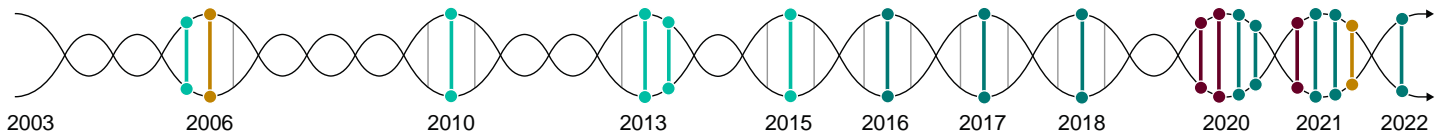


Purposeful design and evolution

Strategic asset allocation using high-quality building blocks



Meaningfully improving investor outcomes since inception



Enhanced asset allocation

- Added emerging markets stocks (2006)
- Added Canada and more international equity exposure (including small-caps) through Total International Stock Index replacing three regional funds (2010)
- Added international bonds (2013)
- Replaced broad TIPS fund with short-term TIPS for better responsiveness to inflation and removed money market fund (2013)
- Increased international allocations for both stocks and bonds (2015)

Lowered fees, increased access

- Lowered expense ratios (2016, 2017, 2018, 2020, and 2021)
- Reduced minimum for Institutional Target Retirement Funds (2020)
- Reduced minimum for Target Retirement Trusts (2021)
- Merging Institutional Target Retirement Funds into Target Retirement Funds (2022)

Reduced implementation costs and tax drag

- Moved from quarterly to monthly glide-path roll down (2020)
- Widened rebalancing bands (2020)
- Across trust vintages, replaced underlying international fund with an international trust, minimizing foreign tax withholdings (2021)

Improved fund/trust lineup

- Launched five-year vintage increments (2006)
- Added optional trust with a 50/50 allocation landing point and added enhanced retirement income services (2021)

Sources: FactSet, Fidelity, BlackRock. Stock market measured by FactSet data derived from MSCI US Broad Market Free Float and MSCI ACWI ex USA IMI Indexes. Bond market measured by FactSet data derived from Bloomberg Global Aggregate ex-USD, U.S. Aggregate Float Adjusted, Global High Yield, and EM Hard Currency Aggregate indexes. Commodities market measured by FactSet data. Data as of December 31, 2022.



Fund performance through June 30, 2023

Vanguard Target Retirement Fund and Trust performance

Portfolio/Benchmark	Average annualized return					Since inception	Inception date
	3 months	1 year	3 years	5 years	10 years		
Vanguard Target Retirement Income Vintage							
Fund	1.36	4.51	1.70	3.45	4.12	4.74	10/27/2003
Trust II	1.36	4.54	1.74	3.49	4.17	4.40	2/29/2008
<i>Target Retirement Income Composite Index</i>	<i>1.44</i>	<i>4.80</i>	<i>1.93</i>	<i>3.72</i>	<i>4.35</i>	—	—
Vanguard Target Retirement 2020 Vintage							
Fund	2.15	6.58	3.85	4.62	6.02	5.78	6/7/2006
Trust II	2.12	6.57	3.87	4.66	6.09	5.63	2/29/2008
<i>Target Retirement 2020 Composite Index</i>	<i>2.20</i>	<i>6.91</i>	<i>4.12</i>	<i>4.96</i>	<i>6.31</i>	—	—
Vanguard Target Retirement 2025 Vintage							
Fund	3.02	8.56	4.96	5.26	6.68	6.41	10/27/2003
Trust II	2.96	8.56	5.05	5.35	6.76	6.03	2/29/2008
<i>Target Retirement 2025 Composite Index</i>	<i>3.04</i>	<i>8.97</i>	<i>5.32</i>	<i>5.66</i>	<i>7.00</i>	—	—
Vanguard Target Retirement 2030 Vintage							
Fund	3.56	9.95	6.04	5.78	7.24	6.40	6/7/2006
Trust II	3.62	10.03	6.13	5.88	7.33	6.35	2/29/2008
<i>Target Retirement 2030 Composite Index</i>	<i>3.64</i>	<i>10.48</i>	<i>6.43</i>	<i>6.20</i>	<i>7.57</i>	—	—
Vanguard Target Retirement 2035 Vintage							
Fund	4.10	11.28	7.21	6.35	7.82	7.19	10/27/2003
Trust II	4.10	11.34	7.30	6.44	7.90	6.74	2/29/2008
<i>Target Retirement 2035 Composite Index</i>	<i>4.13</i>	<i>11.77</i>	<i>7.59</i>	<i>6.74</i>	<i>8.14</i>	—	—
Vanguard Target Retirement 2040 Vintage							
Fund	4.57	12.56	8.35	6.88	8.33	7.04	6/7/2006
Trust II	4.63	12.66	8.43	6.97	8.41	7.13	2/29/2008
<i>Target Retirement 2040 Composite Index</i>	<i>4.62</i>	<i>13.07</i>	<i>8.74</i>	<i>7.28</i>	<i>8.67</i>	—	—

The performance data shown represent past performance. Past performance is no guarantee of future results. Investment returns and principal value will fluctuate, so investors' shares, when sold, may be worth more or less than their original cost. Current performance may be lower or higher than the performance data cited. For performance data current to the most recent month-end, visit our website at vanguard.com/performance. Some funds assess purchase, redemption, and/or account maintenance fees. The performance data shown do not reflect deduction of these fees. If they did, performance would be lower. Details on these fees and adjusted performance figures can be found in the fund detail section.

Sources: Vanguard and Morningstar, as of June 30, 2023.



Fund performance through June 30, 2023

Vanguard Target Retirement Fund and Trust performance (continued)

Portfolio/Benchmark	Average annualized return					Since inception	Inception date
	3 months	1 year	3 years	5 years	10 years		
Vanguard Target Retirement 2045 Vintage							
Fund	5.10	13.93	9.53	7.46	8.69	7.83	10/27/2003
Trust II	5.12	13.96	9.58	7.51	8.77	7.34	2/29/2008
<i>Target Retirement 2045 Composite Index</i>	<i>5.11</i>	<i>14.37</i>	<i>9.90</i>	<i>7.82</i>	<i>9.02</i>	—	—
Vanguard Target Retirement 2050 Vintage							
Fund	5.36	14.58	9.73	7.58	8.76	7.32	6/7/2006
Trust II	5.43	14.67	9.81	7.66	8.83	7.40	2/29/2008
<i>Target Retirement 2050 Composite Index</i>	<i>5.40</i>	<i>15.05</i>	<i>10.13</i>	<i>7.96</i>	<i>9.09</i>	—	—
Vanguard Target Retirement 2055 Vintage							
Fund	5.36	14.60	9.74	7.57	8.74	9.60	8/18/2010
Trust II	5.40	14.67	9.81	7.65	8.82	9.98	8/31/2010
<i>Target Retirement 2055 Composite Index</i>	<i>5.40</i>	<i>15.05</i>	<i>10.13</i>	<i>7.96</i>	<i>9.09</i>	—	—
Vanguard Target Retirement 2060 Vintage							
Fund	5.39	14.62	9.75	7.58	8.74	9.31	1/19/2012
Trust II	5.40	14.71	9.83	7.68	8.83	9.00	3/1/2012
<i>Target Retirement 2060 Composite Index</i>	<i>5.40</i>	<i>15.05</i>	<i>10.13</i>	<i>7.96</i>	<i>9.09</i>	—	—
Vanguard Target Retirement 2065 Vintage							
Fund	5.34	14.62	9.75	7.55	—	7.96	7/12/2017
Trust II	5.38	14.69	9.81	7.68	—	8.61	7/17/2017
<i>Target Retirement 2065 Composite Index</i>	<i>5.40</i>	<i>15.05</i>	<i>10.13</i>	<i>7.96</i>	—	—	—
Vanguard Target Retirement 2070 Vintage							
Fund	5.39	14.68	—	—	—	13.46	6/8/2022
Trust II	5.44	14.72	—	—	—	-0.20	4/7/2022
<i>Target Retirement 2070 Composite Index</i>	<i>5.40</i>	<i>15.05</i>	<i>10.13</i>	<i>7.96</i>	<i>8.97</i>	—	—

The performance data shown represent past performance. Past performance is no guarantee of future results. Investment returns and principal value will fluctuate, so investors' shares, when sold, may be worth more or less than their original cost. Current performance may be lower or higher than the performance data cited. For performance data current to the most recent month-end, visit our website at vanguard.com/performance. Some funds assess purchase, redemption, and/or account maintenance fees. The performance data shown do not reflect deduction of these fees. If they did, performance would be lower. Details on these fees and adjusted performance figures can be found in the fund detail section.

Sources: Vanguard and Morningstar, as of June 30, 2023.



Underlying fund performance contribution

Figure 16.1 3-month return contribution by underlying funds

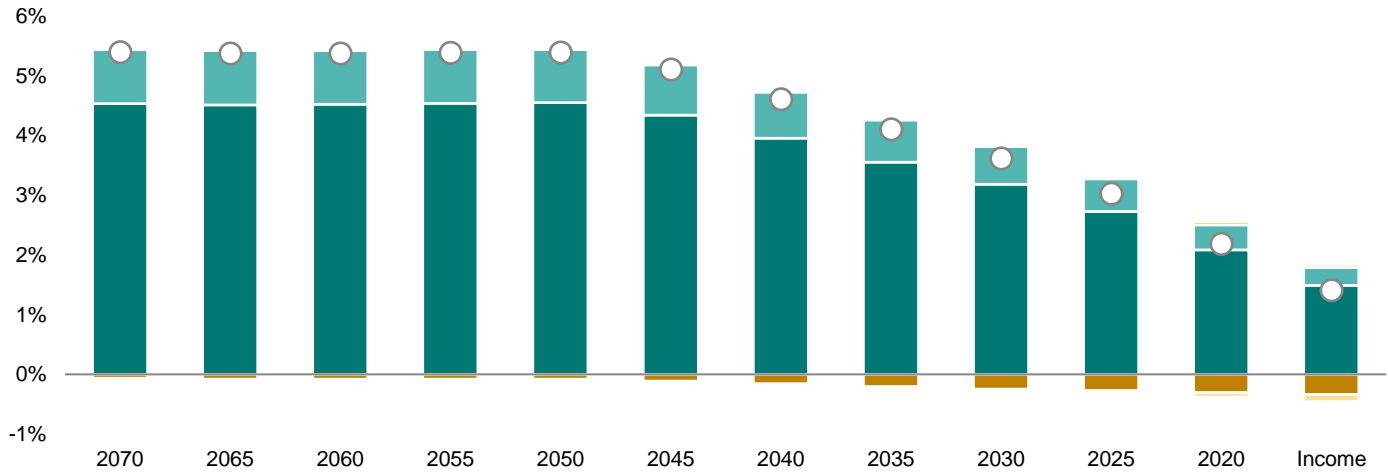
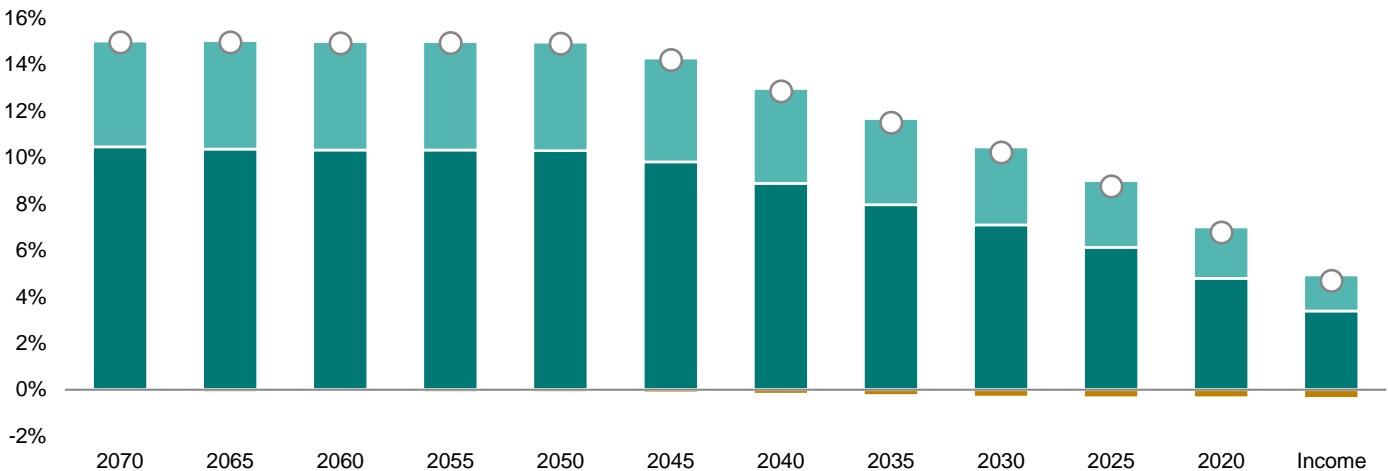


Figure 16.2 1-year return contribution by underlying funds



- Total Stock Market Index
- Total International Stock Index
- Total return
- Total Bond Market II Index
- Total International Bond Index
- Short-Term Inflation-Protected Securities Index
- Cash

Past performance is not a guarantee of future results.

Sources: Vanguard and Morningstar, as of June 30, 2023.





Excess return attribution

Figure 17.1 3-month return attribution

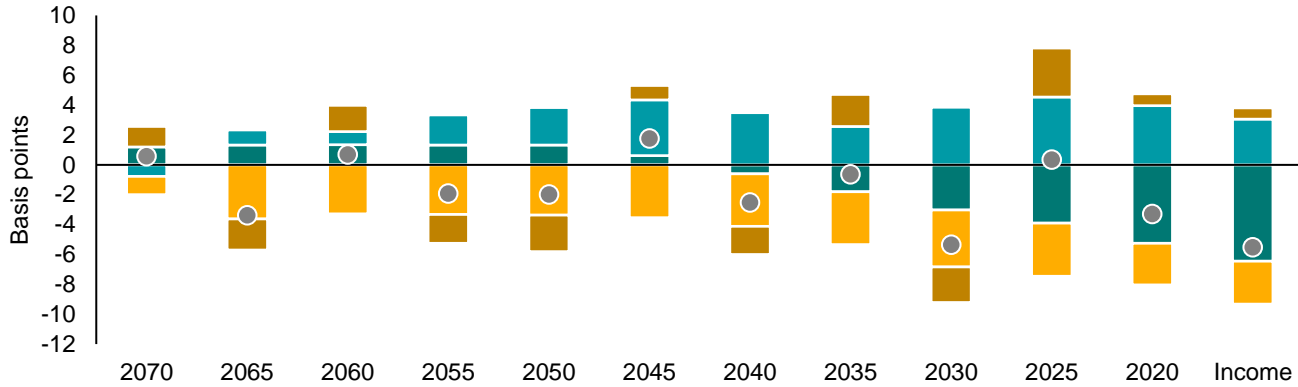
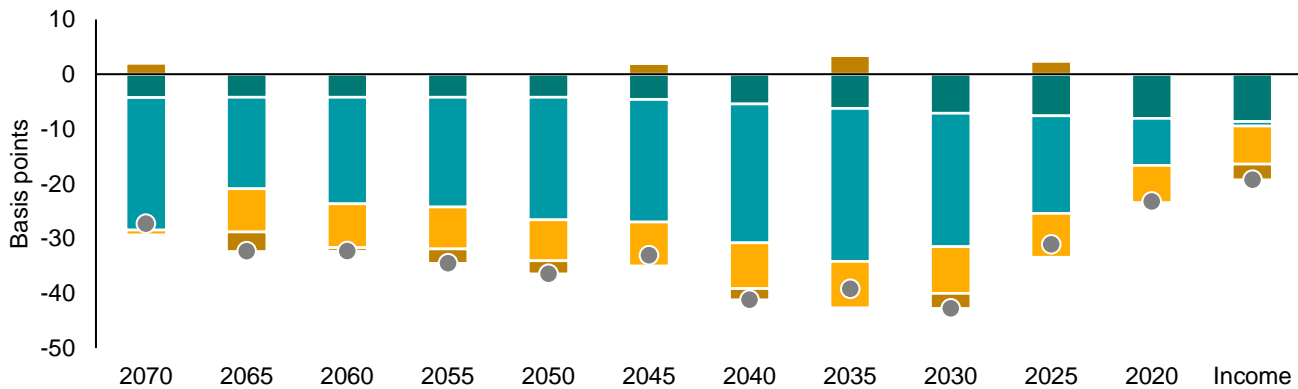


Figure 17.2 1-year return attribution



■ Allocation impact	Out/Underperformance due to differences in the strategic asset allocation of the funds versus their benchmarks. These differences can be particularly notable at times of significant market volatility as portfolio managers work to balance transaction costs against a daily rebalanced benchmark.
■ Fair-value pricing	Out/Underperformance due to the adjustment of the prices of non-U.S. equities for changes in their fair value that occur after the close of their local market but before the net asset value is calculated for each U.S. mutual fund as of 4 p.m., Eastern time. This impact is attributed to accounting and pricing policies that are outside of portfolio management control and is generally artificial and temporary.
■ Underlying fund tracking differences ex-FV	Out/Underperformance of the underlying portfolios versus their relative benchmarks. Figure is shown after controlling for fair-value pricing but is inclusive of the securities lending impact, transaction costs associated with rebalancing the fund-of-funds portfolio, and pricing difference driven by Bloomberg (BB) indexes pricing at 4 p.m., Eastern time.*
■ Residual	Out/Underperformance due to factors outside of those captured above.
● Total excess return	Indicates the total amount of fund returns that were higher or lower than benchmark returns. Calculated as the sum of the individual impacts of each of the five above drivers of benchmark-related excess return. Effect of expense ratios not included.

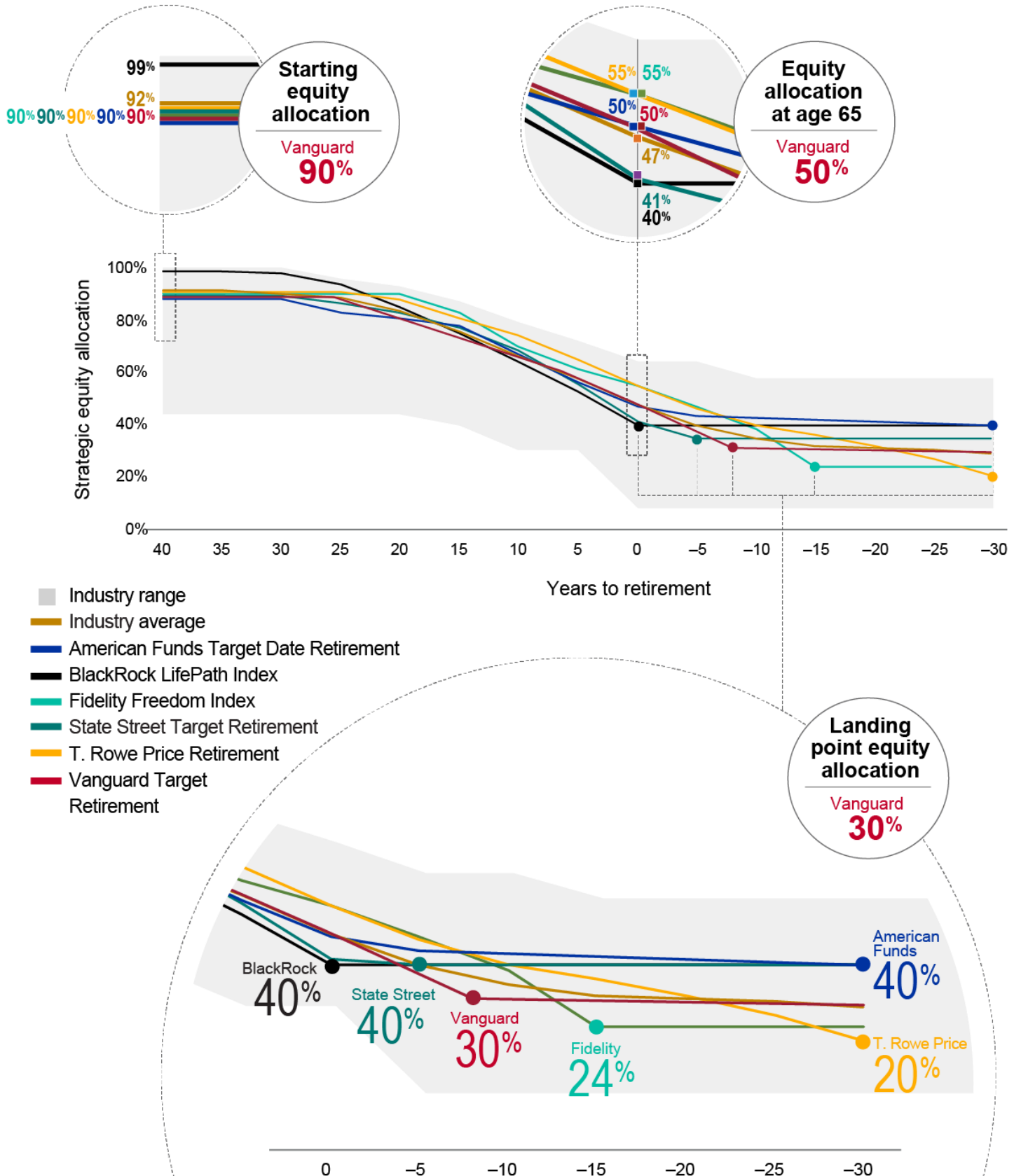
Past performance is not a guarantee of future results.

Sources: Vanguard and Morningstar, as of June 30, 2023.

* On January 14, 2021, Bloomberg changed its index pricing time from 3 p.m., Eastern time, to 4 p.m., Eastern time. The time change affects the 1- and 3-year figures.



Glide path comparison



Sources: Morningstar; data as of June 30, 2023; Vanguard calculation for industry average.



Competitor fund construction and performance

IN THIS SECTION:

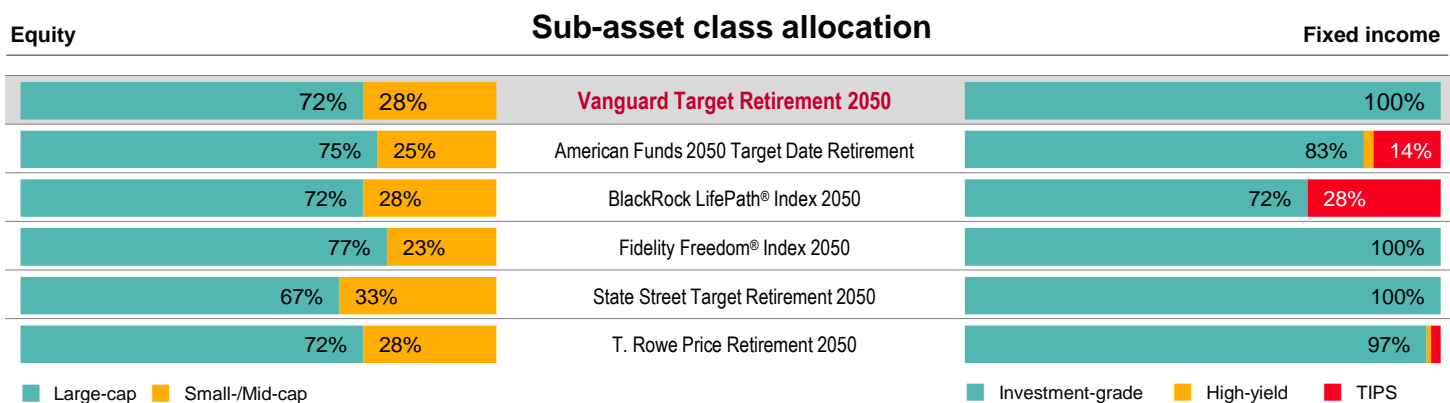
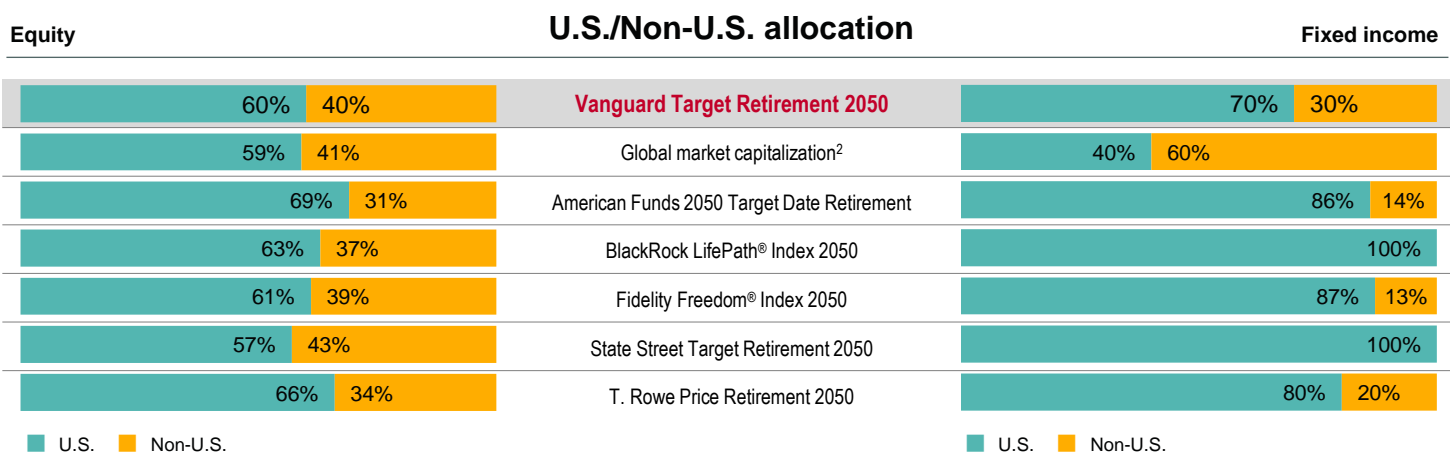
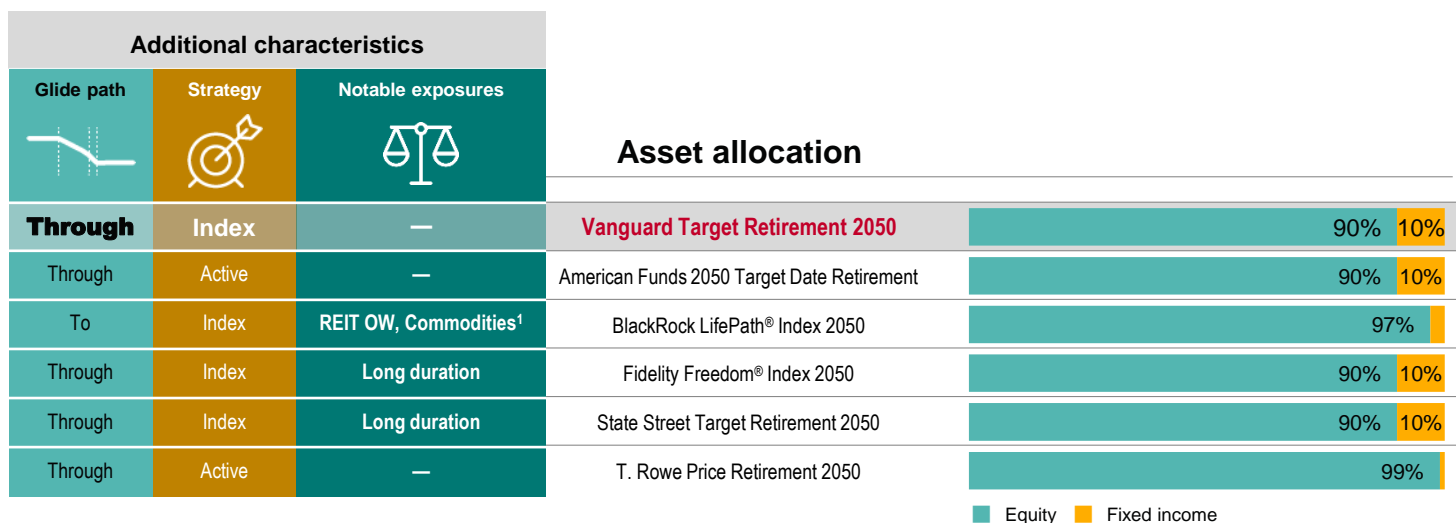
Beyond the glide path

12-month return attribution



2050 vintage: Beyond the glide path

Figure 20.1 Industry peer group asset allocation comparison



Sources: Morningstar data, based on most recent holdings disclosure for each fund included in the calculation. As-of dates may vary depending on the timing and frequency of data made available to Morningstar. Data as of June 30, 2023.

¹Commodity exposure is present in CIT product only. Mutual fund product does not include commodity exposure.

²Global market capitalization calculated using FTSE All Country Equity Index and Bloomberg Barclays Global Aggregate Bond Index.

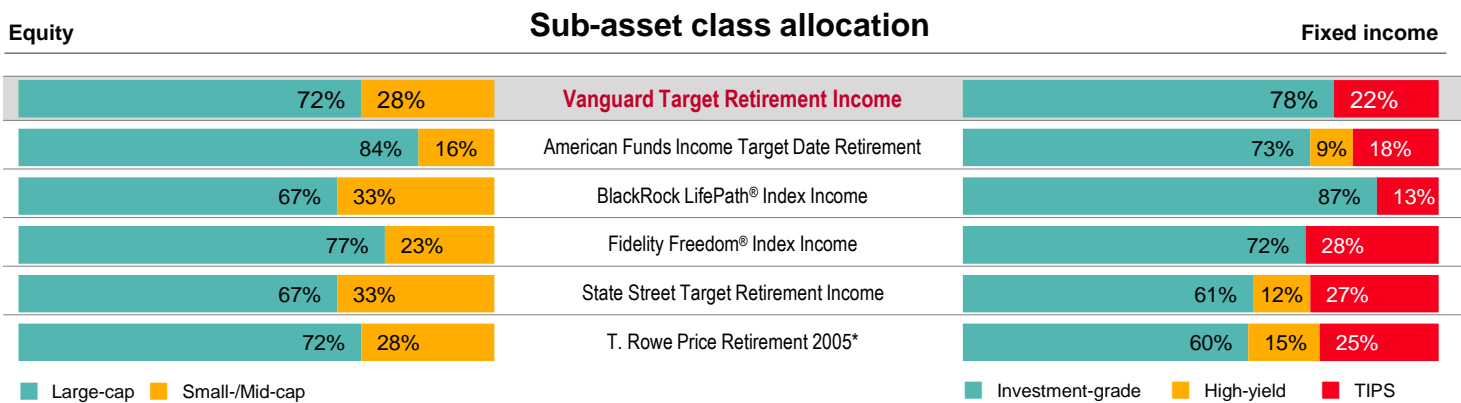
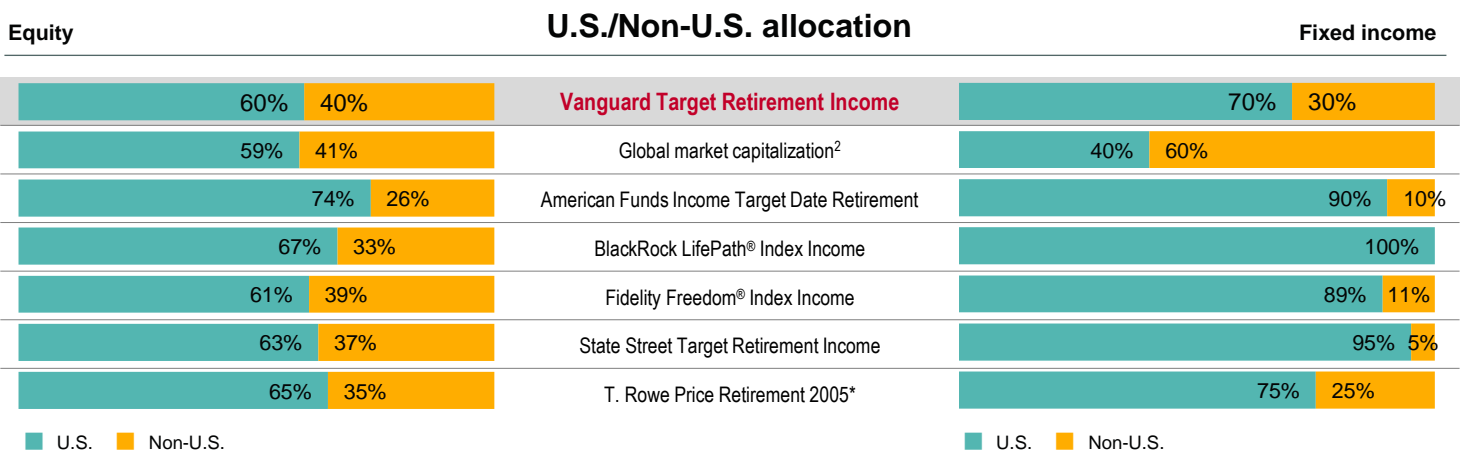
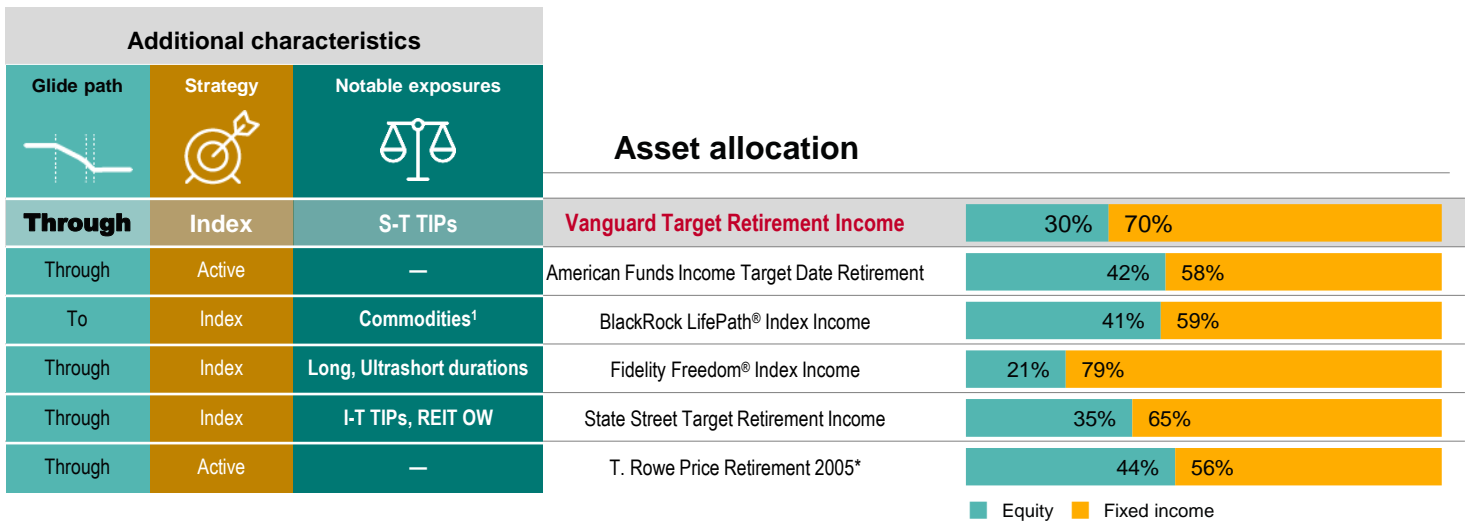
Note: Due to spacing issues, data labels below 7% are not displayed. Due to rounding, may not total to 100%.

There may be other material differences between products that must be considered prior to investing.



Income vintage: Beyond the glide path

Figure 21.1 Industry peer group asset allocation comparison



Sources: Morningstar data, based on most recent holdings disclosure for each fund included in the calculation. As-of dates may vary depending on the timing and frequency of data made available to Morningstar. Data as of June 30, 2023.

¹ Commodity exposure is present in CIT product only. Mutual fund product does not include commodity exposure.

² Global market capitalization calculated using FTSE All Country Equity Index and Bloomberg Barclays Global Aggregate Bond Index.

* No explicit income vintage in lineup. 2005 represents the most conservative asset allocation, as a proxy.

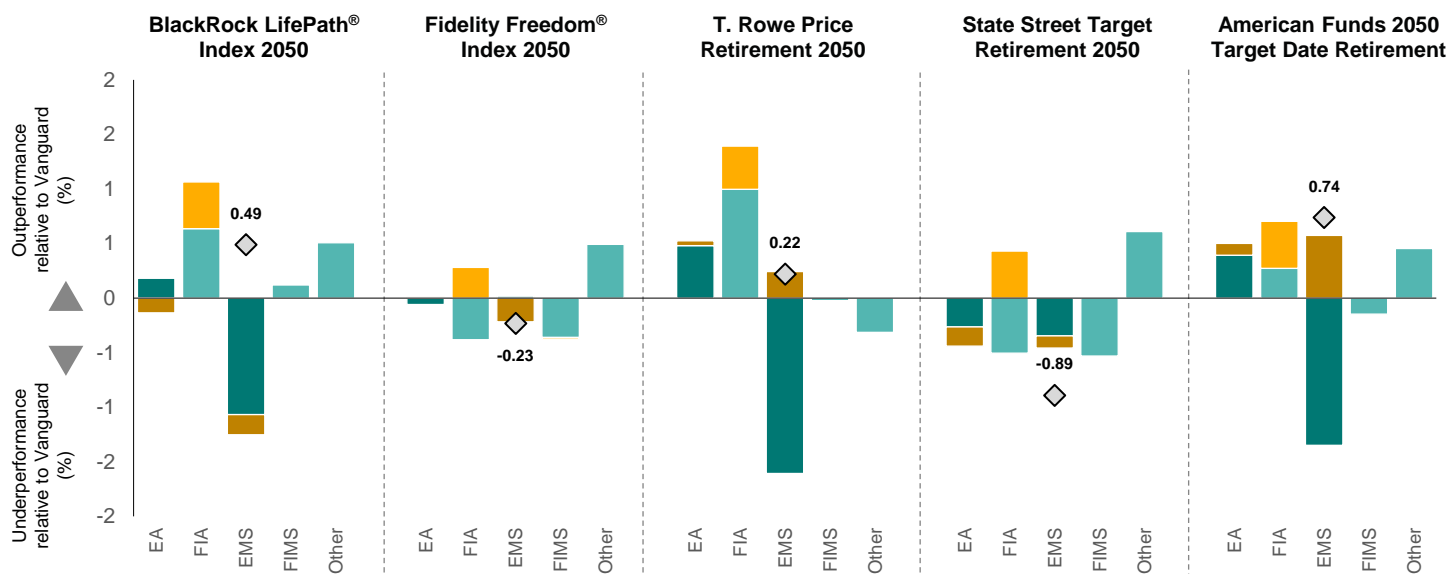
Note: Due to spacing issues, data labels below 7% are not displayed. Due to rounding, may not total to 100%.

There may be other material differences between products that must be considered prior to investing.



12-month return attribution

Figure 22.1 Relative to top five industry 2050 funds



Element	Description
Equity allocation (EA)	Vintage allocation to asset classes and sub-asset allocation to U.S. vs. non-U.S.
Fixed income allocation (FIA)	
Equity manager selection (EMS)	Benchmark construction differences (cap and/or style tilts), securities lending, fair-value pricing, building block expense ratios
Fixed income manager selection (FIMS)	
Other	Compounding effect (residual) due to nondaily holdings availability
Total excess return	The sum of the above relative performance differences between Vanguard Target Retirement Fund and competitors' similar vintage

■ U.S. equity
 ■ Foreign equity
 ◇ Total relative return
■ U.S. fixed income
 ■ Foreign fixed income

- **BlackRock's** outperformance relative to Vanguard was driven by a higher allocation to U.S. Equity.
- **Fidelity's** underperformance was primarily driven by an overweight to long-duration Treasury securities within the U.S. fixed income portion of the portfolio in relation to Vanguard.
- **T. Rowe Price's** outperformance was driven by an underweight to both U.S. and international fixed income relative to Vanguard.
- **State Street's** underperformance was driven by an overweight to long-duration fixed income in relation to Vanguard over the last 12 months.
- **American Funds'** outperformance was primarily driven by an underweight to U.S. and international fixed income relative to Vanguard.

Past performance is not a guarantee of future results.

Sources: Vanguard and Morningstar, as of June 30, 2023.





12-month return attribution (continued)

Figure 23.1 Relative to top five industry income (or equivalent) funds*



- **BlackRock's** outperformance relative to Vanguard was driven by a higher allocation to U.S. Equity.
- **Fidelity's** underperformance was primarily driven by an overweight to long-duration Treasury securities within the U.S. fixed income portion of the portfolio.
- **T. Rowe Price's** outperformance was driven by an underweight to both U.S. and international fixed income relative to Vanguard.
- **State Street's** underperformance was driven by an overweight to long-duration fixed income in relation to Vanguard over the last 12 months.
- **American Funds'** outperformance was primarily driven by an underweight to U.S. and international fixed income relative to Vanguard.

Past performance is not a guarantee of future results.

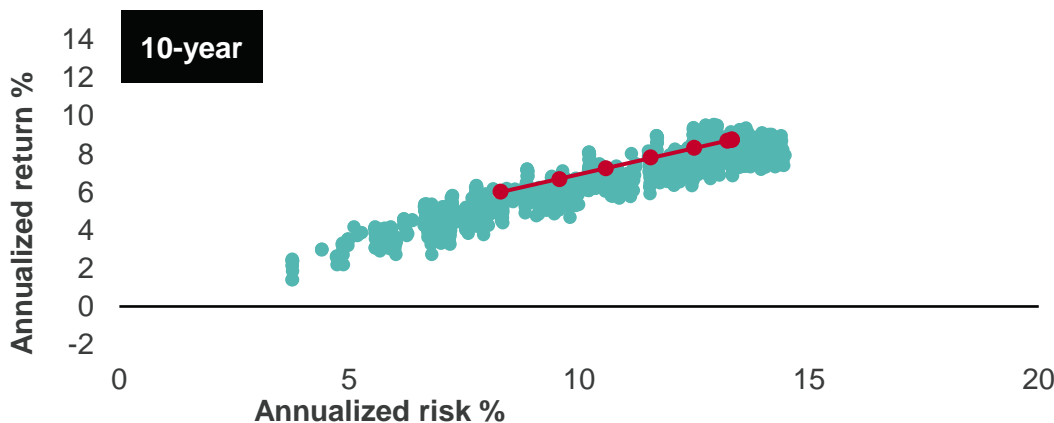
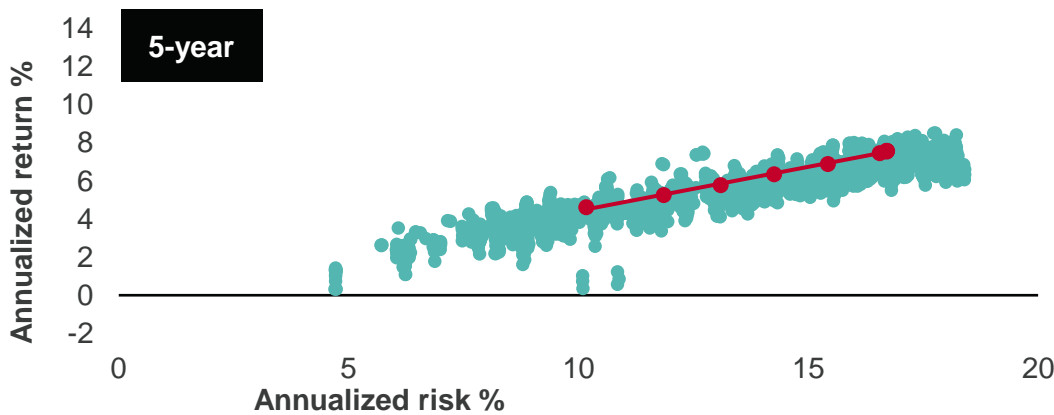
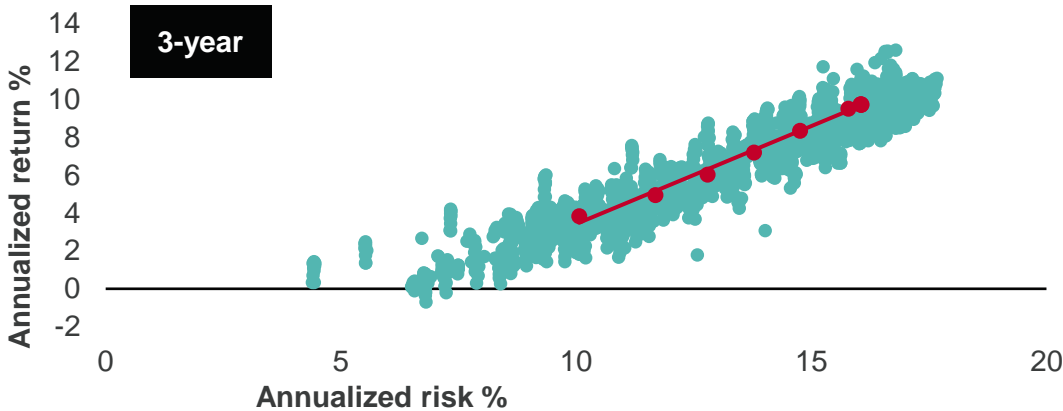
Sources: Morningstar and Vanguard calculations; data as of June 30, 2023.

* The 2005 fund is used as a proxy for T. Rowe Price and the 2010 fund is used as a proxy for American Funds, as there is no terminal Income fund currently.



A history of consistently strong risk-adjusted performance

● TDF peers in Morningstar universe ● Vanguard Target Retirement Funds



Investors may be in TDFs for decades.

Consistent performance across all market environments is critical.

*Standard deviation was used for annualized risk. Results will vary for other time periods. All funds in the Morningstar peer group with a minimum 3-, 5-, or 10-year history, respectively, were included in the comparison. There may be other material differences between products that must be considered before investing. **Note that the competitive performance data shown represent past performance, which is not a guarantee of future results, and that all investments are subject to risks. Investment returns and principal value will fluctuate, so investors' shares, when sold, may be worth more or less than their original cost. Current performance may be lower or higher than the performance data cited. For the most recent performance, visit our website at vanguard.com/performance.***

Sources: Vanguard and Morningstar, Inc., as of June 30, 2023. Vanguard Target Retirement Funds highlighted.



Appendix

IN THIS SECTION:

Absolute performance results



Appendix: Absolute performance results

Average annualized return as of June 30, 2023

Fund	3 months	Year-to-date	1 year	3 years	5 years	10 years	Since inception	Inception date
Vanguard Target Retirement Income Fund	1.36	5.65	4.51	1.70	3.45	4.12	4.74	10/27/2003
Target Retirement Income Composite Index	1.44	5.63	4.80	1.93	3.72	4.35	—	—
Lipper Target Target Consvr Funds Average	1.31	5.15	4.71	1.98	3.02	3.59	—	—
Fidelity Freedom Income	0.47	4.11	2.58	0.76	2.49	3.27	4.34	10/17/1996
Fidelity Freedom Index Income Investor	0.69	4.30	2.78	0.10	2.61	2.98	3.28	10/2/2009
T. Rowe Price Retirement 2005	2.15	6.44	6.15	3.47	4.28	4.95	5.31	2/27/2004
American Funds 2010 Trgt Date Retire R5	0.90	3.50	4.26	3.91	4.56	5.34	4.72	2/1/2007
BlackRock LifePath Index Retire K	1.81	6.49	5.37	2.24	3.98	4.76	4.74	5/31/2011
State Street Target Retirement K	1.43	5.45	5.12	3.20	4.18	—	3.99	9/30/2014
JPMorgan SmartRetirement® Income R5	2.03	6.81	6.95	2.68	3.38	4.21	4.61	5/15/2006
JPMorgan SmartRetirement® Blend IncomeR5	1.98	6.50	6.63	2.56	3.36	4.21	4.31	7/2/2012
TIAA-CREF Lifecycle Retire Income Instl	2.06	5.94	6.39	3.31	4.09	5.07	4.69	11/30/2007
Vanguard Target Retirement 2020 Fund	2.15	7.02	6.58	3.85	4.62	6.02	5.78	6/7/2006
Target Retirement 2020 Composite Index	2.20	6.98	6.91	4.12	4.96	6.31	—	—
Lipper Target 2020 Funds Average	1.98	6.37	6.36	3.47	3.92	4.80	—	—
Fidelity Freedom 2020	2.16	7.60	7.23	4.35	4.55	5.97	6.38	10/17/1996
Fidelity Freedom Index 2020 Investor	2.29	7.73	6.97	3.43	4.62	5.69	6.39	10/2/2009
T. Rowe Price Retirement 2020	2.86	7.59	7.79	5.33	5.36	6.70	7.80	9/30/2002
American Funds 2020 Trgt Date Retire R5	1.50	4.65	5.76	4.50	5.06	6.30	5.30	2/1/2007
State Street Target Retirement 2020 K	1.71	6.05	5.85	4.32	4.89	—	5.10	9/30/2014
JPMorgan SmartRetirement 2020 R5	2.04	6.75	6.80	2.88	3.54	5.13	5.25	5/15/2006
JPMorgan SmartRetirement® Blend 2020 R5	1.98	6.55	6.69	2.82	3.57	5.13	5.51	7/2/2012
TIAA-CREF Lifecycle 2020 Institutional	2.51	6.76	7.59	4.32	4.62	6.16	5.23	1/17/2007
Vanguard Target Retirement 2025 Fund	3.02	8.45	8.56	4.96	5.26	6.68	6.41	10/27/2003
Target Retirement 2025 Composite Index	3.04	8.41	8.97	5.32	5.66	7.00	—	—
Lipper Target 2025 Funds Average	2.11	6.64	6.80	3.95	4.27	5.51	—	—
Fidelity Freedom 2025	2.66	8.44	8.42	5.22	5.03	6.58	6.14	11/6/2003
Fidelity Freedom Index 2025 Investor	2.76	8.50	8.03	4.26	5.11	6.32	7.07	10/2/2009
T. Rowe Price Retirement 2025	3.33	8.34	8.82	6.25	5.87	7.37	6.86	2/27/2004
American Funds 2025 Trgt Date Retire R5	2.06	5.82	7.05	5.12	5.67	7.17	5.95	2/1/2007
JPMorgan SmartRetirement 2025 R5	2.54	7.87	8.23	4.38	4.35	5.99	5.35	7/31/2007
JPMorgan SmartRetirement® Blend 2025 R5	2.49	7.66	8.13	4.36	4.39	5.95	6.41	7/2/2012
TIAA-CREF Lifecycle 2025 Institutional	3.08	7.58	8.91	5.30	5.09	6.75	5.49	1/17/2007
BlackRock Lifepath Index 2025 K	2.13	7.26	6.32	3.69	4.63	5.90	5.75	5/31/2011
State Street Target Retirement 2025 K	2.47	7.69	7.83	5.29	5.78	—	6.04	9/30/2014

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Data from Vanguard and Morningstar.





Appendix: Absolute performance results *(continued)*

Average annualized return as of June 30, 2023

Fund	3 months	Year-to-date	1 year	3 years	5 years	10 years	Since inception	Inception date
Vanguard Target Retirement 2030 Fund	3.56	9.44	9.95	6.04	5.78	7.24	6.40	6/7/2006
Target Retirement 2030 Composite Index	3.64	9.43	10.48	6.43	6.20	7.57	—	—
Lipper Target 2030 Funds Average	2.79	7.77	8.42	5.42	5.02	6.25	—	—
Fidelity Freedom 2030	3.23	9.30	9.79	6.45	5.67	7.36	6.76	10/17/1996
Fidelity Freedom Index 2030 Investor	3.29	9.31	9.26	5.44	5.77	7.12	7.75	10/2/2009
T. Rowe Price Retirement 2030	4.04	9.56	10.39	7.22	6.37	7.98	8.67	9/30/2002
American Funds 2030 Trgt Date Retire R5	3.07	7.63	9.19	6.36	6.32	8.05	6.59	2/1/2007
JPMorgan SmartRetirement 2030 R5	3.43	9.29	10.22	5.91	5.08	6.75	6.19	5/15/2006
JPMorgan SmartRetirement® Blend 2030 R5	3.34	8.99	10.05	5.88	5.16	6.74	7.24	7/2/2012
TIAA-CREF Lifecycle 2030 Institutional	3.70	8.67	10.51	6.36	5.61	7.36	5.72	1/17/2007
BlackRock Lifepath Index 2030 K	3.00	8.67	8.46	5.48	5.49	6.69	6.43	5/31/2011
State Street Target Retirement 2030 K	3.36	9.33	10.02	5.95	6.39	—	6.61	9/30/2014
Vanguard Target Retirement 2035 Fund	4.10	10.28	11.28	7.21	6.35	7.82	7.19	10/27/2003
Target Retirement 2035 Composite Index	4.13	10.24	11.77	7.59	6.74	8.14	—	—
Lipper Target 2035 Funds Average	3.74	9.35	10.65	7.06	5.94	7.14	—	—
Fidelity Freedom 2035	4.06	10.76	12.38	8.63	6.67	8.27	6.96	11/6/2003
Fidelity Freedom Index 2035 Investor	4.17	10.74	11.65	7.53	6.74	8.05	8.57	10/2/2009
T. Rowe Price Retirement 2035	4.82	10.83	12.15	8.18	6.87	8.49	7.49	2/27/2004
American Funds 2035 Trgt Date Retire R5	4.08	9.42	11.75	7.95	7.30	8.93	7.10	2/1/2007
JPMorgan SmartRetirement 2035 R5	4.33	10.54	12.03	7.97	6.17	7.54	6.25	7/31/2007
JPMorgan SmartRetirement® Blend 2035 R5	4.08	10.27	11.93	7.66	6.00	7.43	7.99	7/2/2012
TIAA-CREF Lifecycle 2035 Institutional	4.39	9.93	12.40	7.48	6.15	7.96	6.07	1/17/2007
BlackRock Lifepath Index 2035 K	3.79	10.01	10.40	7.19	6.32	7.43	7.06	5/31/2011
State Street Target Retirement 2035 K	3.93	10.38	11.28	6.65	6.69	—	6.98	9/30/2014
Vanguard Target Retirement 2040 Fund	4.57	11.06	12.56	8.35	6.88	8.33	7.04	6/7/2006
Target Retirement 2040 Composite Index	4.62	11.06	13.07	8.74	7.28	8.67	—	—
Lipper Target 2040 Funds Average	4.52	10.64	12.55	8.25	6.42	7.50	—	—
Fidelity Freedom 2040	5.12	12.45	14.92	10.22	7.46	8.70	4.91	9/6/2000
Fidelity Freedom Index 2040 Investor	5.02	12.21	13.90	9.08	7.52	8.49	8.92	10/2/2009
T. Rowe Price Retirement 2040	5.44	11.83	13.56	9.03	7.32	8.91	9.14	9/30/2002
American Funds 2040 Trgt Date Retire R5	5.12	11.13	14.16	8.91	7.84	9.34	7.36	2/1/2007
JPMorgan SmartRetirement 2040 R5	4.98	11.57	13.56	9.26	6.79	8.06	7.00	5/15/2006
JPMorgan SmartRetirement® Blend 2040 R5	4.71	11.24	13.37	8.90	6.58	7.97	8.51	7/2/2012
TIAA-CREF Lifecycle 2040 Institutional	5.26	11.35	14.33	8.74	6.73	8.52	6.48	1/17/2007
BlackRock Lifepath Index 2040 K	4.66	11.34	12.34	8.79	7.04	8.08	7.63	5/31/2011
State Street Target Retirement 2040 K	4.27	11.03	12.13	7.41	6.97	—	7.26	9/30/2014

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Data from Vanguard and Morningstar.



Appendix: Absolute performance results *(continued)*

Average annualized return as of June 30, 2023

Fund	3 months	Year-to-date	1 year	3 years	5 years	10 years	Since inception	Inception date
Vanguard Target Retirement 2045 Fund	5.10	11.92	13.93	9.53	7.46	8.69	7.83	10/27/2003
Target Retirement 2045 Composite Index	5.11	11.88	14.37	9.90	7.82	9.02	—	—
Lipper Target 2045 Funds Average	4.91	11.27	13.50	9.12	6.89	7.97	—	—
Fidelity Freedom 2045	5.27	12.69	15.27	10.33	7.51	8.75	6.56	6/1/2006
Fidelity Freedom Index 2045 Investor	5.24	12.56	14.34	9.19	7.58	8.54	8.99	10/2/2009
T. Rowe Price Retirement 2045	5.89	12.51	14.56	9.73	7.66	9.14	7.91	5/31/2005
American Funds 2045 Trgt Date Retire R5	5.48	11.65	14.80	9.05	7.93	9.47	7.43	2/1/2007
JPMorgan SmartRetirement 2045 R5	5.48	12.24	14.60	10.31	7.29	8.33	6.84	7/31/2007
JPMorgan SmartRetirement® Blend 2045 R5	5.23	12.05	14.54	9.96	7.04	8.21	8.72	7/2/2012
TIAA-CREF Lifecycle 2045 Institutional	5.84	12.20	15.61	9.82	7.20	8.88	6.34	11/30/2007
BlackRock Lifepath Index 2045 K	5.36	12.43	14.09	10.07	7.66	8.62	8.06	5/31/2011
State Street Target Retirement 2045 K	4.55	11.43	12.93	8.07	7.16	—	7.49	9/30/2014
Vanguard Target Retirement 2050 Fund	5.36	12.35	14.58	9.73	7.58	8.76	7.32	6/7/2006
Target Retirement 2050 Composite Index	5.40	12.34	15.05	10.13	7.96	9.09	—	—
Lipper Target 2050 Funds Average	5.14	11.66	14.05	9.40	6.95	8.00	—	—
Fidelity Freedom 2050	5.22	12.66	15.31	10.31	7.50	8.77	6.44	6/1/2006
Fidelity Freedom Index 2050 Investor	5.28	12.58	14.35	9.19	7.58	8.56	9.03	10/2/2009
T. Rowe Price Retirement 2050	5.92	12.65	14.79	9.78	7.70	9.16	7.13	12/29/2006
American Funds 2050 Trgt Date Retire R5	5.65	12.13	15.32	9.02	7.92	9.50	7.45	2/1/2007
JPMorgan SmartRetirement 2050 R5	5.69	12.52	14.87	10.33	7.29	8.33	6.85	7/31/2007
JPMorgan SmartRetirement® Blend 2050 R5	5.39	12.23	14.77	10.03	7.13	8.26	8.77	7/2/2012
TIAA-CREF Lifecycle 2050 Institutional	6.13	12.56	16.08	10.04	7.32	8.97	6.39	11/30/2007
BlackRock Lifepath Index 2050 K	5.77	13.09	15.07	10.74	7.97	8.91	8.31	5/31/2011
State Street Target Retirement 2050 K	4.81	11.92	13.69	8.48	7.36	—	7.57	9/30/2014
Vanguard Target Retirement 2055 Fund	5.36	12.35	14.60	9.74	7.57	8.74	9.60	8/18/2010
Target Retirement 2055 Composite Index	5.40	12.34	15.05	10.13	7.96	9.09	—	—
Lipper Target 2055+ Funds Average	5.24	11.86	14.32	9.59	7.09	—	—	—
Fidelity Freedom 2055	5.22	12.69	15.33	10.30	7.50	8.81	8.15	6/1/2011
Fidelity Freedom Index 2055 Investor	5.26	12.59	14.40	9.19	7.59	8.60	8.02	6/1/2011
T. Rowe Price Retirement 2055	5.99	12.67	14.72	9.77	7.66	9.13	7.11	12/29/2006
American Funds 2055 Trgt Date Retire R5	5.89	12.58	15.80	8.88	7.85	9.44	9.94	2/1/2010
JPMorgan SmartRetirement 2055 R5	5.68	12.49	14.86	10.35	7.32	8.37	9.01	1/31/2012
JPMorgan SmartRetirement® Blend 2055 R5	5.38	12.23	14.80	10.08	7.13	8.22	8.73	7/2/2012
TIAA-CREF Lifecycle 2055 Institutional	6.17	12.73	16.29	10.19	7.37	9.04	8.45	4/29/2011
BlackRock Lifepath Index 2055 K	5.95	13.26	15.42	10.86	8.03	9.03	8.44	5/31/2011
State Street Target Retirement 2055 K	4.85	11.97	13.76	8.47	7.33	—	7.58	9/30/2014

The performance data shown represent past performance. Past performance is no guarantee of future results. Investment returns and principal value will fluctuate, so investors' shares, when sold, may be worth more or less than their original cost. Current performance may be lower or higher than the performance data cited. For performance data current to the most recent month-end, visit our website at vanguard.com/performance. Some funds assess purchase, redemption, and/or account maintenance fees. The performance data shown do not reflect deduction of these fees. If they did, performance would be lower. Details on these fees and adjusted performance figures can be found in the fund detail section.

Data from Vanguard and Morningstar.





Appendix: Absolute performance results *(continued)*

Average annualized return as of June 30, 2023

Fund	3 months	Year-to-date	1 year	3 years	5 years	10 years	Since inception	Inception date
Vanguard Target Retirement 2060 Fund	5.39	12.39	14.62	9.75	7.58	8.74	9.31	1/19/2012
Target Retirement 2060 Composite Index	5.40	12.34	15.05	10.13	7.96	9.09	—	—
Lipper Target 2055+ Funds Average	5.41	12.15	14.74	9.90	—	—	—	—
Fidelity Freedom 2060	5.27	12.64	15.34	10.31	7.50	—	7.93	8/5/2014
Fidelity Freedom Index 2060 Investor	5.31	12.59	14.40	9.20	7.59	—	7.70	8/5/2014
T. Rowe Price Retirement 2060	6.03	12.75	14.82	9.78	7.66	—	7.63	6/23/2014
American Funds 2060 Trgt Date Retire R5	5.93	12.69	15.90	8.81	7.80	—	8.39	3/27/2015
JPMorgan SmartRetirement 2060 R5	5.66	12.44	14.97	10.37	7.32	—	8.53	8/31/2016
JPMorgan SmartRetirement® Blend 2060 R5	5.41	12.18	14.84	10.08	7.15	—	8.28	8/31/2016
TIAA-CREF Lifecycle 2060 Institutional	6.25	12.84	16.49	10.35	7.45	—	8.18	9/26/2014
BlackRock Lifepath Index 2060 K	5.91	13.24	15.36	10.82	8.03	—	10.48	2/29/2016
State Street Target Retirement 2060 K	4.87	12.01	13.72	8.51	7.38	—	7.57	9/30/2014
Vanguard Target Retirement 2065 Fund	5.34	12.34	14.62	9.75	7.55	—	7.96	7/12/2017
Target Retirement 2065 Composite Index	5.40	12.34	15.05	10.13	7.96	—	—	—
Lipper Target 2055+ Funds Average	5.41	12.15	14.74	9.90	—	—	—	—
Fidelity Freedom 2065	5.25	12.67	15.34	10.29	—	—	8.38	6/28/2019
Fidelity Freedom Index 2065 Investor	5.24	12.53	14.32	9.16	—	—	7.75	6/28/2019
T. Rowe Price Retirement 2065	5.97	12.70	14.68	—	—	—	6.76	10/14/2020
American Funds 2065 Trgt Date Retire R5	5.99	12.74	16.00	8.85	—	—	14.64	3/27/2020
JPMorgan SmartRetirement® Blend 2065 R5	5.39	11.83	—	—	—	—	15.34	11/1/2022
TIAA-CREF Lifecycle 2065 Institutional	6.30	12.98	16.58	—	—	—	8.46	9/30/2020
BlackRock Lifepath Index 2065 K	5.94	13.31	15.49	10.85	—	—	8.38	10/30/2019
State Street Target Retirement 2065 K	4.85	12.04	13.78	8.23	—	—	13.03	3/30/2020
Vanguard Target Retirement 2070 Fund	5.39	12.39	14.68	—	—	—	13.46	6/28/2022
Target Retirement 2070 Composite Index	5.40	12.34	15.05	10.13	7.96	8.97	—	—
Lipper Target 2060+ Funds Average	5.41	12.15	14.74	9.90	—	—	—	—

The performance data shown represent past performance. Past performance is no guarantee of future results. Investment returns and principal value will fluctuate, so investors' shares, when sold, may be worth more or less than their original cost. Current performance may be lower or higher than the performance data cited. For performance data current to the most recent month-end, visit our website at vanguard.com/performance. Some funds assess purchase, redemption, and/or account maintenance fees. The performance data shown do not reflect deduction of these fees. If they did, performance would be lower. Details on these fees and adjusted performance figures can be found in the fund detail section.

Data from Vanguard and Morningstar.



Appendix: Standardized returns

Average annualized return as of June 30, 2023

Fund	3 months	Year-to-date	1 year	3 years	5 years	10 years	Since inception	Inception date
Vanguard Total Bond Market Index Fund Institutional Shares	-0.90	2.24	-0.89	-4.01	0.79	1.49	4.23	09/18/1995
Vanguard Total International Bond Index Fund Institutional Shares	0.18	3.73	0.31	-3.34	0.28	2.08	1.93	05/31/2013
Vanguard Total Stock Market Index Fund Institutional Shares	8.42	16.18	18.94	13.76	11.31	12.29	8.44	07/07/1997
Vanguard Total International Stock Index Fund Institutional Shares	2.61	9.43	12.33	7.54	3.72	5.07	4.64	11/29/2010
Vanguard Short-Term Inflation-Protected Securities Index Fund Institutional Shares	-0.69	1.58	0.14	2.32	2.70	1.68	1.44	10/17/2012

The performance data shown represent past performance. Past performance is no guarantee of future results. Investment returns and principal value will fluctuate, so investors' shares, when sold, may be worth more or less than their original cost. Current performance may be lower or higher than the performance data cited. For performance data current to the most recent month-end, visit our website at vanguard.com/performance. Some funds assess purchase, redemption, and/or account maintenance fees. The performance data shown do not reflect deduction of these fees. If they did, performance would be lower. Details on these fees and adjusted performance figures can be found in the fund detail section.

Data from Vanguard and Morningstar.



Notes

Notes

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Target 2015 Composite Index: An index derived by applying the fund's target asset allocation to the results of the following benchmarks: for international stocks of developed markets, the MSCI EAFE Index through December 15, 2010, the MSCI ACWI ex USA IMI Index through June 2, 2013, and the FTSE Global All Cap ex U.S. Index thereafter; for emerging-market stocks, the Select Emerging Markets Index through August 23, 2006, the MSCI Emerging Markets Index through December 15, 2010, the MSCI ACWI ex USA IMI Index through June 2, 2013, and the FTSE Global All Cap ex U.S. Index thereafter; for U.S. bonds, the Bloomberg U.S. Aggregate Bond Index through December 31, 2009, and the Bloomberg U.S. Aggregate Float Adjusted Index thereafter, as well as the Bloomberg U.S. Treasury Inflation-Protected Securities Index through June 2, 2013, and the Bloomberg U.S. Treasury Inflation-Protected Securities (TIPS) 0-5 Year Index thereafter; for international bonds, the Bloomberg Global Aggregate ex-USD Float Adjusted RIC Capped Index; and for U.S. stocks, the Dow Jones U.S. Total Stock Market Index (formerly known as the Dow Jones Wilshire 5000 Index) through April 22, 2005, the MSCI U.S. Broad Market Index through June 2, 2013, and the CRSP U.S. Total Market Index thereafter.

Target 2020, 2030, 2040, and 2050 Composite Indexes: Indexes derived by applying the fund's target asset allocation to the results of the following benchmarks: for international stocks of developed markets, the MSCI EAFE Index through December 15, 2010, the MSCI ACWI ex USA IMI Index through June 2, 2013, and the FTSE Global All Cap ex U.S. Index thereafter; for emerging-market stocks, the Select Emerging Markets Index through August 23, 2006, the MSCI Emerging Markets Index through December 15, 2010, the MSCI ACWI ex USA IMI Index through June 2, 2013, and the FTSE Global All Cap ex U.S. Index thereafter; for U.S. bonds, the Bloomberg U.S. Aggregate Bond Index through December 31, 2009, and the Bloomberg U.S. Aggregate Float Adjusted Index thereafter; for international bonds, the Bloomberg Global Aggregate ex-USD Float Adjusted RIC Capped Index; and for U.S. stocks, the MSCI U.S. Broad Market Index through June 2, 2013, and the CRSP U.S. Total Market Index thereafter. International stock benchmark returns are adjusted for withholding taxes.

Target 2025, 2035, and 2045 Composite Indexes: Indexes derived by applying the fund's target asset allocation to the results of the following benchmarks: for international stocks of developed markets, the MSCI EAFE Index through December 15, 2010, the MSCI ACWI ex USA IMI Index through June 2, 2013, and the FTSE Global All Cap ex U.S. Index thereafter; for emerging-market stocks, the Select Emerging Markets Index through August 23, 2006, the MSCI Emerging Markets Index through December 15, 2010, the MSCI ACWI ex USA IMI Index through June 2, 2013, and the FTSE Global All Cap ex U.S. Index thereafter; for U.S. bonds, the Bloomberg U.S. Aggregate Bond Index through December 31, 2009, and the Bloomberg U.S. Aggregate Float Adjusted Index thereafter; for international bonds, the Bloomberg Global Aggregate ex-USD Float Adjusted RIC Capped Index; and for U.S. stocks, the Dow Jones U.S. Total Stock Market Index (formerly known as the Dow Jones Wilshire 5000 Index) through April 22, 2005, the MSCI U.S. Broad Market Index through June 2, 2013, and the CRSP U.S. Total Market Index thereafter. International stock benchmark returns are adjusted for withholding taxes.

Important information

Target 2055 Composite Index: An index derived by applying the fund's target asset allocation to the results of the following benchmarks: for international stocks of developed markets, the MSCI EAFE Index through December 15, 2010, the MSCI ACWI ex USA IMI Index through June 2, 2013, and the FTSE Global All Cap ex U.S. Index thereafter; for emerging-market stocks, the MSCI Emerging Markets Index through December 15, 2010, the MSCI ACWI ex USA IMI Index through June 2, 2013, and the FTSE Global All Cap ex U.S. Index thereafter; for U.S. bonds, the Bloomberg U.S. Aggregate Float Adjusted Index; for international bonds, the Bloomberg Global Aggregate ex-USD Float Adjusted RIC Capped Index beginning June 3, 2013; and for U.S. stocks, the MSCI U.S. Broad Market Index through June 2, 2013, and the CRSP U.S. Total Market Index thereafter. International stock benchmark returns are adjusted for withholding taxes.

Target 2060 Composite Index: An index derived by applying the fund's target asset allocation to the results of the following benchmarks: for international stocks of developed markets, the MSCI ACWI ex USA IMI Index through June 2, 2013, and the FTSE Global All Cap ex U.S. Index thereafter; for emerging market stocks, the MSCI ACWI ex USA IMI Index through June 2, 2013, and the FTSE Global All Cap ex U.S. Index thereafter; for U.S. bonds, the Bloomberg U.S. Aggregate Float Adjusted Index; for international bonds, the Bloomberg Global Aggregate ex-USD Float Adjusted RIC Capped Index beginning June 3, 2013; and for U.S. stocks, the MSCI U.S. Broad Market Index through June 2, 2013, and the CRSP U.S. Total Market Index thereafter. International stock benchmark returns are adjusted for withholding taxes.

Target 2065 Composite Index: An index derived by applying the fund's target asset allocation to the results of the following benchmarks: the FTSE Global All Cap ex U.S. Index for international stocks, the Bloomberg U.S. Aggregate Float Adjusted Index for U.S. bonds, the Bloomberg Global Aggregate ex-USD Float Adjusted RIC Capped Index for international bonds, and the CRSP U.S. Total Market Index for U.S. stocks. International stock benchmark returns are adjusted for withholding taxes.

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The VLCM inherits the distributional forecasting framework of the VCMM and applies to it the calculation of wealth outcomes from any given portfolio.

The most impactful drivers of glide path changes within the VLCM tend to be risk aversion, the presence of a defined benefit plan, retirement age, savings rate and starting compensation. The VLCM chooses among glide paths by scoring them according to the utility function described and choosing the one with the highest score. The VLCM does not optimize the levels of spending and contribution rates. Rather, the VLCM optimizes the glide path for a given customizable level of spending, growth rate of contributions and other plan sponsor characteristics.

A full dynamic stochastic life-cycle model, including optimization of a savings strategy and dynamic spending in retirement is beyond the scope of this framework.

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