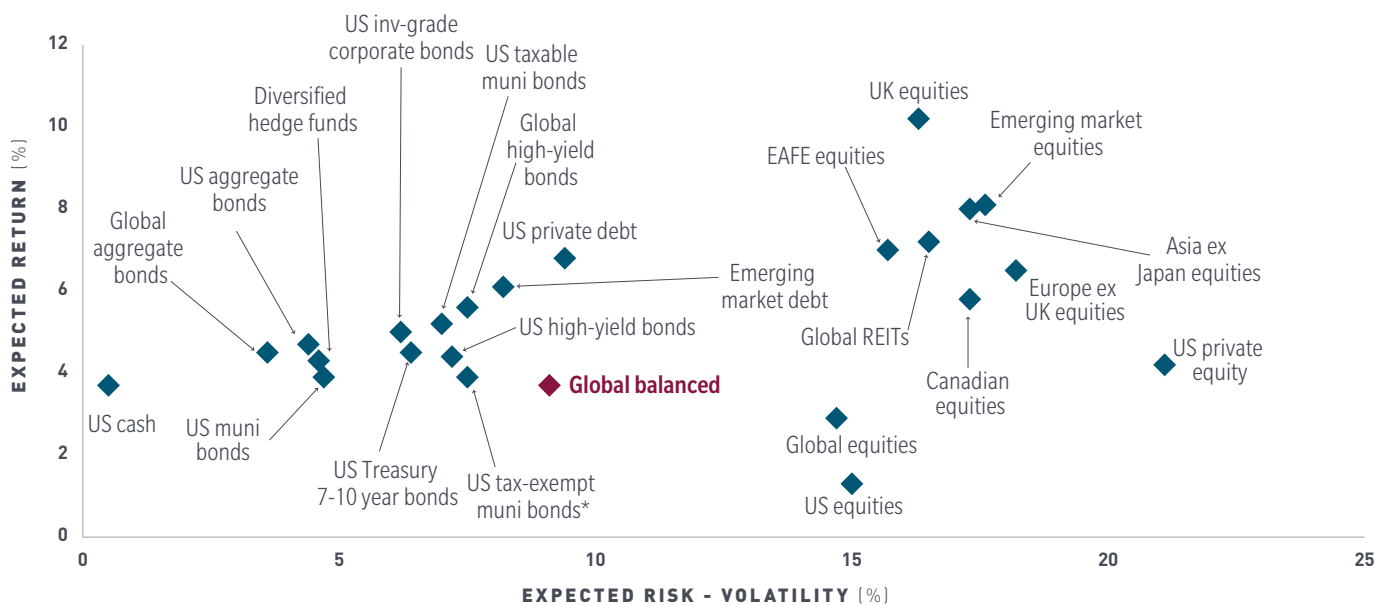


### Executive Summary

MFS® is pleased to present the January 2025 edition of *Long-Term Capital Market Expectations*. These proprietary expectations provide an outlook on return and risk across a variety of asset classes and regions. Below are highlights, details of our market expectations and our view of current economic and capital market conditions.

Our long-term nominal total return expectation for global equities is 2.9%, modestly lower than our July outlook of 3.7%. Global equities finished their second consecutive year of stellar returns of over 20%, besting even the most optimistic expectations at the start of the year. While US market concentration remains a concern, over the year there was a healthy rotation into other areas of the market, including small- and midcap stocks, which had been left out of the prior year’s rally, although they still lagged the S&P 500 Index. On a sector basis, information technology, communication services and financials led while health care, materials and energy lagged. Overall macroeconomic conditions have continued to solidify in the US but remain soft in Europe and look particularly weak in China, despite recent stimulus measures. While the rate cutting cycle is in full gear for most central banks, the speed and magnitude of rate cuts is diverging, a trend we expect to continue into 2025. Inflation in the United States remains too elevated for the US Federal Reserve to cut as aggressively as was expected at the start of the year, and President Donald Trump’s pro-growth agenda is expected to keep economic activity elevated, potentially putting further upward pressure on inflation and, correspondingly, rates. In contrast, the European Central Bank and Bank of Canada are bringing rates down more rapidly as inflation slows and Europe and Canada struggle to maintain consistent growth. While rate cuts are always welcomed by borrowers, cuts in the two regions would be particularly welcome for consumers and the housing markets in part due to the prevalence of short-dated mortgage rates there.

### Exhibit 1: MFS Long-Term Market Expectations



Global balanced portfolio is 60% global equity, 40% global fixed income. Expected Risk-Volatility is represented by standard deviation.  
 \*US tax-exempt muni bonds = US muni bonds return expectation/(1-37%). 37% is the highest marginal tax rate.

A global balanced portfolio is expected to provide a nominal total return of 3.7% with volatility of 9.1% over the next 10 years.

Many homeowners who refinanced their mortgages during the super-low-rate period in 2020 and 2021 will be facing resets to much higher mortgage rates in the next few years, so any relief provided by the central banks in the form of rate cuts could bolster consumer confidence. In the US, most residential mortgages are fixed rate, so while higher rates can negatively impact home purchasers, holders of existing mortgages tend to be less directly impacted. On the other hand, holders of super-low fixed rate mortgages in the US have been reluctant to give them up, leading to limited housing inventory and sticky home prices.

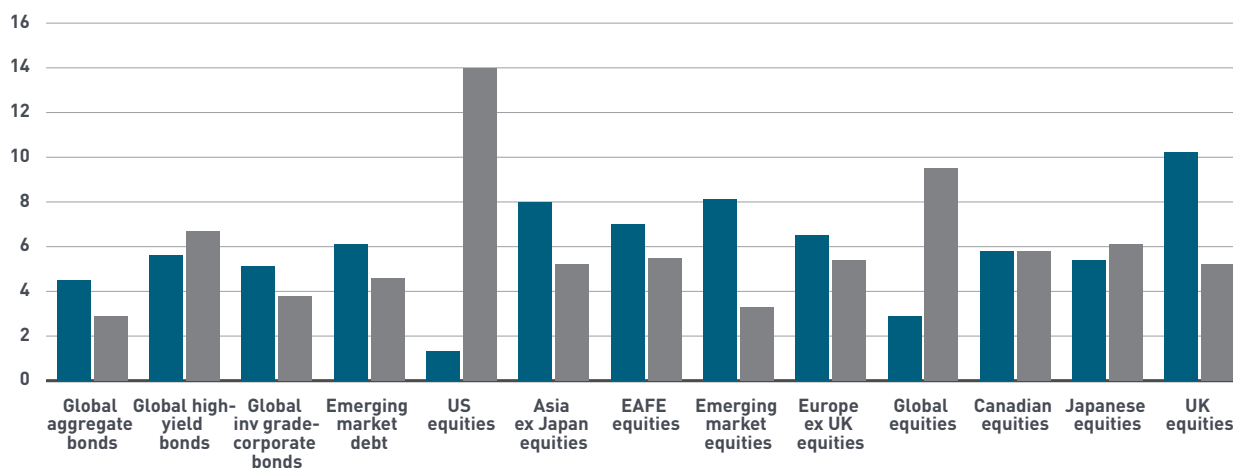
## Trump returns to the Oval Office

The reelection of Donald Trump to the US presidency was one of the more noteworthy events of 2024, following an action-packed election cycle, and his return to office is sure to play a meaningful role in the macro and market environment in coming years. While who sits in the White House doesn't usually make a significant difference in risk and return for markets, some policies, if enacted under certain conditions, could greatly impact economies and markets. Risk markets largely applauded the election results, which saw Republicans hold the House and gain control of the Senate. The twists and turns of this election cycle were historic and included two assassination attempts of President Trump and a late-cycle drop out by former President Joe Biden, which

occurred under pressure from his own party. In addition, the Trump campaign ran on what he positioned as a probusiness platform: lower taxes, less regulation, higher import tariffs and increased investment in the US. While much of this is a continuation of his first term agenda, significant questions remain, particularly around the economic impact of protectionist tariffs. Under the first Trump administration, significant tariffs were imposed on a variety of products, most notably steel and aluminum from China. At the same time, the administration renegotiated NAFTA with Canada and Mexico, the US' two largest trading partners. The Biden administration not only retained those tariffs and trade agreements, but also added additional products to tariff lists, including Chinese electric vehicles and EV-related components. While, in theory, tariffs can be a way to raise revenue and protect domestic manufacturers and workers, in practice the results tend to be mixed and can lead to retaliatory tariffs, shifts in trade partners and subterfuge, such as shipping products through countries not subject to tariffs. They can also lead to outright bans on materials or products vital to the manufacture of critical goods such as semiconductors or pharmaceuticals. Tariffs aside, the Tax Cut and Jobs Act of 2017 is expected to be extended and corporate tax rates lowered, perhaps to 15% to 18%, while individual taxpayers will also likely benefit from an extension of the individual provisions of the TCJA, which were set to expire at the end of 2025.

## Exhibit 2: Expectations vs Historical Return

■ Expectation ■ Historical



Source: FactSet. Historical performance is for the trailing 15-year period as of 30 November 2024. Asset class proxies: Global aggregate bonds – Bloomberg Global Aggregate USD Hedged Index; Global high yield bonds - Bloomberg Global High Yield USD Hedged Index; Global investment grade corporate bonds - Bloomberg Global Aggregate Corporate USD Hedged Index; Emerging market debt – J.P. Morgan EMBI Global Index; US equities – Russell 3000 Index; Asia ex Japan – MSCI AC Asia Ex Japan Index (\$Net); EAFE equities – MSCI EAFE Index (\$Net); Emerging market equities – MSCI Emerging Markets Index (\$ Net); Europe ex UK equities – MSCI Europe Ex-UK Index (\$Net); Global equities – MSCI AC World Index (\$Net); Canadian equities – MSCI Canada Index (\$Net); Japanese equities – MSCI Japan Index (\$Net); UK equities - MSCI United Kingdom Index (\$Net).

How tax cuts will be funded is likely to be a major point of contention within Congress, considering the already-significant US fiscal deficit, which is running around 7% of GDP, with gross federal debt around 130% of GDP.

### Central bank policy paths diverge

During 2020, central banks around the world lowered policy rates concurrently in response to the lockdown-induced global economic slowdown. During 2022, those same banks aggressively hiked rates in response to surging inflation. As we enter 2025, central banks are now forging diverging policy paths. While most central banks are on an easing path, they are beginning to differ in terms of the speed and magnitude of cuts. In the US, the Fed cut rates by 100 basis points in 2024, from an upper bound of 5.5% to 4.5% across three meetings, fewer than the 150 basis points priced in at the start of the year. A key reason for the more moderate pace is that inflation is still a concern, particularly as economic growth is expected to accelerate into the new year. The Fed's key measure of inflation, core PCE, is stuck in the upper 2% range, uncomfortably above its 2% target level. Breaking the measure into goods and services, it is the services component that remains elevated, with the housing, financial and insurance services components proving the most stubborn. Our expectation is that the Fed will continue to follow the path lower but will take a measured approach to avoid a rekindling of the inflation experience of 2021 and 2022. The lessons of the 1970s, when the country experienced a decade of rolling inflation, with the Fed chasing it in both directions, are deeply embedded in the psyche of current policymakers, so our expectation is that the Fed will take a more cautious approach as it eases toward the elusive neutral rate.

The ECB and BoC, on the other hand, are taking more aggressive moves toward accommodation. The BoC dropped rates by 175 basis points in 2024, with back-to-back 50 basis point moves in both October and November. The Canadian economy grew by a tepid 1% in the third quarter while unemployment increased and wage growth slowed, with inflation drifting below their 2% target. Tariffs, if implemented, could weigh heavily on the Canadian economy. One notable exception to rate easing by central banks is the Bank of Japan, which is finally seeing inflation and wage growth on a more consistent basis. Japan's interest rates remain among the lowest in developed markets, with the yawning gap between US and Japanese rates contributing to a weak yen. However, a further convergence in rates could provide much-needed support for the yen.

### US equities continue their run

Despite doubts that US equities will sustain the strong performance of 2024, the S&P 500 price index returned more than 20% for the second consecutive year. While valuations remain lofty, earnings growth allowed stocks to grow into forward multiples, with solid earnings broadening out beyond the technology and communications sectors. We see this broadening as a healthy development and a reflection of strong underlying fundamentals able to meet the market's high expectations. The next-twelve-months P/E ratio has risen from 19.5x end of 2023 to more than 22.4x at year end. If tax cuts, deregulation and productivity gains related to AI materialize, earnings could grow into that multiple, but heightened valuations leave little room for error.

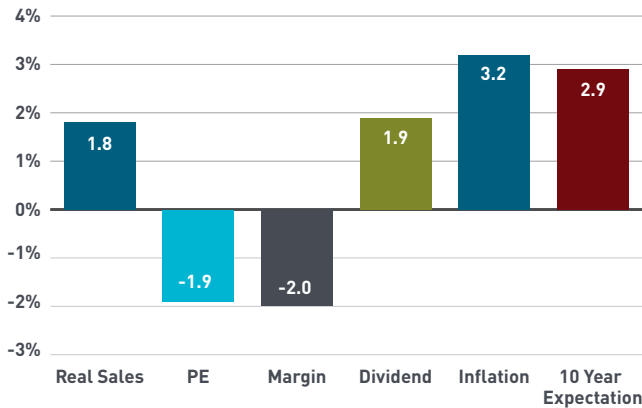
Japan equities, the second-largest single-country equity market after the US, recovered from a midsummer rout related to the unwinding of the popular yen carry trade as the BOJ unexpectedly raised rates, increasing borrowing costs. Our 10-year expectation for Japanese equities is 5.4%, higher than our global equity expectation of 2.9%. The reflation of the Japanese economy should continue to support wage growth and consumer spending while a weak yen has rekindled tourism. Improving corporate governance trends in Japan remain a secular tailwind as companies reduce cross-shareholdings and increase dividend payouts and buyback programs. Turning to the UK and Europe, the region has struggled, with weak growth and significant political turmoil in the United Kingdom, France and Germany. While valuations are far cheaper than in the US, European equities remain an afterthought for many investors. However, while there are macro headwinds in the region, there continue to be opportunities in materials, consumer staples and market leaders in specific segments, such as industrials and luxury goods.

Globally, over the next 10 years we expect modest real sales growth and dividend payouts to be the primary contributors to global equity returns. Valuations continue to run at the higher end of their long-term range, so further multiple expansion is not expected to contribute to returns unless there is renewed interest in non-US equities, which remain cheap relative to the US. Global equity profit margins, at around 10%, remain elevated relative to their 10-year average of 8.6%, so sales growth and dividends, typically stable contributors, are expected to be the primary drivers to returns. Within fixed income, compelling opportunities across several fixed income asset classes remain, with starting yields near or above long-term total returns. However, renewed inflation is a risk given the stickiness of US inflation and the tail risk of a renewed bout of inflation due to tariffs, supply chain shocks or other unanticipated events. Our long-term, nominal total return expectation for global bonds is 4.5%, down from with our July expectation of 5.0%.

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**Exhibit 3: Global Equity Building Blocks**



For illustration purposes only, numbers may not add due to rounding.

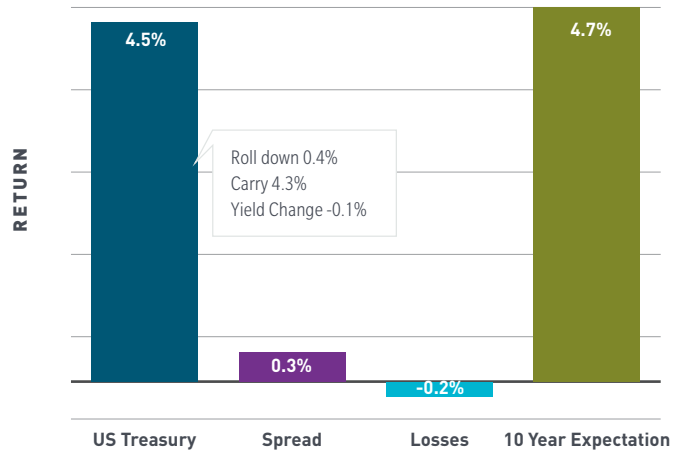
High profit margins are expected to compress, but solid real sales growth and favorable dividend yields are likely to contribute to global equity returns.

## Fixed income: It's all about the carry

Our fixed income expectations focus on the underlying building blocks of return such as starting yield, yield curve roll-down, price change and credit spreads. Across the fixed income spectrum, higher all-in yields present a compelling entry point for many investors, and our view is that carry will be the key contributor to returns as expectations for rate cuts moderate. On the credit side, it was surprising to see spreads continue to grind tighter throughout the year, and while they could compress further, it will be harder to achieve much return beyond additional carry from the credit spread. The combination of a strong technical bid, solid underlying fundamentals and a positive US growth impulse have all been supportive of tight spreads. Global investment-grade bonds offered a yield to worst of 4.8% and global high yield a 7.5% yield to worst as of the end of the year, lower than where they both started. Corporate balance sheets remain solid, and the combination of potential corporate tax cuts and deregulation could provide additional support. Concerns over a credit maturity wall have all but disappeared from the list of investor concerns as healthy fundamentals and a strong technical bid underpin the market. Credit markets remain wide open, and investors remain eager to buy credit, allowing companies,

particularly higher-quality ones, to issue new debt at will. However, placid credit environments can change quickly, and we continue to believe that an active credit selection process is required to successfully navigate both placid and volatile environments.

**Exhibit 4: US core fixed income building blocks**



For illustration purposes only, numbers may not add due to rounding.

Fixed income investors shouldn't expect meaningful returns to come from spread, given low current levels.

## PORTFOLIO CONSIDERATIONS FOR 2025

Through 2024, a 60/40 balanced portfolio performed well, primarily due to the strong run up in global equities, gaining 11.7%. At 67% of the global equity universe and strong absolute and relative performance, the US was by far the greatest contributor to returns. Global equity returns were strong at 17.5% while global bonds performance was respectable at 3.4% amid upward rate pressure. While bonds may not have contributed much to total return, they dampened volatility, particularly during the mid-summer pullback during the yen carry trade unwind. While we continue to be largely constructive on US equities, on a longer-term basis, we continue to favor international equities over the next 10 years. Emerging market equities are expected to outperform both US and developed international ones on a 10-year basis, although there are

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several near-term challenges they must overcome. The most obvious is the strong possibility of more US tariffs. Countries that compete with US raw materials or intermediate goods are most at risk. The anticipated protectionist stance by the new US administration could weigh heavily on export-heavy emerging market countries including Mexico and China. At the same time, China, the world's second largest economy, is facing domestic challenges of its own: weak domestic consumption, a property market in disarray and underwhelming fiscal support. An additional near-term headwind is the strong dollar, which has been girded by both higher growth and higher rates in the US, leading to elevated rate differentials relative to emerging markets. Despite these headwinds, we continue to see positive growth dynamics, favorable demographics and growing domestic demand as secular positives for many emerging economies.

## Exhibit 5: 10-Year and 30-Year Expectations

Asset Class	10-Year Return Expectation	30-Year Return Expectation
Global equities	2.9%	7.3%
US large-cap equities	1.1%	7.1%
EAFE equities	7.0%	7.2%
Emerging market equities	8.1%	7.8%
Global aggregate bonds	4.5%	4.8%
US aggregate bonds	4.7%	4.6%
Global high-yield bonds	5.6%	6.2%
Emerging Market Debt	6.1%	6.8%

Low 10-year expectations for US large-cap equities contrast with our solid 30-year return expectation.

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Region	Asset class	Long-term return expectation <sup>1</sup>	Long-term risk expectation
	Inflation	3.2%	1.1%
<b>Equities (Unhedged nominal total return)</b>			
<b>US</b>	US equities	1.3%	15.0%
	US large-cap equities	1.1%	14.5%
	US small-cap equities	3.1%	19.8%
<b>NON-US REGIONAL</b>	Asia ex Japan equities	8.0%	17.3%
	EAFE equities	7.0%	15.7%
	Emerging market equities	8.1%	17.6%
	Europe ex UK equities	6.5%	18.2%
	Global equities	2.9%	14.7%
<b>COUNTRY</b>	Australian equities	5.2%	21.0%
	Canadian equities	5.8%	17.3%
	Japanese equities	5.4%	13.9%
	UK equities	10.2%	16.3%
<b>Fixed Income (Hedged nominal total return)</b>			
<b>US</b>	US cash	3.7%	0.5%
	US aggregate bonds	4.7%	4.4%
	US high-yield bonds	4.4%	7.2%
	US inv grade-corporate bonds	5.0%	6.2%
	US TIPS	5.4%	5.1%
	US Treasury 7-10-year bonds	4.5%	6.4%
	US Long Treasury	4.8%	12.6%
	US Long Corporate	5.2%	10.8%
	US Long Govt/Credit	5.0%	10.6%
	US Muni Bonds	3.9%	4.7%
	US Taxable Muni Bonds	5.2%	7.0%
<b>GLOBAL</b>	Emerging market debt	6.1%	8.2%
	Global aggregate bonds	4.5%	3.6%
	Global high-yield bonds	5.6%	7.5%
	Global investment-grade bonds	5.1%	5.2%
<b>NON-US REGIONAL</b>	European aggregate bonds	3.8%	4.5%
	European high-yield bonds	4.4%	7.6%
	European investment-grade bonds	4.1%	4.5%
<b>Alternatives (Unhedged nominal return)</b>			
<b>NON-LIQUID</b>	US private equity <sup>2</sup>	4.2%	21.1%
	US direct real estate	5.1%	5.2%
	Diversified hedge funds	4.3%	4.6%
	US private debt	6.8%	9.4%
<b>LIQUID</b>	Global REITs	7.2%	16.5%
	Global infrastructure	5.9%	12.4%
	Commodities	6.9%	14.4%

<sup>1</sup> Geometric return.

<sup>2</sup> As of January 2022, the methodology for US private equity risk has changed from using a fund of funds proxy to using listed private equity companies.

## Exhibit 6: Currency Expectations

		Long Currency									
		Pound Sterling	US Dollar	Canadian Dollar	Swiss Franc	Norwegian Krone	Swedish Krona	Japanese Yen	Australian Dollar	New Zealand Dollar	Euros
Base Currency	Pound Sterling	0.0%	-2.1%	0.3%	-2.1%	3.2%	3.9%	4.9%	-0.6%	-1.5%	0.3%
	US Dollar	2.1%	0.0%	2.4%	0.0%	5.4%	6.1%	7.1%	1.5%	0.5%	2.5%
	Canadian Dollar	-0.3%	-2.4%	0.0%	-2.4%	2.9%	3.6%	4.6%	-0.9%	-1.8%	0.0%
	Swiss Franc	2.1%	0.0%	2.4%	0.0%	5.4%	6.1%	7.1%	1.5%	0.5%	2.5%
	Norwegian Krone	-3.1%	-5.1%	-2.8%	-5.1%	0.0%	0.6%	1.6%	-3.7%	-4.6%	-2.8%
	Swedish Krona	-3.7%	-5.7%	-3.4%	-5.7%	-0.6%	0.0%	1.0%	-4.3%	-5.2%	-3.4%
	Japanese Yen	-4.6%	-6.6%	-4.4%	-6.6%	-1.6%	-1.0%	0.0%	-5.2%	-6.1%	-4.3%
	Australian Dollar	0.6%	-1.5%	0.9%	-1.5%	3.8%	4.5%	5.5%	0.0%	-1.0%	0.9%
	New Zealand Dollar	1.6%	-0.5%	1.9%	-0.5%	4.8%	5.5%	6.5%	1.0%	0.0%	1.9%
	Euros	-0.3%	-2.4%	0.0%	-2.4%	2.9%	3.5%	4.5%	-0.9%	-1.9%	0.0%

## Appendix

The MFS Long-Term Capital Markets Expectations (LTCME) for 2025 includes return and risk expectations for equity, fixed income and alternative asset classes across country, regional and global markets. The focus of these expectations is to provide a strategic, long-term, forward-looking view of various global markets. We use a proprietary top-down approach by employing quantitative, country-based models as the foundation for our expectations. Elements of these models are influenced by views from our fundamental equity and fixed income teams.

Our expectations are developed across 26 countries comprising 18 developed countries and 8 emerging market countries.

### Equity expectations

MFS equity market expectations are displayed in unhedged, nominal total return and are developed using a building-blocks approach.

Elements of market history and mean reversion are incorporated into our models. Reversion speed and target levels are calibrated based on our analysis of historical data and forward looking expectations. Any return figure should be viewed as the mid-point in that range of outcomes.

### Fixed income expectations

MFS fixed income market expectations are displayed in nominal total return, hedged to the investor's home currency. As with our equity model, our fixed income model employs a building-blocks approach.

And, again like the equity model, the fixed income model derives its reversion speed and target level parameters from careful historical research as well as forward-looking expectations.

In our forecast, we focus on the returns from carry, yield change, roll-down and credit loss (where appropriate). Using this framework, we develop expectations across a range of sovereign, global credit and regional credit markets, while being careful to tune our models in accordance with the unique attributes of the various fixed income markets.

### Alternative expectations

Due to the unique characteristics and varying drivers of return in alternatives, we vary our approach for each category. Our equity and fixed income capital market expectations serve as key variables in our alternatives models.

### Currency Expectations

We use a mean reversion approach to calculate currency expectations. Currency expectations represent the nominal excess returns which are nominal total return less domestic carry. Nominal total return is calculated as nominal price change plus foreign currency carry. Domestic and foreign currency carry comes from the MFS Long Term Capital Expectations cash forecasting model. Nominal price change is real price change plus inflation differential between currencies.

## Appendix II MFS 30-Year Capital Market Expectations

In addition to our 10-year capital market expectations, MFS is pleased to release our 30-year capital market expectations to provide perspective across the different time horizons.

In this release, we provide asset class expectations over a period long enough to encompass a variety of equity and credit market cycles and multiple economic regimes. Our 30-year annualized expectation is 7.3% for global equity and 4.8% for global fixed income with a 60/40 global balanced portfolio expected to return 6.5% over that timeframe. These 30-year market expectations are a critical input to the asset allocation process and have a number of practical applications that enable investment professionals to do the following:

- Analyze risk and return relationships across asset classes
- Compare and contrast 10-year expectations with 30-year expectations
- Compare historical market performance with forward-looking expectations
- Develop objective-based multi-asset portfolios
- Serve as inputs for mean variance optimization
- Calculate expected long-term risk and return for policy portfolio
- Develop Monte Carlo simulations and stress tests on portfolios

### Exhibit 7: 30 year return and risk expectations



Source: MFS Long-Term Market Expectations (US Edition) as of January 2025. Global balanced portfolio is 60% global equity, 40% global fixed income. Risk-Volatility is represented by standard deviation. The expected returns presented are hypothetical in nature and are not representative of an actual account. Certain assumptions have been made for modeling purposes and are unlikely to be realized. No representation or warranty is made as to the reasonableness of the assumptions made or that all assumptions used in calculating returns have been stated or fully considered. Projections and forward-looking assumptions are no guarantees of future performance. The expected returns are not targeted or projected performance for any MFS portfolio or advisory service.



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	30-Year Return Expectation <sup>1</sup>	30-Year Risk Expectation
Inflation	2.8%	0.9%
<b>Equities (Unhedged nominal total return)</b>		
US large-cap equities	7.1%	14.5%
EAFE equities	7.2%	15.7%
Emerging market equities	7.8%	17.6%
Global equities	7.3%	14.7%
<b>Fixed Income (Hedged nominal total return)</b>		
US Cash	3.2%	0.5%
US Treasury 10-year bonds	4.3%	6.4%
US Treasury 30-year bonds	4.7%	13.7%
US aggregate bonds	4.6%	4.4%
US high-yield bonds	5.0%	7.2%
US Long Govt/Credit	5.3%	10.6%
Emerging market debt	6.8%	8.2%
Global aggregate bonds	4.8%	3.6%
Global high-yield bonds	6.2%	7.5%
<b>Alternatives (Unhedged nominal total return)</b>		
US private equity*	8.0%	21.1%
Diversified hedge funds	5.5%	4.6%
US REITs	7.1%	17.0%
Global REITs	6.8%	16.5%
Global infrastructure	5.9%	12.4%
Commodities	7.1%	14.4%
Convertible bonds	6.0%	11.9%

<sup>1</sup> Geometric return.

\* As of January 2022, the methodology for US private equity risk has changed from using a fund of funds proxy to using listed private equity companies.

## Methodology

In the development of these expectations, we employ a quantitative framework with our 10-year capital market expectations as a starting point and then incorporate a historical risk premium approach to extend the time horizon to 30 years. The equity risk premium is the higher return over a risk free asset that is offered by equities to compensate for additional volatility and can be estimated on both a historical and forward-looking basis. Combining these two approaches creates extended horizon expectations that incorporate both the current market environment and a long-term historical perspective. Our 10-year market expectations are developed using a building blocks approach where a degree of mean reversion is assumed for fundamental drivers of return such as P/E and profit margin for equity and yield and credit spread for fixed income. For years 11 through 30, we determine historical risk premium and return relationships across asset classes and then build up to an asset class level expectations. Expectations for the two time periods are then proportionally weighted.

## GLOSSARY

### Equity Expectations Building Blocks

Our equity building blocks are measured at the index level for each country.

**Price/Earnings (P/E) ratio** Price to earnings ratio is the trailing 12-month P/E ratio as measured by the index level divided by the trailing 12-month earnings for the constituent members of that index. We use P/E ratio as a measure of valuation. Our very-long-term reversion target for P/E ratios is 18.

**Profit margins** Profit margins are a measure of profitability and are measured in percentage terms. Our margin expectations are assumed to revert toward a target based on long term history.

**Sales growth** Sales growth is a measure of increase or decrease in real sales per share. To estimate this, we incorporate elements of economic theory and examine current levels relative to trends.

**Dividends** Dividends are measured in percentage terms, and we assume that a country's dividend payout ratio, over our forecast horizon, will be equal to its trailing 5-year average.

### Fixed Income Expectations Building Blocks

Our fixed income building blocks are measured at the index level for each country.

**Nominal yield** Nominal yield is the observed yield at the index level. Nominal yields consist of both a real yield component and an inflation expectation component.

**Real yield** Real current yield is a nominal yield less the trailing 5-year annualized change in the Consumer Price Index.

**Carry** The carry return is calculated as the average of the current nominal yield and the expected nominal yield.

**Yield change return** The yield change return is calculated as the expected yield change multiplied by the current duration and then annualized.

**Inflation** Inflation is measured as a 5-year trailing change in the US Consumer Price Index. We then assume that inflation reverts towards a global equilibrium value.

**Roll down** The roll down return expectations are based on index duration as well as localized curve steepness for the maturity being forecast.

**Regional credit markets** For regional credit markets, we take a building-blocks approach incorporating duration-matched risk-free return, spread return and loss return.

**Duration-matched risk-free return** This represents the estimated return of a sovereign bond portfolio with the same duration and nationality as the regional credit in question.

**Spread return** The spread return is measured by the differential between the yield in the index and the yield of the sovereign bonds for that country. This is the return that can be earned for taking on credit risk.

**Credit losses** Credit losses are determined based on historical rates of default losses and credit quality migration that are reflective of the index being forecast.

**Global credit** Because of the complexities of multiple durations and multiple loss provisions across several countries, we take the current yield of the index, assume a constant roll down and subtract any loss return expectations based on expected default rates.

**US Treasury Inflation-Protected Securities** For TIPS, we forecast a future real yield based on the same mean reverting assumptions we use for other sovereign indices. We then calculate a real carry return, a real yield change return, and a real roll-down return in the same manner with which we calculated nominal versions of these returns for sovereign indices. We then add back inflation expectations to produce a nominal return.

**US cash** Our estimate of future cash returns reflects the sum of expected real cash rates and expected inflation, both of which are based on mean reversion.

### Alternatives Expectations Building Blocks

**Real estate** For global real estate investment trusts (REITs), we rely upon current dividend yield based on the fact that REITs pay out a considerable percentage of their funds from operations in the form of dividends.

For US direct real estate (RE), we capture the historical relationship between REITs and direct RE by unsmoothing direct RE returns and then estimating beta.

**Private equity** Our private equity approach starts with our capital markets expectations for global developed markets and then makes adjustments based on the higher levels of risk associated with private equity.

**Global infrastructure** Our global infrastructure expectations are calculated based off of the relationship between listed global infrastructure and real estate.

**Hedge funds** We would note that hedge fund investments are pools of capital invested at the discretion of the manager, and as such, risk and return are highly dependent on skill and timing. In addition, within the hedge fund universe, there is a divergent range of asset classes, strategies and implementation approaches. We take a diversified hedge fund portfolio approach where we assume an investment across multiple hedge fund types. To calculate hedge fund expectations, we use a regression based approach to estimate relationships between certain hedge fund styles and public markets. For hedge fund styles that do not appear to hold relationships to public markets, we use steady state expectations plus cash. Expectations for each hedge fund style are allocated to create a diversified hedge fund portfolio.

**Commodities** We develop our commodities expectations to represent broad exposure to the commodities market through a fully collateralized commodity position. Three primary building blocks — collateral return, spot return and roll return — are estimated and then added to determine our long-term commodities expectation.

**Risk and correlations** Our risk and correlation expectations are derived largely from historical observed risk and correlation patterns. Risk, as measured by standard deviation, and correlations across broad asset classes tend to be relatively stable over long periods of time. However, over shorter periods of time or during periods of market disruption, this stability can quickly break down. We use the 15-year historical standard deviation and correlations of proxy indices where available. Where a 15-year history is not available, we use the longest available history and make adjustments based on historical patterns and relationships to other asset classes.

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