

**CAMBRIDGE REDEVELOPMENT AUTHORITY
PARS OPEB Trust Program**

**Account Report for the Period
3/1/2024 to 3/31/2024**

Christopher Bator
Treasurer
Cambridge Redevelopment Authority
255 Main Street, 8th Floor
Cambridge, MA 02142

Account Summary

Source	Beginning Balance as of 3/1/2024	Contributions	Earnings	Expenses	Distributions	Transfers	Ending Balance as of 3/31/2024
OPEB	\$477,010.62	\$0.00	\$10,502.66	\$114.40	\$0.00	\$0.00	\$487,398.88
Totals	\$477,010.62	\$0.00	\$10,502.66	\$114.40	\$0.00	\$0.00	\$487,398.88

Investment Selection

Source

OPEB **Vanguard Balanced Strategy**

Investment Objective

Source

OPEB The Balanced Portfolio invests in Vanguard mutual funds using an asset allocation strategy designed for investors seeking both a reasonable level of income and long-term growth of capital and income.

Investment Return

Source	1-Month	3-Months	1-Year	Annualized Return			Plan's Inception Date
				3-Years	5-Years	10-Years	
OPEB	2.20%	4.02%	13.63%	3.00%	-	-	9/26/2019

Information as provided by US Bank, Trustee for PARS; Not FDIC Insured; No Bank Guarantee; May Lose Value

Past performance does not guarantee future results. Performance returns may not reflect the deduction of applicable fees, which could reduce returns. Information is deemed reliable but may be subject to change.

Investment Return: Annualized rate of return is the return on an investment over a period other than one year multiplied or divided to give a comparable one-year return.

Account balances are inclusive of Trust Administration, Trustee and Investment Management fees

Public Agency Retirement Services

4Q 2023 Review

Fixed Income Strategy

Investment Objective

The Fixed Income Strategy seeks to provide capital preservation and current income consistent with its current allocation.

Investment Strategy

The Fixed Income Strategy invests in Vanguard mutual funds using an asset allocation strategy designed for investors seeking current income. The underlying funds are: Vanguard Total Bond Market Index Fund, Vanguard Total International Bond Index Fund, Vanguard Intermediate-Term Investment-Grade Fund, and Vanguard Short-Term Investment-Grade Fund.

The Strategy's indirect bond holdings are a diversified mix of short-, intermediate-, and long-term U.S. government, U.S. agency, and investment-grade U.S. corporate bonds; and mortgage-backed and asset-backed securities. The Strategy also holds currency-hedged international bonds.

Fees

The fees for managing the Strategy consists of the expense ratios of the individual funds and the advisor fee. Both of these fees are dependent on the assets under management. Currently the average expense ratio is **0.08%** which consists of averaging the expense ratio of the individual funds which are outlined above. The average advisory fee is **0.02%** based on the current assets under management.

Conservative Strategy

Investment Objective

The Conservative Strategy seeks to provide current income and low to moderate capital appreciation consistent with its current allocation.

Investment Strategy

The Conservative Strategy invests in Vanguard mutual funds using an asset allocation strategy designed for investors seeking current income and low to moderate capital appreciation. The underlying funds are: Vanguard Total Stock Market Index Fund, Vanguard Total International Stock Index Fund, Vanguard Total Bond Market Index Fund, Vanguard Total International Bond Market Index Fund, Vanguard Intermediate-Term Investment-Grade Fund, Vanguard Short-Term Investment-Grade Fund, and Vanguard Real Estate Index Fund.

The Strategy's indirect stock holdings are a diversified mix of U.S. and foreign large-, mid-, and small-capitalization stocks. The Strategy's indirect bond holdings are a diversified mix of short-, intermediate-, and long-term U.S. government, U.S. agency, and investment-grade U.S. corporate bonds; and mortgage-backed and asset-backed securities. The Strategy also holds currency-hedged international bonds.

Fees

The fees for managing the strategy consists of the expense ratios of the individual funds and the advisor fee. Both of these fees are dependent on the assets under management. Currently the average expense ratio is **0.08%** which consists of averaging the expense ratio of the individual funds which are outlined above. The average advisory fee is **0.02%** based on the current assets under management.

Balanced Strategy

Investment Objective

The Balanced Strategy seeks to provide capital appreciation and low to moderate level of current income consistent with its current allocation.

Investment Strategy

The Balanced Strategy invests in Vanguard mutual funds using an asset allocation strategy designed for investors seeking capital appreciation and a low to moderate level of current income. The underlying funds are: Vanguard Total Stock Market Index Fund, Vanguard Total International Stock Index Fund, Vanguard Total Bond Market Index Fund, Vanguard Intermediate-Term Investment-Grade Fund, Vanguard Short-Term Investment-Grade Fund, Vanguard Total International Bond Index Fund, and Vanguard REIT Index Fund.

The strategy's indirect stock holdings are a diversified mix of U.S. and foreign large-, mid-, and small-capitalization stocks. The strategy's indirect bond holdings are a diversified mix of short-, intermediate-, and long-term U.S. government, U.S. agency, and investment-grade U.S. corporate bonds; and mortgage-backed and asset-backed securities. The Strategy also holds currency-hedged international bonds.

Fees

The fees for managing the strategy consists of the expense ratios of the individual funds and the advisor fee. Both of these fees are dependent on the assets under management. Currently the average expense ratio is **0.08%** which consists of averaging the expense ratio of the individual funds which are outlined above. The average advisory fee is **0.02%** based on the current assets under management.

Growth Strategy

Investment Objective

The Growth Strategy seeks to provide capital appreciation and some current income consistent with its current allocation.

Investment Strategy

The Growth Strategy invests in Vanguard mutual funds using an asset allocation strategy designed for investors seeking capital appreciation and some current income. The underlying funds are: Vanguard Total Stock Market Index Fund, Vanguard Total International Stock Index Fund, Vanguard Total Bond Market Index Fund, Vanguard Total International Bond Market Index, Vanguard Intermediate-Term Investment-Grade Fund, Vanguard Short-Term Investment-Grade Fund, and Vanguard Real Estate Index Fund.

The Strategy's indirect stock holdings are a diversified mix of U.S. and foreign large-, mid-, and small-capitalization stocks. The Strategy's indirect bond holdings are a diversified mix of short-, intermediate-, and long-term U.S. government, U.S. agency, and investment-grade U.S. corporate bonds; and mortgage-backed and asset-backed securities. The Strategy also holds currency-hedged international bonds.

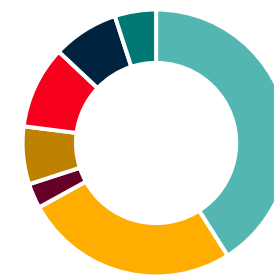
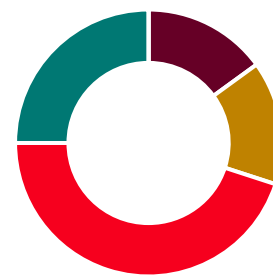
Fees

The fees for managing the strategy consists of the expense ratios of the individual funds and the advisor fee. Both of these fees are dependent on the assets under management. Currently the average expense ratio is **0.08%** which consists of averaging the expense ratio of the individual funds which are outlined above. The average advisory fee is **0.02%** based on the current assets under management.

Asset allocation forecasts

Vanguard strategies

Investments (Equity/Fixed Income)	Fixed Income Strategy (0/100)	Conservative Strategy (40/60)	Balanced Strategy (60/40)	Growth Strategy (75/25)
Total Equity (stocks)	-	36%	54%	67%
● Total Stock Market Index	-	22%	33%	41%
● Total International Stock Market Index	-	14%	21%	26%
Total Fixed Income (bonds)	100%	60%	40%	25%
● Total Bond Market Index	45%	23%	15%	10%
● Total International Bond Market Index	25%	15%	10%	5%
● Intermediate-Term Investment Grade Fund	15%	14%	10%	7%
● Short-Term Investment Grade Fund	15%	8%	5%	3%
Total Real Estate	-	4%	6%	8%
● Real Estate Index	-	4%	6%	8%
Total weighted average expense ratio	0.08%	0.08%	0.08%	0.08%
Vanguard Advisory fee	0.02%	0.02%	0.02%	0.02%
All-in fee	0.10%	0.10%	0.10%	0.10%

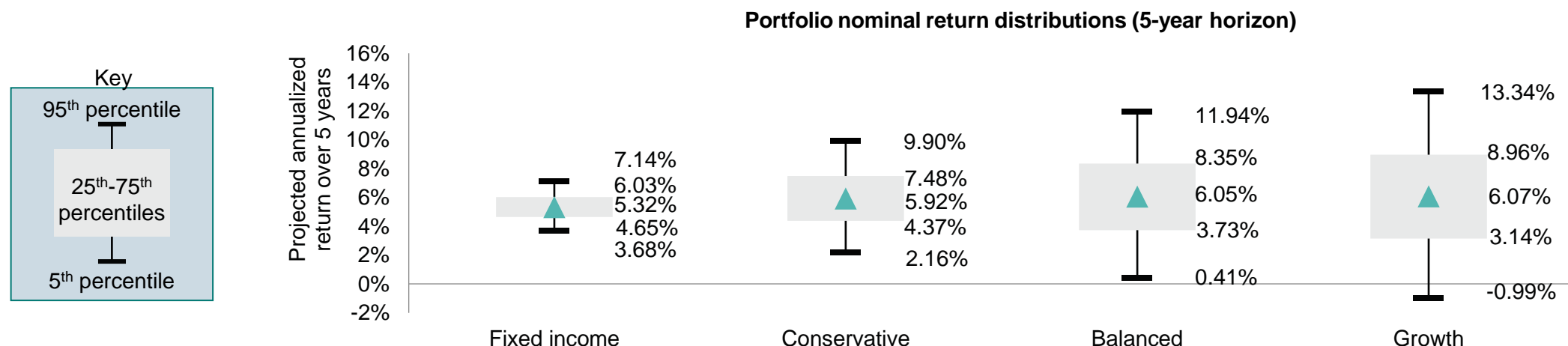


Data as of December 31, 2023

For institutional use only. Not for distribution to retail investors.

Asset allocation analysis: 5-year outlook

Asset classes	Fixed income	Conservative	Balanced	Growth
U.S. Equity	-	22%	33%	41%
Non-U.S. Equity	-	14%	21%	26%
REITs	-	4%	6%	8%
U.S. Aggregate Bonds	45%	23%	15%	10%
Non-U.S. Bonds	25%	15%	10%	5%
Intermediate-Term Credit	15%	14%	10%	7%
Short-Term Credit	15%	8%	5%	3%
Median expected outcomes				
Returns	5.32%	5.92%	6.05%	6.07%
Volatility	4.13%	6.37%	9.15%	11.42%
Sharpe ratio	0.21	0.24	0.20	0.18



IMPORTANT: The projections or other information generated by the Vanguard Capital Markets Model®(VCMM) regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from VCMM are derived from 10,000 simulations for each modeled asset class. Simulations as of September 30, 2023. Results from the model may vary with each use and over time. For more information on VCMM, see the Important Information slide.

Note: Returns, real returns, and Sharpe ratio listed above represent the median value for 10,000 scenarios. The Sharpe ratio calculates return (or reward) per unit of risk; $(R_x - r_f) / \sigma(x - r)$; R_f = cash. The risk-free rate is based on VCMM's projections for cash.

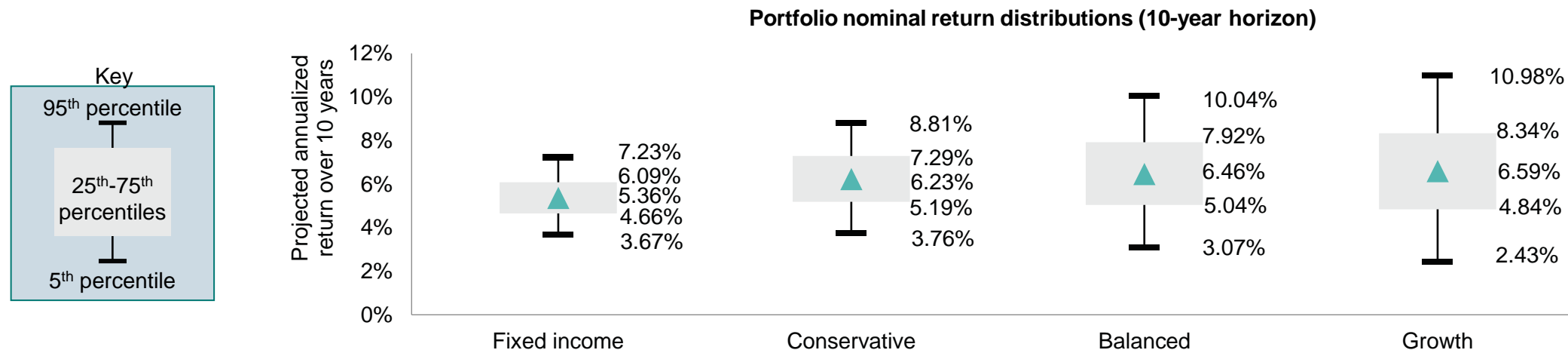
Source: Vanguard, Investment Strategy Group.

For institutional use only. Not for distribution to retail investors.



Asset allocation analysis: 10-year outlook

Asset classes	Fixed income	Conservative	Balanced	Growth
U.S. Equity	-	22%	33%	41%
Non-U.S. Equity	-	14%	21%	26%
REITs	-	4%	6%	8%
U.S. Aggregate Bonds	45%	23%	15%	10%
Non-U.S. Bonds	25%	15%	10%	5%
Intermediate-Term Credit	15%	14%	10%	7%
Short-Term Credit	15%	8%	5%	3%
Median expected outcomes				
Returns	5.36%	6.23%	6.46%	6.59%
Volatility	4.44%	6.79%	9.71%	12.08%
Sharpe ratio	0.20	0.26	0.23	0.21



IMPORTANT: The projections or other information generated by the Vanguard Capital Markets Model®(VCMM) regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from VCMM are derived from 10,000 simulations for each modeled asset class. Simulations as of September 30, 2023. Results from the model may vary with each use and over time. For more information on VCMM, see the Important Information slide.

Note: Returns, real returns, and Sharpe ratio listed above represent the median value for 10,000 scenarios. The Sharpe ratio calculates return (or reward) per unit of risk; $(R_x - r_f) / \sigma(x - r)$; R_f = cash. The risk-free rate is based on VCMM's projections for cash.

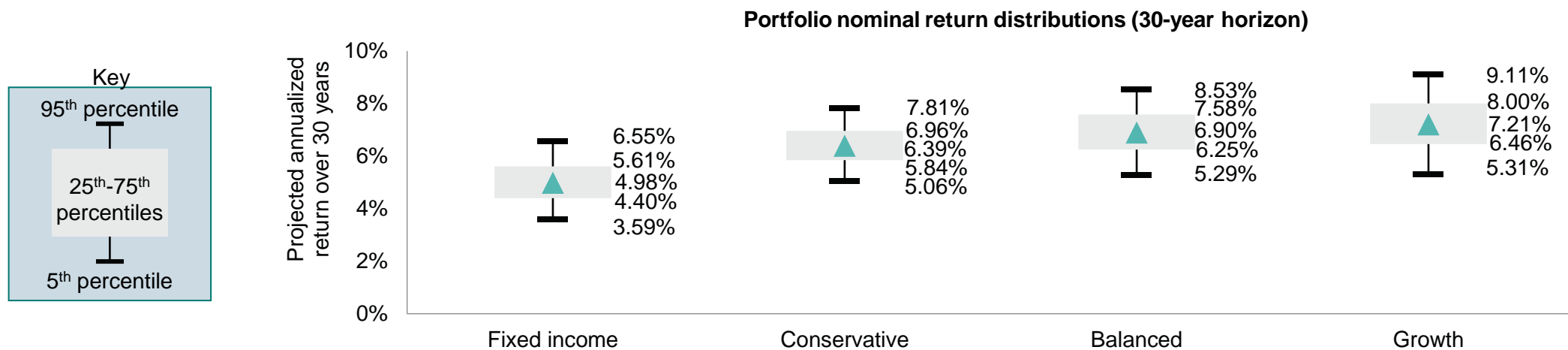
Source: Vanguard, Investment Strategy Group.

For institutional use only. Not for distribution to retail investors.



Asset allocation analysis: 30-year outlook

Asset classes	Fixed income	Conservative	Balanced	Growth
U.S. Equity	-	22%	33%	41%
Non-U.S. Equity	-	14%	21%	26%
REITs	-	4%	6%	8%
U.S. Aggregate Bonds	45%	23%	15%	10%
Non-U.S. Bonds	25%	15%	10%	5%
Intermediate-Term Credit	15%	14%	10%	7%
Short-Term Credit	15%	8%	5%	3%
Median expected outcomes				
Returns	4.98%	6.39%	6.90%	7.21%
Volatility	4.71%	7.04%	10.07%	12.52%
Sharpe ratio	0.31	0.41	0.36	0.33



IMPORTANT: The projections or other information generated by the Vanguard Capital Markets Model®(VCMM) regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from VCMM are derived from 10,000 simulations for each modeled asset class. Simulations as of September 30, 2023. Results from the model may vary with each use and over time. For more information on VCMM, see the Important Information slide.

Note: Returns, real returns, and Sharpe ratio listed above represent the median value for 10,000 scenarios. The Sharpe ratio calculates return (or reward) per unit of risk; $(R_x - r_f) / \sigma(x - r)$; R_f = cash. The risk-free rate is based on VCMM's projections for cash.

Source: Vanguard, Investment Strategy Group.

For institutional use only. Not for distribution to retail investors.

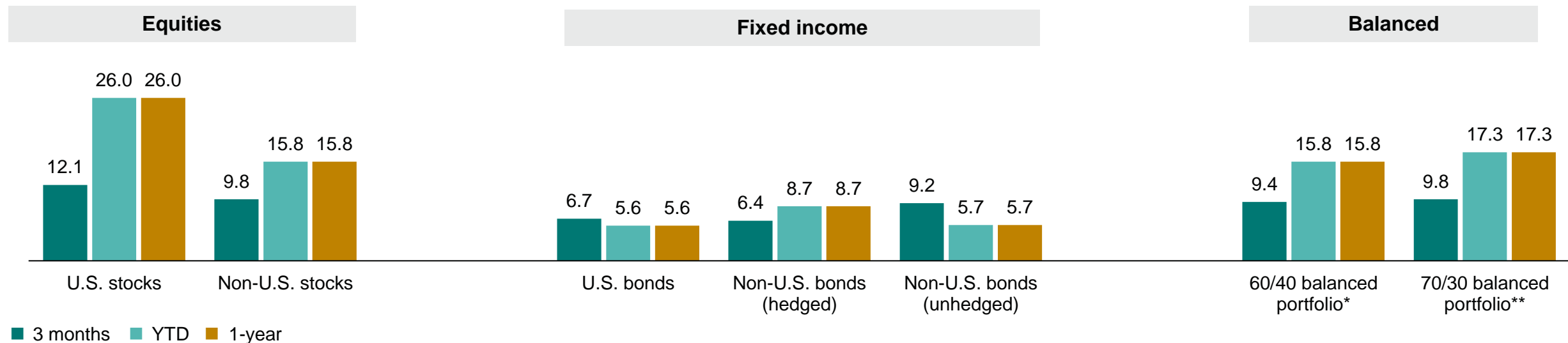


4Q performance review

Global markets rally with lower inflation in sight

- Global banks held rates steady as tighter monetary policy appears to be working to tame inflation.
- US stock and bond markets rallied in anticipation that the Federal Reserve will cut rates multiple times in 2024.

Global market returns as of December 31, 2023 (%)



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: Bloomberg, CRSP, and FTSE.

U.S. stocks (CRSP U.S. Total Market Index), non-U.S. stocks (FTSE Global All-Cap ex-U.S. Index), U.S. bonds (Bloomberg U.S. Aggregate Float Adjusted Index), non-U.S. bonds hedged (Bloomberg Global Aggregate ex-USD Float Adjusted RIC Capped Index hedged), non-U.S. bonds unhedged (Bloomberg Global Aggregate Index ex USD).

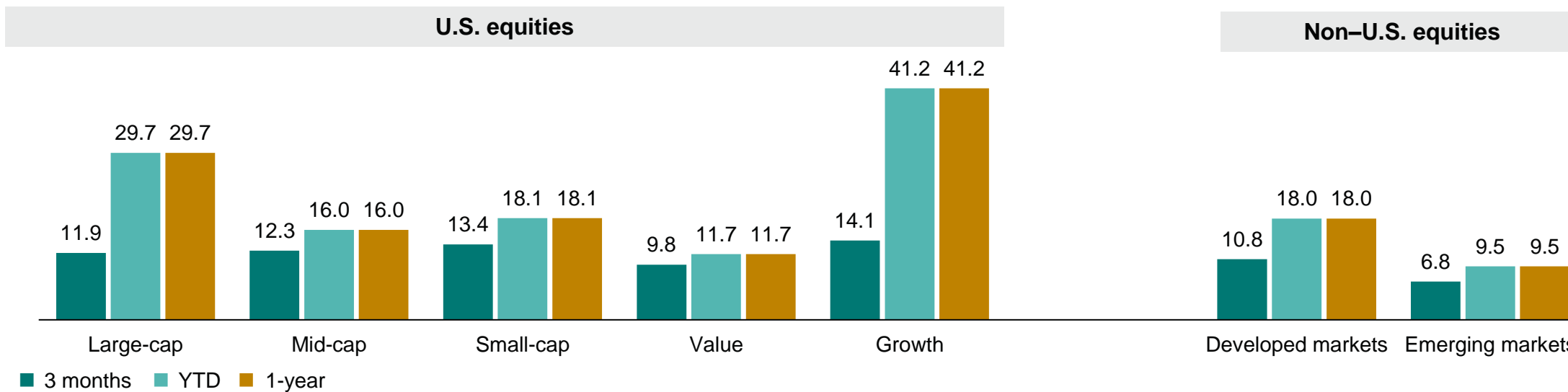
* 60/40 balanced portfolio Static Composite (36% U.S. stocks, 24% international stocks, and 28% investment-grade U.S. bonds, 12% investment-grade international bonds).

** 70/30 balanced portfolio Static Composite (42% U.S. stocks, 28% international stocks, and 21% investment-grade U.S. bonds, 9% investment-grade international bonds).

Global equities finish 2023 off strong

- All three major US indexes reached new highs in December with rate cuts in sight.
- The market rally continued to be driven by the Magnificent 7 due to continued enthusiasm around artificial intelligence and technological innovations.
- Markets across the world finished 2023 off strong as fears of a recession faded and optimism around central bank rate cuts in 2024.

Global equity market returns as of December 31, 2023 (%)



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.

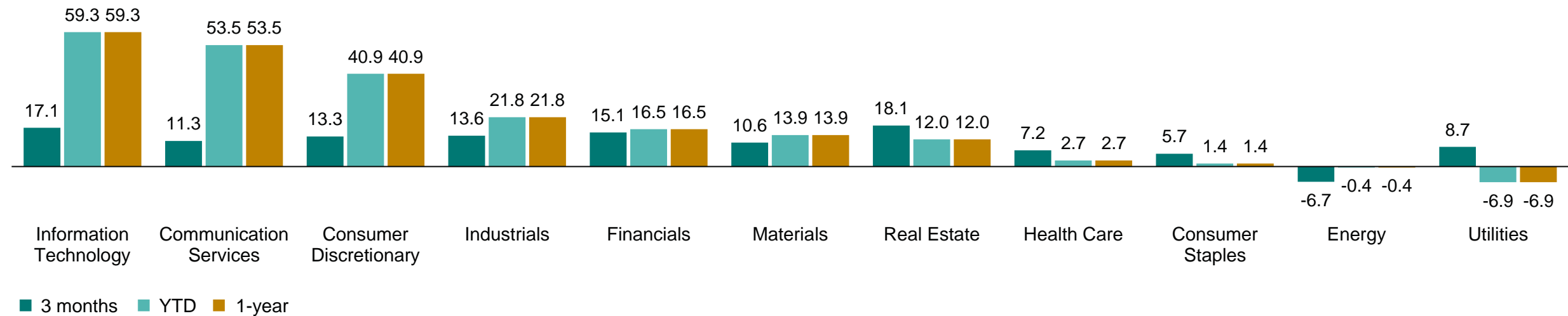
Sources: FTSE, MSCI, Russell, CRSP and Dow Jones.

Large-cap (CRSP US Mega Cap Index), Mid-cap (CRSP US Mid Cap Index), Small-cap (CRSP US Small Cap Index); Value (Russell 3000 Value Index), Growth (Russell 3000 Growth Index); Developed markets (FTSE Developed All Cap ex-US Index), Emerging markets (FTSE Emerging Markets All Cap China A Inclusion Index).

U.S. equities reacts positively to favorable economic data

- Prices decreased for the first time since April 2020, signaling the US may be on pace for a “soft landing.”
- All sectors posted positive returns for the month of December on strong economic news.
- Consumers continued to spend during the holiday season with spending increasing by 3% compared with 2022’s holiday season.

U.S. equity sector returns as of December 31, 2023 (%)



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.

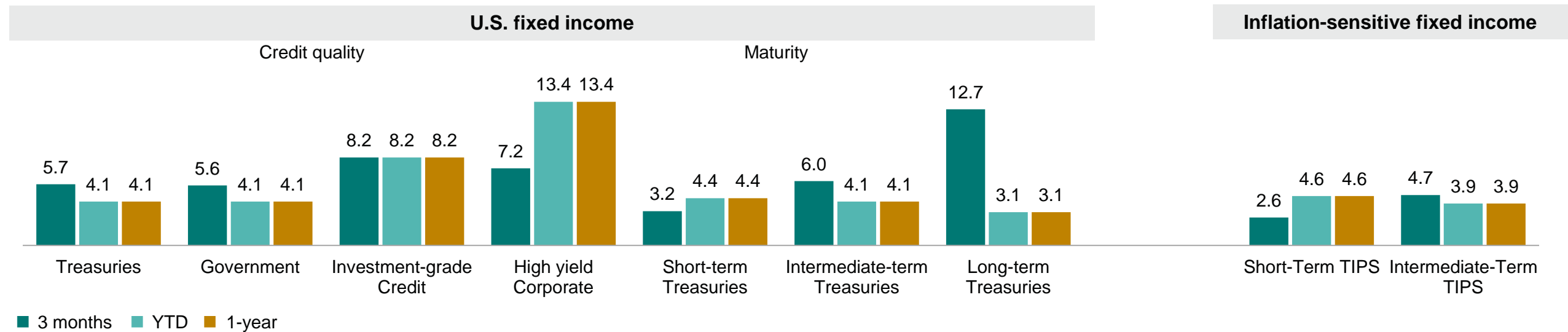
Source: FactSet.

U.S. markets measured by CRSP U.S. Total Market Index.

Fixed income markets benefit from lower yields and expected cuts

- Investment grade bonds gained and rising hopes for a soft landing supported high yield bonds where spreads tightened.
- Bonds rallied in the last quarter of 2023 as investors are pricing in more rapid rate cuts in 2024.
- After a bumpy year in the bond market, all sectors of the bond market ended with positive one-year returns.

Domestic fixed income market returns as of December 31, 2023 (%)



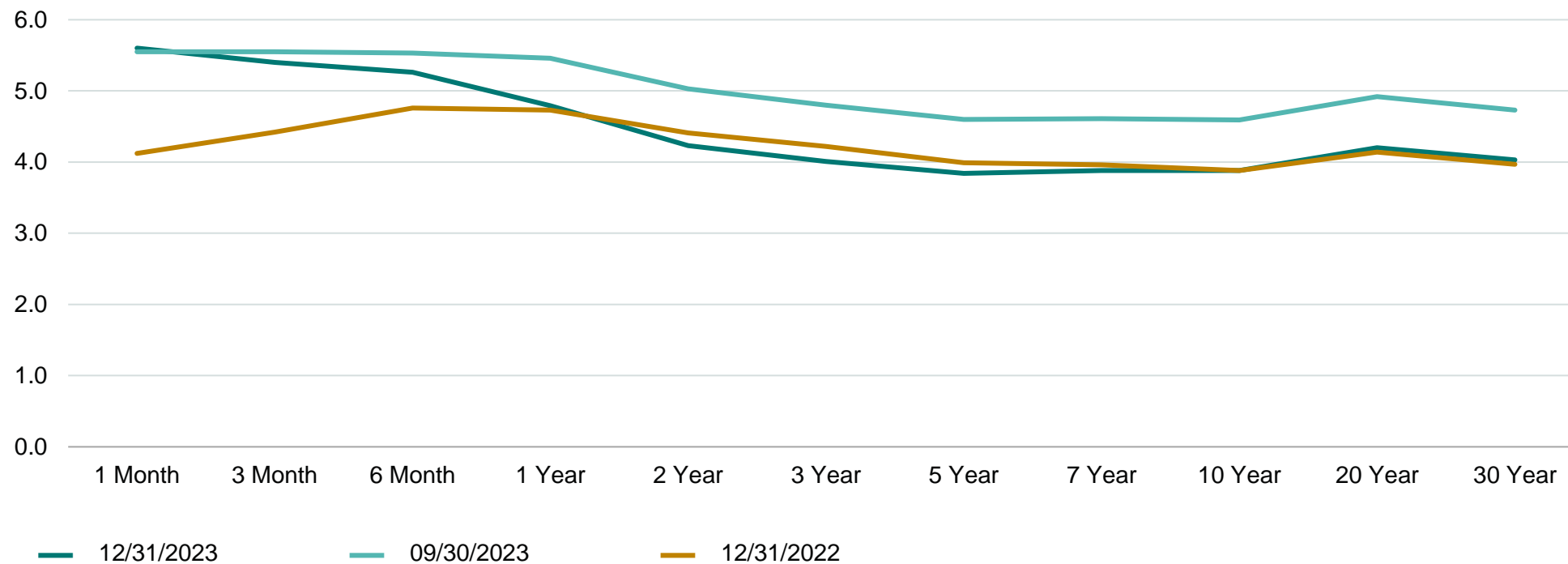
Past performance is no guarantee of future returns. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

Source: Bloomberg.

Treasuries, government, investment-grade credit; high-yield (Bloomberg U.S. Treasury/Government/Credit/Corporate High-Yield Indices); short-inter-long-term Treasuries (Bloomberg U.S. 1-5/5-10/Long Treasury Indices); short-term TIPS (Bloomberg U.S. Treasury 0-5 Year Inflation-Protected Index); intermediate-term TIPS (Bloomberg U.S. Treasury Inflation-Protected Index).

Yields continue to fall as Fed indicates rate hikes are over

Yield (%) and change (bps)	1-month	3-month	6-month	1-year	2-year	3-year	5-year	7-year	10-year	20-year	30-year
Current yield (%)	5.60	5.40	5.26	4.79	4.23	4.01	3.84	3.88	3.88	4.20	4.03
3 Mo. Δ	5	-15	-27	-67	-80	-79	-76	-73	-71	-72	-70
12 Mo. Δ	148	98	50	6	-18	-21	-15	-8	0	6	6



Source: Morningstar.

For institutional use only. Not for distribution to retail investors.

Market outlook

Vanguard's 2024 economic forecasts

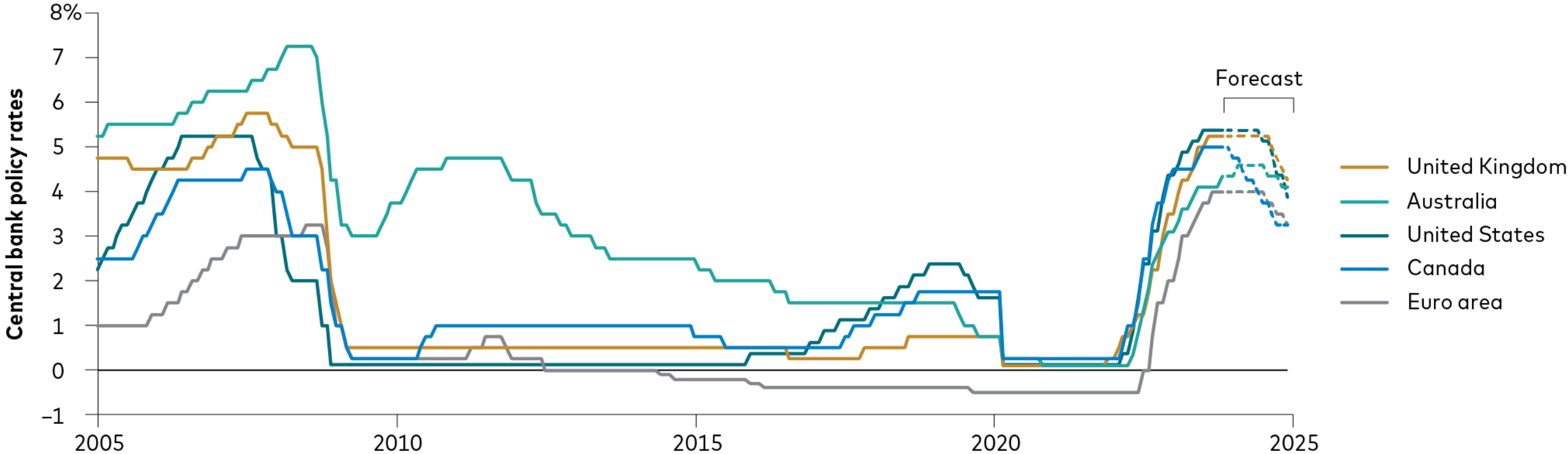
Country/region	GDP growth		Unemployment rate		Core inflation	Monetary policy		
	2024		2024		2024	Year-end 2023	Year-end 2024	Neutral rate
	Vanguard	Trend	Vanguard	NAIRU	Vanguard			
U.S.	0.25%–0.75%	1.8%	4.5%–5%	3.5%–4%	2.3%	5.5%	3.5%–4%	3%–3.5%
Euro area	0.5%–1%	1.2%	7%–7.5%	6.5%–7%	2.1%	4%	3.25%	2%–2.5%
U.K.	0.5%–1%	1%	4.5%–5%	3.5%–4%	2.8%	5.25%	4.25%	3%–3.5%
China	4.5%–5%	4.1%	4.5%–5%	4.5%–5%	1.2%	2.5%	2.2%	4.5%–5%

Notes: Forecasts are as of December 4, 2023. For the U.S., GDP growth is defined as the year-over-year change in fourth-quarter GDP. For all other countries/regions, GDP growth is defined as the annual change in GDP in the forecast year compared with the previous year. Unemployment forecasts are the average for the fourth quarter of 2024. NAIRU is the nonaccelerating inflation rate of unemployment, a measure of labor market equilibrium. Core inflation excludes volatile food and energy prices. For the U.S., euro area, and U.K., core inflation is defined as the year-over-year change in the fourth quarter compared with the previous year. For China, core inflation is defined as the average annual change compared with the previous year. For the U.S., core inflation is based on the core Personal Consumption Expenditures Index. For all other countries/regions, core inflation is based on the core Consumer Price Index. For U.S. monetary policy, Vanguard's forecast refers to the top end of the Federal Open Market Committee's target range. The neutral rate is the equilibrium policy rate at which no easing or tightening pressures are being placed on an economy or its financial markets.

Source: Vanguard.



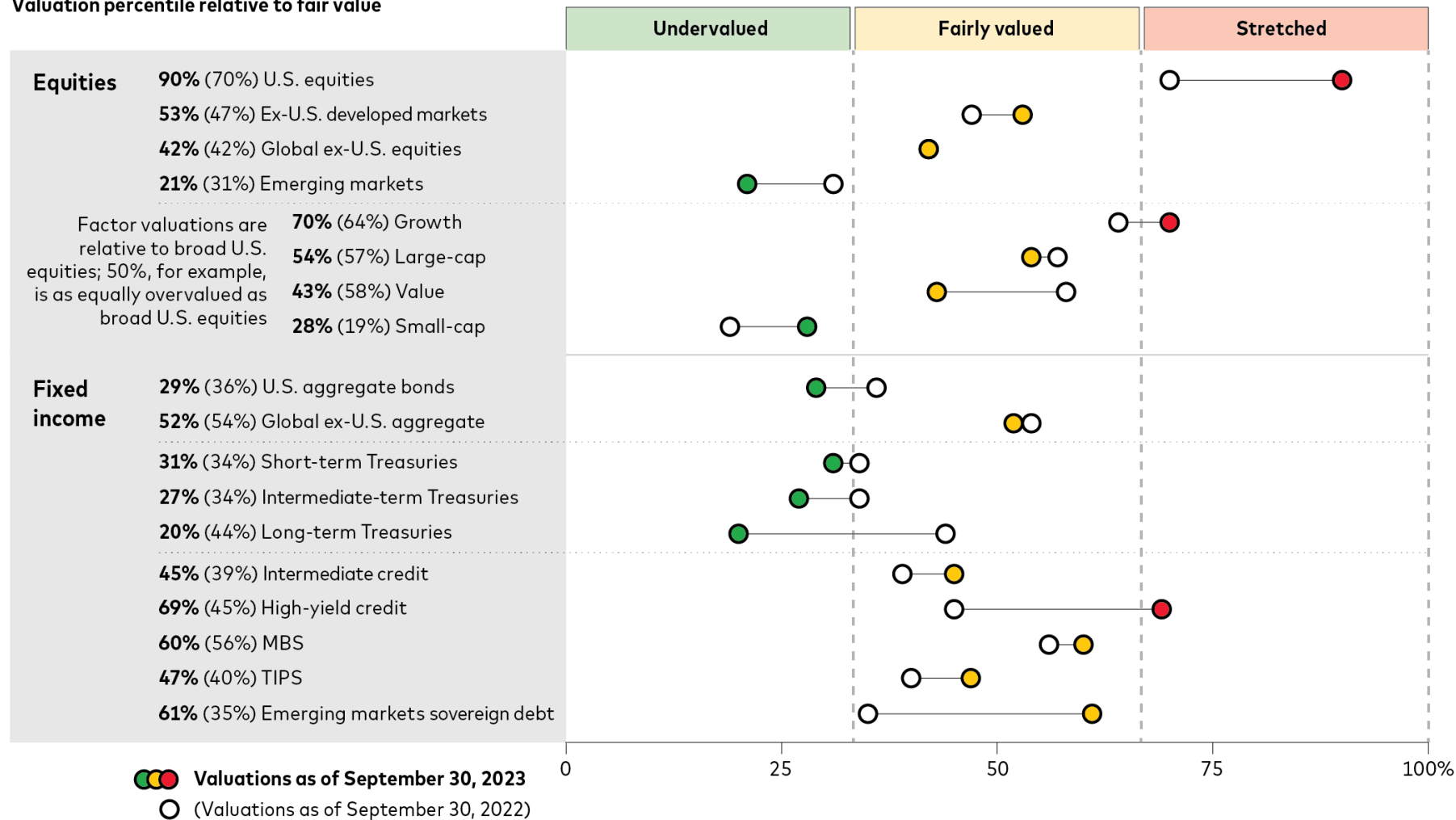
Rate cuts in 2024, but zero rates are behind us



Notes: Monthly data are from January 2005 through November 2023. Forecasts thereafter run through year-end 2024.
Sources: Vanguard calculations, based on data from Bloomberg, as of November 30, 2023.

Opportunities and cautionary signals for long-term investors

Valuation percentile relative to fair value



Notes: The U.S. equity valuation measure is the current cyclically adjusted price/earnings ratio (CAPE) percentile relative to our fair-value CAPE estimate for the MSCI US Broad Market Index. Factor valuations are relative to U.S. equities as the base at the 50th percentile. Growth, value, and small-cap valuation measures are all based on the percentile rank based on our fair-value model relative to the market. The large-cap valuation measure is a composite valuation measure of the style factor to U.S. relative valuations and the current U.S. CAPE percentile relative to its fair-value CAPE. The emerging markets valuation measure is based on the percentile rank based on our fair-value model relative to the market. The ex-U.S. developed markets and global ex-U.S. equity valuation measures are the market-capitalization-weighted CAPE percentiles relative to our fair-value CAPE estimate for the MSCI EMU Index, MSCI UK Index, MSCI Japan Index, MSCI Canada Index, MSCI Australia Index, and MSCI Emerging Markets Index; the MSCI Emerging Markets Index is used only for global ex-U.S. equities.

Aggregate bond valuation measures are market-capitalization-weighted averages of intermediate-term credit and Treasury valuation percentiles for the U.S. and global ex-U.S. (market-capitalization-weighted averages of the euro area, the U.K., Japan, Canada, and Australia). Treasury valuation measures are the key rate duration-weighted average of our fair-value model. Intermediate credit, high-yield credit, mortgage-backed securities (MBS), and emerging markets sovereign debt valuation measures are based on current spreads relative to the VCMM simulation of spreads in year 30 of our forecast. The Treasury Inflation-Protected Securities (TIPS) valuation measure is based on the 10-year annualized inflation forecast relative to our equilibrium forecast for inflation. The valuation percentiles are as of September 30, 2023, and September 30, 2022 (in parentheses).

Sources: Vanguard calculations, based on data from Robert Shiller's website at aida.wss.yale.edu/~shiller/data.htm, the U.S. Bureau of Labor Statistics, the Federal Reserve Board, and Refinitiv, as of September 30, 2023.

IMPORTANT: The projections and other information generated by the VCMM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from the VCMM are derived from 10,000 simulations for each modeled asset class. Simulations as of September 30, 2023, and September 30, 2022. Results from the model may vary with each use and over time.

Appendix

About the Vanguard Capital Markets Model

IMPORTANT: The projections and other information generated by the Vanguard Capital Markets Model regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. VCMM results will vary with each use and over time.

The VCMM projections are based on a statistical analysis of historical data. Future returns may behave differently from the historical patterns captured in the VCMM. More important, the VCMM may be underestimating extreme negative scenarios unobserved in the historical period on which the model estimation is based.

The VCMM is a proprietary financial simulation tool developed and maintained by Vanguard's Investment Strategy Group. The model forecasts distributions of future returns for a wide array of broad asset classes. Those asset classes include U.S. and international equity markets, several maturities of the U.S. Treasury and corporate fixed income markets, international fixed income markets, U.S. money markets, commodities, and certain alternative investment strategies. The theoretical and empirical foundation for the Vanguard Capital Markets Model is that the returns of various asset classes reflect the compensation investors require for bearing different types of systematic risk (beta). At the core of the model are estimates of the dynamic statistical relationship between risk factors and asset returns, obtained from statistical analysis based on available monthly financial and economic data. Using a system of estimated equations, the model then applies a Monte Carlo simulation method to project the estimated interrelationships among risk factors and asset classes as well as uncertainty and randomness over time. The model generates a large set of simulated outcomes for each asset class over several time horizons. Forecasts are obtained by computing measures of central tendency in these simulations. Results produced by the tool will vary with each use and over time.

The primary value of the VCMM is in its application to analyzing potential client portfolios. VCMM asset-class forecasts—comprising distributions of expected returns, volatilities, and correlations—are key to the evaluation of potential downside risks, various risk–return trade-offs, and the diversification benefits of various asset classes. Although central tendencies are generated in any return distribution, Vanguard stresses that focusing on the full range of potential outcomes for the assets considered, such as the data presented in this paper, is the most effective way to use VCMM output.

The VCMM seeks to represent the uncertainty in the forecast by generating a wide range of potential outcomes. It is important to recognize that the VCMM does not impose “normality” on the return distributions, but rather is influenced by the so-called fat tails and skewness in the empirical distribution of modeled asset-class returns. Within the range of outcomes, individual experiences can be quite different, underscoring the varied nature of potential future paths. Indeed, this is a key reason why we approach asset-return outlooks in a distributional framework.

Indexes for VCMM simulations

The long-term returns of our hypothetical portfolios are based on data for the appropriate market indexes through June 30, 2022. We chose these benchmarks to provide the most complete history possible, and we apportioned the global allocations to align with Vanguard's guidance in constructing diversified portfolios. Asset classes and their representative forecast indexes are as follows:

US Equity (Spliced Total Stock Market Index ¹)	US IT Credit (BBgBarc US Credit 5-10 Yr TR USD)
US REITs (Real Estate Spliced Index ²)	US LT Credit (BBgBarc US Credit A+ Long TR USD)
Non-US Equity (Spl Total International Stock Index ³)	Longterm Gov't/Credit (Spl BloomBarc USLongGv/Cr Flt Adj Ix ⁶)
EM Equity (Spliced Emerging Markets Index ⁴)	Total US Credit (Duration Neutral) (BBgBarc US Credit TR USD)
Developed Markets Ex US (MSCI World ex USA NR USD)	US ST TIPS (BBgBarc US TIPS 0-5 Year TR USD)
US Agg (Spliced BloomBarc USAgg Fit AdjIx ⁵)	US IT TIPS (BBgBarc US Trsy Infl Note 5+Y TR USD)
US High Yield (BBgBarc US Corporate High Yield TR USD)	US LT TIPS (BBgBarc US Treasury US TIPS TR USD)
US ST Treasury (BBgBarc 1-5 Yr Treasury TR USD)	US Cash (USTREAS T-Bill Auction Ave 3 Mon)
US IT Treasury (BBgBarc US Treasury 5-10 Yr TR USD)	Non-US Agg USD Hdg (BBgBarc GA ex USD FL Adj RIC USD Hdg)
US LT Treasury (BBgBarc US Treasury Long TR USD)	Emerging Market Bonds (Bloomberg Barclays USD Emerging Markets Government)
US Total Treasury Index (BBgBarc US Treasury TR USD(1987))	Commodities (Bloomberg Commodity TR USD)
US Extended Duration (BBgBarc 20-30Y Treasury Strips TR USD)	Personal Consumption Expenditures Index, or PCE
US ST Credit (BBgBarc Credit 1-5 Yr TR USD)	

- 1.Spliced Total Stock Market Index: Dow Jones Wilshire 5000 Index through April 22, 2005; MSCI US Broad Market Index through June 2, 2013; CRSP US Total Market Index thereafter.
- 2.Real Estate Spliced Index: MSCI US REIT Index adjusted to include a 2% cash position (Lipper Money Market Average) through April 30, 2009; 100% MSCI US REIT Index through 2/1/2018; 100% MSCI US IMI Real Estate 25/50 Transition Index through 7/24/2018; 100% MSCI US IM Real Estate 25/50 Index thereafter.
- 3.Spliced Total International Stock Idx: Total International Composite Index through August 31, 2006; MSCI EAFE + Emerging Markets Index through December 15, 2010; MSCI ACWI ex USA IMI Index through June 2, 2013, FTSE Global All Cap ex US Index thereafter.
- 4.Spliced Emerging Markets Index: Select Emerging Markets Index through August 23, 2006; MSCI Emerging Markets Index Net USD through January 9, 2013; FTSE Emerging Transition Index through June 27, 2013; FTSE Emerging Index through 11/1/2015; FTSE EM All Cap CN A Trans Idx through 9/18/2016; FTSE Emerging ACap CN A Inclus Idx thereafter.
- 5.Spliced Bloomberg Barclays U.S. Aggregate Float Adjusted Index: Bloomberg Barclays U.S. Aggregate Bond Index through December 31, 2009; Bloomberg Barclays U.S. Aggregate Float Adjusted Index thereafter.
- 6.Spl BloomBarc USLongGv/Cr Flt Adj Ix: BloomBarc U.S. Long Government/Credit Bond Index through December 31, 2009; BloomBarc U.S. Long Government/Credit Float Adjusted Index thereafter.

Indexes for VCMM simulations

The long-term returns of our hypothetical portfolios are based on data for the appropriate market indexes through September 30, 2023. We chose these benchmarks to provide the most complete history possible, and we apportioned the global allocations to align with Vanguard's guidance in constructing diversified portfolios. Asset classes and their representative forecast indexes are as follows:

U.S. equities: MSCI US Broad Market Index.

Global ex-U.S. equities: MSCI All Country World ex USA Index.

Global ex-U.S. developed market equities: MSCI World ex USA Index.

Emerging markets equities: MSCI Emerging Markets Index.

U.S. REITs: FTSE/NAREIT US Real Estate Index.

U.S. Treasury bonds: Bloomberg U.S. Treasury Index.

U.S. short-term Treasury bonds: Bloomberg U.S. 1–5 Year Treasury Bond Index.

U.S. intermediate-term Treasury bonds: Bloomberg U.S. 5–10 Year Treasury Bond Index.

U.S. long-term Treasury bonds: Bloomberg U.S. Long Treasury Bond Index.

U.S. intermediate credit bonds: Bloomberg U.S. Credit Bond Index.

U.S. high-yield corporate bonds: Bloomberg U.S. High Yield Corporate Bond Index.

U.S. bonds: Bloomberg U.S. Aggregate Bond Index.

Global ex-U.S. bonds: Bloomberg Global Aggregate ex-USD Index USD Hedged.

U.S. TIPS: Bloomberg U.S. Treasury Inflation Protected Securities Index.

Emerging-market sovereign bonds: Bloomberg Emerging Markets USD Sovereign Bond Index—10% Country Capped.

Mortgage-backed securities (MBS): Bloomberg U.S. Mortgage Backed Securities Index.

All equity indexes below are weighted by market capitalization:

Small-cap equities: Stocks with a market cap in the lowest two-thirds of the Russell 3000 Index.

Large-cap equities: Stocks with a market cap in the highest one-third of the Russell 1000 Index.

Growth equities: Stocks with a price/book ratio in the highest one-third of the Russell 1000 Index.

Value equities: Stocks with a price/book ratio in the lowest one-third of the Russell 1000 Index.

Notes on risk

All investing is subject to risk, including the possible loss of the money you invest. Past performance is no guarantee of future returns. Diversification does not ensure a profit or protect against a loss. There is no guarantee that any particular asset allocation or mix of funds will meet your investment objectives or provide you with a given level of income. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

U.S. government backing of Treasury or agency securities applies only to the underlying securities and does not prevent price fluctuations. Unlike stocks and bonds, U.S. Treasury bills are guaranteed as to the timely payment of principal and interest. Investments that concentrate on a relatively narrow market sector face the risk of higher price volatility. Investments in stocks and bonds issued by non-U.S. companies are subject to risks including country/regional risk and currency risk. These risks are especially high in emerging markets.

Bond funds are subject to the risk that an issuer will fail to make payments on time, and that bond prices will decline because of rising interest rates or negative perceptions of an issuer's ability to make payments. High-yield bonds generally have medium- and lower-range credit quality ratings and are therefore subject to a higher level of credit risk than bonds with higher credit quality ratings. Although the income from U.S. Treasury obligations held in the fund is subject to federal income tax, some or all of that income may be exempt from state and local taxes.

Important information

For more information about any fund, visit institutional.vanguard.com or call 866-499-8473 to obtain a prospectus or, if available, a summary prospectus. Investment objectives, risks, charges, expenses, and other important information are contained in the prospectus; read and consider it carefully before investing.

Vanguard ETF® Shares are not redeemable with the issuing fund other than in very large aggregations worth millions of dollars. Instead, investors must buy or sell Vanguard ETF Shares in the secondary market and hold those shares in a brokerage account. In doing so, the investor may incur brokerage commissions and may pay more than net asset value when buying and receive less than net asset value when selling.

Mutual funds and all investments are subject to risk, including the possible loss of the money you invest. Prices of mid- and small-cap stocks often fluctuate more than those of large-company stocks. Investments in stocks or bonds issued by non-U.S. companies are subject to risks including country/regional risk and currency risk. These risks are especially high in emerging markets. Funds that concentrate on a relatively narrow sector face the risk of higher share-price volatility. It is possible that tax-managed funds will not meet their objective of being tax-efficient. Because company stock funds concentrate on a single stock, they are considered riskier than diversified stock funds.

Investments in bond funds are subject to the risk that an issuer will fail to make payments on time and that bond prices will decline because of rising interest rates or negative perceptions of an issuer's ability to make payments. High-yield bonds generally have medium- and lower-range credit quality ratings and are therefore subject to a higher level of credit risk than bonds with higher credit quality ratings. Although the income from a municipal bond fund is exempt from federal tax, you may owe taxes on any capital gains realized through the fund's trading or through your own redemption of shares. For some investors, a portion of the fund's income may be subject to state and local taxes, as well as to the federal Alternative Minimum Tax. Diversification does not ensure a profit or protect against a loss. There is no guarantee that any particular asset allocation or mix of funds will meet your investment objectives or provide you with a given level of income.

While U.S. Treasury or government agency securities provide substantial protection against credit risk, they do not protect investors against price changes due to changing interest rates. Unlike stocks and bonds, U.S. Treasury bills are guaranteed as to the timely payment of principal and interest.

Investments in Target Retirement Funds and Trusts are subject to the risks of their underlying funds. The year in the fund or trust name refers to the approximate year (the target date) when an investor in the fund or trust would retire and leave the workforce. The fund/trust will gradually shift its emphasis from more aggressive investments to more conservative ones based on its target date. The Income Trust/Fund and Income and Growth Trust have fixed investment allocations and are designed for investors who are already retired. An investment in a Target Retirement Fund or Trust is not guaranteed at any time, including on or after the target date.

Vanguard is responsible only for selecting the underlying funds and periodically rebalancing the holdings of target-date investments. The asset allocations Vanguard has selected for the Target Retirement Funds are based on our investment experience and are geared to the average investor. Investors should regularly check the asset mix of the option they choose to ensure it is appropriate for their current situation.

Vanguard collective trusts are not mutual funds. They are collective trusts available only to tax-qualified plans and their eligible participants. Investment objectives, risks, charges, expenses, and other important information should be considered carefully before investing. The collective trust mandates are managed by Vanguard Fiduciary Trust Company, a wholly owned subsidiary of The Vanguard Group, Inc.

A stable value investment is neither insured nor guaranteed by the U.S. government. There is no assurance that the investment will be able to maintain a stable net asset value, and it is possible to lose money in such an investment.

Vanguard Digital Advisor® and Vanguard Personal Advisor® services are provided solely by Vanguard Advisers, Inc. (VAI), a registered investment advisor. Please review the Vanguard Digital Advisor and Personal Advisor brochure (<https://personal.vanguard.com/pdf/vanguard-digital-advice-brochure.pdf>) for important details about these services, including Personal Advisor's asset-based service levels. Vanguard Digital Advisor's and Personal Advisor's financial planning tools provide projections and goal forecasts, which are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Vanguard Situational Advisor™ is provided by Vanguard Advisers, Inc. (VAI), a federally registered investment advisor. Eligibility restrictions may apply.

VAI is a subsidiary of The Vanguard Group, Inc., and an affiliate of Vanguard Marketing Corporation. Neither VAI nor its affiliates guarantee profits or protection from losses.

Important information

The Factor Funds are subject to investment style risk, which is the chance that returns from the types of stocks in which a Factor Fund invests will trail returns from U.S. stock markets. The Factor Funds are also subject to manager risk, which is the chance that poor security selection will cause a Factor Fund to underperform its relevant benchmark or other funds with a similar investment objective, and sector risk, which is the chance that significant problems will affect a particular sector in which a Factor Fund invests, or that returns from that sector will trail returns from the overall stock market.

The information contained herein does not constitute tax advice and cannot be used by any person to avoid tax penalties that may be imposed under the Internal Revenue Code. We recommend that you consult a tax or financial advisor about your individual situation.

Schwab Personal Choice Retirement Account® (PCRA) is offered through Charles Schwab & Co., Inc. (Member SIPC), the registered broker/dealer, which also provides other brokerage and custody services to its customers.

Charles Schwab & Co., Inc., and Vanguard are not affiliated and are not responsible for the products and services provided by the other. CFA® and Chartered Financial Analyst® are trademarks owned by CFA Institute.

The Vanguard Group has partnered with Financial Engines Advisors L.L.C. (FEA) to provide subadvisory services to the Vanguard Managed Account Program and Personal Online Advisor. FEA is an independent, federally registered investment advisor that does not sell investments or receive commission for the investments it recommends with respect to the services which it is engaged in as subadvisor for Vanguard Advisers, Inc. (VAI). Advice is provided by Vanguard Advisers, Inc. (VAI), a federally registered investment advisor and an affiliate of The Vanguard Group, Inc. (Vanguard). Vanguard is owned by the Vanguard funds, which are distributed by Vanguard Marketing Corporation, a registered broker-dealer affiliated with VAI and Vanguard. Neither Vanguard, FEA, nor their respective affiliates guarantee future results. Vanguard will use your information in accordance with Vanguard's Privacy Policy.

Edelman Financial Engines® is a registered trademark of Edelman Financial Engines, LLC. All rights reserved. Used with permission.

CGS identifiers have been provided by CUSIP Global Services, managed on behalf of the American Bankers Association by Standard & Poor's Financial Services, LLC, and are not for use or dissemination in a manner that would serve as a substitute for any CUSIP service. The CUSIP Database, © 2023 American Bankers Association. "CUSIP" is a registered trademark of the American Bankers Association.

"Bloomberg®" is a service mark of Bloomberg Finance L.P. and its affiliates, including Bloomberg Index Services Limited ("BISL"), the administrator of the index (collectively, "Bloomberg") and have been licensed for use for certain purposes by Vanguard. Bloomberg is not affiliated with Vanguard, and Bloomberg does not approve, endorse, review, or recommend the Vanguard funds. Bloomberg does not guarantee the timeliness, accurateness, or completeness of any data or information relating to the Vanguard funds.

Apple®, iPhone®, and iPad® are trademarks of Apple Inc., registered in the United States and other countries. App Store is a service mark of Apple Inc. Android™ is a trademark of Google Inc.

Morningstar data © 2023 Morningstar, Inc. All rights reserved. The information contained herein: (1) is proprietary to Morningstar and/or its content providers; (2) may not be copied or distributed; and (3) is not warranted to be accurate, complete, or timely. Neither Morningstar nor its content providers are responsible for any damages or losses arising from any use of this information. Past performance is no guarantee of future results.

Private investments involve a high degree of risk and, therefore, should be undertaken only by prospective investors capable of evaluating and bearing the risks such an investment represents. Investors in private equity generally must meet certain minimum financial qualifications that may make it unsuitable for specific market participants.

Vanguard Annuity Access is offered in collaboration with Hueler Investment Services, Inc., through the Income Solutions platform. Income Solutions® is a registered trademark of Hueler Investment Services, Inc., and used under license. United States Patent No. 7,653,560. Vanguard Annuity Access is provided by Vanguard Marketing Corporation, d/b/a VMC Insurance Services in California.

Important information



London Stock Exchange Group companies include FTSE International Limited ("FTSE"), Frank Russell Company ("Russell"), MTS Next Limited ("MTS"), and FTSE TMX Global Debt Capital Markets Inc. ("FTSE TMX"). All rights reserved. "FTSE®," "Russell®," "MTS®," "FTSE TMX®," and "FTSE Russell," and other service marks and trademarks related to the FTSE or Russell Indexes are trademarks of the London Stock Exchange Group companies and are used by FTSE, MTS, FTSE TMX, and Russell under license. All information is provided for information purposes only. No responsibility or liability can be accepted by the London Stock Exchange Group companies nor its licensors for any errors or for any loss from use of this publication. Neither the London Stock Exchange Group companies nor any of its licensors make any claim, prediction, warranty, or representation whatsoever, expressly or impliedly, either as to the results to be obtained from the use of the FTSE Indexes or the fitness or suitability of the indexes for any particular purpose to which they might be put.

The index is a product of S&P Dow Jones Indices LLC ("SPDJI") and has been licensed for use by Vanguard. Standard & Poor's® and S&P® are registered trademarks of Standard & Poor's Financial Services LLC ("S&P"); Dow Jones® is a registered trademark of Dow Jones Trademark Holdings LLC ("Dow Jones"); S&P® and S&P 500® are trademarks of S&P; and these trademarks have been licensed for use by SPDJI and sublicensed for certain purposes by Vanguard. Vanguard product(s) are not sponsored, endorsed, sold, or promoted by SPDJI, Dow Jones, S&P, or their respective affiliates, and none of such parties make any representation regarding the advisability of investing in such product(s) nor do they have any liability for any errors, omissions, or interruptions of the index.

Center for Research in Security Prices, LLC (CRSP®) and its third-party suppliers have exclusive proprietary rights in the CRSP® Index Data, which has been licensed for use by Vanguard but is and shall remain valuable intellectual property owned by, and/or licensed to, CRSP®. The Vanguard Funds are not sponsored, endorsed, sold, or promoted by CRSP®, The University of Chicago, or The University of Chicago Booth School of Business, and neither CRSP®, The University of Chicago, nor The University of Chicago Booth School of Business makes any representation regarding the advisability of investing in the Vanguard Funds.

The Russell Indexes and Russell® are registered trademarks of Russell Investments and have been licensed for use by The Vanguard Group. The products are not sponsored, endorsed, sold, or promoted by Russell Investments, and Russell Investments makes no representation regarding the advisability of investing in the products.

"Dividend Achievers" is a trademark of The NASDAQ OMX Group, Inc. (collectively, with its affiliates, "NASDAQ OMX") and has been licensed for use by The Vanguard Group, Inc. Vanguard mutual funds are not sponsored, endorsed, sold, or promoted by NASDAQ OMX, and NASDAQ OMX makes no representation regarding the advisability of investing in the funds. NASDAQ OMX MAKES NO WARRANTIES AND BEARS NO LIABILITY WITH RESPECT TO THE VANGUARD MUTUAL FUNDS.

The funds or securities referred to herein are not sponsored, endorsed, or promoted by MSCI, and MSCI bears no liability with respect to any such funds or securities. The prospectus or the Statement of Additional Information contains a more detailed description of the limited relationship MSCI has with Vanguard and any related funds.

The Global Industry Classification Standard ("GICS") was developed by and is the exclusive property and a service mark of MSCI Inc. ("MSCI") and Standard and Poor's, a division of McGraw-Hill Companies, Inc. ("S&P") and is licensed for use by Vanguard. Neither MSCI, S&P, nor any third party involved in making or compiling the GICS or any GICS classification makes any express or implied warranties or representations with respect to such standard or classification (or the results to be obtained by the use thereof), and all such parties hereby expressly disclaim all warranties of originality, accuracy, completeness, merchantability, or fitness for a particular purpose with respect to any such standard or classification. Without limiting any of the foregoing, in no event shall MSCI, S&P, any of its affiliates, or any third party involved in making or compiling the GICS or any GICS classification have any liability for any direct, indirect, special, punitive, consequential, or any other damages (including lost profits) even if notified of the possibility of such damages.

Vanguard Marketing Corporation, Distributor of the Vanguard Funds.

© 2024 The Vanguard Group, Inc. All rights reserved.

Rev_012024