

Methodology summary: Target date strategies study

February 2024

Our analysts examined the performance of 11 T. Rowe Price Retirement Funds (RFs) to determine the value added for clients by the firm's target date design process and investment implementation, both at the RF level and in the management of the underlying strategies.

Study universe

The 11 RFs included in the study (Figure 1) were those that had at least 10-year performance histories as of December 31, 2023. Two RFs with relatively distant target dates (2060 and 2065) were excluded from the study because of their incomplete performance track records. The Retirement 2060 Fund inceptioned June 23, 2014, while the Retirement 2065 Fund inceptioned October 13, 2020. A separate set of target date funds using an alternative T. Rowe Price-designed glide path (the target glide path) also was excluded from the study. (See Figure 2 for a list of these funds and their inception dates.) Additionally, T. Rowe Price's Retirement Blend Funds were excluded from the study. These funds, which invest in an underlying mix of actively managed funds and passively managed index funds, inceptioned on July 26, 2021, and, thus, had limited historical track records. The T. Rowe Price funds included in the study held nearly all (approximately 96%) of the RF assets managed by the firm as of December 31, 2023.

As of December 31, 2023, each RF invested its assets in a portfolio of up to 24 underlying T. Rowe Price funds covering the major global equity and fixed income sectors (Figure 3). Twenty-two of the 24 underlying T. Rowe Price funds were actively managed, while two—a large-cap U.S. stock allocation and a long-term U.S. Treasury allocation—used passive management to replicate the returns for their benchmarks (the S&P 500 Index and the Bloomberg U.S. Long Treasury Bond Index, respectively).

Performance periods

The performance of each RF in the study was examined across 1-, 3-, 5-, and 10-year rolling periods (rolled monthly) since each

RF's inception through December 31, 2023. Because these inception dates—and, thus, fund longevities—differed, the number of rolling performance periods also varied for each RF. The total rolling periods in each time frame for each RF are shown in Figure 4.

It should be noted that the number of rolling performance periods declined as the time frames were lengthened. The number of rolling 10-year periods was relatively small, especially for RFs with 2050 and 2055 target dates. Accordingly, the performance results shown for 10-year rolling periods for those funds may have relatively limited statistical significance.

Full performance results for each RF over 1-, 3-, 5-, and 10-year rolling periods can be found in Figures 5, 6, and 7.

Performance metrics

Our analysis used two specific measures to quantify RF performance:

- Active success rates: the percentage of all rolling periods in each time frame (one, three, five, and 10 years) in which an RF either outperformed a specific benchmark or a component of T. Rowe Price's target date process made a positive contribution to RF returns (see Performance Benchmarks). A positive success rate for a fund was defined as achieving a higher return than the relevant benchmark in more than 50% of all periods included in the study.
- Excess returns: the actual margin of relative RF performance (either positive or negative) against its benchmark or the contribution (positive or negative) that a component of the T. Rowe Price target date process made to RF returns, each in basis points. Excess returns for rolling periods of more than one year were annualized. The excess returns shown in the various tables in the study are the average results across all of the rolling time periods in each 1-, 3-, 5-, and 10-year time frame.

Performance benchmarks

The objective of the study was to quantify the value added by tactical asset allocation and our management of the underlying strategies. Accordingly, active success rates and excess returns were calculated relative to:

- The appropriate vintages in a family of target date indexes created by Standard & Poor's, which reflect "consensus" strategic asset allocations and glide paths for the industry as a whole based on an annual survey of reported portfolio holdings.
- Hypothetical returns for the RFs based solely on their long-term strategic asset allocations and glide paths (in other words, excluding the effects of tactical allocation).
- The appropriate asset class, sector, and/or style benchmarks for the underlying T. Rowe Price funds in the RF portfolios. For each rolling period, the relative performances of the underlying funds were aggregated to determine if they collectively added to or detracted from RF active performance.

(Fig. 1) Retirement Funds included in our performance study

Fund	Inception Date	Benchmark
Retirement 2005 Fund	2/27/04	S&P Target Date Retirement Income Index
Retirement 2010 Fund	9/30/02	S&P Target Date 2010 Index
Retirement 2015 Fund	2/27/04	S&P Target Date 2015 Index
Retirement 2020 Fund	9/30/02	S&P Target Date 2020 Index
Retirement 2025 Fund	2/27/04	S&P Target Date 2025 Index
Retirement 2030 Fund	9/30/02	S&P Target Date 2030 Index
Retirement 2035 Fund	2/27/04	S&P Target Date 2035 Index
Retirement 2040 Fund	9/30/02	S&P Target Date 2040 Index
Retirement 2045 Fund	5/31/05	S&P Target Date 2045 Index
Retirement 2050 Fund	12/29/06	S&P Target Date 2050 Index
Retirement 2055 Fund	12/29/06	S&P Target Date 2055 Index

Sources: T. Rowe Price and Standard & Poor's (see Additional Disclosures).

(Fig. 2) T. Rowe Price Target Funds (not included in performance study)

Fund	Inception Date
Target 2005 Fund	8/20/13
Target 2010 Fund	8/20/13
Target 2015 Fund	8/20/13
Target 2020 Fund	8/20/13
Target 2025 Fund	8/20/13
Target 2030 Fund	8/20/13
Target 2035 Fund	8/20/13
Target 2040 Fund	8/20/13
Target 2045 Fund	8/20/13
Target 2050 Fund	8/20/13
Target 2055 Fund	8/20/13
Target 2060 Fund	6/23/14
Target 2065 Fund	10/13/20

Source: T. Rowe Price.

(Fig. 3) Underlying T. Rowe Price funds in Retirement Fund portfolios¹

Fund	Date Included
U.S. Equity	
Equity Index 500	9/30/02
U.S. Large-Cap Core	5/4/20
U.S. Equity Research	12/1/21
Growth Stock	9/30/02
Value	9/30/02
Mid-Cap Growth	9/30/02
Mid-Cap Value	2/1/04
Small-Cap Stock	9/30/02
New Horizons	11/1/05
Small-Cap Value	11/1/05
Non-U.S. Equity	
Overseas Stock	12/1/06
International Stock	9/30/02
International Value Equity	2/1/04
Emerging Markets Stock	5/1/07
Emerging Markets Discovery Stock	5/13/20
Fixed Income	
New Income	9/30/02
International Bond (USD Hedged)	10/1/17
Dynamic Global Bond	10/1/17
High Yield	9/30/02
Floating Rate	10/1/17
Emerging Markets Bond	5/1/08
U.S. Treasury Long-Term Index ²	10/1/17
Limited Duration Inflation Focused Bond ³	9/30/02
Dynamic Credit	8/1/23
Other	
Real Assets	7/1/10
Hedged Equity	10/1/23

As of December 31, 2023.

Source: T. Rowe Price.

¹ Not included: U.S. Treasury Money Fund.

² Prior to October 1, 2020, the name of the U.S. Treasury Long-Term Index Fund was the U.S. Treasury Long-Term Fund.

³ From inception to 2006, our conservative fixed income allocation was a mix of the T. Rowe Price Short-Term Bond Fund and the T. Rowe Price Summit Cash Reserves Fund (renamed the Cash Reserves Fund on August 1, 2016). In 2006, the T. Rowe Price Short-Term Income Fund replaced these two funds. In May 2011, the name and investment objective of the T. Rowe Price Short-Term Income Fund changed to the T. Rowe Price Inflation Focused Bond Fund, which is now known as the T. Rowe Price Limited Duration Inflation Focused Bond Fund.

(Fig. 4) Rolling periods in each time frame

Fund	1-Year	3-Year	5-Year	10-Year
Retirement 2005 Fund	227	203	179	119
Retirement 2010 Fund	244	220	196	136
Retirement 2015 Fund	227	203	179	119
Retirement 2020 Fund	244	220	196	136
Retirement 2025 Fund	227	203	179	119
Retirement 2030 Fund	244	220	196	136
Retirement 2035 Fund	227	203	179	119
Retirement 2040 Fund	244	220	196	136
Retirement 2045 Fund	212	188	164	104
Retirement 2050 Fund ¹	176	152	128	68
Retirement 2055 Fund ²	164	140	116	56

Fund inceptions through December 31, 2023.

Source: T. Rowe Price.

¹ The S&P Target Date 2050 Index inceptioned in June 2008, and rolling periods are shown beginning in the first period shared with the Retirement 2050 Fund.

² The S&P Target Date 2055 Index inceptioned in June 2009, and rolling periods are shown beginning in the first period shared with the Retirement 2055 Fund.

(Fig. 5) Active success rates and average value added by tactical allocation

Fund	Active success rates				Average annualized value added (basis points)			
	Rolling Periods				Rolling Periods			
	1-Year	3-Year	5-Year	10-Year	1-Year	3-Year	5-Year	10-Year
Retirement 2005 Fund	65%	79%	82%	100%	15	14	12	13
Retirement 2010 Fund	66	81	86	100	17	16	14	14
Retirement 2015 Fund	67	78	85	100	15	15	13	13
Retirement 2020 Fund	66	77	85	99	15	15	13	13
Retirement 2025 Fund	62	71	85	99	13	13	10	11
Retirement 2030 Fund	64	72	86	100	13	13	11	11
Retirement 2035 Fund	60	69	84	100	11	10	8	9
Retirement 2040 Fund	59	67	85	97	9	9	8	8
Retirement 2045 Fund	55	60	82	95	7	7	6	7
Retirement 2050 Fund	51	57	77	91	5	6	6	6
Retirement 2055 Fund	49	57	78	86	5	5	6	5

Fund inceptions through December 31, 2023.

Sources: Standard & Poor's (see Additional Disclosures) and T. Rowe Price. Data analysis by T. Rowe Price.

(Fig. 6) Active success rates and average value added by security selection

Fund	Active success rates				Average annualized value added (basis points)			
	Rolling Periods				Rolling Periods			
	1-Year	3-Year	5-Year	10-Year	1-Year	3-Year	5-Year	10-Year
Retirement 2005 Fund	47%	38%	46%	58%	2	5	9	6
Retirement 2010 Fund	49	46	49	67	-1	5	8	10
Retirement 2015 Fund	54	63	70	76	11	13	16	15
Retirement 2020 Fund	55	69	78	83	13	17	21	24
Retirement 2025 Fund	59	74	85	84	23	24	29	29
Retirement 2030 Fund	55	74	83	88	23	27	31	36
Retirement 2035 Fund	57	77	86	87	32	31	38	39
Retirement 2040 Fund	56	76	84	88	26	30	36	41
Retirement 2045 Fund	57	76	87	83	33	32	38	39
Retirement 2050 Fund	56	76	85	79	31	32	33	35
Retirement 2055 Fund	56	76	85	79	32	33	33	35

Fund inceptions through December 31, 2023.

Sources: Bloomberg Finance L.P., MSCI, Standard & Poor's, FTSE/Russell, Morningstar, J.P. Morgan, Credit Suisse, Chicago Board of Options Exchange (see Additional Disclosures), and T. Rowe Price. Data analysis by T. Rowe Price.

(Fig. 7) Active success rates and average value added by total implementation

Fund	Active success rates				Average annualized value added (basis points)			
	Rolling Periods				Rolling Periods			
	1-Year	3-Year	5-Year	10-Year	1-Year	3-Year	5-Year	10-Year
Retirement 2005 Fund	67%	90%	97%	100%	134	115	110	117
Retirement 2010 Fund	70	87	93	100	129	106	91	98
Retirement 2015 Fund	66	87	96	100	115	92	89	96
Retirement 2020 Fund	69	87	93	100	136	112	98	105
Retirement 2025 Fund	70	86	94	100	123	99	98	106
Retirement 2030 Fund	72	87	95	100	131	112	102	112
Retirement 2035 Fund	70	88	98	100	115	96	101	108
Retirement 2040 Fund	68	90	97	100	104	97	96	105
Retirement 2045 Fund	67	88	99	100	97	95	101	98
Retirement 2050 Fund	71	88	98	100	104	85	83	80
Retirement 2055 Fund	66	81	96	100	52	55	56	57
Percent of Funds With Positive Active Success Rates	100%	100%	100%	100%				

Fund inceptions through December 31, 2023.

Sources: Standard & Poor's (see Additional Disclosures) and T. Rowe Price. Data analysis by T. Rowe Price.

Tactical asset allocation

For each RF, the actual weights of the underlying funds in the RF were multiplied by their style-specific benchmark returns to generate positioning inclusive of tactical allocation changes. These positions were then subtracted from each underlying fund's fixed strategic asset allocation weights multiplied by the style-specific benchmark returns. The result was the difference between actual positioning, including tactical decisions and implementation, versus strategic asset allocation positioning. This comparison enabled us to isolate the contribution to performance made by tactical allocation decisions.

Security selection

Historical returns, net of fees and other costs, for the underlying T. Rowe Price funds in the Retirement Fund portfolios were measured relative to their specific asset class, sector, or style benchmarks. Two of these underlying funds, the Equity Index 500 Fund and the U.S. Treasury Long-Term Index Fund, are passively managed funds with the investment objectives of tracking the performance of the S&P 500 Index and the Bloomberg U.S. Long Treasury Bond Index, respectively. The other funds are all actively managed investment vehicles.

The indexes used to calculate excess returns in this analysis were the style-appropriate benchmarks used by the T. Rowe Price Asset Allocation Committee to evaluate the performance of the underlying funds in the RF portfolios (see Figure 8). The RF performance numbers shown in our study represent the true after-cost results for investors. Returns were based on reported net asset values and SEC standardized returns for the underlying funds from which management fees and operating expenses were subtracted. In other words, returns for the underlying funds were based on the after-cost performance of the Investor Class up to the inception date of the Z Class (March 16, 2020) and the after-cost performance results since that date of the Z Class for each underlying fund, which is the class invested in by the Retirement Funds.

Excess returns for the underlying funds were aggregated for each rolling period to show the total contribution (positive or negative) made to the performance of each RF by security selection. Active success rates for positive aggregate return contributions (i.e., value added) and average aggregate excess returns (annualized) were calculated for each 1-, 3-, 5-, and 10-year time frame for each RF. Returns on the underlying funds were included in these aggregate performance calculations as of the date of their addition to the RF portfolio (see Figure 3). Those calculations reflected the changing weights for the underlying funds as the RFs moved along their glide paths.

Performance averages

To provide a high-level summary of the effectiveness of T. Rowe Price's target date process, we calculated performance averages for all 11 RFs in the study across all three of the metrics used in our analysis. Average performance over rolling 1-, 3-, 5-, and 10-year periods since RF inception can be found in Figures 9, 10, and 11. To account for the differing inception dates (and, thus, longevities) of each fund, these averages were time weighted—that is, the results were based on the percentage of the total performance periods in each time frame provided by each fund. Weights for each fund in each time frame are shown in Figure 12. Overall, time weighting had relatively little impact on average performance results.

Data sources

Fund and benchmark return data were taken from T. Rowe Price's internal performance database, which is used by the firm to calculate returns for quarterly, semiannual, and annual client reports; marketing materials; and regulatory disclosures. Benchmark returns in the T. Rowe Price database are collected from index managers. All results were based on total returns, including dividends reinvested.

(Fig. 8) Benchmarks for underlying T. Rowe Price funds¹

Fund	Benchmarks
U.S. Equity	
Equity Index 500	S&P 500 Index
U.S. Large-Cap Core	S&P 500 Index
U.S. Equity Research	S&P 500 Index
Growth Stock	Russell 1000 Growth Index
Value	Russell 1000 Value Index
Mid-Cap Growth	Russell Midcap Growth Index
Mid-Cap Value	Russell Midcap Value Index
Small-Cap Stock	Russell 2000 Index
New Horizons	Russell 2000 Growth Index
Small-Cap Value	Russell 2000 Value Index
Non-U.S. Equity	
Overseas Stock	MSCI EAFE Index (Net)
International Stock	MSCI EAFE Growth Index (Net) ²
International Value Equity	MSCI EAFE Value Index (Net) ²
Emerging Markets Stock	MSCI Emerging Markets Index (Net)
Emerging Markets Discovery Stock	MSCI Emerging Markets Index (Net)
Fixed Income	
New Income	Bloomberg U.S. Aggregate Bond Index
International Bond (USD Hedged)	Bloomberg Global Agg. Ex-USD (USD Hedged)
Dynamic Global Bond	ICE BofA US 3-Month Treasury Bill Index ³
High Yield	Credit Suisse High Yield Index
Floating Rate	Morningstar LSTA Performing Loan Index
Emerging Markets Bond	J.P. Morgan Emerging Markets Bond Index Global
U.S. Treasury Long-Term Index ⁴	Bloomberg U.S. Long Treasury Bond Index
Limited Duration Inflation Focused Bond ⁵	Bloomberg U.S. 1–5 Year Treasury TIPS Index ⁶
Dynamic Credit	Dynamic Credit Weighted Benchmark ⁷

¹ Not included: U.S. Treasury Money Fund.

² The indexes shown here are the style-appropriate benchmarks used to calculate the active performance of the firm's target date portfolios. For the International Stock Fund (ISF) and the International Value Equity Fund (IVE), these benchmarks differ from the indexes used by the funds for their own performance reporting. The standard benchmark for the ISF is the MSCI All Country World Index ex USA (Net). The standard benchmark for the IVE is the MSCI EAFE Index (Net).

³ Effective 1 May 2021, the benchmark for the Dynamic Global Bond Fund changed to ICE BOA ML 3 month T bill index. Prior to this change, the benchmark was the 3 Month Libor in USD.

⁴ Prior to October 1, 2020, the name of the U.S. Treasury Long-Term Index Fund was the U.S. Treasury Long-Term Fund.

⁵ From inception to 2006, our conservative fixed income allocation was a mix of the T. Rowe Price Short-Term Bond Fund and the T. Rowe Price Summit Cash Reserves Fund (renamed the Cash Reserves Fund on August 1, 2016). In 2006, the T. Rowe Price Short-Term Income Fund replaced these two funds. In May 2011, the name and investment objective of the T. Rowe Price Short-Term Income Fund changed to the T. Rowe Price Inflation Focused Bond Fund, which is now known as the T. Rowe Price Limited Duration Inflation Focused Bond Fund.

⁶ Effective May 1, 2011, the benchmark was changed to the Bloomberg U.S. 1–5 Year Treasury TIPS Index. For time periods prior to this date, returns were measured against a linked performance benchmark composed of 100% Citigroup 3-Month Treasury Bill Index.

⁷ As of December 31, 2023, the Dynamic Credit Fund's weighted benchmark was comprised of 25% Bloomberg 1-3 Year U.S. Corporate Bond Index, 25% Credit Suisse High Yield Index, 25% J.P. Morgan Emerging Markets Bond Index Global Diversified, and 25% LSTA Performing Loan Index.

(Fig. 8) Benchmarks for underlying T. Rowe Price funds (cont.)

Fund	Benchmarks
Other	
Real Assets	Combined Index Portfolio ⁸
Hedged Equity	CBOE S&P 500 5% Put Protection Index

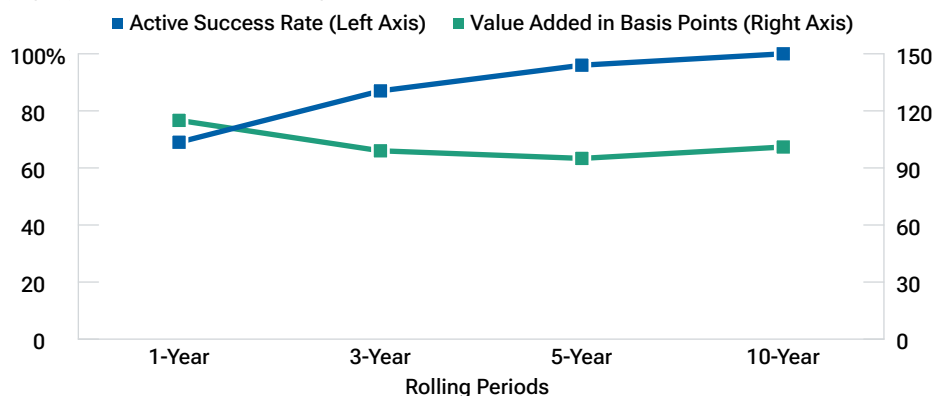
As of December 31, 2023.

Sources: T. Rowe Price, Bloomberg Finance L.P., MSCI, Standard & Poor's, FTSE/Russell, Morningstar, J.P. Morgan, Credit Suisse, Chicago Board of Options Exchange, and T. Rowe Price (See Additional Disclosures). Data analysis by T. Rowe Price.

⁸ As of December 31, 2023, the Real Assets Fund's combined index portfolio was composed of 30% MSCI World Select Natural Resources Net, 25% MSCI All Country World Index Metals and Mining Net, 20% FTSE NAREIT All Equity REITs Index, 20% EPRA/NAREIT Developed Real Estate Index Net, 4% MSCI All Country World Index IMI Gold Net, and 1% MSCI All Country World Index IMI Precious Metals Net.

Time-weighted average active success rates and value added by total implementation

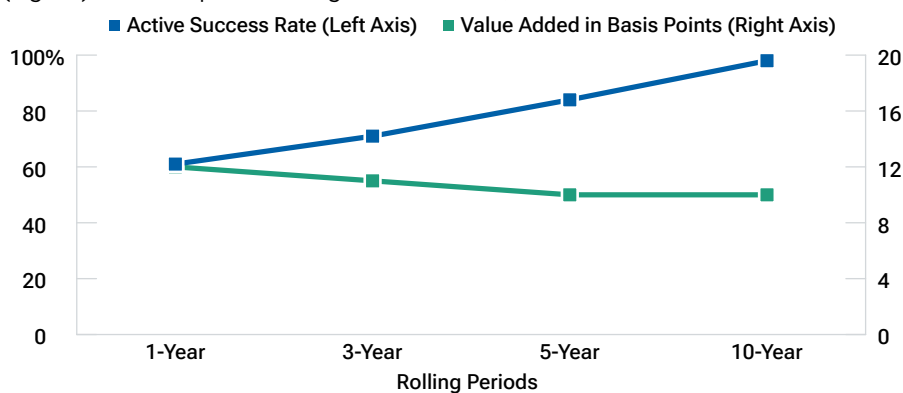
(Fig. 9) Fund inceptions through December 31, 2023



Sources: Standard & Poor's (see Additional Disclosures) and T. Rowe Price. Data analysis by T. Rowe Price.

Time-weighted average active success rates and value added by tactical asset allocation

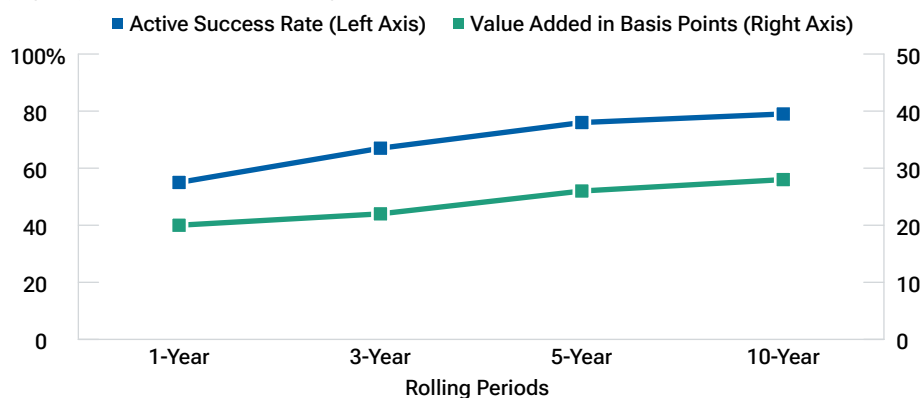
(Fig. 10) Fund inceptions through December 31, 2023



Source: T. Rowe Price.

Time-weighted average active success rates and value added by security selection

(Fig. 11) Fund inceptions through December 31, 2023



Sources: Bloomberg Finance L.P., MSCI, Standard & Poor's, FTSE/Russell, Morningstar, J.P. Morgan, Credit Suisse, Chicago Board of Options Exchange (see Additional Disclosures), and T. Rowe Price. Data analysis by T. Rowe Price.

Time weights used in performance averages

(Fig. 12) Percentage of total rolling performance periods

Fund	1-Year	3-Year	5-Year	10-Year
Retirement 2005 Fund	9.32%	9.35%	9.38%	9.54%
Retirement 2010 Fund	10.02	10.13	10.27	10.90
Retirement 2015 Fund	9.32	9.35	9.38	9.54
Retirement 2020 Fund	10.02	10.13	10.27	10.90
Retirement 2025 Fund	9.32	9.35	9.38	9.54
Retirement 2030 Fund	10.02	10.13	10.27	10.90
Retirement 2035 Fund	9.32	9.35	9.38	9.54
Retirement 2040 Fund	10.02	10.13	10.27	10.90
Retirement 2045 Fund	8.70	8.66	8.60	8.33
Retirement 2050 Fund	7.22	7.00	6.71	5.45
Retirement 2055 Fund	6.73	6.45	6.08	4.49

Source: T. Rowe Price.

T. Rowe Price identifies and actively invests in opportunities to help people thrive in an evolving world, bringing our dynamic perspective and meaningful partnership to clients so they can feel more confident.

Additional Disclosure

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