

Vanguard Target Retirement Funds and Trusts

Quarterly Review | December 31, 2023



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Quarterly perspective

2023 year in review

Brian M. Miller, CFA
Senior Investment Specialist



Both stock and bond markets saw a strong rebound in 2023 following the downturn experienced across most major markets in 2022, with U.S. equities ending the year up 26.0% and U.S. fixed income up 5.7%. Non-U.S. markets recovered as well, with non-U.S. equities and fixed income returning 15.5% and 8.9%, respectively*.

Vanguard Target Retirement Funds also had a strong 2023, with absolute returns ranging from 10.7% (Income vintage) to 20.2% (2070 vintage). On a peer-relative basis, most vintages across the glide path outperformed their respective Morningstar peer-group median. On the investor behavior front, we continued to see target-date fund (TDF) investors staying the course after a rocky 2022 and contributing at historically consistent levels—indicating that those who are saving for retirement view TDFs as long-term investments as intended.

Notably, 2023 marked the 20th anniversary of Vanguard Target Retirement Funds. Celebrating this milestone gave us the opportunity to reflect on our valued partnerships and the progress made over the past two decades with respect to broad TDF adoption and plan enhancements. To commemorate the occasion, we created an animated video examining the specific contributions of TDFs to the retirement savings landscape, posing the question, “What if TDFs never existed?”

As we look ahead toward the next 20 years and beyond, we remain committed to ensuring that our Target Retirement Funds continue to meet the evolving needs of our investors. On page 4, we’ve highlighted select TDF-related thought leadership and research pieces that were released in 2023. These topics, with

an emphasis on increasing retirement readiness among investors, represent the latest in our efforts to evolve our target-date offer, always with the goal of giving participants the best chance of achieving retirement success.

Finally, 2023 saw the continued build-out of the significant dedicated resources focused on ensuring that Vanguard Target Retirement Funds are consistently delivering for our investors. This included the evolution of our Strategic Asset Allocation Committee (SAAC), which we highlight in this quarter’s Spotlight article. Composed of senior investment executives, the SAAC is responsible for governing the methodology behind our glide-path design and asset allocation. In addition, several individuals took on new portfolio manager roles in February 2023, including Michael Roach, CFA, senior manager and head of Multiasset Portfolio Management, and Roger Aliaga-Díaz, Ph.D., chief economist, Americas, and global head of Portfolio Construction.

As always, we thank you for your trust and partnership, and we look forward to a prosperous 2024.

Performance of key Vanguard index funds

Fund name (inception date)	1Q 2023	2Q 2023	3Q 2023	4Q 2023	1-year
Vanguard Total Stock Market Index Fund (07/07/1997)	7.15%	8.42%	-3.30%	12.17%	26.02%
Vanguard Total International Stock Index Fund (11/29/2010)	6.65%	2.61%	-4.01%	9.98%	15.53%
Vanguard Total Bond Market Index Fund (09/18/1995)	3.16%	-0.90%	-3.08%	6.69%	5.72%
Vanguard Total International Bond Index Fund (05/31/2013)	3.54%	0.18%	-1.50%	6.54%	8.85%
Vanguard Short-Term Inflation-Protected Securities Index Fund (10/17/2012)	2.28%	-0.69%	0.43%	2.55%	4.61%

Source of performance figures: Vanguard, Institutional share class, as of December 31, 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 [institutional.vanguard.com](https://www.institutional.vanguard.com). Standard performance of the funds can be located on page 31 of the Quarterly Review.

* Percentages derived from returns table on this page.



TDF Research/Thought leadership in 2023

Quarterly spotlight articles

(Re)validating the case for international bonds

We took a deeper look into our current fixed income exposure with a key question in mind: Should we change the fixed income home bias? Our updated research reaffirms how and why maintaining a meaningful allocation to currency-hedged international bonds (30% of the total fixed income exposure) is a sufficient way for investors to improve risk-adjusted returns within their portfolios.

Meaningful vs. marketing:

Assessing changes in glide-path design

Any change Vanguard makes to its glide path represents our belief in that change having a consistent, positive impact on investor outcomes. 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.

A look back on 20 years of Vanguard

Target Retirement Funds

We celebrate the 20th anniversary of the Vanguard Target Retirement Funds series and our partnership with plan sponsors, as well as the contribution that TDFs have made to retirement savings outcomes.

Adding value via strategic asset allocation:

Vanguard's Strategic Asset Allocation Committee

When it comes to long-term portfolios, specifically TDFs, having the right allocation mix is key to achieving successful retirement outcomes. Since the inception of Vanguard Target Retirement Funds in 2003, we've emphasized a strategic approach to asset allocation, and our [Strategic Asset Allocation Committee](#) (SAAC) plays a critical role in helping to guide our methodology.

Vanguard viewpoints

TDFs or financial advice? How about both?

We recognize that providing a path to financial wellness for a diverse population, such as TDF investors, requires a spectrum of solutions. Acknowledging that TDFs and financial advice are not in conflict, we present key factors that investors should consider when evaluating these two approaches and weighing how to best chart their path toward retirement saving.

Guiding participants to the right retirement income door

Thanks to plan design features such as automatic enrollment and automatic escalation, TDFs have greatly simplified retirement accumulation. Given these trends, plan sponsors are in a unique position to help participants convert their retirement savings into income.

How America Saves 2023

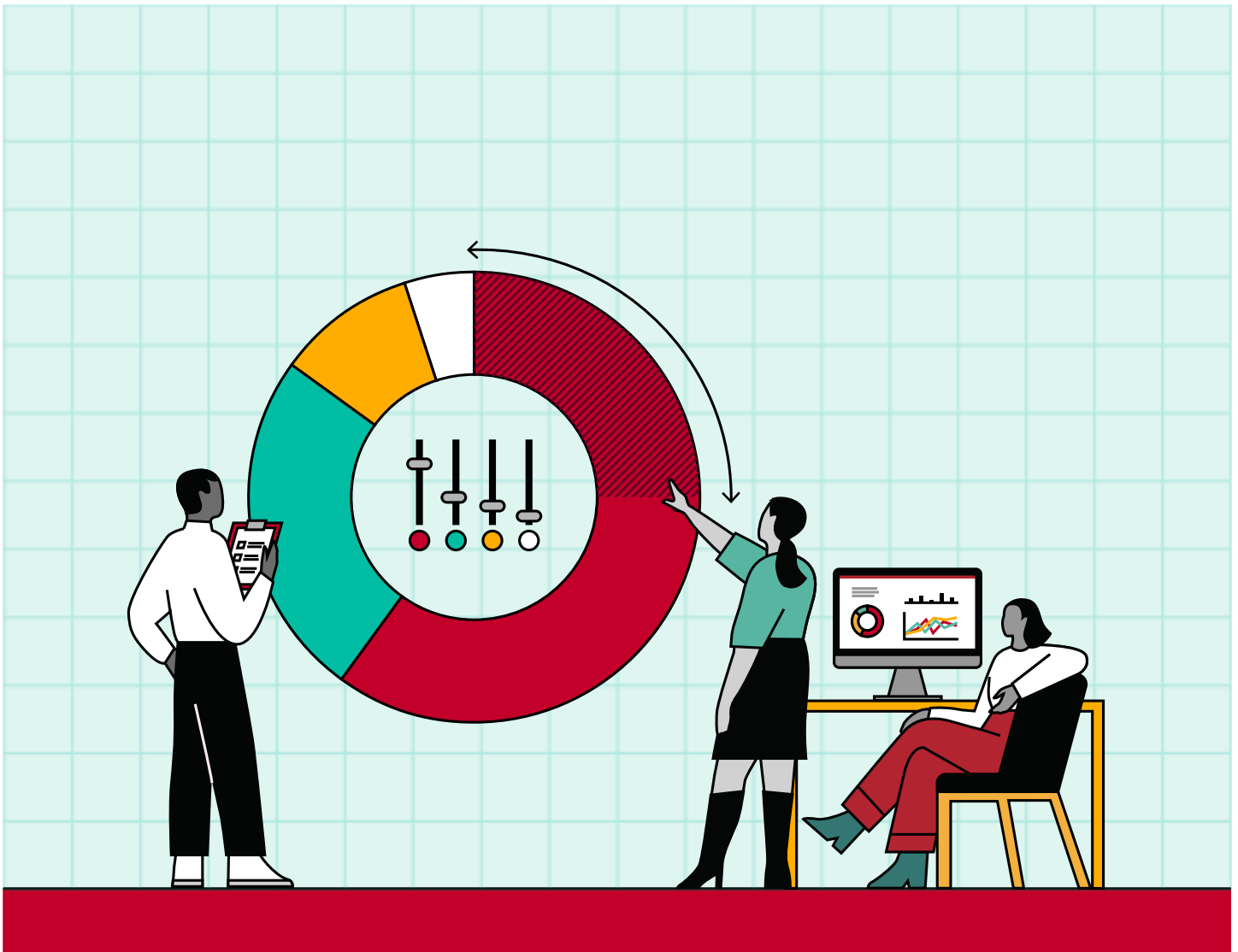
Vanguard's annual deep dive into participant saving behaviors found that the percentage of plans offering TDFs has grown from 86% in 2013 to 96% in 2022, among other key insights.

How investor behavior factors into our TDF portfolio plan

As co-managers on several Vanguard multiasset strategies, including Vanguard Target Retirement series, Roger Aliaga-Díaz, chief economist for the Americas and head of Portfolio Construction, and Michael Roach, senior manager and head of Multiasset Portfolio Management, discuss their newest roles at Vanguard as well as what differentiates our TDFs from those of our competitors.

Increasing retirement readiness through higher savings rates and TDFs

Vanguard's Investment Strategy Group outlines key findings from its recent study on how saving at recommended rates and investing in an age-appropriate asset allocation can help increase retirement readiness for investors.



Adding value via strategic asset allocation

Vanguard's Strategic Asset Allocation Committee

Strategic versus tactical asset allocation approach is an age-old debate in the world of asset managers, fiduciaries, and everyday investors alike. When it comes to long-term portfolios, specifically target-date funds (TDFs), which approach has the greatest impact on retirement outcomes, and how do you ensure that you have the right allocation mix on an ongoing basis?



We're often asked about Vanguard's approach to constructing TDFs and how it specifically relates to helping improve investor outcomes. Since the inception of the Vanguard Target Retirement Funds series in 2003, we have emphasized a strategic approach to asset allocation. This is where the Strategic Asset Allocation Committee (SAAC) plays a critical role in helping to guide our asset allocation methodology. Composed of global investment leaders from across Vanguard, the SAAC meets regularly to debate investment strategies and research recommendations, which, in turn, ensures that we maintain a consistent approach in meeting the retirement needs of TDF investors. In this article, we revalidate why strategic asset allocation still matters and how, in tandem with the governing oversight, it ensures that we maintain a consistent approach in meeting the retirement needs of TDF investors.

Determining the appropriate asset allocation for retirement success

Our position on asset allocation is rooted in research that has consistently shown that the mix of assets in broadly diversified portfolios is by far the greatest determinant of both total returns and return variability over the long term. In addition to the seminal research conducted by Gary P. Brinson, L. Randolph Hood, and Gilbert L. Beebower in 1986, our own study, Vanguard's Framework for Constructing Globally Diversified Portfolios, shows that, over time, more than 90% of a portfolio's return variability can be explained by its strategic asset allocation.

Vanguard has developed a set of investment principles that we believe are important to long-term investment success: **having clear and appropriate investment goals; developing a suitable asset allocation using broadly diversified, or balanced, funds; minimizing costs; and maintaining perspective and long-term discipline (Figure 1)**. In designing a solution for the wide range of TDF investors, we strongly believe in balancing risk aversion and other investor risk preferences with return expectations that appropriately compensate for those risks. As such, strategic asset allocation is a core part of the portfolio construction framework that underpins this investment philosophy and our approach to TDF design.

Conversely, as our study shows, short-term tactical investment decisions, market-timing, and security selection had relatively little impact on return variability over longer time periods. The primary reason for this is within broadly diversified portfolios is extremely difficult to consistently replicate over a multidecade time horizon, which is what TDFs are specifically designed for.

Over time, more than 90% of a portfolio's return variability can be explained by its strategic asset allocation.

FIGURE 1. Vanguard's investment principles

Investment philosophy Four principles for successful investing	1 Goals Create clear, appropriate investment goals.	2 Balance Avoid uncompensated risk via diversification.	3 Cost Minimize cost.	4 Discipline Maintain perspective and long-term discipline.
Portfolio construction framework	Financial goals (portfolio allocations, Vanguard Asset Allocation Model) <ul style="list-style-type: none"> • Wealth accumulation. • Solving portfolio income. • Hedging specific risks. Personal life-cycle goals (glide paths, Vanguard Life-Cycle Investing Model) <ul style="list-style-type: none"> • Retirement success. • Saving for higher education. • Buying a house. • Legacy goals. 	<ul style="list-style-type: none"> • Explicit estimation of investment risks and risk-return trade-offs. • Estimated asset return distributions (Vanguard Capital Markets Model return forecasts, volatility, correlations, fat tails). • Portfolio optimization minimizes idiosyncratic (uncompensated) risks. 	<ul style="list-style-type: none"> • Net-of-fee returns. • Consider taxes, trading costs, and liquidity costs. 	<ul style="list-style-type: none"> • Behavioral response to market volatility. • Explicitly account for risk aversion and other investor risk preferences (utility-based approach).



For each tactical move to succeed, portfolio managers need to be right in not just one area but all of the following:

- Identifying a reliable indicator of short-term future market returns.
- Timing the exit from an asset class or the market down to the precise day.
- Timing reentry to an asset class or the market down to the precise day.
- Deciding on the size of the allocation and how to fund the trade.
- Executing the trade at a cost less than the expected benefit (reflecting transaction costs, spreads, and taxes).

Even if a portfolio manager can get these steps right most of the time, the long-term value is marginal. Vanguard previously conducted an analysis of the incremental benefits of market-timing based on how frequently a hypothetical investor might be successful in anticipating economic surprises and found the following: **An investor would have to be correct at least 75% of the time to get a return only slightly higher than that of the traditional baseline 60/40 portfolio.** While there are professional asset managers who demonstrate such skill, very few can consistently achieve a 75% hit rate, especially in a globally diversified portfolio.

Strategic asset allocation still matters

Over the past 18 months, investors have been inundated with articles proclaiming the “death” of the 60/40 portfolio, the de facto balanced portfolio.¹ This is largely due to the losses experienced in 2022 when both stocks and bonds ended the year in negative territory, driven in part by historically high stock-bond correlations. However, while increases in stock-bond correlations may have garnered a lot of attention, when viewed through a longer performance lens, the impact on retirement savings outcomes is less significant in its broader context than short-term analyses may imply. As is often the case, the idea that both the 60/40 portfolio and the underlying strategic asset allocation that guides it are dead is greatly exaggerated.¹ In contrast, we would argue that defining an *appropriate* strategic asset allocation remains as important as ever for achieving long-term investing success.

Strategic asset allocation has endured for a reason. Not only has it been reaffirmed by research, but it has also outlasted multiple market cycles, which is why the strategic approach remains a key investment principle behind Vanguard Target Retirement Funds. While participants and plan sponsors may sometimes feel that this approach is overly passive, it is certainly not without careful

deliberation. It has proven to be a reliable driver of long-term return variability and remains as effective as ever in helping TDF investors seek lifelong financial well-being.

Strategic oversight: Meet the SAAC

While the concept of strategic asset allocation may seem straightforward on the surface, it takes considerable time and resources to ensure that it is effectively meeting the evolving needs of our TDF investors. In addition to the ongoing rigor that is applied to our Target Retirement Funds and portfolio construction methodology, strategic asset allocation methodology and related decisions are governed by Vanguard’s Strategic Asset Allocation Committee, an executive oversight committee composed of investment experts sitting in key leadership roles across investment research, behavioral research, portfolio management, and portfolio construction (page 9). Heading the committee are co-chairs Joseph Davis, our global chief economist and global head of Vanguard’s Investment Strategy Group (ISG), and Roger Aliaga-Díaz, global head of portfolio construction, chief economist for the Americas, and co-portfolio manager of the Target Retirement Funds.

The SAAC meets regularly to discuss research and recommendations made by specialists from across the firm, but it does not operate alone. Experts within ISG, the Portfolio Review Department (PRD), and trading functions within the Investment Management Group (IMG) partner on the creation of research and other content that it reviews. For example, Vanguard conducts an annual comprehensive review of our glide path and strategic asset allocation to ensure that Vanguard’s latest and best thinking is reflected in our Target Retirement Funds and that they continue to meet the evolving needs of our investors. During this process, Vanguard considers new asset classes, currency exposures, home bias, regulatory impacts, investment costs, investor behaviors, and implementation factors, among other things. While these considerations may result in recommendations for glide-path changes, such changes require debate and are not always accepted. Regardless of the outcome, this valuable process results in a collection of research that is later published for external consumption or leveraged internally for future analyses.

Importantly, the SAAC is a role-based committee. This means that the focus is on ensuring that the viewpoints from critical roles in multiasset portfolio construction and the management process are represented rather than the viewpoints of a specific individual. Given Vanguard’s rotational culture, this also means that turnover on the committee can be more frequent, but we find that this allows fresh approaches to be introduced and lends itself to more robust discussion and decision-making.



The SAAC in action

We are often asked how changes to the glide path or underlying asset allocation are made and what that process looks like in practice. To bring this to life, we provide a previous case study as an example: the decision to allocate to currency-hedged international bonds in our Target Retirement Funds.

The process began with research spearheaded by ISG, which showed considerable benefits for including international bonds, such as improved portfolio diversification by providing access to the largest part of the global fixed income market. The research was presented to the SAAC, and while it was met with a positive reception, there was some concern about the volatility of international bonds compared with U.S. bonds.

This feedback resulted in a deeper dive, which showed that the higher relative volatility level could be almost entirely attributed to the currency risk associated with the

underlying bond exposures. The resulting recommendation was to mitigate this currency risk by hedging the international bonds allocation to the U.S. dollar. By hedging the currency risk entirely, the volatility level of an international bond allocation falls below that of an equivalent investment grade U.S. bond allocation. This allows the international bond allocation to function as

intended in the overall portfolio mix by improving diversification while also helping to reduce the overall portfolio risk level.

This deeper dive led to the research making its second trip to the SAAC. With the refreshed recommendation being approved, it paved the way for the inclusion of the asset class in our Target Retirement Funds in 2013. We increased our currency-hedged international bond exposure in 2015 to its current level (30% of the total fixed income allocation). Recently, [we reaffirmed our research](#) on why international bonds continue to add value for investors.

Designed to meet long-term objectives

Our conviction in setting a prudent strategic asset allocation as a key foundation for long-term investing success remains strong. Our TDFs, on average, have performed in the top quartile among their peer groups for 10-year returns,² which helped give investors a better chance for lasting income through retirement. The care and rigor that is applied to determining and revalidating our strategic asset allocation has been the primary driver of this success. We remain committed to this approach, as we believe our investors will benefit from it for years to come.

¹ "Time to move on from the 60/40 debate." Vanguard, 2023. (article, published June 2023)

² Vanguard and Morningstar, Inc., as of December 31, 2023. Our Target Retirement Funds with a 10-year track record or longer (2060 and earlier vintages), on average, ranked in the 78th percentile among peer groups for 10-year returns through 4Q 2023. Vanguard Target Retirement Income Fund ranked 28th out of 106 peers; 2020 Fund, 24th out of 94; 2025 Fund, 13th out of 146; 2030 Fund, 20th out of 139; 2035 Fund, 29th out of 141; 2040 Fund, 34th out of 139; 2045 Fund, 27th out of 141; 2050 Fund, 26th out of 139; and 2055 Fund, 28th out of 124; and 2060 Fund, 1st out of 8. Only competing funds with a 10-year history were included. Results will vary in other time periods.

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. For the most recent performance, visit our website at www.vanguard.com/performance.



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 the Vanguard Advice Policy Committee, thereby ensuring a consistent approach in our single-fund solutions and advice offers.

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



Top row, left to right

Joseph Davis, Ph.D., (Committee Chair)

Global Chief Economist and Global Head of Investment Strategy Group

Roger Aliaga-Diaz, Ph.D., (Committee Vice-chair)

Chief Economist, Americas, Global Head of Portfolio Construction

Greg Davis, CFA, (Ex-Officio) Global Chief Investment Officer

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

Geoff Parrish, Principal, Global Head of Fixed Income Indexing (New Member)

Middle row

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

Matthew Brancato, CFA, CPA, Chief Client Officer, Institutional Investor Group

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

Dan Reyes, CFA, Head of Portfolio Review Department

Brian Wimmer, CFA, Head of Multi-Asset Solutions (Nonvoting Member)

Bottom row

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

Michael Roach, CFA, Senior Manager, Head of Multi-Asset Portfolio

Brent Beardsley, Head of Strategy and Development (New Member)

Yan Pu, CFA, Principal, Head of Advice Methodology (Nonvoting Member)

Ian Kresnak, CFA, Chief of Staff, Investment Strategy Group (Nonvoting Member)

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

- *Hybrid annuity target date funds: A new class of target date funds incorporating annuities*

Source: Vanguard.



TDF industry and market overview

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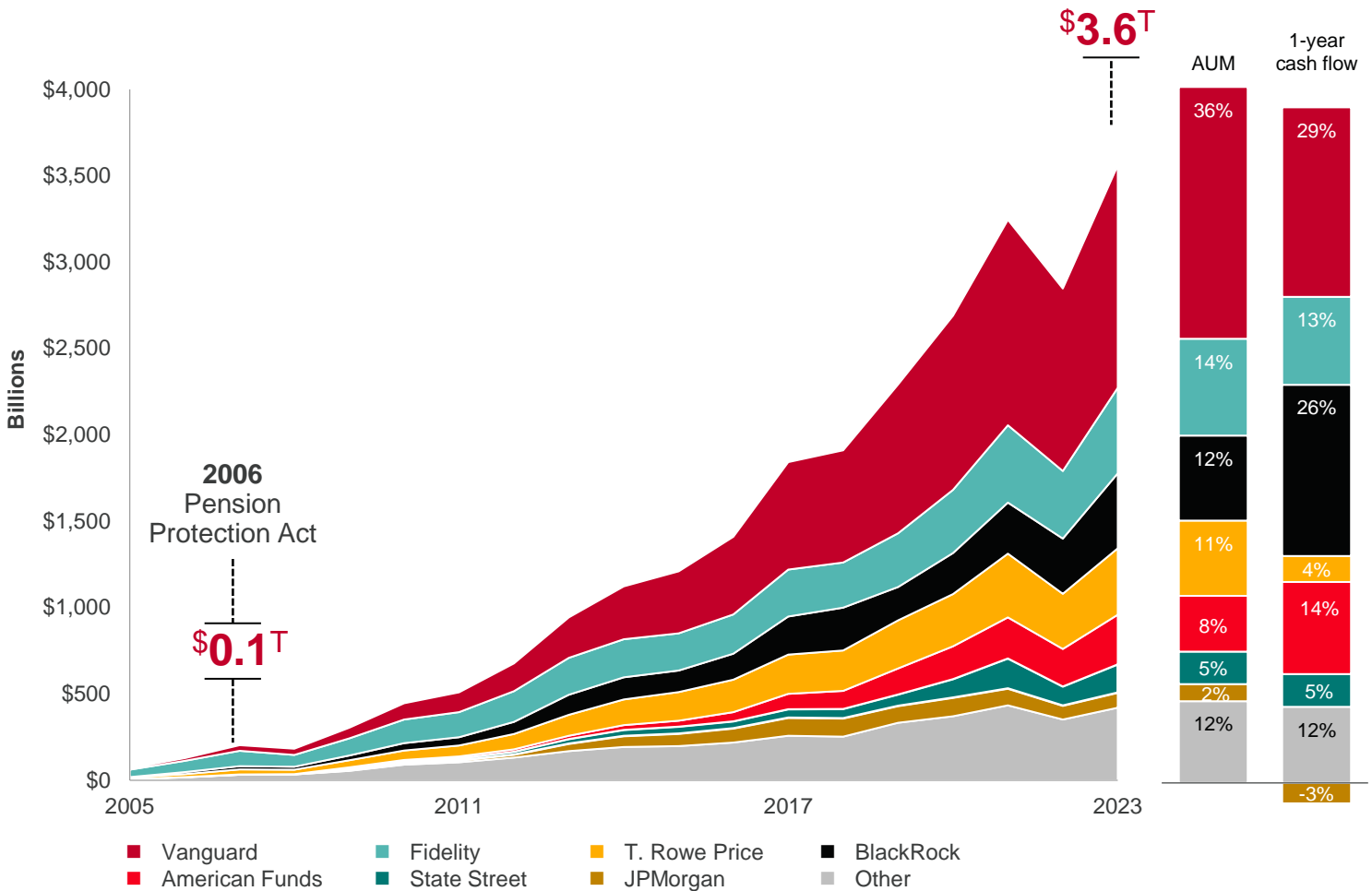
Industry growth and market share

Market environment



Industry growth and market share

Figure 11.1 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 \$3.55 trillion as of the end of Q4 2023. Vanguard continued to lead the industry in cash flow and assets under management, receiving more than one-quarter 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 \$3.13 trillion, as of December 31, 2023.

We estimate that as of the end of December, the target-date fund industry experienced a 4.8% organic growth rate over the last 12 months.*

Sources: Vanguard, Morningstar, as of December 31, 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 12.1 Index returns ranked by performance

2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	1Q 2023	2Q 2023	3Q 2023	4Q 2023
REIT 30.4	REIT 2.5	HYB 17.1	FTSE 27.4	IAGG 3.2	CRSP 30.8	CRSP 21.0	REIT 43.1	COM 16.1	CRSP 26.0	CRSP 7.2	CRSP 8.4	COM 4.7	REIT 16.0
CRSP 12.6	IAGG 1.3	CRSP 12.7	CRSP 21.2	CASH 1.9	REIT 25.8	FTSE 11.2	COM 27.1	CASH 1.5	FTSE 15.8	FTSE 6.4	REIT 2.7	CASH 1.4	CRSP 12.1
IAGG 9.1	EMB 1.3	COM 11.4	EMB 9.2	STPS 0.6	FTSE 21.8	AGG 7.5	CRSP 25.7	STPS -2.7	REIT 13.7	HYB 3.6	FTSE 2.5	HYB 0.5	EMB 9.8
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	HYB 13.4	IAGG 3.2	HYB 1.8	STPS 0.4	FTSE 9.8
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	EMB 10.5	AGG 3.0	EMB 1.4	IAGG -1.3	HYB 7.2
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	IAGG 8.8	REIT 2.7	CASH 1.3	EMB -2.9	AGG 6.8
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	AGG 5.5	STPS 2.2	IAGG 0.4	AGG -3.2	IAGG 6.4
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	CASH 5.3	EMB 2.1	STPS -0.7	CRSP -3.3	STPS 2.6
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	STPS 4.5	CASH 1.1	AGG -0.8	FTSE -3.3	CASH 1.4
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	COM -7.9	COM -5.4	COM -2.6	REIT -7.0	COM -4.6

Average annualized returns

Index returns		3 months	1 year	3 years	5 years	10 years	
Target Retirement Fund building blocks	CRSP	CRSP U.S. Total Market Index	12.14	25.98	8.44	15.08	11.44
	FTSE	FTSE Global All Cap ex U.S. Index	9.77	15.79	1.88	7.46	4.20
	AGG	Bloomberg U.S. Aggregate Bond Index	6.82	5.53	-3.31	1.10	1.81
	IAGG	Bloomberg Global Agg ex U.S. Float Adj RIC Cap Index (Hedged)	6.38	8.75	-2.41	1.02	2.59
	STPS	Bloomberg U.S. 0-5 Year TIPS Index	2.60	4.57	2.32	3.37	1.98
Other indexes	CASH	3-Month T-Bill	1.41	5.26	2.24	1.91	1.25
	HYB	Bloomberg U.S. Corporate High Yield Index	7.16	13.44	1.98	5.37	4.60
	EMB	Bloomberg USD Emerging Market Gov RIC Cap Index	9.79	10.46	-3.47	1.65	3.03
	REIT	MSCI U.S. REIT Index	16.00	13.74	7.10	7.40	7.60
	COM	Bloomberg Commodity Index	-4.63	-7.91	10.76	7.23	-1.11

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 December 31, 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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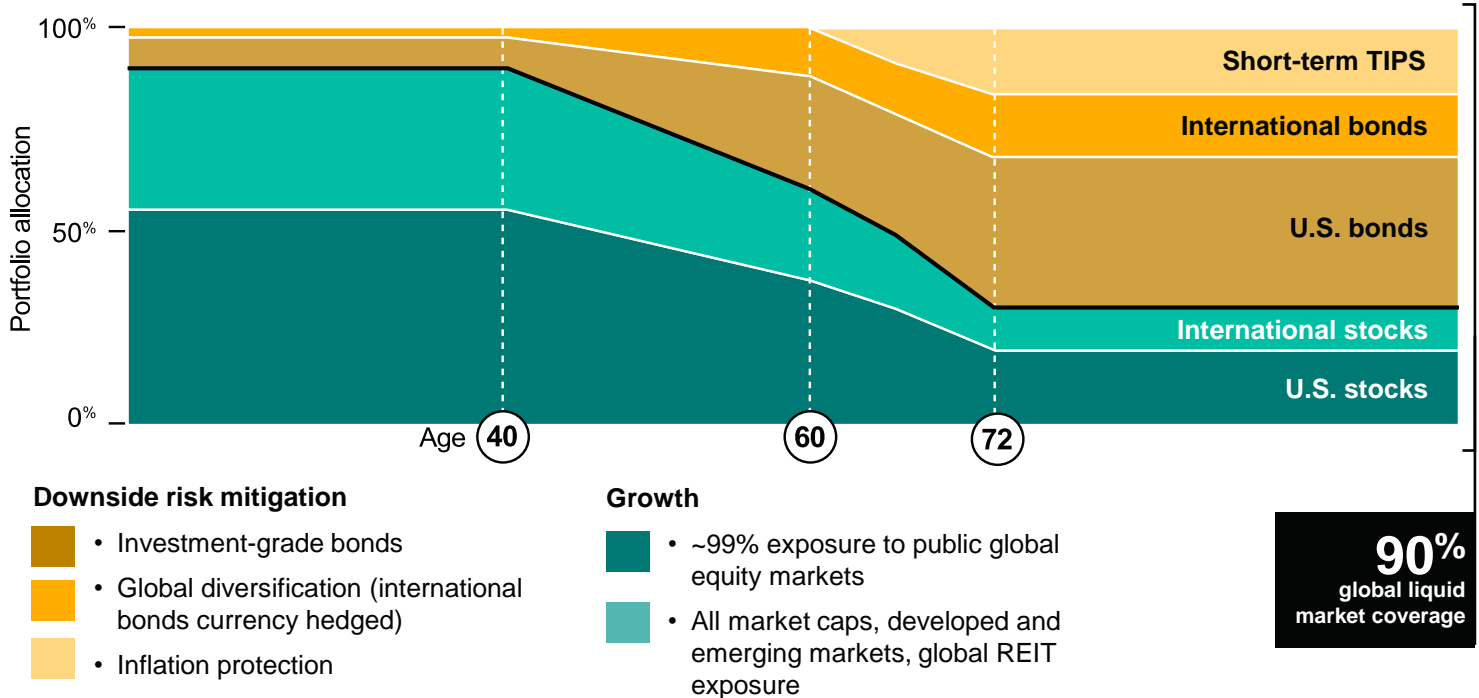
Evolution of Vanguard's glide-path design

Vanguard fund performance and attribution

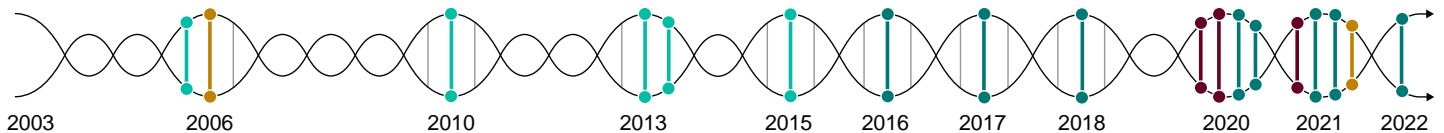


Purposeful design and evolution

Strategic asset allocation using high-quality building blocks



Meaningfully improving investor outcomes since inception



Enhanced asset allocation

- Increased equity weight in Income fund (2006)
- 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 December 31, 2023

Vanguard Target Retirement Fund and Trust performance

Portfolio/Benchmark	Average annualized return as of December 31, 2023					Since inception	Inception date
	3 months	1 year	3 years	5 years	10 years		
Vanguard Target Retirement Income Vintage							
Fund	7.34	10.74	0.56	4.83	4.09	4.87	10/27/2003
Trust II	7.32	10.70	0.56	4.86	4.13	4.57	2/29/2008
<i>Target Retirement Income Composite Index</i>	7.33	10.80	0.76	5.13	4.32	—	—
Vanguard Target Retirement 2020 Vintage							
Fund	8.00	12.51	1.47	6.61	5.52	5.91	6/7/2006
Trust II	7.99	12.52	1.50	6.65	5.58	5.78	2/29/2008
<i>Target Retirement 2020 Composite Index</i>	7.97	12.65	1.74	6.98	5.81	—	—
Vanguard Target Retirement 2025 Vintage							
Fund	8.87	14.55	2.03	7.56	6.10	6.53	10/27/2003
Trust II	8.90	14.56	2.11	7.65	6.19	6.20	2/29/2008
<i>Target Retirement 2025 Composite Index</i>	8.85	14.74	2.39	8.01	6.43	—	—
Vanguard Target Retirement 2030 Vintage							
Fund	9.53	16.03	2.66	8.37	6.58	6.57	6/7/2006
Trust II	9.54	16.03	2.73	8.45	6.66	6.53	2/29/2008
<i>Target Retirement 2030 Composite Index</i>	9.51	16.26	3.05	8.83	6.92	—	—
Vanguard Target Retirement 2035 Vintage							
Fund	9.82	17.14	3.33	9.17	7.06	7.32	10/27/2003
Trust II	9.89	17.20	3.42	9.28	7.15	6.93	2/29/2008
<i>Target Retirement 2035 Composite Index</i>	9.86	17.43	3.72	9.64	7.40	—	—
Vanguard Target Retirement 2040 Vintage							
Fund	10.23	18.34	4.02	9.99	7.52	7.22	6/7/2006
Trust II	10.23	18.37	4.08	10.07	7.60	7.32	2/29/2008
<i>Target Retirement 2040 Composite Index</i>	10.20	18.60	4.38	10.43	7.87	—	—

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 December 31, 2023.



Fund performance through December 31, 2023

Vanguard Target Retirement Fund and Trust performance (continued)

Portfolio/Benchmark	Average annualized return as of December 31, 2023					Since inception	Inception date
	3 months	1 year	3 years	5 years	10 years		
Vanguard Target Retirement 2045 Vintage							
Fund	10.57	19.48	4.68	10.76	7.91	7.97	10/27/2003
Trust II	10.56	19.53	4.75	10.82	7.97	7.54	2/29/2008
<i>Target Retirement 2045 Composite Index</i>	<i>10.54</i>	<i>19.77</i>	<i>5.03</i>	<i>11.20</i>	<i>8.25</i>	—	—
Vanguard Target Retirement 2050 Vintage							
Fund	10.79	20.17	4.91	10.93	7.99	7.51	6/7/2006
Trust II	10.80	20.22	4.99	10.99	8.05	7.61	2/29/2008
<i>Target Retirement 2050 Composite Index</i>	<i>10.78</i>	<i>20.48</i>	<i>5.27</i>	<i>11.37</i>	<i>8.34</i>	—	—
Vanguard Target Retirement 2055 Vintage							
Fund	10.78	20.16	4.92	10.92	7.97	9.77	8/18/2010
Trust II	10.81	20.23	4.99	11.00	8.05	10.14	8/31/2010
<i>Target Retirement 2055 Composite Index</i>	<i>10.78</i>	<i>20.48</i>	<i>5.27</i>	<i>11.37</i>	<i>8.34</i>	—	—
Vanguard Target Retirement 2060 Vintage							
Fund	10.79	20.18	4.92	10.92	7.97	9.52	1/19/2012
Trust II	10.81	20.23	5.00	11.02	8.06	9.22	3/1/2012
<i>Target Retirement 2060 Composite Index</i>	<i>10.78</i>	<i>20.48</i>	<i>5.27</i>	<i>11.37</i>	<i>8.34</i>	—	—
Vanguard Target Retirement 2065 Vintage							
Fund	10.79	20.15	4.95	10.91	—	8.44	7/12/2017
Trust II	10.83	20.24	5.00	11.02	—	9.05	7/17/2017
<i>Target Retirement 2065 Composite Index</i>	<i>10.78</i>	<i>20.48</i>	<i>5.27</i>	<i>11.37</i>	—	—	—
Vanguard Target Retirement 2070 Vintage							
Fund	10.83	20.24	—	—	—	13.75	6/8/2022
Trust II	10.80	20.23	—	—	—	3.81	4/7/2022
<i>Target Retirement 2070 Composite Index</i>	<i>10.78</i>	<i>20.48</i>	<i>5.27</i>	<i>11.37</i>	<i>8.22</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 December 31, 2023.





Underlying fund performance contribution

Figure 17.1 3-month return contribution by underlying funds

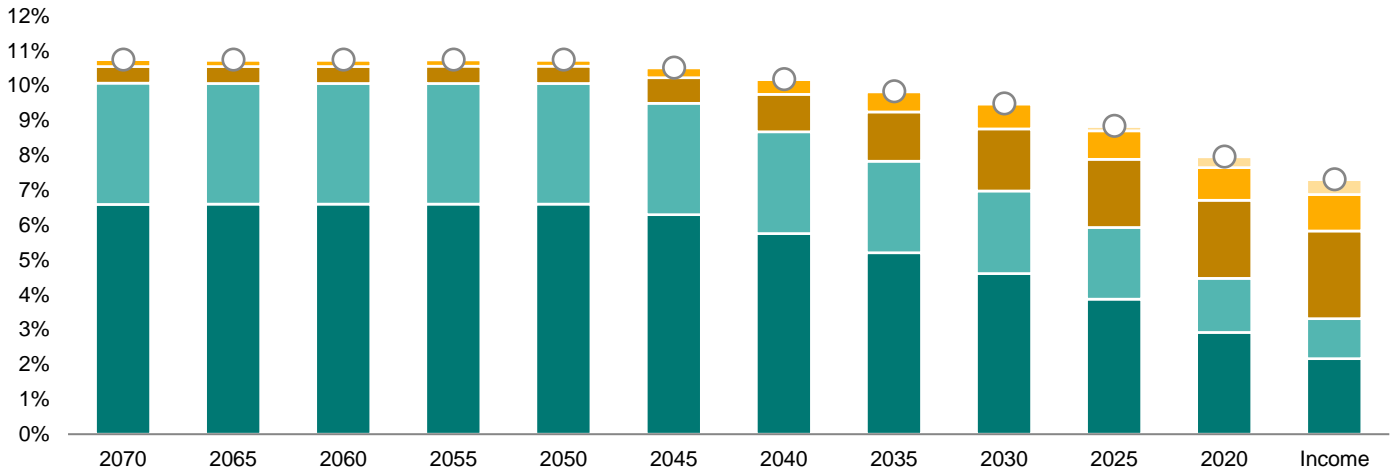
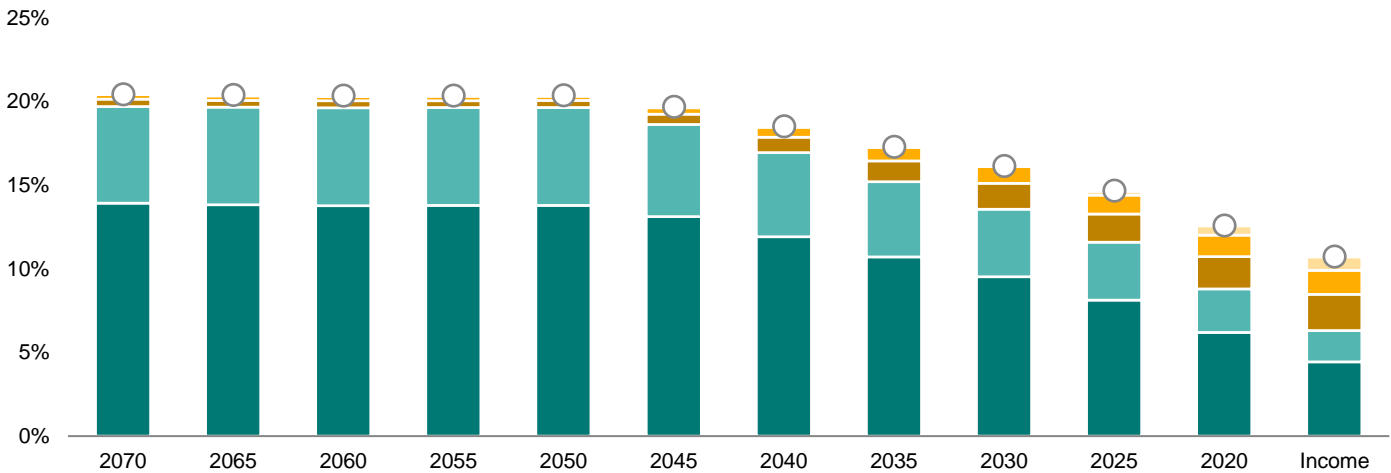


Figure 17.2 1-year return contribution by underlying funds



- 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 December 31, 2023.





Excess return attribution

Figure 18.1 3-month return attribution

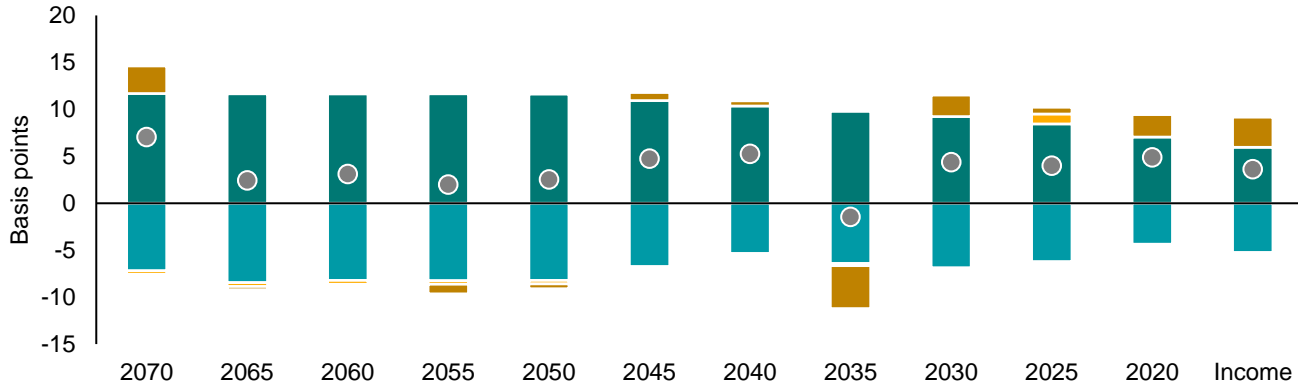
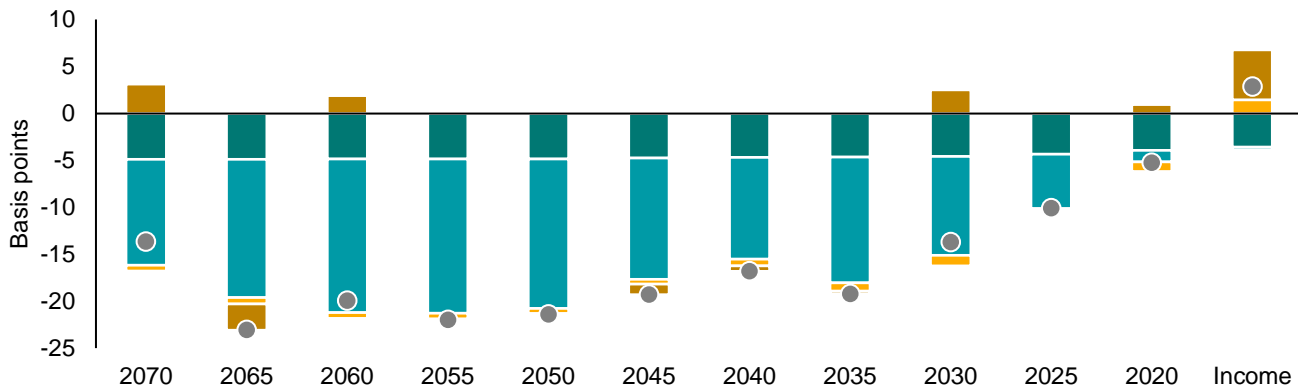


Figure 18.2 1-year return attribution



■ 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.

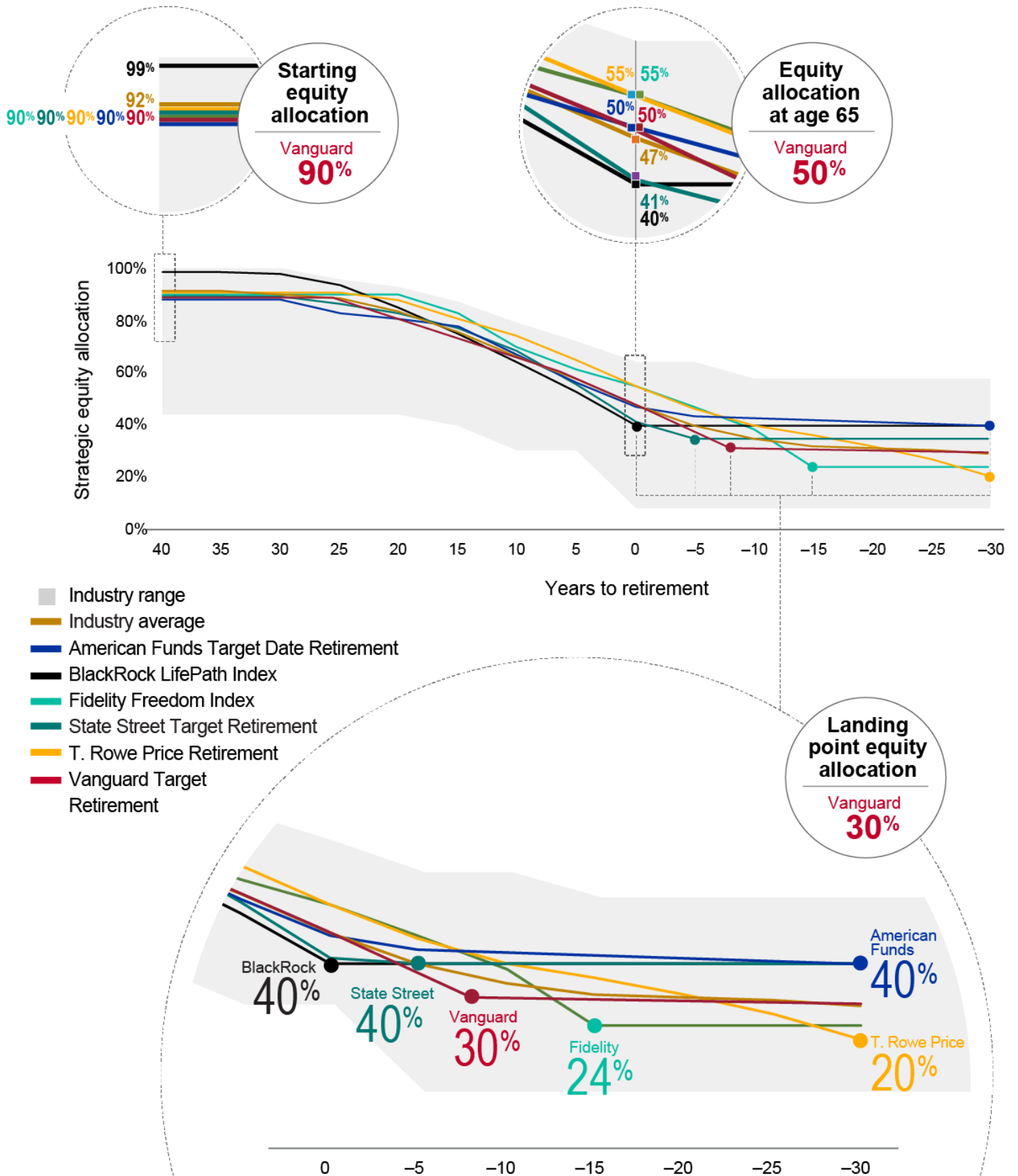
Past performance is not a guarantee of future results.

Sources: Vanguard and Morningstar, as of December 31, 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 December 31, 2023; Vanguard calculation for industry average.



Competitor fund construction and performance

IN THIS SECTION:

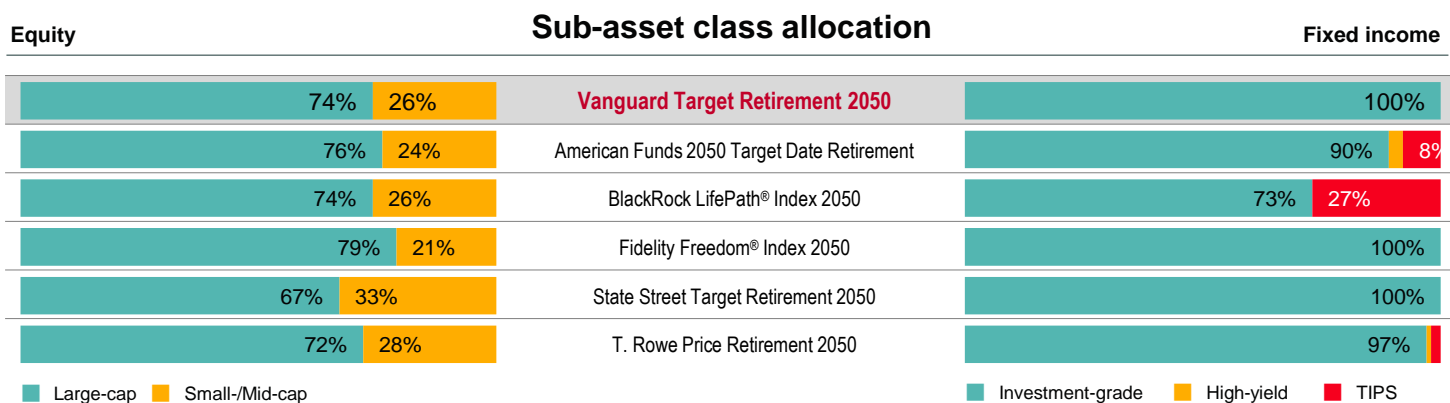
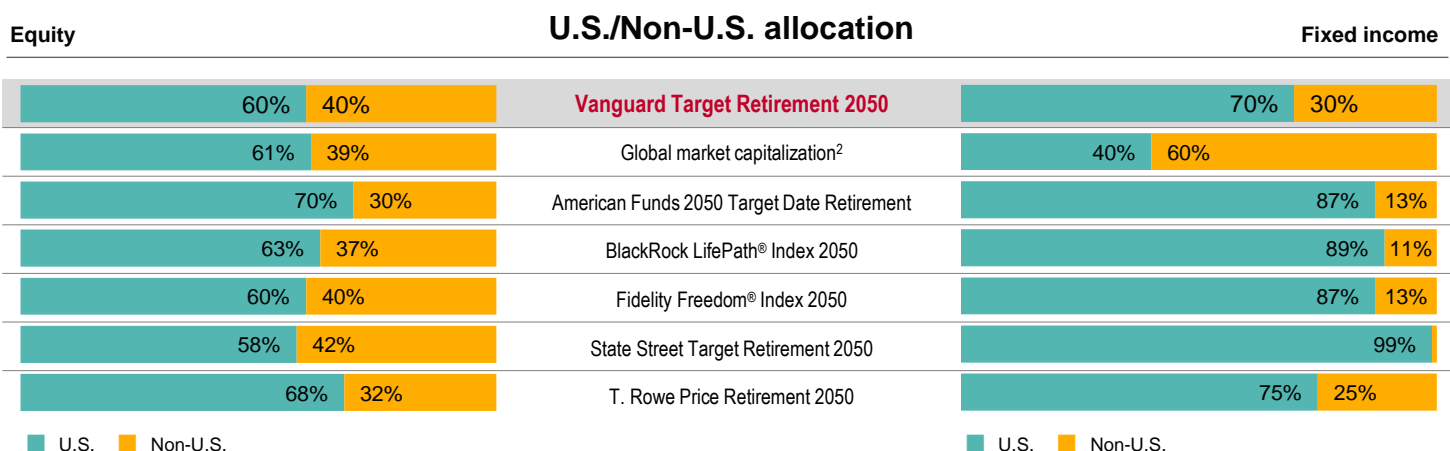
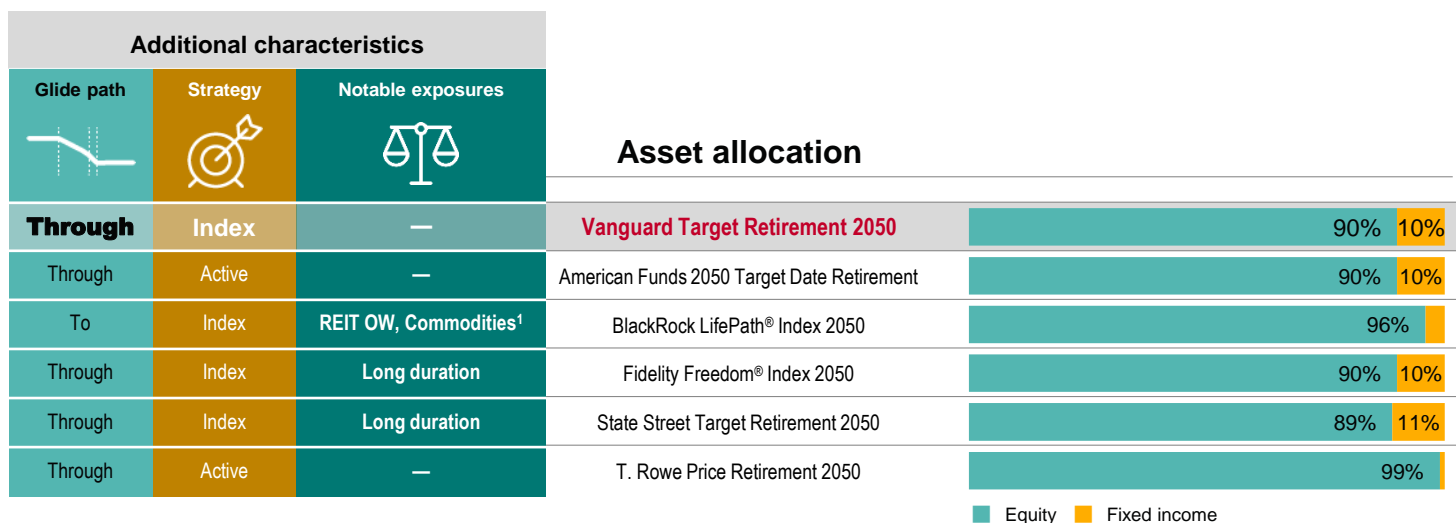
Beyond the glide path

12-month return attribution



2050 vintage: Beyond the glide path

Figure 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 December 31, 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.

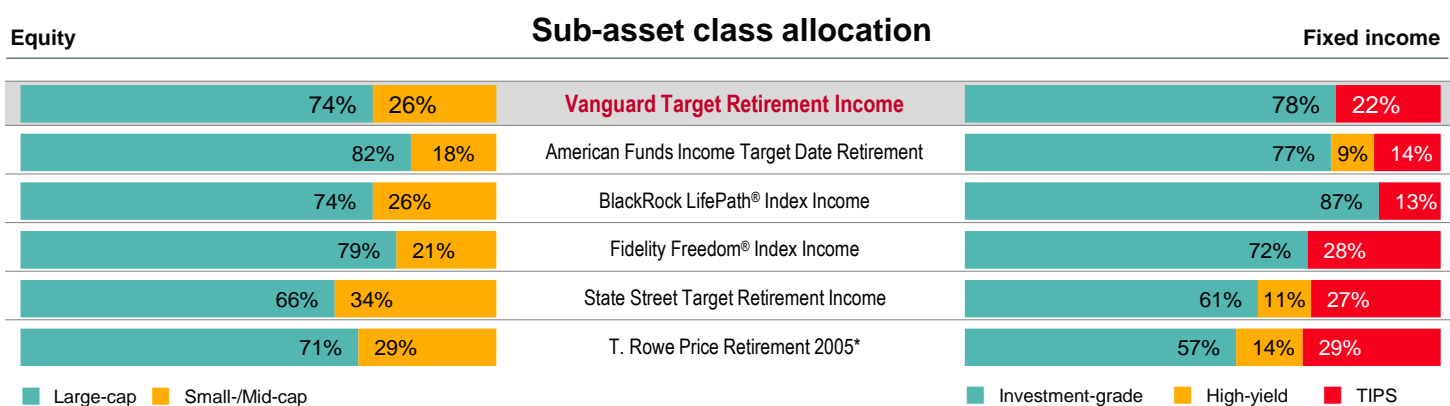
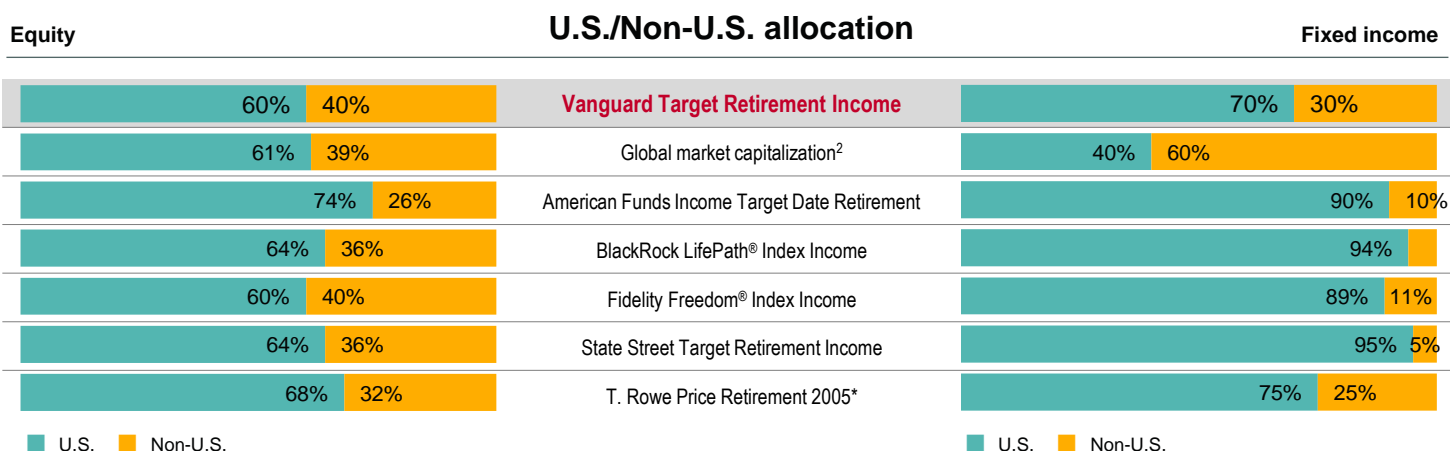
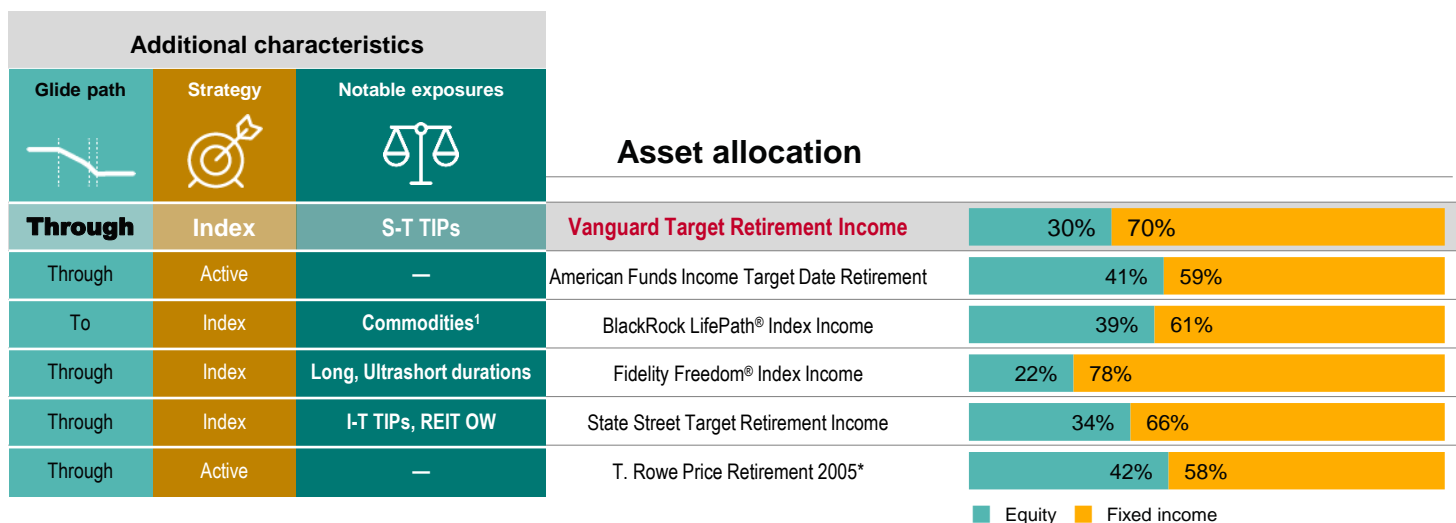
Note: Due to spacing issues, data labels below 7% are not displayed. Due to rounding, may not total to 100%.

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



Income vintage: Beyond the glide path

Figure 22.1 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 December 31, 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.

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

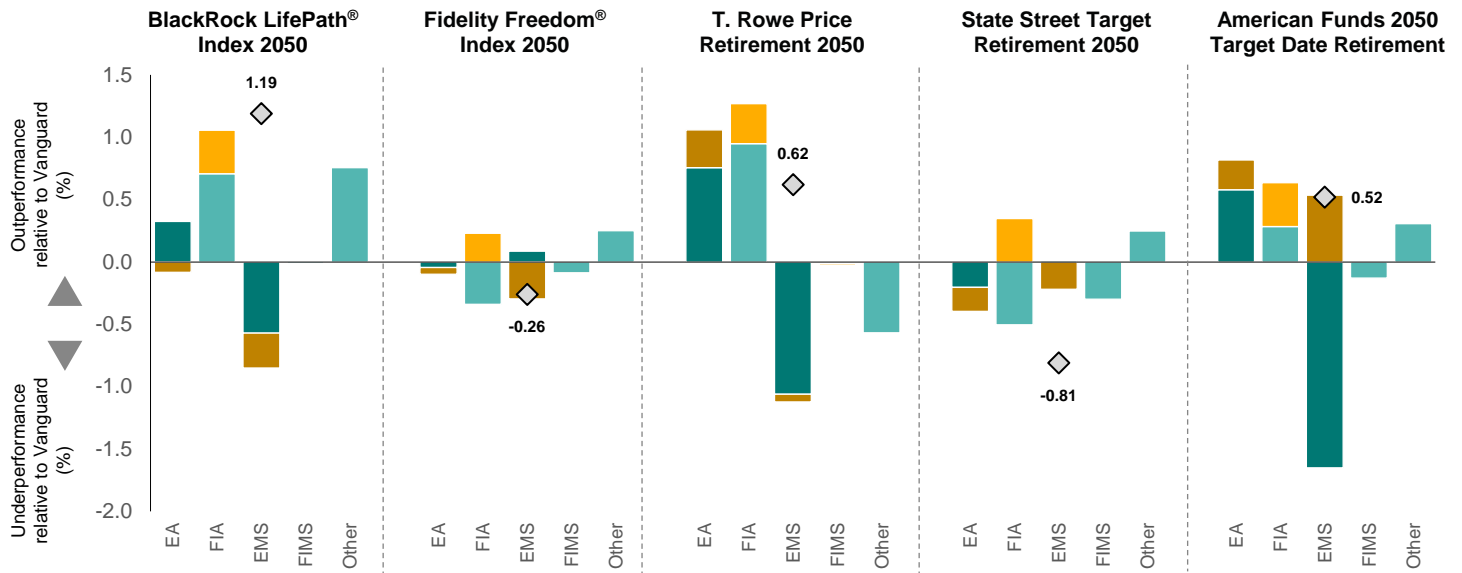
Note: Due to spacing issues, data labels below 7% are not displayed. Due to rounding, may not total to 100%.

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



12-month return attribution

Figure 23.1 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 lower allocation to U.S. and international fixed income.
- **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 relative to Vanguard was driven by a lower allocation to U.S. and international fixed income.
- **State Street's** underperformance was driven by an overweight to long duration fixed income in relation to Vanguard.
- **American Funds'** outperformance relative to Vanguard was driven by a lower allocation to U.S. and international fixed income.

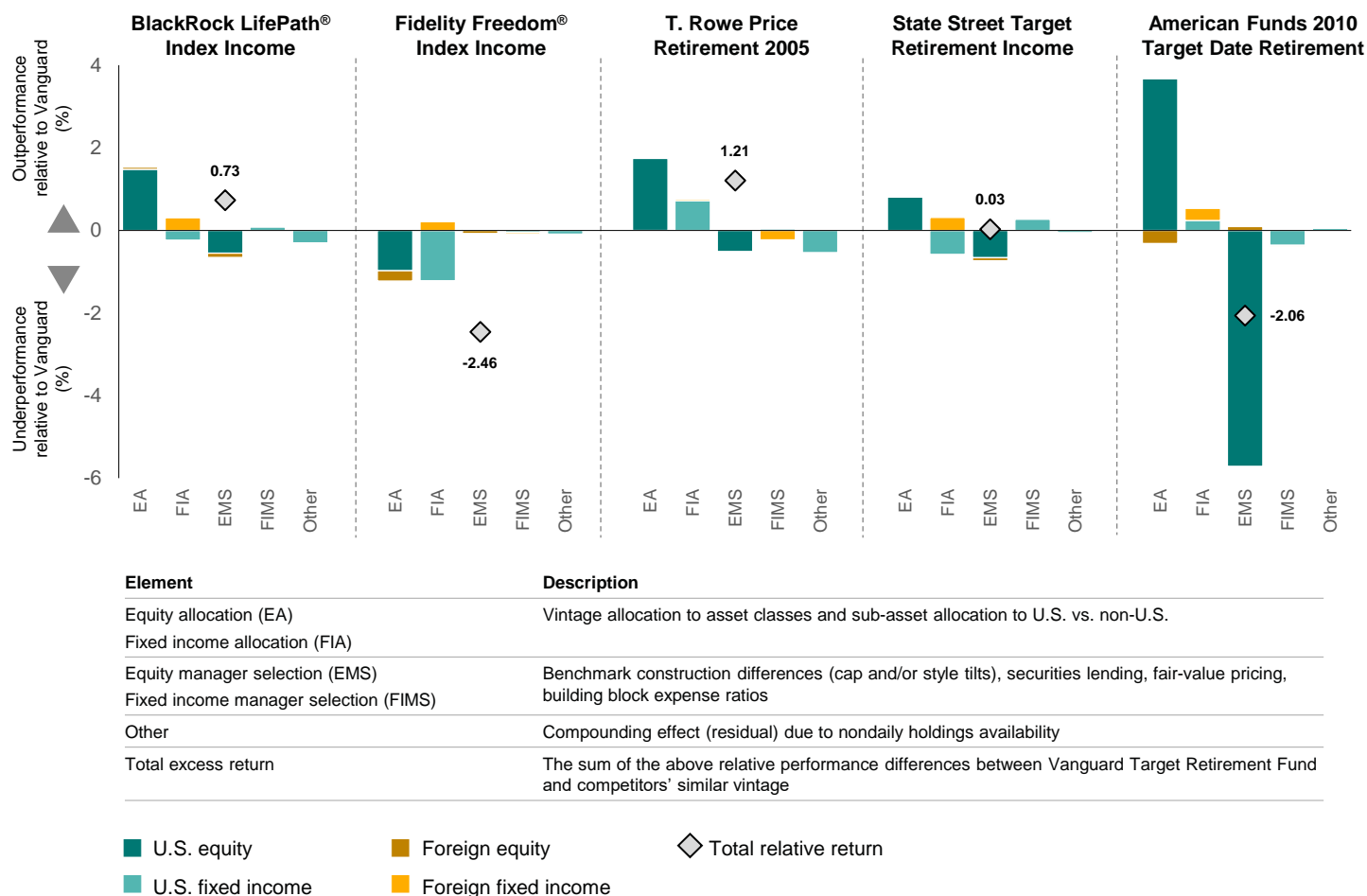
Past performance is not a guarantee of future results.

Sources: Vanguard and Morningstar, as of December 31, 2023.



12-month return attribution (continued)

Figure 24.1 Relative to top five industry income (or equivalent) funds*



- **BlackRock's** outperformance over the period was driven by a higher allocation to U.S. equity
- **Fidelity's** underperformance was driven by a significant underweight to equity securities relative to Vanguard and a large exposure to cash equivalents.
- **T. Rowe Price's** outperformance was driven by a higher allocation to U.S. equity relative to Vanguard.
- **State Street's** outperformance was driven by a lower allocation to fixed income and an overweight to short duration fixed income relative to Vanguard.
- **American Funds'** underperformance was driven by poor security selection within the U.S. equity portion of the portfolio.

Past performance is not a guarantee of future results.

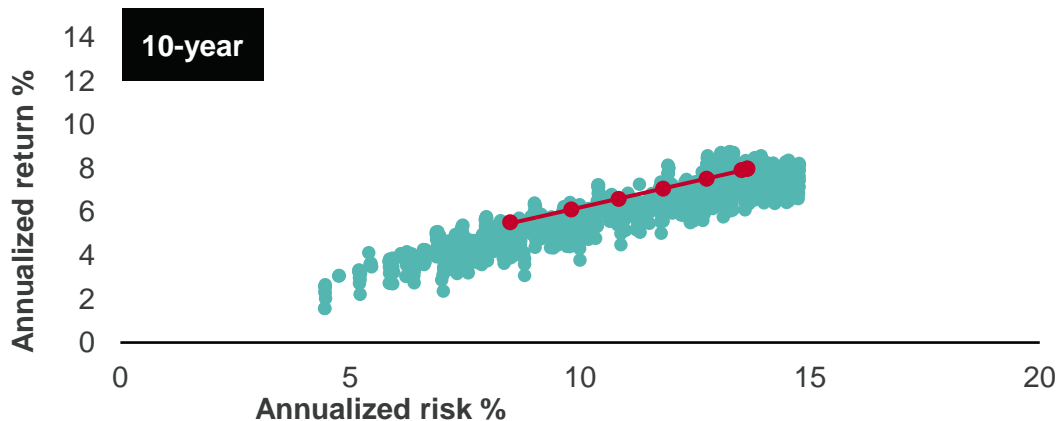
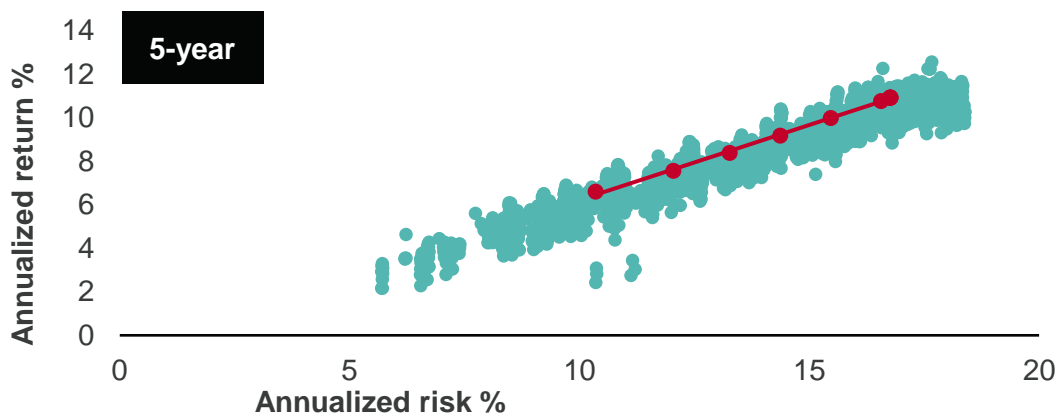
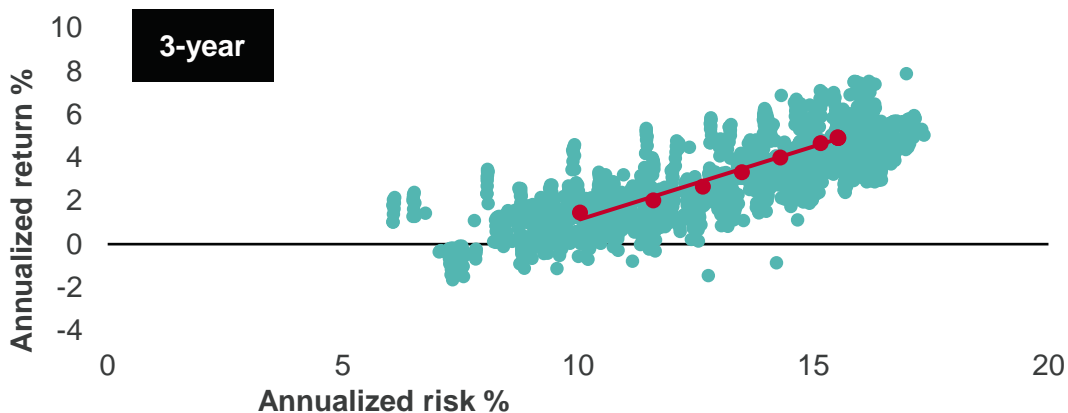
Sources: Morningstar and Vanguard calculations; data as of December 31, 2023.

* 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 December 31, 2023. Vanguard Target Retirement Funds highlighted.



Appendix

IN THIS SECTION:

Absolute performance results



Appendix: Absolute performance results

Average annualized return as of
December 31, 2023

Fund	3 months	Year-to-date	1 year	3 years	5 years	10 years	Since inception	Inception date
Vanguard Target Retirement Income Fund	7.34	10.74	10.74	0.56	4.83	4.09	4.87	10/27/2003
Target Retirement Income Composite Index	7.33	10.80	10.80	0.76	5.13	4.32	—	—
Lipper Target Target Consvr Funds Average	7.37	9.87	9.87	0.50	4.53	3.55	—	—
Fidelity Freedom Income	6.40	8.18	8.18	-0.36	3.59	3.26	4.40	10/17/1996
Fidelity Freedom Index Income Investor	6.34	8.28	8.28	-0.36	3.50	3.05	3.43	10/2/2009
T. Rowe Price Retirement 2005	7.53	11.94	11.94	1.46	5.98	4.73	5.44	2/27/2004
American Funds 2010 Trgt Date Retire R5	7.69	8.68	8.68	2.55	6.03	5.05	4.88	2/1/2007
BlackRock LifePath Index Retire K	8.50	11.47	11.47	0.35	5.62	4.60	4.93	5/31/2011
State Street Target Retirement K	7.16	10.77	10.77	1.66	5.72	—	4.32	9/30/2014
JPMorgan SmartRetirement® Income R5	7.98	12.01	12.01	0.70	5.11	4.07	4.76	5/15/2006
JPMorgan SmartRetirement® Blend IncomeR5	7.89	11.67	11.67	0.75	5.00	4.08	4.54	7/2/2012
TIAA-CREF Lifecycle Retire Income Instl	7.12	10.81	10.81	1.26	5.87	4.77	4.84	11/30/2007
Vanguard Target Retirement 2020 Fund	8.00	12.51	12.51	1.47	6.61	5.52	5.91	6/7/2006
Target Retirement 2020 Composite Index	7.97	12.65	12.65	1.74	6.98	5.81	—	—
Lipper Target 2020 Funds Average	8.04	11.45	11.45	1.27	5.83	4.45	—	—
Fidelity Freedom 2020	8.76	12.85	12.85	1.05	6.73	5.52	6.45	10/17/1996
Fidelity Freedom Index 2020 Investor	8.73	12.73	12.73	0.90	6.47	5.33	6.50	10/2/2009
T. Rowe Price Retirement 2020	8.10	13.45	13.45	2.27	7.64	6.04	7.87	9/30/2002
American Funds 2020 Trgt Date Retire R5	8.50	10.36	10.36	2.77	6.82	5.73	5.47	2/1/2007
State Street Target Retirement 2020 K	7.57	11.51	11.51	1.94	6.82	—	5.39	9/30/2014
JPMorgan SmartRetirement 2020 R5	7.94	11.93	11.93	0.70	5.46	4.68	5.38	5/15/2006
JPMorgan SmartRetirement® Blend 2020 R5	7.93	11.86	11.86	0.81	5.41	4.70	5.71	7/2/2012
TIAA-CREF Lifecycle 2020 Institutional	7.72	12.06	12.06	1.67	6.83	5.53	5.37	1/17/2007
Vanguard Target Retirement 2025 Fund	8.87	14.55	14.55	2.03	7.56	6.10	6.53	10/27/2003
Target Retirement 2025 Composite Index	8.85	14.74	14.74	2.39	8.01	6.43	—	—
Lipper Target 2025 Funds Average	8.36	11.93	11.93	1.40	6.39	4.98	—	—
Fidelity Freedom 2025	9.36	14.10	14.10	1.53	7.46	5.97	6.25	11/6/2003
Fidelity Freedom Index 2025 Investor	9.34	13.89	13.89	1.34	7.18	5.81	7.18	10/2/2009
T. Rowe Price Retirement 2025	8.56	14.57	14.57	2.63	8.44	6.59	6.99	2/27/2004
American Funds 2025 Trgt Date Retire R5	8.95	11.92	11.92	2.83	7.79	6.36	6.12	2/1/2007
JPMorgan SmartRetirement 2025 R5	8.63	13.46	13.46	1.32	6.63	5.39	5.50	7/31/2007
JPMorgan SmartRetirement® Blend 2025 R5	8.54	13.24	13.24	1.48	6.55	5.41	6.59	7/2/2012
TIAA-CREF Lifecycle 2025 Institutional	8.18	13.15	13.15	2.12	7.61	6.01	5.63	1/17/2007
BlackRock Lifepath Index 2025 K	8.83	12.40	12.40	1.04	6.65	5.47	5.91	5/31/2011
State Street Target Retirement 2025 K	8.64	13.68	13.68	2.17	8.12	—	6.32	9/30/2014

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Data from Vanguard and Morningstar.





Appendix: Absolute performance results *(continued)*

Fund	Average annualized return as of December 31, 2023						Since inception	Inception date
	3 months	Year- to-date	1 year	3 years	5 years	10 years		
Vanguard Target Retirement 2030 Fund	9.53	16.03	16.03	2.66	8.37	6.58	6.57	6/7/2006
Target Retirement 2030 Composite Index	9.51	16.26	16.26	3.05	8.83	6.92	—	—
Lipper Target 2030 Funds Average	9.08	13.61	13.61	2.22	7.53	5.65	—	—
Fidelity Freedom 2030	9.68	15.37	15.37	2.22	8.50	6.69	6.84	10/17/1996
Fidelity Freedom Index 2030 Investor	9.66	15.10	15.10	2.00	8.18	6.55	7.85	10/2/2009
T. Rowe Price Retirement 2030	9.30	16.30	16.30	3.11	9.25	7.12	8.76	9/30/2002
American Funds 2030 Trgt Date Retire R5	9.67	14.38	14.38	3.40	8.85	7.20	6.77	2/1/2007
JPMorgan SmartRetirement 2030 R5	9.47	15.53	15.53	2.22	7.74	6.06	6.34	5/15/2006
JPMorgan SmartRetirement® Blend 2030 R5	9.33	15.16	15.16	2.39	7.67	6.10	7.42	7/2/2012
TIAA-CREF Lifecycle 2030 Institutional	8.65	14.59	14.59	2.64	8.48	6.50	5.88	1/17/2007
BlackRock Lifepath Index 2030 K	9.55	14.57	14.57	2.19	7.87	6.21	6.61	5/31/2011
State Street Target Retirement 2030 K	9.79	15.74	15.74	2.30	8.99	—	6.90	9/30/2014
Vanguard Target Retirement 2035 Fund	9.82	17.14	17.14	3.33	9.17	7.06	7.32	10/27/2003
Target Retirement 2035 Composite Index	9.86	17.43	17.43	3.72	9.64	7.40	—	—
Lipper Target 2035 Funds Average	9.82	15.84	15.84	3.13	8.83	6.46	—	—
Fidelity Freedom 2035	10.28	17.67	17.67	3.48	10.06	7.54	7.10	11/6/2003
Fidelity Freedom Index 2035 Investor	10.25	17.26	17.26	3.18	9.66	7.41	8.69	10/2/2009
T. Rowe Price Retirement 2035	9.91	18.08	18.08	3.66	10.03	7.57	7.63	2/27/2004
American Funds 2035 Trgt Date Retire R5	10.40	16.83	16.83	4.13	10.33	8.09	7.30	2/1/2007
JPMorgan SmartRetirement 2035 R5	10.12	17.42	17.42	3.45	9.17	6.78	6.44	7/31/2007
JPMorgan SmartRetirement® Blend 2035 R5	9.93	16.94	16.94	3.51	8.80	6.74	8.17	7/2/2012
TIAA-CREF Lifecycle 2035 Institutional	9.23	16.38	16.38	3.29	9.38	7.00	6.24	1/17/2007
BlackRock Lifepath Index 2035 K	10.18	16.59	16.59	3.25	9.03	6.92	7.26	5/31/2011
State Street Target Retirement 2035 K	10.54	16.94	16.94	2.50	9.49	—	7.25	9/30/2014
Vanguard Target Retirement 2040 Fund	10.23	18.34	18.34	4.02	9.99	7.52	7.22	6/7/2006
Target Retirement 2040 Composite Index	10.20	18.60	18.60	4.38	10.43	7.87	—	—
Lipper Target 2040 Funds Average	10.42	17.74	17.74	3.89	9.61	6.84	—	—
Fidelity Freedom 2040	10.89	20.07	20.07	4.55	11.10	8.00	5.10	9/6/2000
Fidelity Freedom Index 2040 Investor	10.86	19.37	19.37	4.21	10.68	7.88	9.06	10/2/2009
T. Rowe Price Retirement 2040	10.31	19.53	19.53	4.11	10.69	7.96	9.26	9/30/2002
American Funds 2040 Trgt Date Retire R5	11.28	19.31	19.31	4.70	11.13	8.53	7.59	2/1/2007
JPMorgan SmartRetirement 2040 R5	10.63	18.93	18.93	4.23	10.09	7.29	7.18	5/15/2006
JPMorgan SmartRetirement® Blend 2040 R5	10.37	18.29	18.29	4.27	9.63	7.22	8.70	7/2/2012
TIAA-CREF Lifecycle 2040 Institutional	10.02	18.39	18.39	4.09	10.34	7.53	6.67	1/17/2007
BlackRock Lifepath Index 2040 K	10.84	18.58	18.58	4.26	10.08	7.55	7.85	5/31/2011
State Street Target Retirement 2040 K	10.83	17.82	17.82	2.85	10.01	—	7.54	9/30/2014

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Data from Vanguard and Morningstar.



Appendix: Absolute performance results *(continued)*

Fund	Average annualized return as of December 31, 2023						Since inception	Inception date
	3 months	Year- to-date	1 year	3 years	5 years	10 years		
Vanguard Target Retirement 2045 Fund	10.57	19.48	19.48	4.68	10.76	7.91	7.97	10/27/2003
Target Retirement 2045 Composite Index	10.54	19.77	19.77	5.03	11.20	8.25	—	—
Lipper Target 2045 Funds Average	10.68	18.58	18.58	4.37	10.23	7.24	—	—
Fidelity Freedom 2045	11.16	20.56	20.56	4.69	11.20	8.06	6.77	6/1/2006
Fidelity Freedom Index 2045 Investor	11.03	19.90	19.90	4.36	10.78	7.92	9.14	10/2/2009
T. Rowe Price Retirement 2045	10.54	20.46	20.46	4.53	11.18	8.21	8.08	5/31/2005
American Funds 2045 Trgt Date Retire R5	11.55	20.06	20.06	4.77	11.30	8.67	7.67	2/1/2007
JPMorgan SmartRetirement 2045 R5	11.01	19.89	19.89	4.87	10.71	7.58	7.05	7/31/2007
JPMorgan SmartRetirement® Blend 2045 R5	10.74	19.41	19.41	4.95	10.23	7.50	8.93	7/2/2012
TIAA-CREF Lifecycle 2045 Institutional	10.24	19.47	19.47	4.63	11.08	7.90	6.55	11/30/2007
BlackRock Lifepath Index 2045 K	11.26	20.29	20.29	5.11	10.95	8.05	8.31	5/31/2011
State Street Target Retirement 2045 K	11.15	18.56	18.56	3.12	10.42	—	7.79	9/30/2014
Vanguard Target Retirement 2050 Fund	10.79	20.17	20.17	4.91	10.93	7.99	7.51	6/7/2006
Target Retirement 2050 Composite Index	10.78	20.48	20.48	5.27	11.37	8.34	—	—
Lipper Target 2050 Funds Average	10.89	19.15	19.15	4.56	10.38	7.30	—	—
Fidelity Freedom 2050	11.05	20.46	20.46	4.68	11.18	8.05	6.66	6/1/2006
Fidelity Freedom Index 2050 Investor	11.05	19.91	19.91	4.35	10.78	7.92	9.18	10/2/2009
T. Rowe Price Retirement 2050	10.64	20.78	20.78	4.64	11.25	8.25	7.35	12/29/2006
American Funds 2050 Trgt Date Retire R5	11.68	20.68	20.68	4.67	11.35	8.72	7.69	2/1/2007
JPMorgan SmartRetirement 2050 R5	11.13	20.32	20.32	4.92	10.75	7.59	7.07	7/31/2007
JPMorgan SmartRetirement® Blend 2050 R5	10.89	19.63	19.63	5.02	10.32	7.55	8.97	7/2/2012
TIAA-CREF Lifecycle 2050 Institutional	10.49	20.03	20.03	4.81	11.28	8.01	6.61	11/30/2007
BlackRock Lifepath Index 2050 K	11.50	21.36	21.36	5.58	11.41	8.30	8.58	5/31/2011
State Street Target Retirement 2050 K	11.43	19.36	19.36	3.37	10.72	—	7.89	9/30/2014
Vanguard Target Retirement 2055 Fund	10.78	20.16	20.16	4.92	10.92	7.97	9.77	8/18/2010
Target Retirement 2055 Composite Index	10.78	20.48	20.48	5.27	11.37	8.34	—	—
Lipper Target 2055+ Funds Average	10.96	19.40	19.40	4.64	10.57	7.48	—	—
Fidelity Freedom 2055	11.12	20.55	20.55	4.68	11.19	8.05	8.39	6/1/2011
Fidelity Freedom Index 2055 Investor	11.10	19.95	19.95	4.36	10.78	7.92	8.23	6/1/2011
T. Rowe Price Retirement 2055	10.65	20.82	20.82	4.60	11.21	8.22	7.33	12/29/2006
American Funds 2055 Trgt Date Retire R5	11.85	21.32	21.32	4.59	11.29	8.68	10.16	2/1/2010
JPMorgan SmartRetirement 2055 R5	11.14	20.23	20.23	4.93	10.75	7.61	9.22	1/31/2012
JPMorgan SmartRetirement® Blend 2055 R5	10.84	19.60	19.60	5.06	10.30	7.56	8.93	7/2/2012
TIAA-CREF Lifecycle 2055 Institutional	10.51	20.25	20.25	4.89	11.37	8.08	8.65	4/29/2011
BlackRock Lifepath Index 2055 K	11.51	21.60	21.60	5.69	11.50	8.37	8.70	5/31/2011
State Street Target Retirement 2055 K	11.43	19.45	19.45	3.37	10.69	—	7.90	9/30/2014

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Data from Vanguard and Morningstar.





Appendix: Absolute performance results *(continued)*

Fund	Average annualized return as of December 31, 2023						Since inception	Inception date
	3 months	Year- to-date	1 year	3 years	5 years	10 years		
Vanguard Target Retirement 2060 Fund	10.79	20.18	20.18	4.92	10.92	7.97	9.52	1/19/2012
Target Retirement 2060 Composite Index	10.78	20.48	20.48	5.27	11.37	8.34	—	—
Lipper Target 2055+ Funds Average	11.02	19.76	19.76	4.76	—	—	—	—
Fidelity Freedom 2060	11.14	20.50	20.50	4.69	11.20	—	8.26	8/5/2014
Fidelity Freedom Index 2060 Investor	11.02	19.91	19.91	4.36	10.78	—	7.99	8/5/2014
T. Rowe Price Retirement 2060	10.66	20.82	20.82	4.62	11.20	—	7.99	6/23/2014
American Funds 2060 Trgt Date Retire R5	11.87	21.50	21.50	4.55	11.25	—	8.82	3/27/2015
JPMorgan SmartRetirement 2060 R5	11.08	20.13	20.13	4.94	10.74	—	8.90	8/31/2016
JPMorgan SmartRetirement® Blend 2060 R5	10.88	19.60	19.60	5.10	10.31	—	8.64	8/31/2016
TIAA-CREF Lifecycle 2060 Institutional	10.60	20.46	20.46	4.97	11.53	—	8.48	9/26/2014
BlackRock Lifepath Index 2060 K	11.49	21.66	21.66	5.68	11.51	—	10.78	2/29/2016
State Street Target Retirement 2060 K	11.51	19.45	19.45	3.39	10.72	—	7.89	9/30/2014
Vanguard Target Retirement 2065 Fund	10.79	20.15	20.15	4.95	10.91	—	8.44	7/12/2017
Target Retirement 2065 Composite Index	10.78	20.48	20.48	5.27	11.37	—	—	—
Lipper Target 2055+ Funds Average	11.02	19.76	19.76	4.76	—	—	—	—
Fidelity Freedom 2065	11.13	20.54	20.54	4.70	—	—	9.03	6/28/2019
Fidelity Freedom Index 2065 Investor	11.10	19.93	19.93	4.36	—	—	8.37	6/28/2019
T. Rowe Price Retirement 2065	10.61	20.81	20.81	4.85	—	—	7.98	10/14/2020
American Funds 2065 Trgt Date Retire R5	10.43	18.97	18.97	—	—	—	19.22	3/27/2020
JPMorgan SmartRetirement® Blend 2065 R5	11.91	21.53	21.53	4.59	—	—	14.83	11/1/2022
TIAA-CREF Lifecycle 2065 Institutional	10.61	20.59	20.59	5.15	—	—	9.27	9/30/2020
BlackRock Lifepath Index 2065 K	11.53	21.62	21.62	5.70	—	—	9.17	10/30/2019
State Street Target Retirement 2065 K	11.42	19.43	19.43	3.39	—	—	13.10	3/30/2020
Vanguard Target Retirement 2070 Fund	10.83	20.24	20.24	—	—	—	13.75	6/28/2022
Target Retirement 2070 Composite Index	10.78	20.48	20.48	5.27	11.37	8.22	—	—
Lipper Target 2060+ Funds Average	11.02	19.76	19.76	4.76	—	—	—	—

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Data from Vanguard and Morningstar.



Appendix: Standardized returns

Fund	Average annualized return as of December 31, 2023						Since inception	Inception date
	3 months	Year- to-date	1 year	3 years	5 years	10 years		
Vanguard Total Stock Market Index Fund Institutional Shares	12.17	26.02	26.02	8.44	15.08	11.44	8.60	07/07/1997
Vanguard Total International Stock Index Fund Institutional Shares	9.98	15.53	15.53	1.80	7.37	4.12	4.89	11/29/2010
Vanguard Total Bond Market Index Fund Institutional Shares	6.69	5.72	5.72	-3.34	1.13	1.80	4.28	09/18/1995
Vanguard Total International Bond Index Fund Institutional Shares	6.54	8.85	8.85	-2.48	0.91	2.45	2.30	05/31/2013
Vanguard Short-Term Inflation-Protected Securities Index Fund Institutional Shares	2.55	4.61	4.61	2.31	3.34	1.95	1.64	10/17/2012

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Data from Vanguard and Morningstar.



Notes

Important information

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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.

Product guarantees are subject to the claims-paying ability of the issuing insurance company.

Deferred variable annuities are long-term vehicles designed for retirement purposes and contain underlying investment portfolios that are subject to investment risk, including possible loss of principal.

Immediate variable annuities contain underlying investment portfolios that are subject to investment risk, including possible loss of principal.

The Vanguard Life-Cycle Investing Model (VLCM) is designed to identify the product design that represents the best investment solution for a theoretical, representative investor who uses the target-date funds to accumulate wealth for retirement. The VLCM generates an optimal custom glide path for a participant population by assessing the trade-offs between the expected (median) wealth accumulation and the uncertainty about that wealth outcome, for thousands of potential glide paths. The VLCM does this by combining two set of inputs: the asset class return projections from the VCMM and the average characteristics of the participant population. Along with the optimal custom glide path, the VLCM generates a wide range of portfolio metrics such as a distribution of potential wealth accumulation outcomes, risk and return distributions for the asset allocation, and probability of ruin, such as the odds of participants depleting their wealth by age 95.

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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