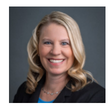
Our Fixed Income Design Added Value for Retirement Investors

Enhancements increased diversification and improved returns

June 2023



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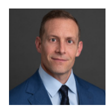

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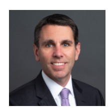

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KEY INSIGHTS

- The growth of the global fixed income markets in recent years has greatly expanded investment opportunities beyond the U.S. investment-grade sectors.
- T. Rowe Price thoughtfully evolves the capabilities within our target date portfolios in our efforts to help clients achieve their retirement goals.
- The five-year performance of the fixed income sleeves of our target date strategies shows that our changes improved absolute and risk-adjusted fixed income returns.

The fixed income allocations in our target date portfolios are designed to reflect the nuanced roles that the asset class plays within multi-asset portfolios. These range from the goal of mitigating equity risk to seeking to preserve purchasing power against inflation. We have thoughtfully evolved our fixed income design over time as part of our efforts to improve outcomes for investors.

In 2017, after careful review, our target date portfolio team made a number of enhancements to the fixed income allocations in our target date strategies, changes designed to take advantage of a broader global fixed income opportunity set and better align those allocations with the changing needs of retirement investors as they move along their target date glide paths.

A review of the performance of our fixed income allocations since those changes were fully implemented demonstrates that our efforts to enhance fixed income diversification have yielded tangible benefits for retirement investors.[1] Our performance analysis illustrates that the enhancements delivered the diversification benefits expected by our target date team—confirming the rigor of our design process.

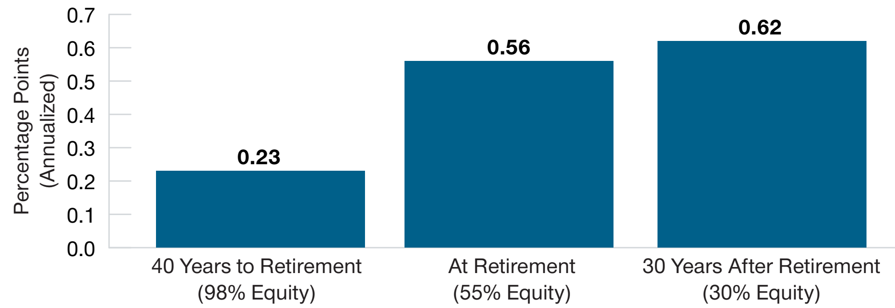
We found that the enhancements improved the overall performance of our target date strategies by enhancing fixed income returns on both an absolute and a risk-adjusted basis at various points along their glide paths, relative to T. Rowe Price's previous strategic allocation design (Figure 1).

[1] The allocation enhancements discussed in this analysis were made gradually, beginning in the fourth quarter of 2017. All changes were fully implemented by May 31, 2018. For illustrative purposes, the glide paths for the T. Rowe Price Retirement Funds were used in this analysis. The firm also offers a separate family of target date funds, the Target Funds, that feature somewhat lower equity exposure along the glide path. Fixed income return enhancements to the Target Funds were directionally similar to those for the Retirement Funds over the five-year period examined.

> A broader opportunity set has created additional opportunities for diversification and for skilled active management to generate excess returns.

Value Added to Fixed Income Returns

(Fig. 1) Return improvements vs. previous design at various points on the Retirement Funds glide path*



June 1, 2018, through May 31, 2023.
Past and model performance are not reliable indicators of future performance.
*Returns shown here and throughout this paper are based on the I Class shares of the underlying funds in the Retirement Funds. Allocation weights are based on the Retirement Funds glide path model strategic weights and do not reflect tactical allocation changes. **Please see Appendix for more detail on the allocations, standardized performance and other important information on the analysis.**
Source: T. Rowe Price.

The Evolution of Our Fixed Income Design

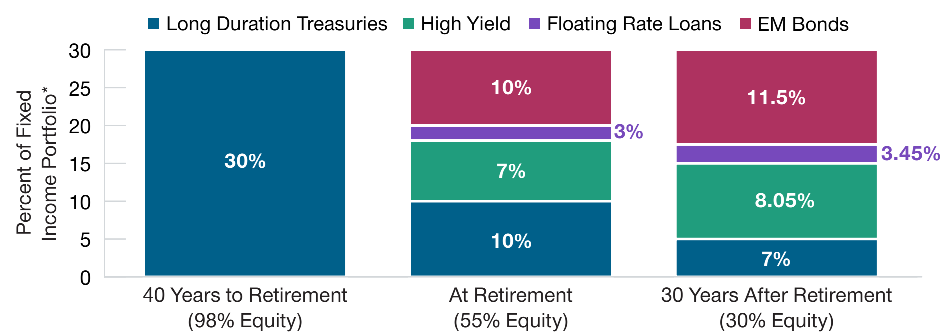
The growth of global fixed income markets in recent years has greatly expanded investment opportunities. A broader opportunity set has created additional opportunities for diversification and for skilled active management to generate excess returns.

To take fuller advantage of these opportunities, our target date team decided that a number of allocation enhancements had the potential to dampen total portfolio volatility and improve risk-adjusted returns. These enhancements affected two major categories in our target date fixed income portfolios:

- The core component, which consists primarily of investment-grade bonds and a lower-volatility foundation for the overall fixed income allocation. The core component represents 70% of the total fixed income portfolio[2] across the entire glide path.

The Role of Fixed Income Can Change Over Time

(Fig. 2) Diversifying sector weights on the Retirement Funds glide path. Core = 70%



As of May 31, 2023.
*Not including TIPS. Represents the strategic weights of the underlying fixed income components within the fixed income allocation.
Source: T. Rowe Price.

[2] Not including Treasury inflation protected securities (TIPS). We excluded the TIPS allocation from our analysis as that allocation did not change with the enhancements.

Adapting to an Evolving Global Bond Market

(Fig. 3) Enhancements to T. Rowe Price target date fixed income allocations

	Change	Rationale	Solution
Core Enhancement	Diversifying the core	Core component was heavily focused on the investment-grade assets in the Bloomberg U.S. Aggregate Bond Index.	Add a currency-hedged international bond allocation and a dynamic bond strategy that seeks opportunities across global yield curves and interest rate cycles.
	Managing exchange rate exposure	Unhedged international bond allocations historically have shown higher volatility and tracking error.	Move the international bond strategy to the core and hedge against U.S. dollar movements. Applying the hedge as a benchmark overlay still allows the manager to seek opportunities through currency positioning.
Diversifying Enhancement	Offsetting equity risk	Some diversifiers historically have had high equity correlations. This can add risk when equity allocations are high.	Include an allocation to longer-duration Treasuries as a diversifier. Historically, these bonds have had relatively low return correlations with equities in most—though not all—market downturns.
	Enhancing credit diversification	Floating rate loans feature shorter duration than high yield bonds and may outperform when interest rates are rising.	Add a modest allocation to floating rate loans to the diversifying component.
	Dynamic weights in diversifier component	As target date portfolios move along their glide paths, investors have changing fixed income diversification needs.	As equity risk exposure declines, portfolios have room for higher allocations to credit-sensitive sectors such as high yield and EM bonds.

Source: T. Rowe Price.

- A diversifying component that includes additional return-seeking sectors, such as high yield bonds and emerging market (EM) debt. This component represents 30% of the fixed income allocation across the glide path, but the weights within it are dynamic, changing over time as the target date portfolios move along their glide paths (Figure 2).

Our 2017 design enhancements, and the thinking behind them, are summarized in Figure 3.

The Benefits of an Active Approach

In our view, the expansion of the global fixed income opportunity set has created additional opportunities for skilled active management to seek uncorrelated sources of excess return. Taking advantage of these opportunities is a key goal of our fixed income design.

The use of passive investment components can be especially problematic in the fixed income arena. Within some fixed income sectors, it isn't practical—or in some cases even possible—to hold all the securities in the most common market indexes, making it difficult to replicate benchmark performance without significant tracking error.

Replicating benchmark exposures also may result in unintended or undesired risk concentrations, resulting in higher risk of loss from potential defaults or downgrades in the largest issues. An active investing approach allows for credit research that we believe may help mitigate certain default risks.

Many of the fixed income diversification enhancements we have made to our target date design would be inefficient or impossible to replicate using only passive components. A purely passive approach also can foreclose potential opportunities to generate excess returns.

The addition of a nontraditional global bond fund in our core component, for

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Improvement in annualized return, in basis points, for T. Rowe Price's enhanced fixed income design versus the previous allocation, at age of retirement.

example, was designed to supplement traditional fixed income qualities with a focus on downside risk management, providing diversification during periods of risk aversion. The fund manager also has the ability to use multiple active levers—such as duration; yield curve positioning; and sector, country, and currency exposures—to seek excess return opportunities.

Likewise, the addition of a floating rate bank loan fund to the diversifying component—supplementing a portion of the high yield bond allocation—provides additional mitigation against duration risk and extends the potential benefits of T. Rowe Price's credit research capabilities.

In addition, T. Rowe Price takes an active approach to managing allocations to the underlying building blocks in our target date strategies with dynamic tactical adjustments. We believe we can harness the insights of leaders in the firm's equity, fixed income, and multi-asset investment divisions by leaning into or away from asset classes based on our 6- to 18-month market outlook. In our view, having a diversified set of underlying strategies gives us the ability to implement our views as markets evolve over the shorter term, which can support our investors over the long-term as well.

Performance Analysis

A review of the performance of our target date fixed income allocations verifies that our enhanced design improved returns relative to their previous strategic allocations.

We looked at the five-year performance of our enhanced fixed income design at different points along the glide path for our Retirement Funds—40 years before retirement, at retirement, and 30 years after retirement. We compared these results with the performance of the strategic allocations in our previous fixed income design. The results of our analysis are summarized in Figure 4.[3]

Higher Returns and Lower Volatility Resulted in Improved Risk-Adjusted Performance

(Fig. 4) Annualized performance results for our enhanced and previous fixed income designs*

Point on Glide Path	Annualized Return (%)†	Volatility (Standard Deviation)	Sharpe Ratio
40 Years to Retirement (98% Equity)	0.49	6.91	-0.13
At Retirement (55% Equity)	0.82	5.87	-0.11
30 Years After Retirement (30% Equity)	0.88	5.86	-0.10
Previous Fixed Income Design	**0.26**	**6.98**	**-0.16**

June 1, 2018, through May 31, 2023.

Past and model performance are not reliable indicators of future performance.

*Not including TIPS.

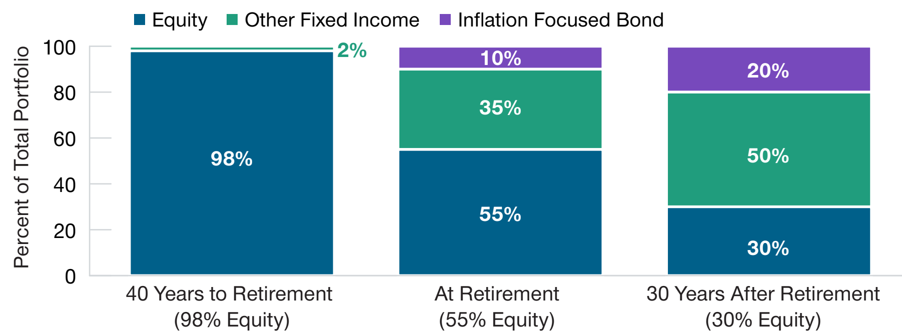
† Returns shown here and throughout this paper are based on the I Class shares of the underlying funds in the Retirement Funds. Allocation weights are based on the Retirement Funds glide path strategic weights and do not reflect tactical allocation changes. **Please see Appendix for more detail on the allocations, standardized performance, and other important information on the analysis.**

Source: T. Rowe Price.

[3] Because relative sector weights were fixed along the glide path prior to our enhancements, only one set of results is shown for our previous glide path. Allocations for both the previous and the enhanced designs were assumed to rebalance monthly. Performance is based on strategic allocations and does not reflect shorter-term tactical adjustments.

Dynamic Allocation to Inflation Focused Bonds

(Fig. 5) TIPS allocations in the Retirement Funds*



As of May 31, 2023.

*TIPS = T. Rowe Price Limited Duration Inflation Focused Bond Fund. Reflects strategic weights.

Source: T. Rowe Price.

Overall, return improvements along the glide path, relative to our previous fixed income design, ranged from 0.23 to 0.62 percentage points (23 to 62 basis points), annualized.

At retirement (age 65), for example, the enhanced fixed income design raised annualized returns by more than 0.56 percentage points (56 basis points), relative to our previous design.

Our enhancements also had the additional effect of reducing overall fixed income volatility—a key benefit amid 2022's bond bear market. This resulted in higher Sharpe ratios for the entire fixed income allocation at all three points on the glide path that we examined, relative to the previous strategic allocation.

Not All Fixed Income Is Created Equal

In addition to the components outlined above, our target date fixed income design also includes an allocation to short-term TIPS. This allocation is designed to help offset the potential negative impact of inflation—especially an unexpected acceleration in inflation—on real portfolio values.

The TIPS allocation is dynamic, and increases as portfolios move along their glide paths, both as a share of the total fixed income allocation and as a percent of the entire portfolio (Figure 5).

The shorter duration of our TIPS allocation made a meaningful contribution to relative performance during the 2022 bond bear market. While many target date fixed income models include a TIPS component, those allocations often are benchmarked to broad TIPS indexes that include longer-term securities. Reflecting their longer durations, many of these indexes experienced losses comparable to traditional core bond benchmarks in 2022.

The Bloomberg U.S. Government Inflation Linked 1-10 Year Index, for example, posted a 7.38% loss in 2022. In contrast, the Bloomberg U.S. Treasury TIPS 1-5 Year Index fell less than 4%, as its more limited duration helped cushion interest rate risk while still mitigating the erosive impact of inflation on real yields.

Strengths of T. Rowe Price's Target Date Design Process

T. Rowe Price has been an industry leader in target date investing for nearly two decades. We constantly reassess our design to seek improved outcomes. Our fixed income portfolios reflect the depth of our asset allocation expertise and the rigor and discipline of our target date design process.

Our target date team was early in understanding that traditional fixed income allocations based on “core” U.S. investment-grade sectors might be suboptimal for retirement investors. They recognized that:

- The growth and evolution of global bond markets had created attractive diversification opportunities.
- A larger opportunity set had expanded the field for skilled active management.
- Dynamic diversifying allocations could better serve the needs of retirement investors at various points on the glide path.

We also were early in recognizing that defined contribution plan sponsors want more sophisticated fixed income allocations for their participants. One T. Rowe Price survey, for example, found that 79% of plan sponsors believe it is important to offer participants a range of fixed income options based on their risk, return, and retirement income preferences.[4] By incorporating a broader range of asset classes within a target date solution, we believe we can bring a more sophisticated and risk-aware approach to plan participants.

Conclusions

Overall, we believe the performance of our fixed income allocations testifies to the strengths of T. Rowe Price’s target date design process:

- prudent innovation backed by rigorous research;
- allocations that we seek to make durable under a variety of return, volatility, and correlation assumptions;
- rigorous scenario testing to analyze potential performance under varying market and/or economic conditions.

As always, we will continue to evaluate our allocations to ensure they reflect our best understanding of asset class relationships and capital market conditions. Our goal will remain the same: to construct portfolios that effectively further the long-term objectives of target date investors.

[4] T. Rowe Price Future of Fixed Income in DC Plans Survey, March 2023. Survey fielded October 12, 2022, through November 15, 2022. Reflects responses from 158 plan sponsors. Not all respondents answered every question.

Appendix

Fig. A1: Previous Glide Path for Retirement Funds—Fixed Income

Allocations	Underlying Funds	Weights in Fixed Income Allocation*		
		40 Years to Retirement (90% Equity)	At Retirement (55% Equity)	30 Years After Retirement (20% Equity)
U.S. Aggregate	New Income Fund	70.0%	70.0%	70.0%
High Yield	High Yield Fund	10.0%	10.0%	10.0%
International Bond (Unhedged)	International Bond Fund	10.0%	10.0%	10.0%
Emerging Markets Bond	Emerging Markets Bond Fund	10.0%	10.0%	10.0%

*Not including TIPS. We excluded the TIPS allocation from our analysis as that allocation did not change with the enhancements.
Because relative sector weights were fixed along the glide path prior to our enhancements, only one set of results for the prior design is shown in our analysis.
Weights in the allocation reflect the weights of the underlying fixed income components within the fixed income allocation only. Weights of the underlying fixed income components as a percent of the entire portfolio will be smaller.
Source: T. Rowe Price.

Fig. A2: Current Glide Path for Retirement Funds—Fixed Income

Allocations	Underlying Funds	Weights in Fixed Income Allocation*		
		40 Years to Retirement (98% Equity)	At Retirement (55% Equity)	30 Years After Retirement (30% Equity)
U.S. Aggregate	New Income Fund	45.0%	45.0%	45.0%
International Bond (Hedged)	International Bond Fund (USD Hedged)	15.0%	15.0%	15.0%
Nontraditional Global Bond	Dynamic Global Bond Fund	10.0%	10.0%	10.0%
Long Duration Treasuries	U.S. Treasury Long-Term Index Fund	30.0%	10.0%	7.0%
High Yield	High Yield Fund	0.0%	7.0%	8.05%
Floating Rate	Floating Rate Fund	0.0%	3.0%	3.45%
Emerging Markets Bond	Emerging Markets Bond Fund	0.0%	10.0%	11.5%

*Not including TIPS. We excluded the TIPS allocation from our analysis as that allocation did not change with the enhancements.
Weights in the allocation reflect the weights of the underlying fixed income components within the fixed income allocation only. Weights of the underlying fixed income components as a percent of the entire portfolio will be smaller.
Source: T. Rowe Price.

Important Information—Fixed Income Strategic Design

This material contains results based on glide path model allocations in the Appendix and past performance of T. Rowe Price mutual funds also shown in the Appendix. Past performance is not a reliable indicator of future performance. This material is not intended to forecast or predict future events, but rather to demonstrate the impact of the fixed income changes implemented within target date strategies. It does not reflect the actual returns of the target date funds and does not guarantee future results. Certain assumptions have been made and are unlikely to be realized. No representation or warranty is made as to the reasonableness of the assumptions made or that all assumptions used in the analysis presented have been stated or fully considered. Changes in the assumptions may have a material impact on the information presented. The results assume monthly rebalancing. Additionally, as the design reflects strategic weights, the results do not reflect the impact that material economic, market or other factors may have on weighting decisions which may be reflected in tactical changes. If tactical changes were reflected in the analysis, results would likely be different. Furthermore, as the fixed income allocation is evaluated, the results do not reflect those derived from the overall target date portfolio or fund, which also includes TIPS and equity exposure. The fixed income design results are derived from the actual NAV returns of T. Rowe Price mutual funds listed in the Appendix and reflects the reinvestment of dividends and capital gains. Actual investment results experienced by clients may vary significantly. The information is not intended as a recommendation to buy or sell any particular security, and there is no guarantee that results shown will be achieved.

T. Rowe Price Fund Returns: Returns shown in this analysis are based on the I Class shares of the underlying funds in the Retirement Funds portfolio. The Z Class shares that are actually held in T. Rowe Price's target date funds do not charge a management fee. In addition, the Z Class shares did not have full track records for five-year period covered by our analysis.

Standardized Performance

Annualized total returns for periods ended 3/31/2023

Fund	Fund Inception Date	Share Class Inception Date	Gross Expense Ratio[1]	Annualized Total Returns, Net of Fees (%)*				
				1-Year	3-Year	5-Year	10-Year	Since Inception‡
New Income Fund–I Class	8/31/73	8/28/15	0.35	-6.05	-1.37	0.58	1.18	
Bloomberg U.S. Aggregate Bond Index				-4.78	-2.77	0.91	1.36	
International Bond Fund–I Class	9/10/86	8/28/15	0.57	-12.91	-3.51	-3.17	-0.92	
Bloomberg Global Aggregate ex USD Bond Index				-10.72	-4.13	-3.17	-0.99	
International Bond Fund (USD Hedged)–I Class	9/12/17	9/12/17	0.53	-6.12	-0.99	0.72	N/A	1.08
Bloomberg Global Aggregate ex USD Bond (USD Hedged) Index				-3.27	-1.82	0.90	N/A	1.13
Dynamic Global Bond Fund–I Class	1/22/15	8/28/15	0.53	0.81	3.45	2.70	N/A	2.57
ICE BofA US 3-Month Treasury Bill Index				2.53	0.9	1.41	N/A	1.05
High Yield Fund–I Class	12/31/84	8/28/15	0.60	-3.82	5.61	2.75	3.78	
Credit Suisse High Yield Index				-3.02	6.29	3.03	3.98	
Floating Rate Fund–I Class	7/29/11	11/29/16	0.62	2.85	7.19	3.31	3.36	
Morningstar LSTA Performing Loan Index				2.63	8.96	3.80	4.00	
Emerging Markets Bond Fund–I Class	12/30/94	8/28/15	0.75	-8.05	0.86	-2.08	0.89	
J.P. Morgan Emerging Markets Bond Index Global Diversified				-6.92	-0.02	-0.60	2.01	
U.S. Treasury Long-Term Index Fund–I Class	9/29/89	5/3/17	0.08	-17.12	-11.68	-0.56	0.98	
Bloomberg U.S. Long Treasury Bond Index				-16.00	-11.33	-0.35	1.45	
Limited Duration Inflation Focused Bond Fund	9/29/06	9/29/15	0.34	-2.53	3.39	2.76	1.35	
Bloomberg U.S. 1-5 Year Treasury TIPS Index				-1.14	3.34	2.92	1.48	

* The T. Rowe Price Funds–I Class share the portfolio of an existing fund (the original share class of the fund is referred to as the "investor class"). The total return figures for I Class shares have been calculated using the performance data of the investor class up to the inception date of the I Class and the actual performance results of the I Class since that date. Because the I Classes are expected to have lower expenses than the Investor Classes, the I Class performance, had it existed over the periods shown, would have been higher. The fund inception date shown in the returns table above is the date on which the investor class started operations.

† Expense ratios are as of the most recent prospectus.

‡ For funds without a 10-year performance history. Since fund inception date.

Sources: Bloomberg Finance L.P., ICE BofA, Credit Suisse, Morningstar, J.P. Morgan Chase (see Additional Disclosures), and T. Rowe Price

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