

PIMCO's Capital Market Assumptions

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Executive Summary

Fixed income has become especially attractive over our five-year secular horizon following the dramatic repricing of 2022, which sent U.S. bond yields (followed by other countries) to their highest levels in a decade.

Since our last capital market assumptions (CMA) update as of June 2023, equity and credit markets have rallied, and the Federal Reserve paused its hiking cycle in July. Our 2024 baseline scenario anticipates a downshift of varying degrees toward slower growth for major economies. Given ebbing inflation and signals from the U.S. Federal Reserve, the European Central Bank, and the Bank of England, developed market (DM) central banks appear likely to reduce rates as early as June. We expect this environment will support attractive returns and risk diversification from high quality bonds. Five-year forecasts in our latest semiannual capital market assumptions include

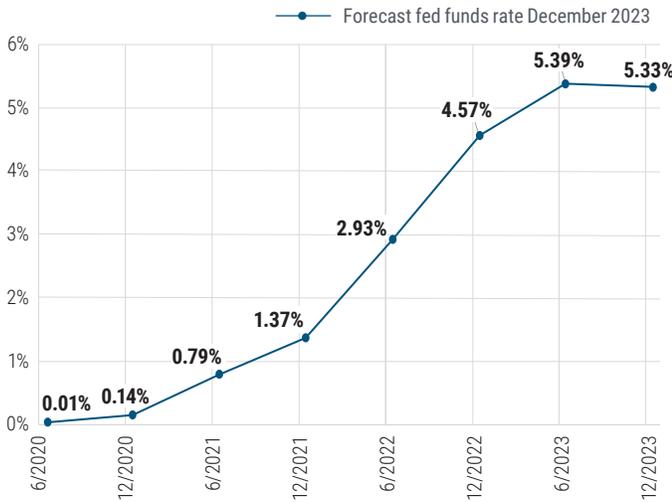
- An average cash rate of 3.5%, similar to our forecast as of June 2023
- An estimated annualized return of 6.8% for U.S. large cap equities based on the S&P 500; this is 30 basis points (bps) above our June 2023 forecast, and about 3.3 percentage points above the average U.S. cash rate
- Estimated annualized U.S. government bond returns ranging from 4.7% to 6.4%, which are higher than our estimated inflation rate of 2.5%, implying positive *real* returns
- Estimated risk premiums from 1.1% to 2.8% over cash on a foreign-exchange-hedged basis for other DM sovereign bonds and corporate bonds

We believe the repricing of yields since 2022 has led to some of the most compelling return estimates for fixed income since the global financial crisis. After a surprisingly resilient 2023, this year we anticipate a slowdown in major economies, including the U.S, albeit at different rates and from different starting points. Given our expectation that inflation will be contained, DM central banks have likely reached the end of

their hiking cycles and attention has switched to the timing and magnitude of future rate cuts. We expect high quality bonds will provide attractive returns and risk diversification in this environment. The bond market rally toward the end of 2023 illustrated the potential of high quality, intermediate duration bonds to provide both high carry and price appreciation when the yield curve normalizes.

Figure 1 shows how the forecast for the terminal U.S. federal funds rate in December 2023, as implied by fed funds futures, evolved over time. In June 2020, the market expected a 0% fed funds rate in December 2023 – effectively predicting the Fed would remain at the zero lower bound for several years. In December 2021, 18 months later and right before the start of the most aggressive Fed rate-hiking cycle in decades, that expectation had moved up to only 137 bps. Yet, by the end of 2022, this forecast had risen to 4.6% – dramatic evidence of how far and how fast the fed funds rate has risen relative to expectations. It was not until June 2023 that the forecast stabilized and converged to the realized level.

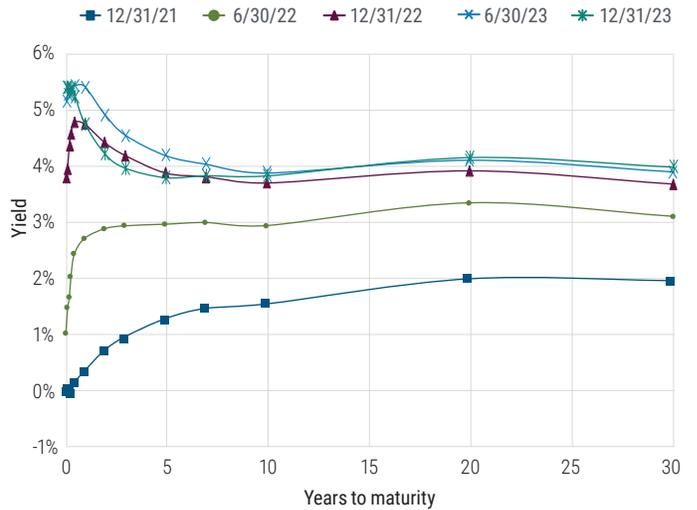
Figure 1: Evolution of market expectations for the federal funds rate as of December 2023



Source: Bloomberg as of December 2023

Figure 2 compares the U.S. Treasury yield curves for our past semiannual CMA updates dating back to December 2021. In June 2022, bond yields increased significantly compared with six months prior, followed by a year of continued Fed rate hikes and intensified yield curve inversion, resulting in the most inverted 2-year versus 10-year U.S. Treasury bond yield slope in the past four decades. Today's 2–10 slope is slightly less negative than June 2023 but remains inverted. We expect the curve will eventually normalize, providing a potential tailwind for many fixed income assets.

Figure 2: The U.S. Treasury yield curve remains inverted



Source: Bloomberg as of December 2023

Painful economic, financial, and geopolitical disruptions over the past few years have resulted in massive fiscal and monetary policy interventions that likely will not be repeated in the next five years due to the fear of inflation and surging sovereign debt. With limited policy options, the global economy will likely face increased volatility and potential aftershocks over the secular horizon. (For more, please read our latest *Secular Outlook*, "[The Aftershock Economy](#).")

PIMCO'S CAPITAL MARKET ASSUMPTIONS

Figure 3 shows PIMCO's five-year CMAs as of December 2023 for key benchmarks. Our CMAs are updated semiannually and generally evolve gradually. Consequently, while changes versus

December 2021 are significant, those since June 2023 are relatively minor, with all semiannual CMA updates indicating attractive fixed income returns over a five-year horizon.

Figure 3: Five-year capital market assumptions for select benchmarks

Index	Unhedged			USD-hedged (for global indices)			
	5-year nominal return ¹	Volatility ²	Sharpe ratio ³	5-year nominal return ¹	Volatility ²	Sharpe ratio ³	
EQUITIES	S&P 500 Index	6.8%	14.9%	0.22			
	Russell 2000 Index	6.5%	21.3%	0.14			
	MSCI World Index	6.7%	15.0%	0.21	6.8%	14.0%	0.24
	MSCI EAFE Index	6.2%	16.3%	0.17	6.8%	12.6%	0.26
	MSCI Emerging Markets Index	7.6%	18.6%	0.22	6.8%	15.3%	0.21
	MSCI All Country World Index	6.8%	15.0%	0.22	6.8%	13.8%	0.24
FIXED INCOME	Bloomberg Global Aggregate Bond Index	4.8%	6.2%	0.21	5.0%	3.9%	0.38
	Bloomberg US Aggregate Bond Index	5.2%	4.9%	0.35			
	Bloomberg Euro Aggregate Bond Index	3.2%	10.2%	-0.03	4.6%	5.4%	0.19
	Bloomberg US Government Bond Index	4.7%	4.7%	0.26			
	Bloomberg US Credit Index	5.6%	5.8%	0.37			
	Bloomberg US Treasury Long Index	6.4%	12.2%	0.24			
	Bloomberg US Long Credit Index	6.3%	10.7%	0.26			
	Bloomberg US Long Government/Credit Index	6.4%	10.6%	0.27			
	Bloomberg US High Yield Index	5.6%	6.2%	0.34			
	Bloomberg US TIPS Index	5.2%	5.4%	0.31			
	Bloomberg Municipal Bond Index	6.1%	4.7%	0.55			
	Bloomberg HY Municipal Bond Index	7.9%	7.2%	0.61			
	Bloomberg Fixed-Rate MBS Index	5.6%	5.3%	0.40			
	JPMorgan EMBI Global Index	6.6%	7.2%	0.44			
JPMorgan GBI-EM Global Div Index	6.2%	10.1%	0.27	4.7%	3.8%	0.31	
ALTERNATIVES	Bloomberg Commodity Index	6.5%	17.1%	0.18			
	Dow Jones Credit Suisse Hedge Fund Index	5.9%	7.3%	0.32			
	Private Equity Model ³	9.9%	26.7%	0.24			
	Private Credit Model ³	8.7%	11.9%	0.43			
	Private Infrastructure Model ³	9.6%	17.7%	0.35			
Private Real Estate - Value ³	8.9%	16.7%	0.32				
FX	U.S. Dollar Index (DXY)	-0.3%	7.4%	-0.51			

Source: PIMCO as of December 2023. **For illustrative purposes only. Figure is not indicative of the past or future results of any PIMCO product or strategy. There is no assurance that the stated results will be achieved.**

Returns for the Bloomberg Municipal Bond Index and the Bloomberg HY Municipal Bond Index are reported on a tax-equivalent basis using a 37% federal tax rate plus 3.8% Medicare tax. Income from municipal bonds for U.S. domiciled investors is exempt from federal income tax and may be subject to state and local taxes and at times the alternative minimum tax. Income from municipal bonds for investors domiciled outside of the U.S. may be taxable. PIMCO does not provide legal or tax advice. Please consult your tax and/or legal counsel for specific tax or legal questions and concerns.

- For indices and asset class models, return estimates are based on the product of risk factor exposures and projected risk factor premia which rely on historical data valuation metrics and qualitative inputs from senior PIMCO investment professionals.
- PIMCO's estimate of volatility over the secular horizon
- The Sharpe ratio calculation is as follows: (estimated asset return - estimated cash return)/estimated asset volatility. Estimated cash return = 3.5%.

We expect the **U.S. cash rate** to average 3.5% over the five-year horizon, which reflects a migration of the cash rate toward 2.75% in five years from about 5.3% today. A cash rate of 2.75% is consistent with our long-term view that inflation will be contained and indicates a modest real return for investors who hold short-term U.S. government bonds.

Our annualized five-year CMA for **large cap U.S. equities** as measured by the S&P 500 is 6.8%, or an equity risk premium over cash of about 3.3 percentage points. Compared with June 2023, the risk premium increased by 30 bps, consistent with our revised U.S. real GDP growth forecast to 1.5% from 1.3% combined with a higher probability of a soft landing. Overall, our estimated five-year Sharpe ratios for most equity markets on a foreign exchange (FX)-hedged basis are around 0.25.

Developed market (DM) sovereign and corporate bonds are seen earning a risk premium of between 60 bps and 220 bps over cash on an FX-hedged basis, depending on the index. This produces fixed income Sharpe ratios higher than those of equities on an FX-hedged basis. Importantly, estimated fixed income returns exceed our five-year expected inflation rate of 2.5%, implying positive *real* returns. U.S. investment grade credit and agency mortgage-backed securities (MBS), in particular, are estimated to earn a risk premium of 2.1% over cash, with an estimated Sharpe ratio close to 0.4. **Treasury Inflation-Protected Securities (TIPS)** appear attractively valued relative to nominal bonds and are estimated to earn a risk premium of 1.7% with a Sharpe ratio of 0.31.

Emerging market (EM) local (unhedged) and external bonds are estimated to earn a risk premium between 2.7% and 3.1% over cash. **Municipal bond** returns continue to look highly attractive on a long-term basis for those in the highest marginal federal tax brackets, with estimated tax-equivalent total returns of 6.1% and 7.9% for the Bloomberg Municipal Bond and Bloomberg High Yield Municipal Bond indices, respectively.

Private assets are estimated to earn a risk premium of between 5.2% and 6.4% over cash. **Private credit** stands out with a Sharpe ratio of 0.43 and an estimated total return of 8.7%, which is close to the 9.9% for private equity, especially when considering the difference in risk. Finally, our CMA for the **US Dollar Index (DXY)** is -0.3%, reflecting our general view of a marginally overvalued U.S. currency against other major DM currencies.

FOCUS ON FIXED INCOME

As discussed above, our base case is that inflation is likely to be reasonably contained over a five-year horizon. As a result, we expect terminal cash rates will be below today's levels as the nominal cash rate adjusts to a more normalized inflationary regime.

Figure 4 shows the starting (December 2023) levels and estimated terminal levels in five years for U.S. nominal and real yields for various tenors. The path of modestly declining yields should produce favorable returns for U.S. government bonds. As the figure shows, our base case rate path results in an estimated Sharpe ratio of 0.28 for a hypothetical 10-year (monthly rebalanced) U.S. government bond. For comparison, our estimated Sharpe ratio for this same bond was a mere 0.03 at the end of 2021, indicating our expectation for meager returns to U.S. sovereign debt at that time. Given a relatively sanguine market view of inflation as measured by breakeven inflation (implied by the difference between nominal and real bond yields), we are modestly more constructive on TIPS relative to nominal bonds. In particular, there are right tail risks to the inflation rate today that would likely produce an outsize return to TIPS should such risks materialize.

Figure 4 also shows that U.S. investment grade (IG) and high yield (HY) credit spreads at the end of December 2023 were still slightly below their long-term estimated terminal levels. For example, the U.S. IG spread is estimated to migrate from 1.05% in December 2023 to 1.50% in five years. However, this still produces a positive

risk premium for duration-hedged credit, although nowhere near as high as it was in, say, the depths of the COVID-19 crisis. Therefore, we believe that investors in both IG and HY fixed income will be rewarded over the secular horizon, with estimated Sharpe ratios for duration-hedged credit of 0.17 for both IG and HY.

Figure 4: Five-year rate forecasts for U.S. nominal and real rates

Q4 2023			
Risk factors	Current level	Level at 5-year horizon	Sharpe ratio¹
U.S. Treasury 3M yield	5.27%	2.75%	
U.S. Treasury 2Y yield	4.70%	2.86%	
U.S. Treasury 10Y yield	4.23%	3.43%	0.28
U.S. Treasury 30Y yield	4.30%	3.77%	
Bloomberg US Credit Index: spread level (OAS)	1.05%	1.50%	0.17
Bloomberg US High Yield: spread level (OAS)	3.47%	4.75%	0.17

Q4 2023			
Risk factors	Current level	Level at 5-year horizon	Sharpe ratio¹
U.S. TIPS 2Y real yield	2.88%	0.82%	
U.S. TIPS 10Y real yield	2.08%	1.41%	0.34
U.S. TIPS 30Y real yield	2.02%	1.76%	

Source: Bloomberg as of December 2023. **For illustrative purposes only. Figure is not indicative of the past or future results of any PIMCO product or strategy. There is no assurance that the stated results will be achieved.**

For indices and asset class models, return estimates are based on the product of risk factor exposures and projected risk factor premia which rely on historical data, valuation metrics and qualitative inputs from PIMCO.

¹ To estimate the Sharpe ratios, we map nominal or real yields to the corresponding par-coupon bonds and map spreads to the corresponding duration-hedged credit indices. The formula is Sharpe ratio = (estimated asset return – estimated cash return)/estimated asset volatility. Estimated cash return = 3.5%.

CONCLUSION

PIMCO's current CMAs suggest some of the most attractive fixed income returns over a medium- to long-term horizon that we've seen in recent history. This stems from our expectation that central banks will succeed in bringing inflation and inflation expectations much closer to long-run targets, although the average level of inflation over the secular horizon will be somewhat higher than it was before

the pandemic (i.e., the "last mile" of the inflation fight may be complicated). In an aftershock and post-peak economy characterized by ongoing disruptions and likely rate cuts later this year, today's starting yields and expectations that inflation will be contained suggest that high quality fixed income could offer attractive returns and serve as a hedge against equity risk.

ASSET INCLUSION TEST

CMAs are a key input to strategic asset allocations. Instead of conducting a full optimization, investors can also consider incremental changes to an existing portfolio to boost the risk-adjusted return (i.e., the Sharpe ratio), by adding one asset at a time. This can be done with the so-called asset inclusion test.

Using SR_p and SR_i to denote the Sharpe ratio of the existing portfolio and the new asset i being considered, we can show that the addition of the asset improves the portfolio Sharpe ratio if the following condition holds¹

$$\frac{SR_i}{SR_p} > \rho_{i,P}$$

$\rho_{i,P}$ denotes the correlation of the new asset with the existing portfolio.

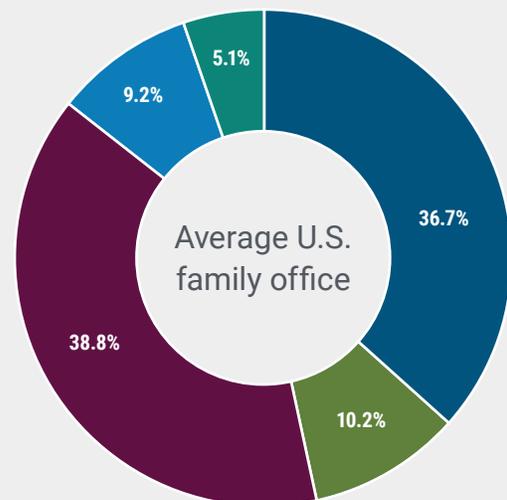
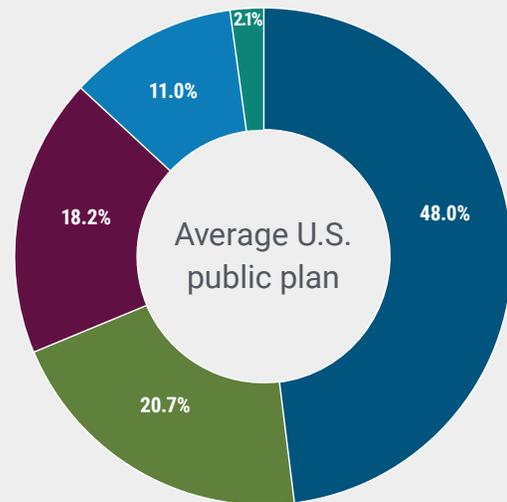
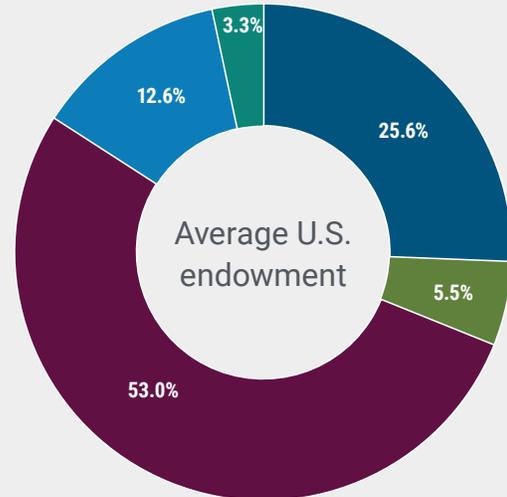
To evaluate relative attractiveness between assets, we can compute the marginal Sharpe ratio for each asset. We calculate the derivative of the portfolio Sharpe ratio with respect to a small addition to the asset, which allows us to determine which asset has the most positive impact. The marginal Sharpe ratio (MSR) takes the form

$$\text{Marginal Sharpe ratio} = \frac{\sigma_P r_i - \sigma_i \rho_{i,P} r_P}{\sigma_P^2}$$

In the equation above, r_i and r_p denote the excess returns, σ_i and σ_p denote volatilities, and $\rho_{i,P}$ denotes the correlation of the asset and the portfolio. To take an example, a marginal Sharpe ratio of 1 would indicate that a 10% increase in allocation to the asset would result in a 0.1 increase to the portfolio Sharpe ratio.

We take the asset inclusion test for a spin on three sample portfolios below.

■ Equity ■ Fixed Income ■ Alternatives ■ Real Asset ■ Cash



¹ See appendix for full proof of the asset inclusion test. For simplicity, we assume that the existing portfolio has a positive Sharpe ratio (i.e., $SR_p > 0$)

We use PIMCO’s latest capital market assumptions (CMAs) as forward estimated returns and PIMCO’s proprietary risk engine to estimate volatilities and equity betas. We then compute the MSR for a broad selection of asset classes for each of the three sample portfolios. Figure 5 shows the five assets with the highest marginal Sharpe ratios.

Figure 5: Top 5 asset classes with the highest marginal Sharpe ratio (MSR)

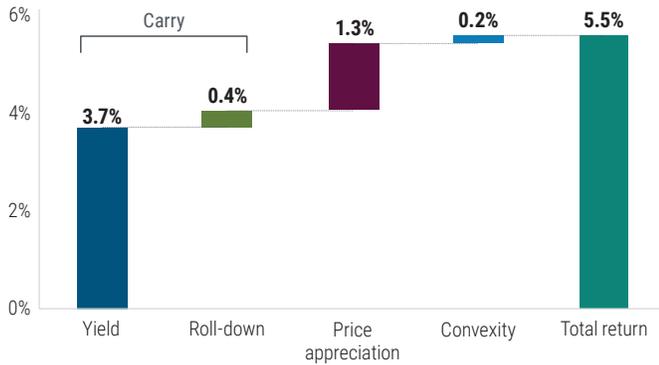
Average U.S. endowment plan		Average U.S. public plan		Average U.S. family office	
Asset	MSR	Asset	MSR	Asset	MSR
Risk Mitigation Strategies	0.25	Risk Mitigation Strategies	0.32	Risk Mitigation Strategies	0.25
Private Corporate Credit Model	0.20	Private Corporate Credit Model	0.24	Private Corporate Credit Model	0.21
Private Real Estate Value-Add Model	0.15	BBG US Agg Securitized Index	0.16	Private Real Estate Value-Add Model	0.15
BBG US Agg Securitized Index	0.14	JPM EMBI Global Index	0.15	Private Infrastructure Model	0.14
JPM EMBI Global Index	0.13	Private Real Estate Value-Add Model	0.14	JPM EMBI Global Index	0.14

As of 31 December 2023. **For illustrative purposes only. Figure is not indicative of the past or future results of any PIMCO product or strategy. There is no assurance that the stated results will be achieved.** The asset inclusion test aims to identify potential assets that may improve the Sharpe ratio of the portfolio. Therefore, the asset universe is broader than the list of selected benchmarks (and capital market assumptions) shown in Figure 3. The average U.S. endowment portfolio reflects the largest NACUBO portfolio. The average U.S. public plan is based on the RVK average public plan asset allocation survey as of 30 June 2023. The average U.S. family office is based on UBS/Campden Wealth Global Family Office Report 2022. Risk Mitigation Strategies is proxied by equally weighted long Treasuries, trend-following strategies, and alternative risk premium models.

We see that adding risk mitigation strategies, private credit, private real estate, securitized credit and EM external bonds tends to have the biggest potential to improve the sample portfolios’ Sharpe ratios. Different portfolios and/or assumptions would provide different results.

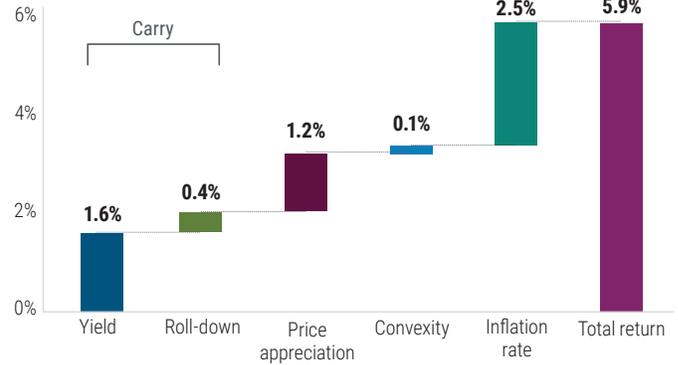
APPENDIX: ESTIMATED RETURN DECOMPOSITIONS FOR KEY ASSET CLASSES (FIVE-YEAR HORIZON)

10-year U.S. Treasury note



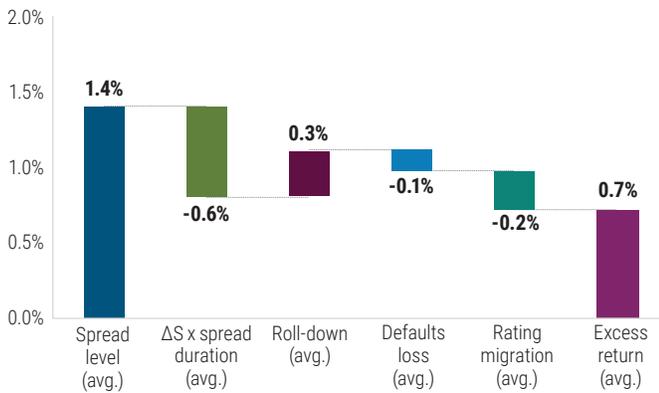
Source: PIMCO as of December 2023. **For illustrative purposes only. Figure is not indicative of the past or future results of any PIMCO product or strategy. There is no assurance that the stated results will be achieved.** Total return estimate represents 10-year U.S. government bond return decomposed into carry (average yield plus roll-down) and price appreciation/losses due to yield changes.

10-year U.S. TIPS note



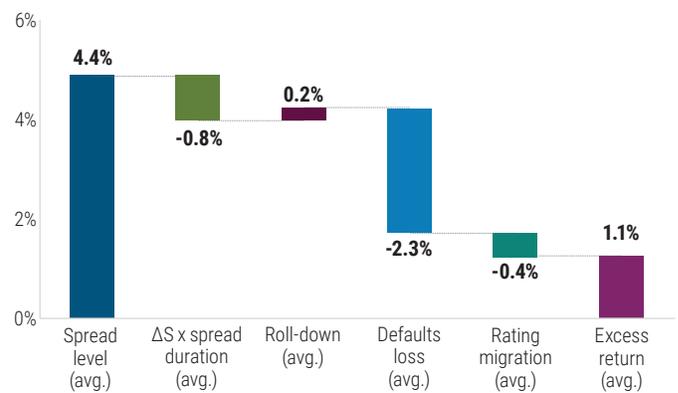
Source: PIMCO as of December 2023. **For illustrative purposes only. Figure is not indicative of the past or future results of any PIMCO product or strategy. There is no assurance that the stated results will be achieved.** Total return estimate represents 10-year U.S. real government bond return decomposed into carry (average yield plus roll-down) and price appreciation/losses due to yield changes.

Duration-hedged U.S. investment grade credit



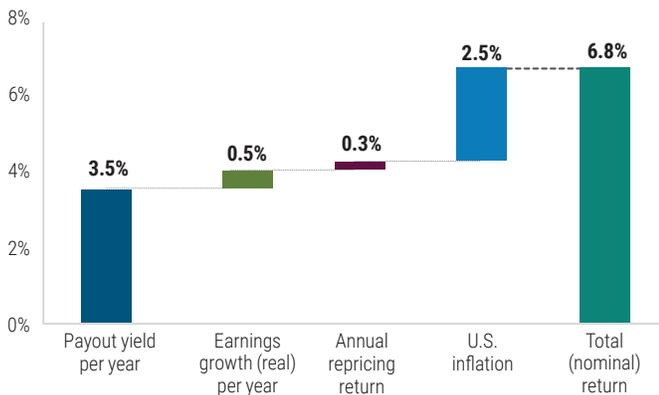
Source: PIMCO as of December 2023. **For illustrative purposes only. Figure is not indicative of the past or future results of any PIMCO product or strategy. There is no assurance that the stated results will be achieved.** Estimate of U.S. IG credit spread excess return (over duration-matched governments) decomposed into carry (average spread level adjusted for losses due to defaults), roll-down and price appreciation/losses due to spread changes adjusted for losses due to downgrades.

Duration-hedged U.S. high yield bonds



Source: PIMCO as of December 2023. **For illustrative purposes only. Figure is not indicative of the past or future results of any PIMCO product or strategy. There is no assurance that the stated results will be achieved.** Estimate of U.S. HY spread excess return (over duration-matched governments) decomposed into carry (average spread level adjusted for losses due to defaults) and price appreciation/losses due to spread changes.

U.S. large cap equity*



Source: PIMCO as of December 2023. **For illustrative purposes only. Figure is not indicative of the past or future results of any PIMCO product or strategy. There is no assurance that the stated results will be achieved.**

* Decomposition based on the S&P 500. Dividend yield includes buybacks.

Past performance is not a guarantee or a reliable indicator of future results.

The analysis contained in this paper is based on hypothetical modeling. Hypothetical illustrations have many inherent limitations, some of which are described below. No representation is being made that any account will or is likely to achieve results similar to those shown. In fact there are frequently sharp differences between hypothetical results and actual results subsequently achieved by any particular trading program.

One of the limitations of hypothetical results is that they are generally prepared with the benefit of hindsight. In addition, hypothetical scenarios do not involve financial risk, and no hypothetical illustration can completely account for the impact of financial risk in actual trading. For example, the ability to withstand losses or to adhere to a particular trading program in spite of trading losses are material points which can also adversely affect actual trading results. There are numerous other factors related to the markets in general or to the implementation of any specific trading program which cannot be fully accounted for in the preparation of a hypothetical illustration and all of which can adversely affect actual results.

Because of limitations of these modeling techniques, we make no representation that use of these models will actually reflect future results, or that any investment actually will achieve results similar to those shown. Hypothetical or simulated performance modeling techniques have inherent limitations. These techniques do not predict future actual performance and are limited by assumptions that future market events will behave similarly to historical time periods or theoretical models. Future events very often occur to causal relationships not anticipated by such models, and it should be expected that sharp differences will often occur between the results of these models and actual investment results.

Return assumptions are for illustrative purposes only and are not a prediction or a projection of return. Return assumption is an estimate of what investments may earn on average over a 5 year period. Actual returns may be higher or lower than those shown and may vary substantially over shorter time periods. Return assumptions are subject to change without notice.

Forecasts, estimates and certain information contained herein are based upon proprietary research and should not be considered as investment advice or a recommendation of any particular security, strategy or investment product. There is no guarantee that results will be achieved.

Figures are provided for illustrative purposes and are not indicative of the past or future performance of any PIMCO product. It is not possible to invest directly into an unmanaged index. Models are provided as a proxy for asset classes where a market index is not available and are not intended or generally made available for investment purposes.

All investments contain risk and may lose value. Investing in the **bond market** is subject to risks, including market, interest rate, issuer, credit, inflation risk, and liquidity risk. The value of most bonds and bond strategies are impacted by changes in interest rates. Bonds and bond strategies with longer durations tend to be more sensitive and volatile than those with shorter durations; bond prices generally fall as interest rates rise, and low interest rate environments increase this risk. Reductions in bond counterparty capacity may contribute to decreased market liquidity and increased price volatility. Bond investments may be worth more or less than the original cost when redeemed. **Inflation-linked bonds (ILBs)** issued by a government are fixed income securities whose principal value is periodically adjusted according to the rate of inflation; ILBs decline in value when real interest rates rise. **Treasury Inflation-Protected Securities (TIPS)** are ILBs issued by the U.S. government. **Sovereign securities** are generally backed by the issuing government. Obligations of U.S. government agencies and authorities are supported by varying degrees, but are generally not backed by the full faith of the U.S. government. Portfolios that invest in such securities are not guaranteed and will fluctuate in value. Investing in **foreign-denominated and/or -domiciled securities** may involve heightened risk due to currency fluctuations, and economic and political risks, which may be enhanced in **emerging markets**. **Currency rates** may fluctuate significantly over short periods of time and may reduce the returns of a portfolio. **High yield, lower-rated securities** involve greater risk than higher-rated securities; portfolios that invest in them may be subject to greater levels of credit and liquidity risk than portfolios that do not. **Equities** may decline in value due to both real and perceived general market, economic and industry conditions. The **credit quality** of a particular security or group of securities does not ensure the stability or safety of the overall portfolio. Investors should **consult their investment professional** prior to making an investment decision.

Carry is the rate of interest earned by holding the respective securities. **Roll-down** is a form of return that is realized as a bond approaches maturity, assuming an upward sloping yield curve. The **Sharpe Ratio** measures the risk-adjusted performance. The risk-free rate is subtracted from the rate of return for a portfolio and the result is divided by the standard deviation of the portfolio returns.

To calculate **estimated volatility** we employed a block bootstrap methodology to calculate volatilities. We start by computing historical factor returns that underlie each asset class proxy from January 1997 through the present date. We then draw a set of 12 monthly returns within the dataset to come up with an annual return number. This process is repeated 25,000 times to have a return series with 25,000 annualized returns. The standard deviation of these annual returns is used to model the volatility for each factor. We then use the same return series for each factor to compute covariance between factors. Finally, volatility of each asset class proxy is calculated as the sum of variances and covariance of factors that underlie that particular proxy. For each asset class, index, or strategy proxy, we will look at either a point in time estimate or historical average of factor exposures in order to determine the total volatility. Please contact your PIMCO representative for more details on how specific proxy factor exposures are estimated.

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