



Capital Market Assumptions

FIVE-YEAR PERSPECTIVE 2023

U.S. Dollar





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The T. Rowe Price
Capital Market Assumptions
benefit from the expertise of our
global investment platform.

Capital Market Assumptions Five Year Perspective | 2023

In-depth analysis and insights to inform your decision-making.

We are pleased to present the fifth annual publication of T. Rowe Price's Capital Market Assumptions (CMAs). Last year's edition highlighted a number of challenges for financial markets, including the persistence of elevated inflation, a dramatic inflection in monetary policy, and delays to the resumption of normal economic activity in the wake of the COVID pandemic. These challenges, along with unanticipated risks—particularly Russia's invasion of Ukraine—made 2022 a difficult year for investors. At the outset of 2023, financial markets still face near-term headwinds, but investors with a longer-term perspective have some room for optimism, in our view.

As noted in the past, our predictions about the future performance of financial assets are rooted in our assessment of present valuations. Financial assets, across both equities and fixed income, cheapened meaningfully in 2022. While the path to those valuations was painful, we believe the resulting lower levels provide a supportive first step for returns over the next five years.

With those starting valuations in mind, our return forecasts this year have shifted higher compared to our 2022 CMAs. Within equity markets, lower starting multiples and resilient nominal earnings expectations provide the basis for increased return expectations. Within fixed income, higher starting yields and expectations of falling yields on sovereign debt support higher forecasts for total returns. Lastly, our expected returns for alternative investment strategies also have increased to reflect higher nominal risk-free rates, expectations for higher equity-related premia, and continued opportunities for alpha generation.

T. Rowe Price's CMAs are best understood as forecasts of what we believe are the central tendencies of forward returns. We do not seek to predict actual or realized returns as there is bound to be material variation around this central tendency in any given historical or future period. For this reason, our approach to portfolio construction relies on multiple optimization methods and robustness checks.

Our baseline forecasts incorporate the insights of senior portfolio managers and analysts across T. Rowe Price's equity, fixed income, and multi-asset divisions. We believe this interdisciplinary approach, which seeks to capture both fundamental and quantitative insights, delivers the firm's collective best thinking.

We acknowledge the significant impact that environmental, social, and governance (ESG) factors may have on the future risk and return characteristics of different assets. These factors vary in materiality and impact across both sectors and individual securities. Additionally, some ESG trends may play out over time horizons beyond our 5-year forecasting period. Consequently, we have not explicitly adjusted our forecasts to reflect ESG considerations. However, our firm's investment processes are fully ESG integrated and each senior portfolio manager or analyst we survey does analyze and monitor these factors when forming asset class views and making investment decisions.

We encourage your questions, comments, and feedback as they truly impact the continuous improvements we seek to make to this publication. Please feel free to contact your T. Rowe Price relationship manager and/or any of the investment professionals who contributed to this effort.

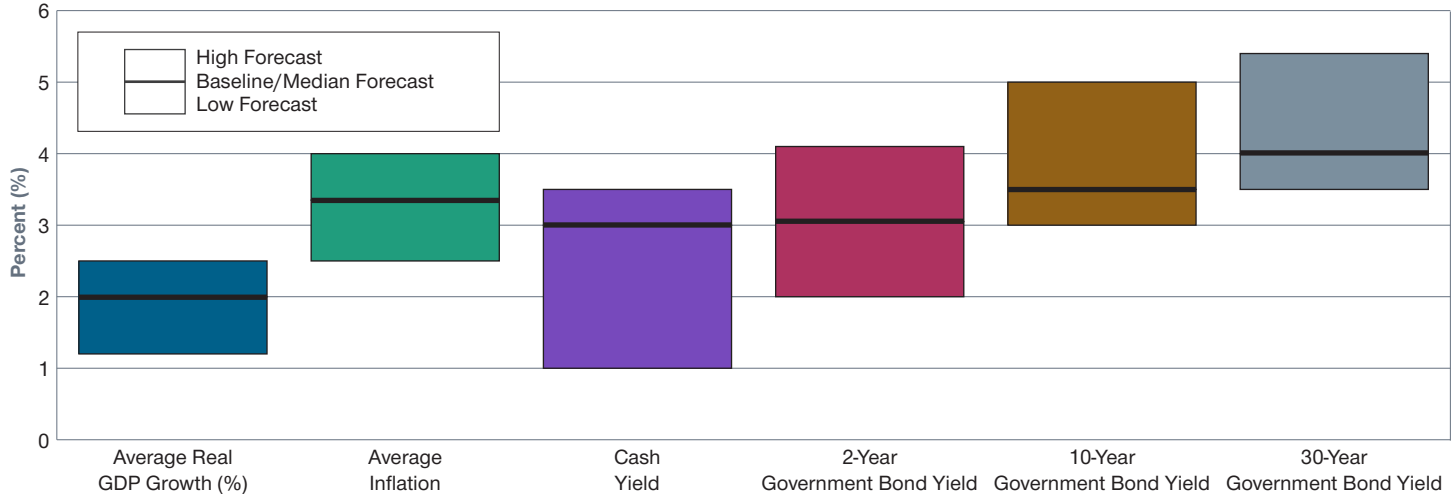
This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance.

U.S. DOLLAR



(Figures in U.S. Dollars)

RANGE OF U.S. ECONOMIC FORECASTS FOR THE 5-YEAR PERIOD ENDING DECEMBER 31, 2027



Source: T. Rowe Price.

COMMENTARY ON BASELINE FORECASTS

The primary market theme in 2022 was inflation, which spurred belated action from central banks followed by an immediate reaction from financial markets. Fixed income assets were the most direct casualties of tighter monetary conditions, as bond markets experienced their worst performance in decades. Additionally, as rates moved higher, equity multiples contracted, and risk assets generally underperformed.

At the outset of 2023, global inflation rates appeared to be either near or at their peaks, but uncertainty remained about the monetary policy courses to be followed by the major central banks and their effects on economic growth. The prospect of recession may warrant near-term caution, but we believe a longer horizon—like the five-year term of these forecasts—supports a more positive outlook for investors.

Economic

Inflationary pressures, which first appeared in the U.S., have spread across the globe. Underlying economic strength also has put pressure on central banks to rein in inflation by raising risk-free rates.

Our forecasts for real gross domestic product (GDP) anticipate middling economic performance over the next five years. While we expect inflation rates to ease, high starting points result in levels that are above central bank targets across most economic regions. Overall, our global GDP growth forecasts remain positive, supported by strong economic fundamentals but sensitive to the ongoing monetary tightening cycle.

Equity

Our five-year expectations for equity returns are significantly higher versus last year's CMAs. Globally, our baseline forecast foresees resilient nominal earnings per share (EPS) growth and moderate support for equity prices through multiple expansion.

With the economic recovery and the monetary cycle further along in the U.S. relative to the rest of the world, our forecast includes slightly higher non-U.S. equity returns. Underlying EPS growth expectations

are comparable across regions, but disparate starting valuations result in varied return estimates. In particular, we expect emerging market (EM) equities to outperform developed markets. Within the developed markets, we expect the return leaders to be the U.K., Europe ex-U.K., and Australia.

Fixed Income

In previous years, regional interest-rate environments were largely characterized by their similarities—subdued inflation, modest economic outlooks, and low policy rates. In contrast, our expectations this year are for more distinct, asynchronous regional cycles.

The U.S. yield curve stands out as the outlier in our interest-rate forecasts, as we foresee a moderate decline in rates across the curve over the next five years. In other regions, we expect cash and short rates to remain stable or to fall moderately—with the exception of Japan, where we anticipate continued pressure on the Bank of Japan to keep short rates lower for longer. Long rates are predicted to rise across all non-U.S. regions.

Generally, our investment professionals expect yield curves to steepen, as central banks complete their hiking cycles and economic activity picks up towards the end of our forecast horizon. However, higher starting rates and greater expected carry, on average, should provide a material cushion for investors. As a result, expected total returns for most fixed income asset classes are meaningfully higher than in previous years' CMAs.

Alternatives

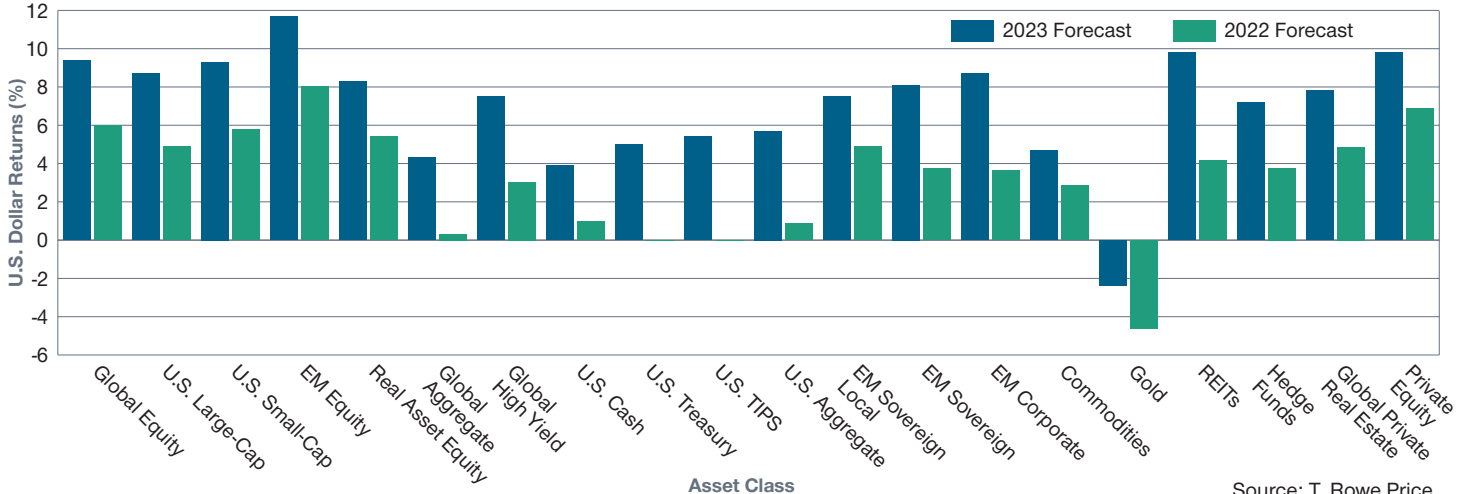
Our more bullish expectations for public equity and fixed income markets carry through to our forecasts for alternative asset classes. We expect healthy equity risk premia to benefit many alternative strategies that have structural exposure to equities. In addition, we forecast marginally higher return premia for credit, duration, and EM exposure compared to last year's CMAs.

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(Figures in U.S. Dollars)

COMPARISON OF 2023 AND 2022 RETURN FORECASTS



Source: T. Rowe Price.

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However, structural return premia opportunities are offset by lower expectations for alpha generation. While we still believe that alternatives offer rich opportunities for active management, we believe the strongest performance tailwinds over the next five years will come from beta and risk premia.

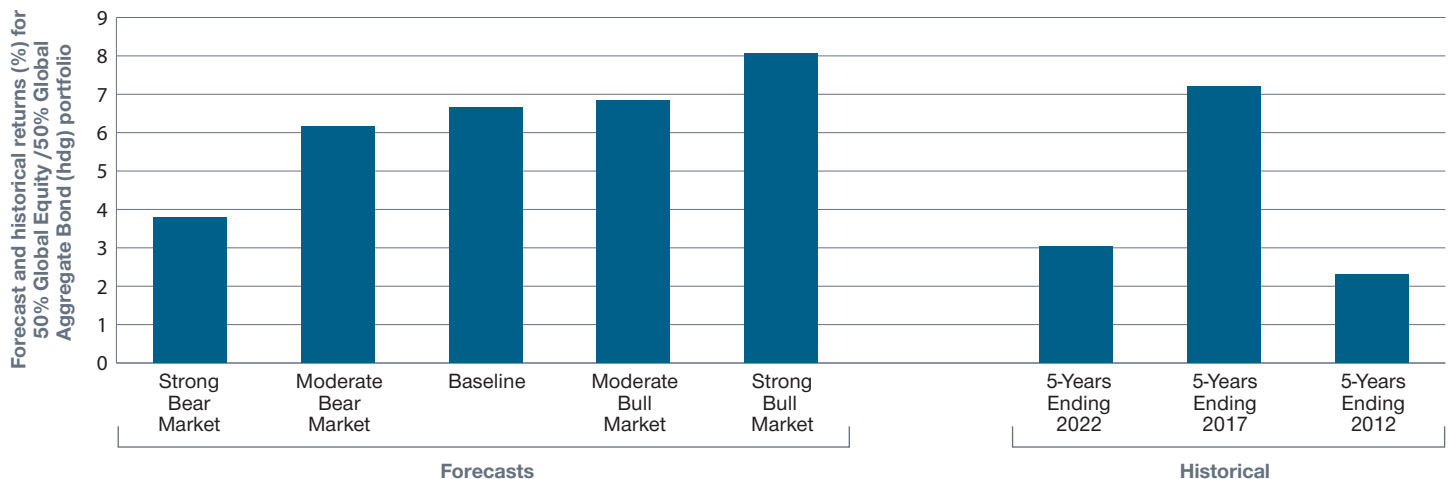
United States

Our U.S. forecast incorporates our expectation that the inflation cycle will peak in the near term, and that tailwinds for performance will return in the latter stages of our forecast horizon. Within U.S. equities, earnings growth is expected to remain resilient, on average, over the period. We expect valuations to rise disproportionately for U.S. small-cap equities, translating into higher returns relative to the U.S. large-cap universe.

With the Federal Reserve approaching the end of its hiking cycle, our forecast sees the U.S. yield curve reversing its current inversion. We expect the short end of the curve to see the largest declines, with cash rates falling by 60 basis points (bps) and the 2-year Treasury yield declining by 140 bps. The long end of the Treasury curve is forecast to see more moderate declines of 20-50 bps, depending on the maturity.

The U.S. equity and fixed income backdrops support our strong expectations for multi-asset portfolio returns. Below, we present five forecast scenarios for returns from a 50% global equity and 50% global fixed income U.S. dollar-hedged portfolio, along with historical returns for five-year periods ended December 31, 2022, 2017, and 2012. Our five-year forecast is relatively bullish versus the historical periods shown, reflecting a more attractive starting point for valuations and yields.

IMPACT OF LOW EXPECTED RETURNS ON MULTI-ASSET PORTFOLIOS



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Representative indexes are MSCI ACWI (USD) and Bloomberg Global Aggregate Bond (Hdg USD) Index. Refer to page 18, "Methodology - Scenarios" for definition of Bear and Bull Markets.

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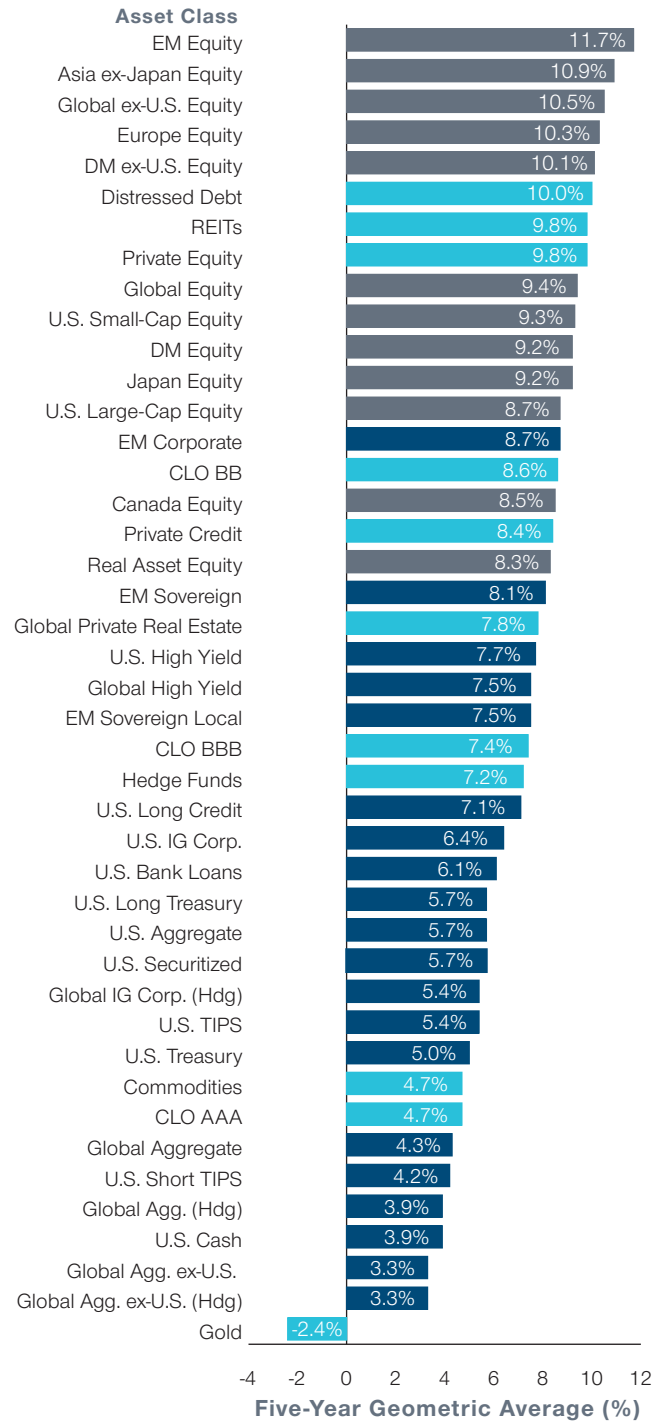


(Figures in U.S. Dollars)

ANNUALIZED FORECAST AND HISTORICAL NOMINAL RETURNS

ASSET CLASS	2023 5-YEAR RETURN FORECAST	HISTORICAL 5-YEAR RETURNS, ENDED 31 DECEMBER				
		2022	2017	2012		
EQUITY	Global Equity	9.4%	5.7%	11.4%	-0.7%	
	Global ex-U.S. Equity	10.5	1.3	7.2	-2.5	
	DM Equity	9.2	6.7	12.2	-0.6	
	DM ex-U.S. Equity	10.1	2.3	7.9	-3.0	
	U.S. Large-Cap Equity	8.7	9.1	15.7	1.9	
	U.S. Small-Cap Equity	9.3	4.1	14.1	3.5	
	Canada Equity	8.5	5.2	3.7	0.7	
	Europe Equity	10.3	2.5	7.9	-3.8	
	Asia ex-Japan Equity	10.9	-0.4	8.2	0.1	
	Japan Equity	9.2	0.1	12.3	-3.2	
	EM Equity	11.7	-1.1	4.6	-0.7	
	Real Asset Equity	8.3	3.0	4.0	5.0	
	Global Aggregate	4.3	-1.7	0.8	5.4	
	Global Agg. (Hdg)	3.9	0.4	3.1	5.3	
	Global Agg. ex-U.S.	3.3	-3.1	-0.2	5.1	
	Global Agg. ex-U.S. (Hdg)	3.3	0.5	3.7	4.8	
	Global IG Corp. (Hdg)	5.4	0.5	3.8	6.6	
	Global High Yield	7.5	1.1	5.4	10.4	
FIXED INCOME	U.S. Cash	3.9	1.2	0.2	0.4	
	U.S. Treasury	5.0	-0.1	1.3	5.4	
	U.S. TIPS	5.4	2.1	0.1	7.0	
	U.S. Short TIPS	4.2	2.5	0.1	4.0	
	U.S. IG Corp.	6.4	0.5	3.5	7.9	
	U.S. Long Credit	7.1	-0.8	5.1	10.4	
	U.S. Long Treasury	5.7	-2.2	3.5	9.7	
	U.S. Aggregate	5.7	0.0	2.1	5.9	
	U.S. High Yield	7.7	2.3	5.8	10.3	
	U.S. Bank Loans	6.1	3.5	4.3	5.8	
	U.S. Securitized	5.7	-0.4	2.0	5.6	
	EM Sovereign Local	7.5	-2.5	-1.5	8.9	
	EM Sovereign	8.1	-1.3	4.6	10.1	
	EM Corporate	8.7	0.5	4.2	10.2	
	Commodities	4.7	6.4	-8.5	-5.2	
	Gold	-2.4	5.7	-5.4	13.8	
	ALTERNATIVES	REITs	9.8	4.4	9.8	5.7
		Distressed Debt	10.0	-0.1	7.1	11.3
CLO AAA		4.7	2.3	2.1	N/A	
CLO BBB		7.4	3.0	5.9	N/A	
CLO BB		8.6	5.0	9.1	N/A	
Hedge Funds		7.2	3.2	4.0	-1.8	
Private Credit		8.4	8.2	9.5	8.9	
Global Private Real Estate		7.8	8.4	10.2	2.1	
Private Equity		9.8	17.9	14.2	4.2	

FIVE-YEAR ANNUALIZED EXPECTED RETURNS



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Hdg = Hedged currency treatment. EM = Emerging Markets. DM = Developed Markets.

Sources: Bloomberg Index Services Limited, Cambridge Associates, Cliffwater, FTSE/Russell, HFR, ICE BofA, J.P. Morgan Chase & Co., MSCI, NCREIF, and S&P.

Analysis: T. Rowe Price. See Additional Disclosures in Appendix for further source information. January 2023. See Appendix for a representative list of indexes.

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(Figures in U.S. Dollars)

EXPECTED VOLATILITIES AND CORRELATIONS (CONTINUED)

Volatility and Correlation Matrix		FIXED INCOME													ALTERNATIVES										VOLATILITY (%)			
		U.S. TIPS	U.S. Short TIPS	U.S. IG Corporate	U.S. Long Credit	U.S. Long Treasury	U.S. Aggregate	U.S. High Yield	U.S. Bank Loans	U.S. Securitized	EM Sovereign Local	EM Sovereign	EM Corporate	Commodities	Gold	REITs	Distressed Debt	CLO AAA	CLO BBB	CLO BB	Hedge Funds	Private Credit	Global Private Real Estate	Private Equity				
EQUITY	Global Equity																									17.7		
	Global ex-U.S. Equity																										19.3	
	DM Equity																										17.4	
	DM ex-U.S. Equity																										18.7	
	U.S. Large-Cap Equity																										17.1	
	U.S. Small-Cap Equity																										22.0	
	Canada Equity																										21.9	
	Europe Equity																											20.1
	Asia ex-Japan Equity																											21.4
	Japan Equity																											16.4
	EM Equity																											22.8
	Real Asset Equity																											22.4
	FIXED INCOME	Global Aggregate																										6.3
Global Aggregate (Hdg)																											3.6	
Global Agg. ex-U.S.																											8.7	
Global Agg. ex-U.S. (Hdg)																											3.4	
Global IG Corporate (Hdg)																											5.6	
Global High Yield																											12.2	
U.S. Cash																											0.8	
U.S. Treasury																											5.3	
U.S. TIPS		1.0																									5.2	
U.S. Short TIPS		0.8	1.0																								3.3	
U.S. IG Corporate		0.6	0.3	1.0																							6.7	
U.S. Long Credit		0.6	0.2	1.0	1.0																						10.6	
U.S. Long Treasury		0.4	-0.1	0.4	0.6	1.0																					14.0	
U.S. Aggregate		0.7	0.2	0.8	0.8	0.8	1.0																				4.1	
U.S. High Yield		0.4	0.6	0.6	0.5	-0.3	0.1	1.0																			11.0	
U.S. Bank Loans	0.3	0.6	0.4	0.3	-0.5	-0.1	0.9	1.0																		10.3		
U.S. Securitized	0.7	0.3	0.7	0.7	0.7	0.9	0.2	0.0	1.0																	3.3		
EM Sovereign Local	0.4	0.4	0.6	0.5	-0.1	0.3	0.7	0.5	0.3	1.0																11.8		
EM Sovereign	0.6	0.5	0.8	0.7	0.0	0.5	0.8	0.7	0.5	0.8	1.0															9.4		
EM Corporate	0.5	0.6	0.8	0.6	-0.1	0.4	0.9	0.8	0.4	0.8	0.9	1.0														8.9		
ALTERNATIVES	Commodities	0.2	0.5	0.1	0.0	-0.5	-0.3	0.6	0.6	-0.3	0.4	0.4	0.4	1.0												19.6		
	Gold	0.6	0.5	0.4	0.4	0.3	0.5	0.2	0.1	0.5	0.4	0.4	0.3	0.3	1.0											14.2		
	REITs	0.2	0.3	0.4	0.4	-0.2	0.1	0.7	0.6	0.1	0.5	0.6	0.6	0.4	0.1	1.0										22.6		
	Distressed Debt	0.2	0.5	0.5	0.4	-0.4	0.0	1.0	0.9	0.0	0.6	0.7	0.8	0.6	0.1	0.7	1.0									18.3		
	CLO AAA	0.2	0.2	0.4	0.4	-0.2	0.1	0.4	0.4	0.0	0.4	0.6	0.4	0.3	0.1	0.3	0.4	1.0								1.8		
	CLO BBB	0.2	0.2	0.4	0.3	-0.2	0.1	0.4	0.4	0.0	0.4	0.5	0.4	0.3	0.1	0.3	0.4	0.9	1.0							11.1		
	CLO BB	0.2	0.2	0.4	0.3	-0.2	0.0	0.4	0.4	-0.1	0.4	0.5	0.4	0.3	0.1	0.3	0.4	0.9	1.0	1.0						17.4		
	Hedge Funds	0.2	0.4	0.4	0.3	-0.5	-0.1	0.8	0.7	-0.1	0.6	0.6	0.7	0.6	0.1	0.5	0.7	0.5	0.5	0.5	1.0					8.7		
	Private Credit	0.2	0.5	0.3	0.1	-0.5	-0.2	0.8	0.8	-0.1	0.4	0.6	0.6	0.6	0.1	0.5	0.7	0.5	0.5	0.5	0.8	1.0				12.4		
	Global Private Real Estate	0.2	0.3	0.0	0.0	-0.2	-0.1	0.4	0.5	-0.1	0.1	0.2	0.2	0.4	0.0	0.5	0.4	0.0	0.0	0.0	0.4	0.6	1.0			12.6		
Private Equity	0.2	0.4	0.4	0.2	-0.5	-0.1	0.7	0.7	-0.1	0.6	0.6	0.6	0.6	0.1	0.6	0.7	0.5	0.5	0.5	0.9	0.8	0.5	1.0		23.4			

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Hdg = Hedged currency treatment. EM = Emerging Markets. DM = Developed Markets.

Sources: Bloomberg Index Services Limited, Cambridge Associates, Cliffwater, FTSE/Russel, HFR, ICE BofA, J.P. Morgan Chase & Co., MSCI, NCREIF, and S&P.

Analysis: T. Rowe Price. See Additional Disclosures in Appendix for further source information. January 2023. See Appendix for a representative list of indexes.

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(Figures in U.S. Dollars)

FIVE-YEAR SCENARIO EXPECTED ANNUALIZED RETURNS

	ASSET CLASS	BASELINE	STRONG BEAR MARKET	MODERATE BEAR MARKET	MODERATE BULL MARKET	STRONG BULL MARKET	
EQUITY	Global Equity	9.4	4.7	8.8	9.9	12.2	
	Global ex-U.S. Equity	10.5	5.5	10.1	10.8	12.7	
	DM Equity	9.2	4.7	8.5	9.7	11.9	
	DM ex-U.S. Equity	10.1	5.8	9.5	10.5	12.3	
	U.S. Large-Cap Equity	8.7	4.3	8.0	9.3	11.6	
	U.S. Small-Cap Equity	9.3	3.6	7.5	10.4	13.7	
	Canada Equity	8.5	3.6	7.4	8.5	10.6	
	Europe Equity	10.3	6.6	9.9	10.8	12.8	
	Asia ex-Japan Equity	10.9	4.8	10.3	11.4	14.2	
	Japan Equity	9.2	4.2	8.8	9.5	10.7	
	EM Equity	11.7	4.6	11.7	11.7	14.1	
	Real Asset Equity	8.3	0.8	4.5	4.8	5.4	
	Global Aggregate	4.3	3.9	4.2	4.3	4.5	
	Global Agg. (Hdg)	3.9	2.9	3.5	3.8	3.9	
FIXED INCOME	Global Agg. ex-U.S.	3.3	2.7	3.1	3.2	3.4	
	Global Agg. ex-U.S. (Hdg)	3.3	2.7	3.1	3.2	3.4	
	Global IG Corp. (Hdg)	5.4	3.5	5.0	5.5	6.1	
	Global High Yield	7.5	3.8	7.4	7.6	9.3	
	U.S. Cash	3.9	2.7	3.4	3.9	3.9	
	U.S. Treasury	5.0	6.2	5.6	5.0	4.8	
	U.S. TIPS	5.4	3.5	5.6	5.0	4.4	
	U.S. Short TIPS	4.2	3.5	3.8	4.0	3.8	
	U.S. IG Corp.	6.4	4.7	6.2	6.5	7.3	
	U.S. Long Credit	7.1	4.5	7.1	7.1	7.8	
	U.S. Long Treasury	5.7	6.8	6.7	4.9	4.6	
	U.S. Aggregate	5.7	5.6	5.8	5.7	6.0	
	U.S. High Yield	7.7	4.1	7.5	7.8	9.5	
	U.S. Bank Loans	6.1	2.7	4.9	6.6	7.2	
	U.S. Securitized	5.7	5.5	5.6	5.8	6.4	
	EM Sovereign Local	7.5	3.6	5.8	7.5	8.7	
	EM Sovereign	8.1	4.3	6.1	8.2	9.2	
	EM Corporate	8.7	4.6	8.6	8.8	10.1	
	ALTERNATIVES	Commodities	4.7	-0.5	2.3	5.0	6.4
		Gold	-2.4	-2.5	-2.5	-2.2	-3.4
REITs		9.8	6.2	10.5	9.8	11.4	
Distressed Debt		10.0	4.6	8.7	10.3	12.1	
CLO AAA		4.7	2.6	3.9	4.7	5.0	
CLO BBB		7.4	0.9	5.6	7.4	9.0	
CLO BB		8.6	-0.6	5.9	8.8	11.3	
Hedge Funds		7.2	4.5	6.3	7.4	8.2	
Private Credit		8.4	5.1	7.2	8.4	9.0	
Global Private Real Estate		7.8	5.5	7.0	8.0	8.6	
Private Equity	9.8	6.3	8.8	10.3	12.1		

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Sources: Bloomberg Index Services Limited, Cambridge Associates, Cliffwater, FTSE/Russell, HFR, ICE BofA, J.P. Morgan Chase & Co., MSCI, NCREIF, and S&P. Analysis: T. Rowe Price. See Additional Disclosures in Appendix for further source information. January 2023. See Appendix for a representative list of indexes.

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METHODOLOGY

METHODOLOGY

Fixed Income



Basic Model

We decompose fixed income sector returns into three components: the average yield over the five-year period, the average roll-down yield over the five-year period, and the average annual return due to changes in valuation over the five-year period:

$$\text{Return} = \text{average yield} + \text{roll-down} + \text{valuation change}$$

These three components are calculated from the following inputs: current yield, forecast yield, and current duration for a given asset class.

Current Yield

The current yield is calculated using linear interpolation—matching the yield on the appropriate sovereign yield curve for the maturity that matches the current duration of the sector. For spread sectors, the current option-adjusted spread is added to the yield of the sovereign maturity that matches the duration of the spread sector.

Forecast Yield

The forecast yield is calculated similar to the current yield, with the inputs provided by the survey results. For a non-government index (e.g., credit), the five-year spread forecast from our survey is then added to the forecast sovereign yield.

Current Duration

The current duration is used in two ways. First, to find current yield through duration matching to the sovereign curve, as discussed above. Second, it is used to calculate the average annual roll-down yield and return due to valuation change. These calculations assume the sector will maintain a constant duration throughout the subsequent five-year period. Our research shows that this assumption, while not perfect, is reasonable since modified durations typically vary within +/- one year over rolling five-year windows.

Average Yield

The average yield is the simple average of the current yield and the forecast yield five years forward, incorporating expectations for spread capture ratios in non-Treasury asset classes:

$$\text{Average yield} = (\text{current yield} + \text{forecast yield}) / 2$$

Change in Yield

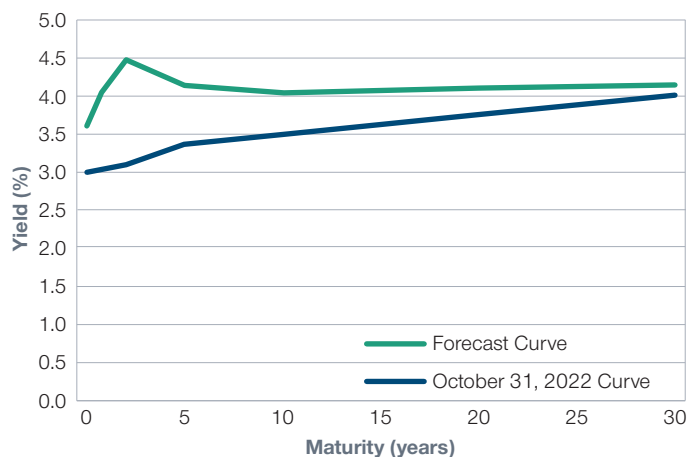
The change in yield is the annual average change from the current yield to the five-year forecast yield:

$$\text{Yield change} = (\text{forecast yield} - \text{current yield}) / 5$$

Roll-Down Return

The roll-down return is earned through rebalancing each year to maintain a constant duration. The return is due to the

FORECAST U.S. TREASURY CURVE



The forecasts contained herein are for illustrative purposes only and are not indicative of future results.

Analysis by T. Rowe Price.

convergence of a bond's end-of-period yield to the beginning-of-period yield of an equivalent bond with a one-year shorter maturity. Thus, we estimate the roll-down return as follows:

1. First, we use the same estimation methods as for the current and forecast rolled-down yields, except that we interpolate to the maturity points on the current and future yield curves that are one year less than the current average maturity of the index.

2. Second, we estimate the average rolled-down yield over the five-year period as the simple average of the current and forecast rolled-down yields from step 1:

$$\text{Average rolled-down yield} = (\text{current rolled-down yield} + \text{forecast rolled-down yield}) / 2$$

3. Third, we calculate the average annual change in yield due to rolling down the curve (roll-down change):

$$\text{Average roll-down change} = (\text{average rolled-down yield} - \text{average yield}) / 5$$

4. Last, we multiply the current duration by the roll-down change to get the average annual return to the index from rolling down the yield curve:

$$\text{Average roll-down return} = \text{current duration} \times \text{average roll-down change}$$

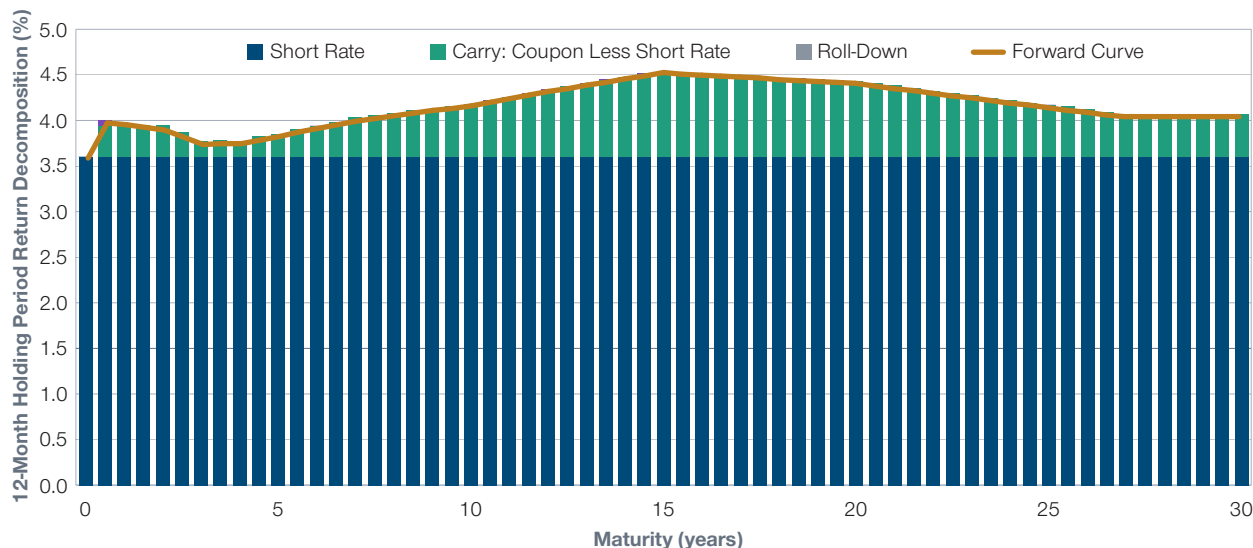
Valuation Change

Valuation change has two components: the return due to changes in the level of the underlying sovereign curve and the return due to changes in the spread over the sovereign curve.

$$\text{Average level change return} = \text{current duration} \times \text{yield change}$$



CARRY AND ROLL-DOWN FOR GOVERNMENT BONDS



The forecasts contained herein are for illustrative purposes only and are not indicative of future results.
Analysis by T. Rowe Price.

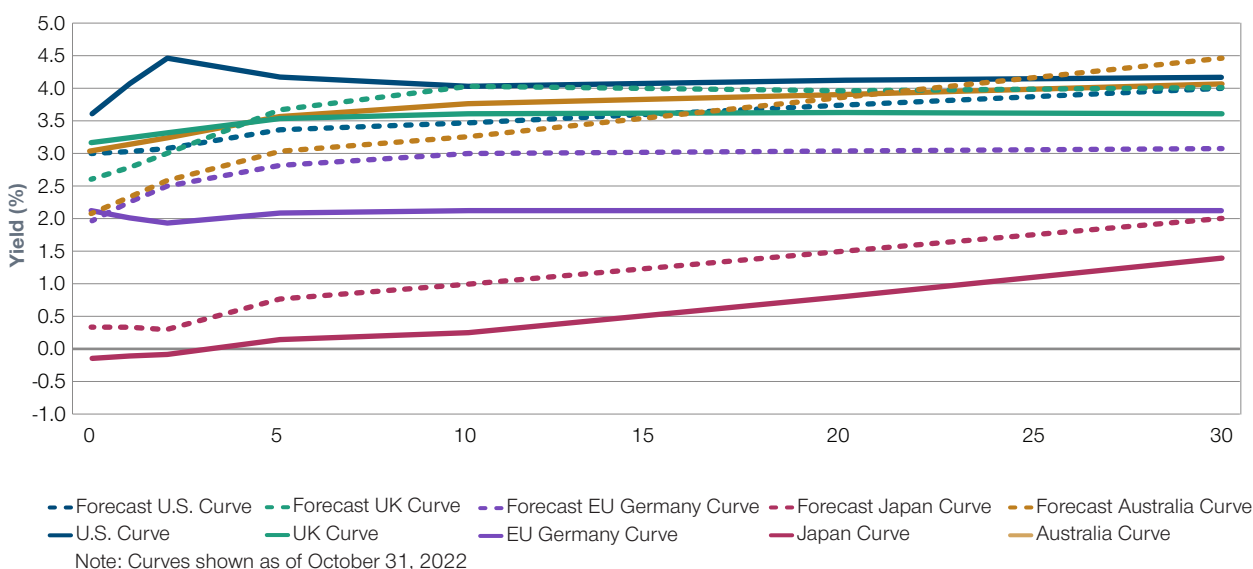
Comment on Durations

We use analytical modified adjusted durations to ascertain the correct point on the yield curve for interpolation. However, we use empirical durations for estimating the returns from valuation changes so that we can ensure we cleanly separate the duration due purely to level changes in the underlying sovereign curve and changes in spread levels for a sector.

Inflation-Linked Bonds

We decompose inflation-linked bond returns into two components: the portion of return due to underlying changes in the nominal sovereign curve and the portion attributable to unexpected changes in inflation. The nominal government bond return is developed using the same process as described previously. The unexpected inflation return is computed by subtracting the current five-year consensus inflation estimate from our inflation forecast and then multiplying by the current duration of the index.

GLOBAL YIELD CURVES



The forecasts contained herein are for illustrative purposes only and are not indicative of future results.
Analysis by T. Rowe Price.



METHODOLOGY

Equities

The CMAs for equities provide return forecasts for the U.S., the UK, Europe, Japan, Australia, and emerging markets. U.S. returns are further broken out by large-cap and small-cap returns. Our survey process leverages the knowledge and expertise of our global equity portfolio manager and analyst teams via forecasts for each market that are combined to arrive at a global equity forecast. We blend the survey results with market data to develop our equity market assumptions.

Survey Data:

1. Expected Inflation—headline consumer price index annualized over the next five years
2. Real earnings per share (EPS) growth—arithmetic average over the next five years
3. Future price/earnings ratio (P/E)—multiple in five years' time

Market Data:

1. Dividend yield—historical average percentage yield
2. Current P/E—Last 12-month P/E

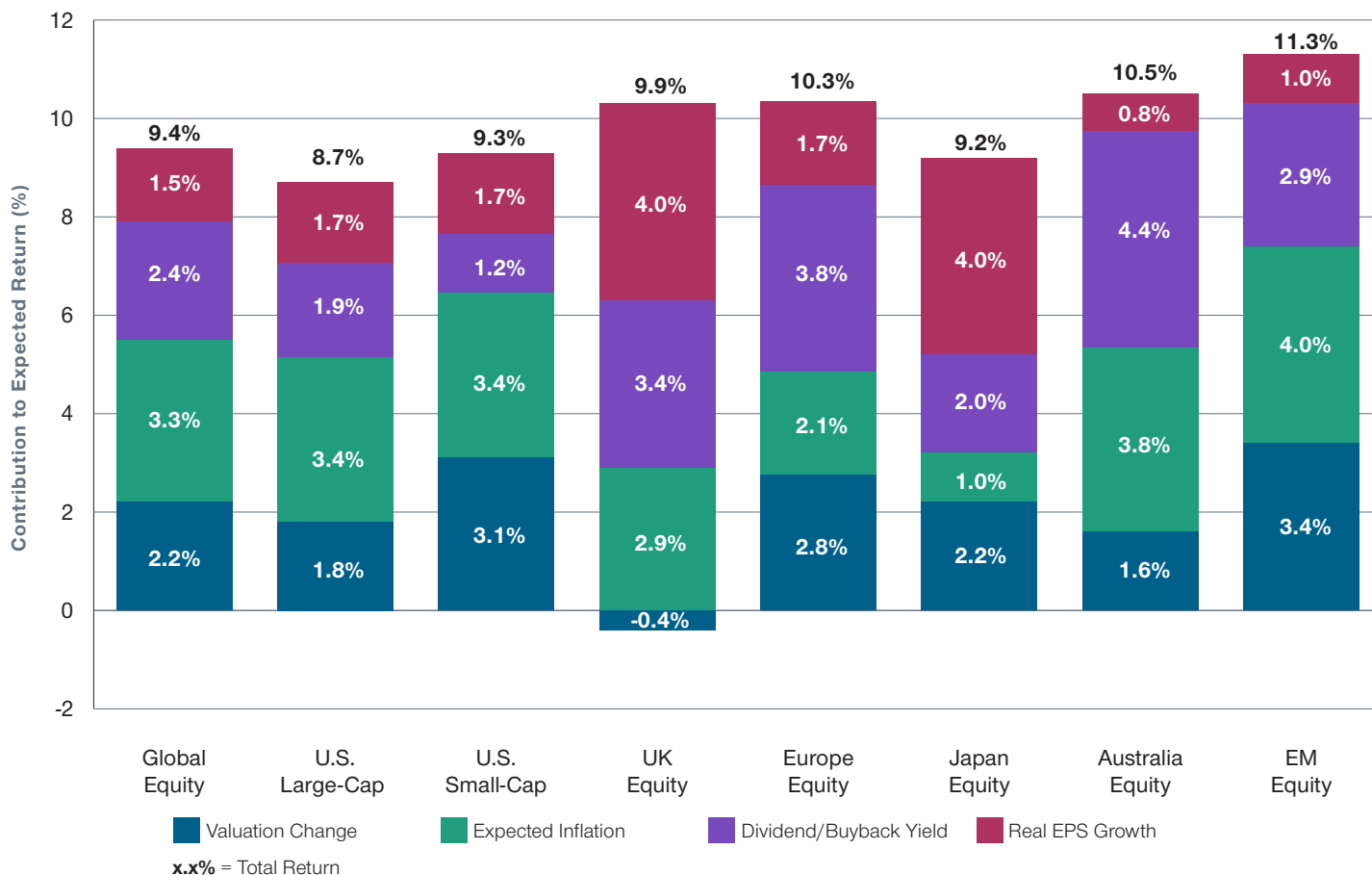
For each equity asset class, the above inputs are used to calculate expected average annual returns, according to the equation:

$$\text{Expected Inflation} + \text{Real EPS Growth} + \text{Dividend Yield} + \Delta\text{Valuation}$$

Where annual Δ Valuation for each of the next five years is given by:

$$\left(\frac{\text{Future P/E}}{\text{Current P/E}} \right) \times \frac{1}{5}$$

EQUITY MARKET FIVE YEAR ANNUALIZED EXPECTED RETURNS (IN LOCAL CURRENCY)



The forecasts contained herein are for illustrative purposes only and are not indicative of future results.

Analysis: T. Rowe Price. January 2023. This information is not intended to be investment advice or a recommendation to take any particular investment action. Forecasts are based on subjective estimates about market environments that may never occur. Please see page 21 for the complete list of asset classes and representative indexes.



Real Asset Equity

The returns for real asset equities reflect the three components that make up the underlying benchmark: inflation-sensitive equities, real estate investment trusts (REITs), and physical commodities. Returns for the asset class reflect a 50% MSCI ACWI ex-USA equity, 25% REITs, and 25% commodities weighting. MSCI ACWI ex-USA Index returns were selected to give higher notional weight to commodities-producing countries at the expense of the U.S.

Impacts of Buybacks and New Issuance

Two components purposefully absent from our equity-return model are share buybacks and net issuance. When companies buy their own stock, the remaining outstanding shares each represent a larger ownership percentage and should, therefore, appreciate in price. However, the positive effects of share buybacks may be offset by initial and secondary stock offerings. Published academic literature has been inconclusive on the net effect at the market level.

In favor of a negative buyback effect, on the order of -2% per year, William Bernstein and Rob Arnott argue that share issuances and initial public offerings have consistently outpaced buybacks. Their observation that the market capitalizations of global stock markets consistently grow faster than the price level of indexes that follow the same markets supports this argument. On the other side of the debate, Philip Straehl and Roger Ibbotson have argued for a positive buyback effect on the order of +1.5%, based on aggregating net issuance at the individual company level divided by beginning market capitalization for all stocks in the S&P 500 Index from 1970–2014.

Rather than align directly with either side of the debate, we have chosen a middle ground by assuming no net change in return due to buybacks and new issuance.



METHODOLOGY

Alternatives

To forecast the returns of alternative investments, we use a factor regression model with the following premia used as the predictive variables:

- Equity risk premium (Equity return in excess of cash)
- Small-cap premium (Small-cap return in excess of large-cap)
- EM premium (EM equity return in excess of DM equity)
- Investment-grade credit premium (Investment grade credit return in excess of duration matched government bonds)
- Duration premium (Government bonds return in excess of cash)

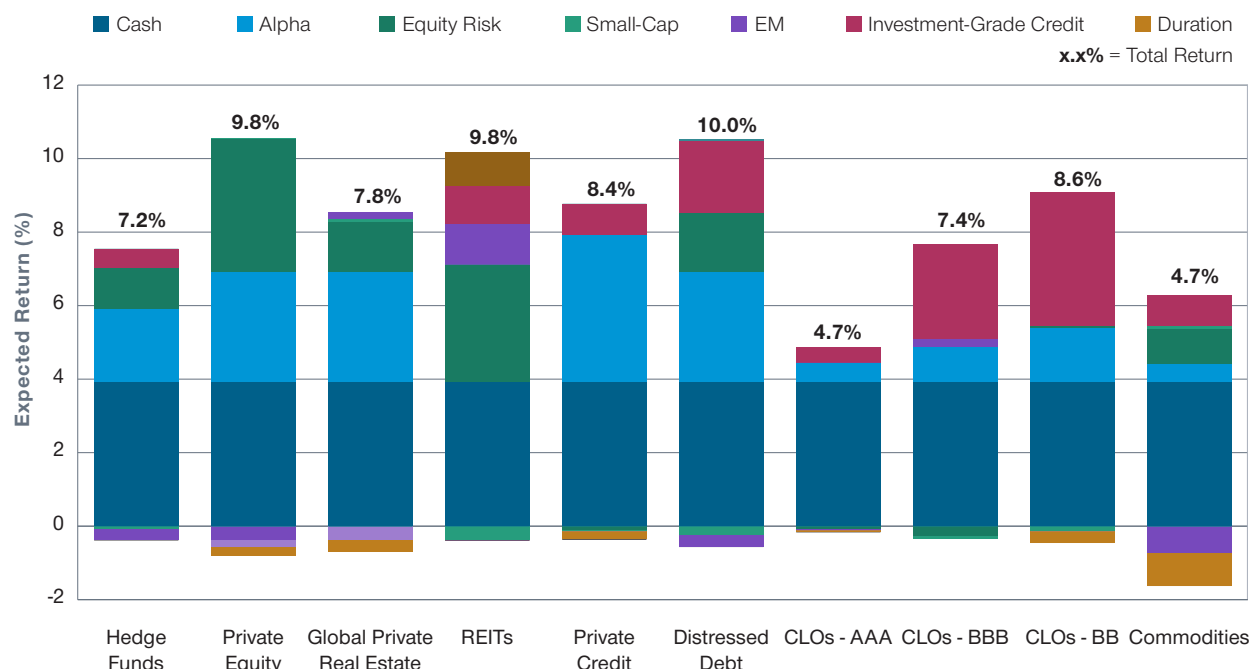
We use data starting in 2002 to help estimate the exposure of each asset class to the premia. Additionally, investments such as hedge funds and private equity/real estate have a

non-negligible active management component that is a foundational portion of the value proposition.

Based on our survey results, we quantify each premium as shown below and apply investments' historical beta to the premia to calculate an expected return.

Premia	Forecasted Value Over Next 5 Years (Arithmetic Averages)
Equity Risk	4.8%
Small-Cap	0.6%
EM	3.0%
Investment-Grade Credit	1.4%
Duration	1.1%

COMPONENT OF EXPECTED RETURN



The forecasts contained herein are for illustrative purposes only and are not indicative of future results.

Source: T. Rowe Price. January 2023. This information is not intended to be investment advice or a recommendation to take any particular investment action. Forecasts are based on subjective estimates about market environments that may never occur.

Commodities

In addition to the factor model described above, for commodities we also use gold and oil forecasts from our sector specialists as inputs into our estimates. Generally, we are bearish on commodities, as supply/demand imbalances in oil have continued to place downward pressure on the asset class.

Our investment professionals forecast the average spot price in five years for a barrel of Brent crude oil and an ounce of gold as \$60 and \$1,450, respectively.

EM =Emerging Markets. DM = Developed Markets.

METHODOLOGY



Survey

The foundation of our CMAs is a survey provided to a wide range of senior T. Rowe Price portfolio managers, economists, and analysts across our equity, fixed income, and multi-asset divisions. The survey requests forecasts for many inputs: GDP growth, inflation, commodity prices, equity valuations, earnings growth, fixed income yields, slopes of yield curves, and spread levels. Respondents are asked to offer insights for their respective areas of expertise and are invited to add thoughts for other categories. After all surveys are collected, baseline forecasts are developed for each asset class. The Capital Market Assumptions Governance and Investment Committee then reviews the results for internal consistency and reasonableness.

Correlations and Volatility

Empirical research has shown that over short time horizons (days and months), volatility regimes tend to cluster—i.e., today's volatility environment is highly correlated to that which investors are likely to experience in the near future. However, these results are less conclusive over longer time horizons. Similarly, certain asset classes, like EM debt, have experienced significant structural declines in volatility over the past decades, while others, like developed market investment-grade debt, recently have increased in volatility as the duration of the asset class has extended in a low interest rate environment.

The volatility and correlation matrix shown is based on approximately 15 years of historical data, making adjustments as necessary to reflect recent developments within each asset class. We “unsmooth” return histories of alternative investments, which have significant auto-correlation, to better reflect the economic volatility of the underlying assets.

Currency Treatment

Estimating returns for assets domiciled in a different currency than the base currency invites several questions:

- Should currency movements be hedged and does that view change by asset class?
- What is a reasonable approach for estimating currency return?

Starting with the 2022 assumptions, we presume that developed market currencies contribute no return relative to each other. This approach contrasts with uncovered interest rate parity — essentially the difference in nominal interest rates between two countries is equal to the expected depreciation of one currency relative to the other. Although intuitive, empirically uncovered interest-rate parity does not hold well, so our

currency approach reflects this evidence. We do expect depreciation in emerging market currencies, reflecting the higher economic growth, inflation expectations, and cash yields available in those markets.

In terms of hedging considerations, historical data demonstrates that better risk-adjusted returns potentially can be earned by investors hedging high-quality fixed income versus leaving investment-grade foreign bond exposures unhedged. This is generally true for investors domiciled across the globe. The data is less conclusive for equities and the results are more country specific. We have elected to forecast returns for global aggregate bonds and global investment-grade corporates with hedging, while leaving all other foreign currency exposures unhedged. The difference between our hedged and unhedged return expectations are driven by differences between our interest-rate views and the five-year forward cash rate implied by the market.

Longer-Term Expectations

Many, if not most, investors have a time horizon longer than the five-year forecasts included in this document. As examples, the T. Rowe Price Target Date and Target Allocation franchises offer strategies targeted to investors with 40+ year accumulation and 30+ year retirement cycles. We are often asked for the forecasts we use to inform the construction and design of those portfolios. While we strongly advise against using any single set of assumptions for portfolio construction, investors with a longer-term or perpetual time horizon should consider market conditions beyond the current market environment, which, admittedly, heavily influences many of the forecasts we share here. Included below are several of the risk premia we believe the markets tend to reward over long investment horizons, along with estimates of their average magnitudes over multiple market cycles. By definition, these are long term and relatively stable over time, but they are subject to revisions and revalidation as necessary. The table below includes the same premia we use for estimating alternative asset class returns, but are just a subset of the premia potentially available over long investment horizons.

Premia	Forecasted Value Over Market Cycles (Arithmetic Averages)
Equity Risk	5.5%
Small-Cap	1.0%
EM	1.0%
Investment-Grade Credit	0.5%
Duration	1.0%

METHODOLOGY

Scenarios



Point estimates of future returns are implicitly accompanied by some level of uncertainty. For that reason, we have constructed four additional sets of capital market assumptions that represent strong bear, moderate bear, moderate bull, and strong bull outlooks. These scenarios are intended to bookend our baseline scenarios, allowing for consideration of a range of economic and return scenarios.

The scenarios are underpinned by the belief that the level of aggregate investor risk appetite is the primary driver of investment returns over short- to medium-term horizons. With this in mind, our scenario generation process begins by analyzing historical periods of differing investor sentiment towards risk. Using global equity returns as a proxy for risk, we divide the past 15 years of common asset class performance into quartiles and estimate the volatility of each asset class and its correlation to global equities during those periods. This approach

explicitly acknowledges that average correlations and volatilities do not adequately represent asset class behaviors during all risk regimes. We then divide the past 30 years of rolling 5-year periods into quartiles and reconstruct the broader set of asset class returns using their previously estimated volatilities and correlations. These quartiles correspond to the strong bear, moderate bear, moderate bull, and strong bull market scenarios.

The resulting asset class returns from this quantitative process form the starting point for the Capital Market Assumptions Governance and Investment Committee's oversight. The Committee makes adjustments to returns, often due to structural changes of an asset class that are not reflected through a solely backwards-looking quantitative lens. These qualitative insights are important in assessing the forward-looking potential behavior of investments.

We believe that considering portfolio designs across multiple regimes is necessary for aligning investor objectives and asset allocation.

APPENDIX



APPENDIX

Acknowledgments

The following investment professionals make up the T. Rowe Price Capital Market Assumptions Governance and Investment Committee:

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APPENDIX



REFERENCE INDEXES

	ASSET CLASS	REPRESENTATIVE INDEX	
EQUITY	Global Equity	MSCI ACWI	
	Global ex-U.S. Equity	MSCI ACWI ex-USA	
	Global ex-Japan Equity	MSCI Kokusai	
	Global ex-Australia Equity	MSCI ACWI ex-Australia	
	DM Equity	MSCI World	
	DM ex-U.S. Equity	MSCI World ex-USA	
	U.S. Equity	Russell 3000	
	Europe ex-UK Equity	MSCI Europe ex-UK	
	UK Equity	FTSE 100	
	U.S. Large-Cap Equity	Russell 1000	
	U.S. Small-Cap Equity	Russell 2000	
	Canada Equity	S&P/TSX Composite	
	Europe Equity	MSCI Europe	
	Asia ex-Japan Equity	MSCI Asia ex-Japan	
	Japan Equity	MSCI Japan	
	Australia Equity	S&P/ASX 200	
	EM Equity	MSCI Emerging Markets	
	Real Asset Equity	S&P Real Assets Index	
	FIXED INCOME	Global Aggregate	Bloomberg Global Aggregate
		Global Aggregate (Hdg)	Bloomberg Global Aggregate (Hdg)
Global Agg ex-U.S.		Bloomberg Global Aggregate ex-U.S.	
Global Agg ex-U.S. (Hdg)		Bloomberg Global Aggregate ex-U.S. (Hdg)	
Global IG Corporate (Hdg)		Bloomberg Global Aggregate Corporate (Hdg)	
Global High Yield		Bloomberg Corporate High Yield	
U.S. Cash		Bloomberg 1-3M Treasury Bills	
U.S. TIPS		Bloomberg Global Inflation-Linked U.S. TIPS	
U.S. Short TIPS		Bloomberg Global Inflation-Linked 1-5 Year U.S. TIPS	
U.S. Treasury		Bloomberg U.S. Treasury	
U.S. IG Corporate		Bloomberg U.S. Aggregate Corporate	
U.S. IG Coporate (Hdg)		Bloomberg U.S. Aggregate Corporate (Hdg)	
U.S. Long Credit		Bloomberg U.S. Long Credit	
U.S. Long Treasury		Bloomberg U.S. Long Treasury	
U.S. Aggregate		Bloomberg U.S. Aggregate Bond	
U.S. High Yield		Bloomberg U.S. Corporate High Yield	
U.S. Bank Loans		S&P/LSTA Leveraged Performing Loan	
U.S. Securitized		Bloomberg U.S. Securitized	
UK Cash		Bloomberg Sterling Treasury Bills 0-3 Month	
UK Gilts		Bloomberg UK Gilts	
UK IG Corporate		Bloomberg UK Aggregate Corporate	
Europe Cash		Bloomberg EUR Treasury Bills 0-3 Month	
Europe Treasury		Bloomberg EUR Treasury	
Europe IG Corporate		Bloomberg EUR Aggregate Corporate	
Europe IG Corporate (Hdg)		Bloomberg EUR Aggregate Corporate (Hdg)	
Europe High Yield		Bloomberg EUR High Yield	
Japan Cash		Bloomberg Japan Treasury Bills 1-3 Months	
Japan Treasury		Bloomberg Japan Treasury	
Japan IG Corporate		Bloomberg Japan Aggregate Corporate	
Australia Cash		Bloomberg Ausbond Bank Bill	
Australia Bonds		Bloomberg Ausbond 0+ Composite	
EM Sovereign Local		JP Morgan GBI - EM Global Diversified	
EM Sovereign		JP Morgan EMBI Global Diversified	
EM Corporate		JP Morgan CEMBI	
ALTERNATIVES		Hedge Funds	HFRI Fund of Funds Composite
		Distressed Debt	ICE BofA CCC & Lower
		CLOs - AAA	Palmer Square CLO AAA
		CLOs - BBB	Palmer Square CLO BBB
		CLOs - BB	Palmer Square CLO BB
		Private Credit	Cliffwater Direct Lending
	Private Equity	Cambridge Associates LLC Global Private Equity	
	Commodities	Bloomberg Commodity	
	Gold	S&P GSCI Gold Total Return	
	Global Private Real Estate	NCREIF Property	
REITs	FTSE EPRA/NAREIT Developed		

Hdg = Hedged currency treatment. EM =Emerging Markets. DM = Developed Markets.

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APPENDIX

Key Risks, Additional Disclosures, and Important Information

Key Risks

Forecasts are based on subjective estimates about market environments that may never occur. Some of the factors that could impact these forecasts include, but are not limited to:

- Political and economic conditions
- Performance of financial markets
- Interest rate levels
- Changes to laws or regulations

Investments in equities are subject to the volatility inherent in equity investing, and their value may fluctuate more than investing in income-oriented securities. Certain asset classes are subject to sector concentration risk and are more susceptible to developments affecting those sectors than broader classes. Investment in small companies involves greater risk than is customarily associated with larger companies, since small companies often have limited product lines, markets, or financial resources. Transactions in securities denominated in foreign currencies are subject to fluctuations in exchange rates, which may affect the value of an investment. Debt securities could suffer an adverse change in financial condition due to a ratings downgrade or default, which may affect the value of an investment. Investments in high yield involve a higher element of risk. Investments in less developed regions can be more volatile than other, more developed markets due to changes in market, political, and economic conditions. Investments are less liquid than those that trade on more established markets.

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