



# Honey, the Fed Shrank the Equity Premium:

## *Asset Allocation in a Higher-Rate World*

### Executive Summary

The future path of interest rates is highly uncertain, but we can at least be fairly confident that the *level* of rates will be substantially higher in the medium term than it has been in recent decades—in the U.S. and many other major economies. What, if any, are the implications for asset allocation? Does a higher cash rate tide lift all asset return boats? This article presents a simple empirical analysis covering stocks, bonds and alternative investments, and compares those

historical patterns to yield-based expected returns as of mid-2023.

One result is clear: equity markets have earned slimmer excess returns when the cash baseline is higher. We discuss the role of so-called “cash-plus” liquid alternative strategies—overlooked beneficiaries of higher cash rates—and conclude with a simple allocation case study. In a higher-rate world that investors haven’t seen for many years, diversification away from equities may prove to be especially valuable.

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## **About the Portfolio Solutions Group**

The Portfolio Solutions Group provides thought leadership to the broader investment community and custom analyses to help AQR clients achieve better portfolio outcomes.

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# Introduction

In 2023 the federal funds rate rocketed above 5%, after averaging just 0.5% from 2010 to 2021. Other major economies have seen similarly dramatic policy rate changes (with the notable exception of Japan). Many investors are pondering the implications for their portfolios.

But investors can't control the risk-free rate. Their job is to beat it—to earn excess returns—by taking investment risk. Should the level of the risk-free rate itself impact their asset allocation decisions?

There are two ways that it might:

1. If excess-of-cash returns of assets and strategies depend on the risk-free rate in some systematic way, then optimal allocations will too.
2. Even if expected excess returns stay the same, constrained investors may face different trade-offs when the cash rate changes. For example, in a low-rate environment, investors might have to compensate by increasing equity allocations. When the cash baseline is higher, they might find they can hit the same return objective with a more diversified portfolio.

In this article, we focus on point (1), though we also examine the implications of point (2) near the end.

According to the Capital Asset Pricing Model (CAPM), a stock's required excess return is the **equity market risk premium**—the expected return of the equity market in excess of the

risk-free rate—multiplied by the stock's beta. The equity risk premium cannot be measured directly, but there is an extensive empirical literature attempting to explain its variation, with interest rates among the many different variables considered. In most studies, a *high* interest rate (especially relative to recent history) has been found to predict a *low* equity premium on average, and vice versa, though interpretations and estimates of economic and statistical significance vary.<sup>1</sup> We re-examine the evidence using simple regime-based tests.

What about the **bond risk premium**? Here too there is an extensive literature, often focusing on the role of the shape of the yield curve.<sup>2</sup> Flat or inverted curves, which have tended to occur when the short rate is high compared to its recent history (as in 2023), signal lower carry for bonds but have also preceded recessions and falling rates. We test the resulting relationship between short rates and bond returns.

Finally, what is the relationship between interest rate levels and **alternative investments**? This paper's main contribution is to combine established results for traditional assets with more novel findings for illiquid assets and “cash-plus” liquid alternatives. Which strategies deserve that promising “cash-plus” appellation, and why? We explore the implications for asset allocation, partly to address the commonly-held—but misguided—belief that a higher-rate environment strongly favors bonds over liquid alternatives.

1 For a succinct recent treatment focusing on the interest rate level specifically, see Blitz (2022). Older but influential analyses include Goyal and Welch (2008) and Campbell and Thompson (2008). Blanchett (2022) examines the impact of bond yields rather than short rates, but the findings are consistent with a smaller equity risk premium in a high-rate environment.

2 Influential papers include Fama and Bliss (1987) and Cochrane and Piazzesi (2005). In “[Asset Allocation in a Low Yield Environment](#)” (Mendelson et al., 2017), the authors stress the importance of considering excess returns and not yield levels when judging the attractiveness of bonds in asset allocation. *AQR Alternative Thinking Q3 2019* showed that a flatter or inverted yield curve has predicted lower near-term excess returns for both bonds and equities on average, though with a wide range of outcomes.

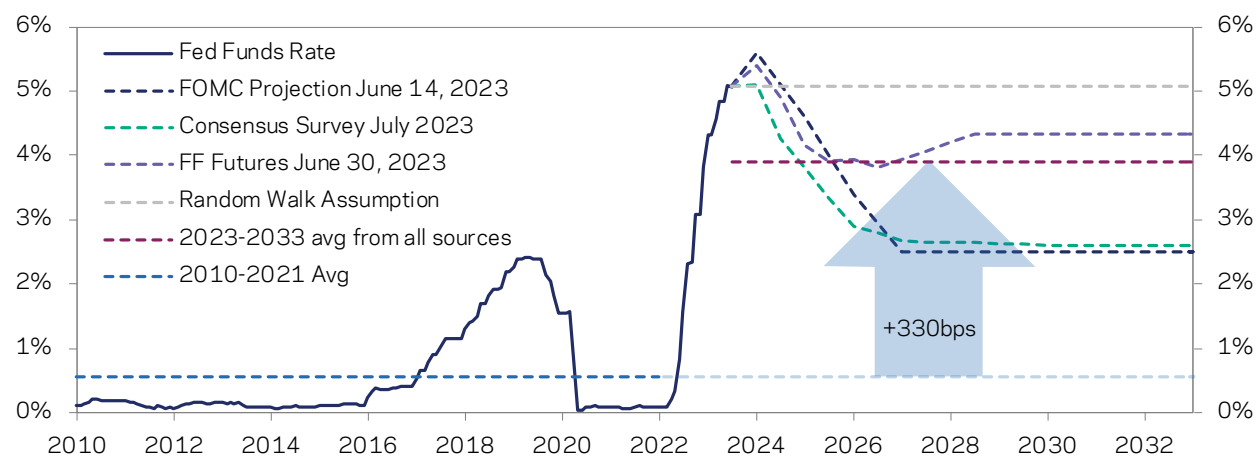
# Rates Outlook: Higher for How Long?

The path of interest rates is difficult to forecast, especially during times of heightened policy uncertainty like 2023. After a large change in rates, commentators often debate how long the new level might be sustained, and whether there might be a “new normal.” But markets, economists and central bankers usually answer a firm “no” to this question and forecast a fairly rapid reversion to some perceived equilibrium rate. 2023 appears no different, with markets and forecasters expecting a fairly rapid reversion to lower interest rates (see **Exhibit 1**). Historically, sometimes reversion occurred rapidly (as after the short-lived early-90s and early-00s troughs), and sometimes it took much longer than the market expected (as after the Financial Crisis).

In this article we are not taking a view on whether the market’s interest rate expectations are too low or too high.<sup>3</sup> We don’t need to, because regardless of where rates peak, and whether or how quickly they fall, it’s almost certain that the *average level of rates* will be substantially higher over the next 5-10 years than it was during the last decade or the one before. Specifically, the average across all forecasts in **Exhibit 1** is for the Fed Funds rate to average **330bps** higher in the 10 years *after* the 2022 inflation shock than the 12 years *before* (blue arrow). For the eurozone the equivalent gap is 320bps, and for the U.K. it’s 380bps (see [Appendix](#) for charts). That’s probably enough for investors to consider strategically repositioning their portfolios for a higher-rate world.

## Exhibit 1: Surveys and Markets Tend to Predict Rapid Reversion to a Perceived Anchor Rate

Fed Funds Rate and Various Projections, January 2010 – July 2023



Source: Federal Reserve, Consensus Economics, Bloomberg, AQR. Furthest available projections are extended to end of period where necessary.

<sup>3</sup> We do include a random walk assumption with ¼ weight in our average of forecasts in **Exhibit 1**, as an acknowledgment that future interest rate moves and the timing of any mean reversion are hard to forecast.

# Historical Patterns

Testing return sensitivities to the *level* of interest rates is problematic because, unlike *changes* in rates, levels are highly persistent. But some historical patterns are so strong they demand our attention. Below we examine first a long dataset of traditional assets and then a shorter, broader one that includes alternatives. In each case, we use three different methods to define lower- and higher-rate regimes:

1. *Full-sample categorization*: We divide the sample into rates above and below the median. This method is simple and intuitive but tends to result in a few prolonged episodes of each environment, and therefore a small number of independent observations for our analysis.
2. *Rolling categorization (trailing window)*: Here we compare each observation to the trailing

5-year period, to “de-trend” the series and identify more episodes of locally higher and lower rates.<sup>4</sup>

3. *Rolling categorization (centered window)*: Here we compare each observation to the 5-year period centered upon it. We include this centered method because, unlike a trailing window, it is not biased towards periods of rising rates—and here we want to test sensitivity to levels, not changes.

We calculate average returns in the higher- and lower-rate environments defined by each method, and then take a simple average across the three methods for our reported results. The main results are consistent across the different methods.

## Long Dataset

We have almost a century of returns for U.S. equities, Treasuries and credit,<sup>5</sup> as well as 3-month T-Bill rates. **Exhibit 2** shows the T-Bill rate and the regimes defined using the three methods described above. The different shades show how many of the three rules indicate a higher-rate environment. While the full-sample categorization is dominated by the

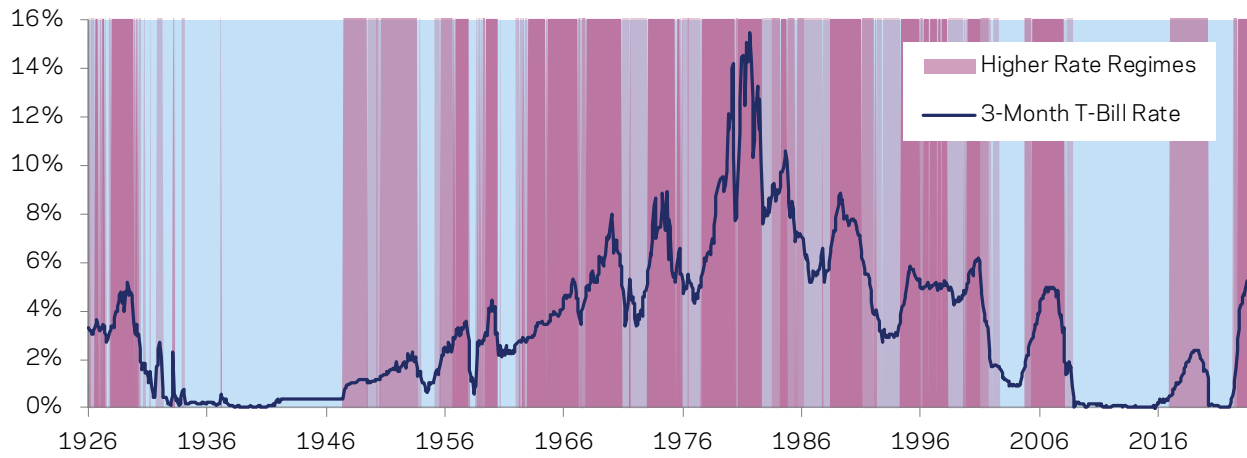
interest rate “mountain” of the 1970s and ’80s, rising between the “plains” of the 1930s-40s and the 2010s, the other rules identify many more episodes of locally higher and lower rates, as intended. The last observation, June 2023, is classified as “higher rates” by all three rules.

4 To avoid unintuitive categorizations in the rolling methods, we define all rates of less than 0.5% as low. Because of this constraint, for the rest of the sample we shift the lower/higher threshold from the median to the 40th percentile, to ensure approximately equal numbers of higher and lower observations.

5 For the early sample we use IG credit returns in excess of empirically duration-matched Treasuries from Asvanunt and Richardson (2018).

### Exhibit 2: (Almost) A Century of Interest Rate Regimes

January 1, 1926 - June 30, 2023



Source: Federal Reserve, AQR. Regimes defined in main text. Different shades show how many of the three rules indicate a higher-rate environment.

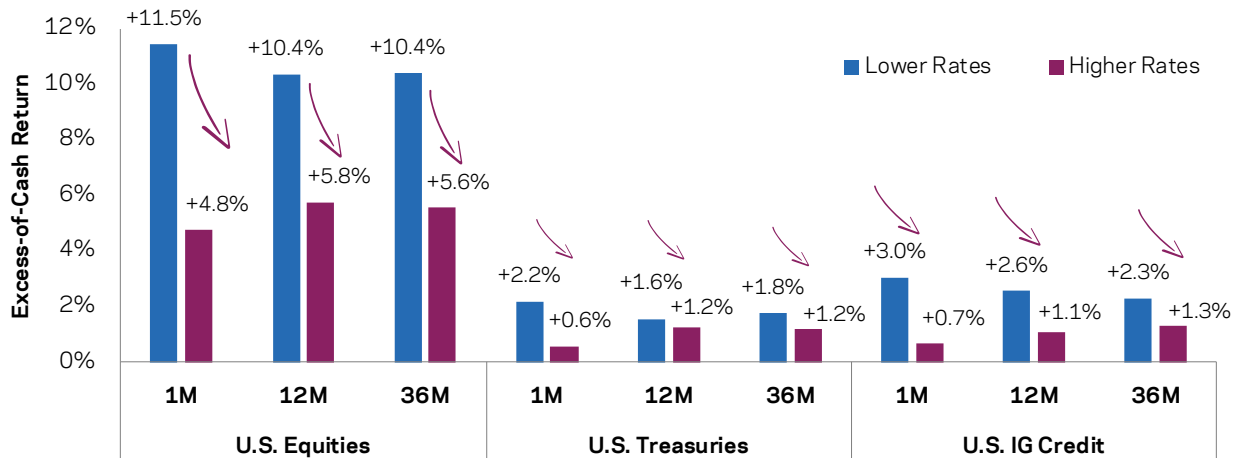
Exhibit 3 shows average returns in each regime for major U.S. assets. The good news for allocators is that all three asset classes have delivered positive premia in both regimes over a range of horizons (chart A). But premia have *not* been constant. For all three asset classes and at all horizons—and most dramatically for equities—risk premia have been smaller when

starting cash rates are higher. Chart B adds the prevailing cash rates to show the impact on *total* nominal and real returns. Bonds have earned somewhat higher total returns in higher-rate regimes, albeit with slimmer risk premia. But for equities, total nominal and real returns have actually been lower, not higher, when cash rates are higher.<sup>6</sup>

### Exhibit 3: Slimmer Pickings When Cash Rates Are High

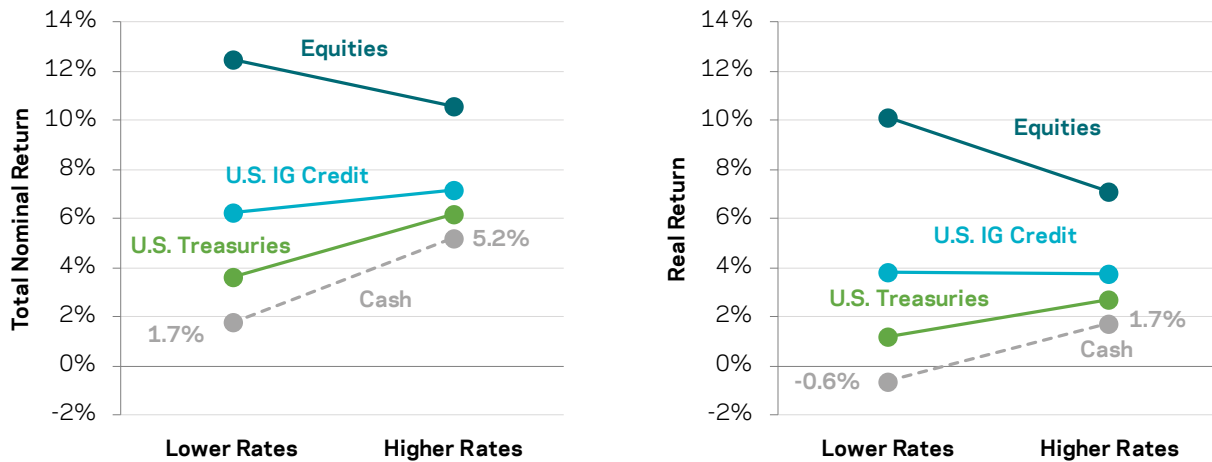
January 1, 1926 - June 30, 2023

A. Average Excess-of-Cash Returns over Various Horizons



6 There are of course other ways to measure sensitivity to rates. A simple regression of monthly excess returns on starting interest rate levels produces a statistically significant negative relationship for equities and credit (t-statistics -2.2 and -2.4, respectively), but not for Treasuries.

## B. Average Total Nominal and Real Returns (Averaged across 1M, 12M, 36M Horizons)



Source: Global Financial Data, Federal Reserve, AQR. Results shown are the average across the three rules described previously. Cash is U.S. 3-month T-Bill. For U.S. IG Credit, panel A shows excess-of-Treasury return and panel B shows credit excess return plus corresponding Treasury nominal or real return.

Why might the equity premium shrink when rates are high? Blitz (2022) considers explanations related to risk, multiple expansion and fundamentals, and favors the last—that is, when interest rates are higher, firms have not generated sufficiently higher earnings to deliver higher returns and maintain a constant premium. Intuitively, it is low interest rates that stimulate demand and facilitate business financing and expansion. Regardless of the underlying driver, these patterns make for tougher investing when rates are high, with implications for asset allocation.

Our analysis considers only one variable—the level of the interest rate—although it is more likely there are several interacting variables

### Broad Dataset

Our broad data set begins in 1990 so that we can add real estate, private equity, and liquid alternatives (represented by hedge fund indices) to our analysis. We apply the same

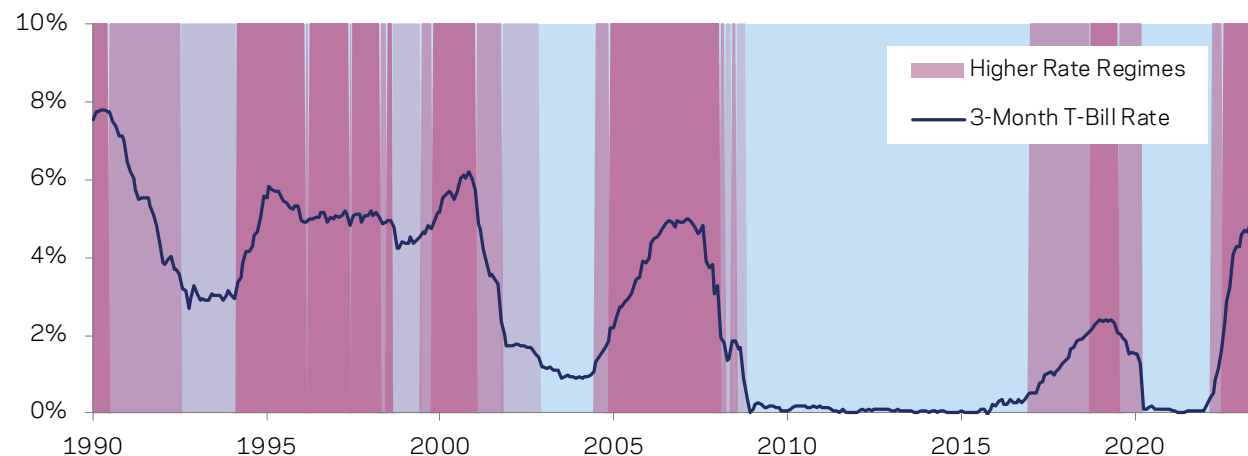
driving risk premia. For example, the best-known predictors of equity excess returns relate not to interest rates but to valuations. During higher-rate environments, the equity market has tended to be cheaper. This means that when we control for valuations, the relationship with interest rates gets even stronger. It also means that the rare combination of high rates and high valuations pertaining in 2023 is a twofold challenge (see [Appendix](#) for analysis).

The natural next question is: Do some investments offer more resilient premia in the face of higher interest rates? To answer this, we examine a shorter, broader dataset that includes alternatives.

categorization rules as before, but the regimes look a little different, as shown in **Exhibit 4**, because rates were generally lower during this 33½-year period.

## Exhibit 4: Defining Interest Rate Regimes Since 1990

January 1, 1990 – June 30, 2023



Source: Federal Reserve, AQR. Regimes defined as described in main text. Different shades show how many of the three rules indicate a higher-rate environment.

**Exhibit 5** shows average returns in each regime for traditional and alternative assets.<sup>7</sup> Equities and credit follow the same pattern as before—much slimmer premia when rates are higher—which is also clearly seen for private equity and real estate. Treasuries fared better during this sample, even earning a slightly higher premium from higher starting rates. This post-1990 period was characterized by generally declining rates and repeated downside rate surprises that boosted bond returns especially after periods of higher rates.

*Liquid alternatives'* sensitivities are particularly interesting. We chose equity market neutral and trend following strategies because both have exhibited near-zero equity beta over the long term, and both tend to maintain large cash holdings. They were able to generate comparable excess returns in both environments, so their average total returns were substantially higher in the higher-rate regimes: they delivered on their “cash-plus” objective.<sup>8</sup>

7 For the rolling regime definitions, we reduce the higher/lower threshold from 40<sup>th</sup> to 30<sup>th</sup> percentile for this sample, to maintain similar numbers of higher and lower observations. Due to space limitations, we average across the 1-, 12- and 36-month horizons here, as well as across the three regime definitions. Results are directionally similar across horizons, across regime definitions, and if we re-use the regime boundaries from the long data set instead of recalculating them for this shorter sample. We also tested commodities, which showed mixed results over different horizons.

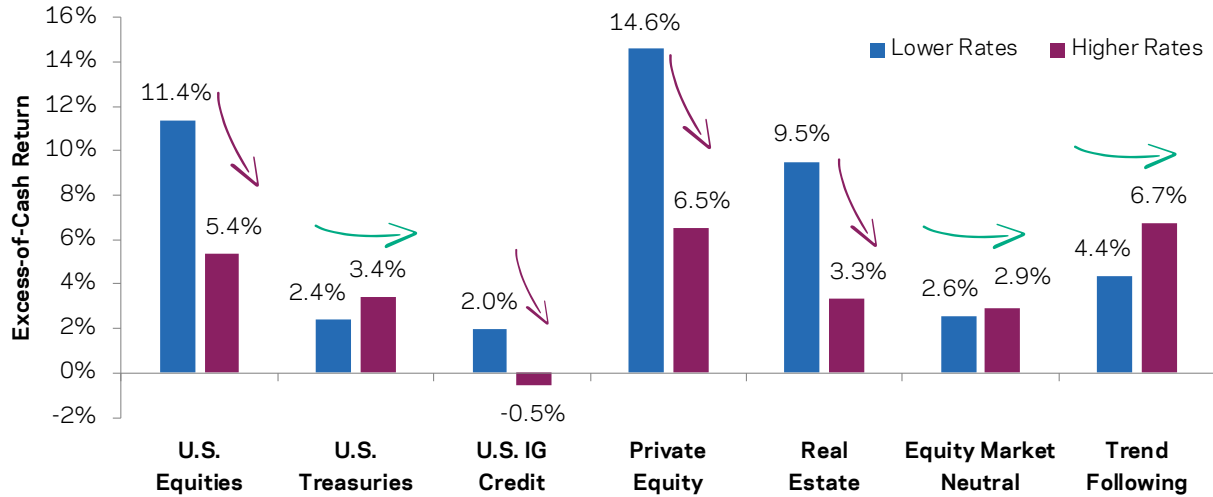
8 We also tested broad hedge fund indices, which inherit some of equities' preference for lower rates—not surprising given their well-known passive beta exposure.



### Exhibit 5: Which Investments Maintained Their Edge Over Cash?

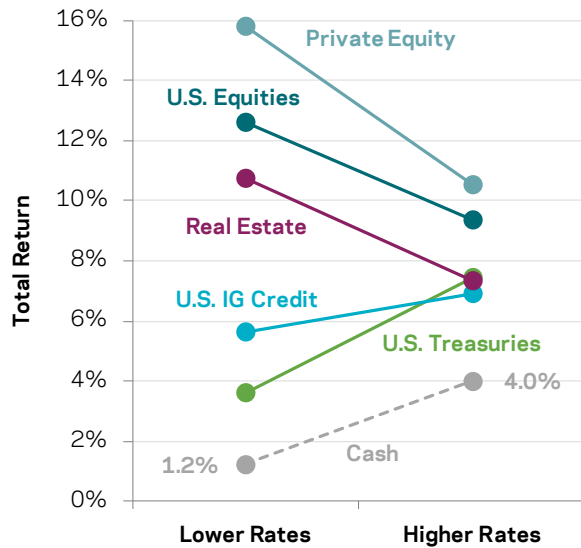
January 1, 1990 - June 30, 2023

A. Average Excess-of-Cash Returns (Averaged across 1M, 12M, 36M Horizons)

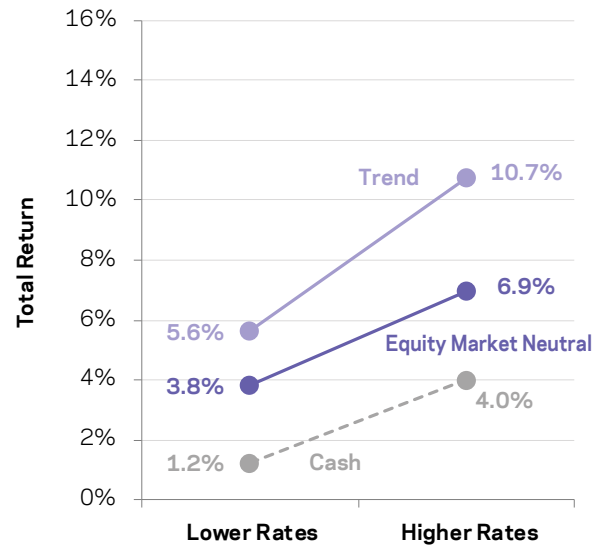


B. Average Total Returns (Averaged across 1M, 12M, 36M Horizons)

Traditional Assets and Illiquid Alternatives



Liquid Alternatives



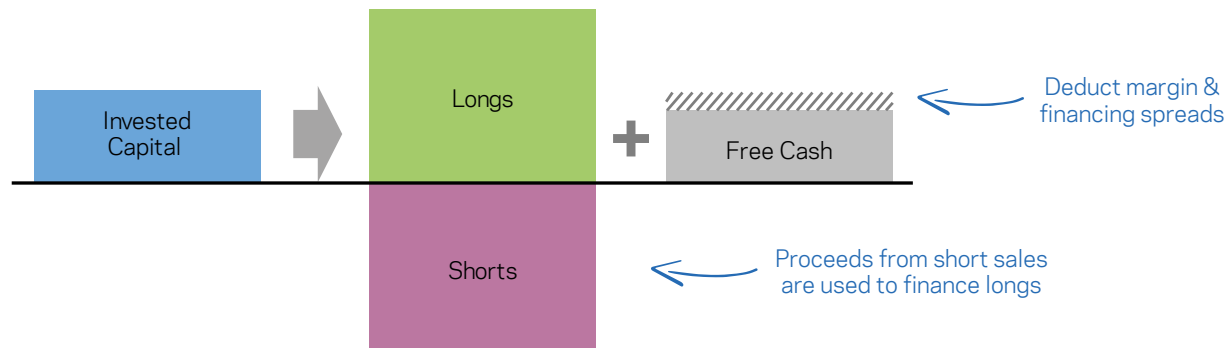
Source: Global Financial Data, Federal Reserve, Bloomberg and AQR. Results shown are the average across the three rules described previously, and the average across 1-, 12- and 36-month horizons. Cash is U.S. 3-month T-Bill. For U.S. IG Credit, chart A shows excess-of-Treasury return and chart B shows credit excess return plus corresponding Treasury return.

# Understanding “Cash-Plus” Strategies (and Their Fees)

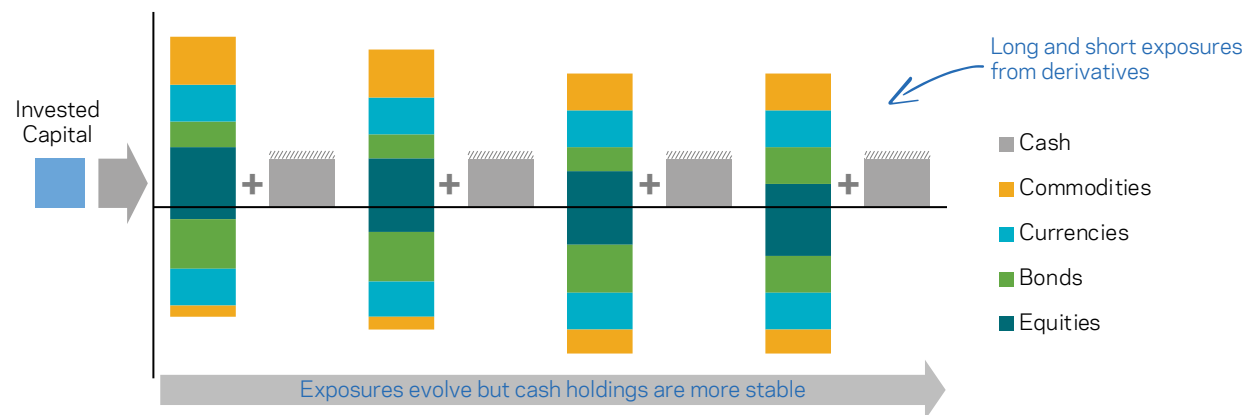
It should be no surprise or mystery that some hedge fund or liquid alternative strategies are able to earn similar excess-of-cash returns whether rates are low or high, and pass higher cash rates on to investors. After all, these strategies literally invest in cash instruments alongside their active positions. Also, any return impact from higher rates on the (long and short) active positions will tend to cancel out.<sup>9</sup> Exhibit 6 illustrates two types of strategies with the largest cash holdings and the smallest net market

exposures over the long term. They deliver cash-plus returns in slightly different ways: an equity market neutral strategy (Panel A) uses proceeds from shorts to finance most of its long positions, whereas a trend following strategy (panel B) primarily uses derivatives with small margin requirements, and therefore maintains large cash holdings even as long and short exposures evolve through time. Some strategies employ a combination of both techniques.

**Exhibit 6: Liquid Alts and Cash: When ‘Cash-Plus’ Comes into Its Own**  
 A. Cash in an Equity Market Neutral Strategy



B. Cash in a Trend Following Strategy



Source: AQR. For illustrative purposes only.

9 Long/short alternative risk premia have tended to exhibit milder macroeconomic sensitivities than traditional asset classes, including to the interest rate environment—see for example Ilmanen, Maloney and Ross (2014).

**Money for old rope? A word on fees:** Some hedge funds charge performance fees on their total returns. In other words, they charge performance fees simply for holding those risk-free cash instruments alongside their active bets and collect higher fees when interest rates are higher. This dilutes their usefulness as diversifiers to slimmer premia on risk assets

in these environments, and their investors are effectively paying hedge fund fees for returns they could get in a money market account. Where “cash-plus” strategies charge performance fees, they should be on returns above a cash benchmark, just as long-only managers should be evaluated against an appropriate market benchmark.

## Consulting Yield-Based Expected Returns

In Section 3 we reviewed the historical evidence on realized excess returns in higher- and lower-rate environments, which was not encouraging for equities, credit and illiquid assets given the sharply higher rates outlook for the 2020s. We can also consult forward-looking yield-based estimates of expected returns to see if they corroborate the story of slimmer premia for these assets.

AQR has published yield-based capital market assumptions for the past decade, including cash rate forecasts, with the full methodology described in our annual publication each January. The horizon is 5 to 10 years. **Exhibit 7** plots the evolution of our estimates from year-end 2021 (when interest rates were near zero across major markets) to mid-year 2023. Cash and fixed income expected returns moved sharply higher, but equity and real estate expected returns are little changed in the

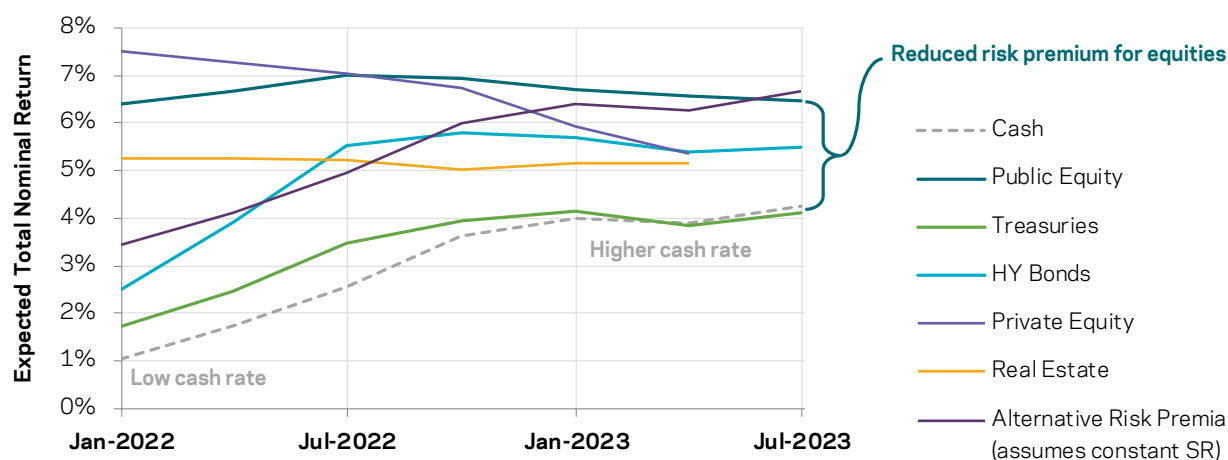
higher-rate environment, despite the rise in the riskless part of their discount rates, implying much slimmer risk premia. Private equity expected returns have actually fallen due to higher financing costs combined with a lack of cheapening, implying an even bigger drop in premium.

Yield-based forecasts do indeed agree with the historical evidence,<sup>10</sup> and suggest the current episode of higher rates may follow the same pattern as previous episodes. For liquid alternatives, we don't have natural yield-based forecasts because positions are constantly evolving. Instead, our expected returns are based on a constant Sharpe ratio assumption, an approach supported by the results in Section 3. So, as cash rates have risen, expected returns for liquid alts have risen by a similar amount—in stark contrast to equities.

<sup>10</sup> Not just today, but over the long term. For equities, Treasuries and cash we have long histories of simple yield-based return estimates. From January 1926 to June 2023, the yield-based expected excess-of-cash return for equities averaged 4.2% in lower rate environments, but only 2.3% in higher-rate environments. For Treasuries the corresponding premia are 0.7% and 0.3%. So results for realized and expected returns are broadly consistent.

## Exhibit 7: Expected Returns before and after the Rise in Cash Rates

Yield-Based Total Returns for U.S. Asset Classes, December 31, 2021 to June 30, 2023



Source: AQR; see AQR Alternative Thinking Q1 2023 for further details. Biannual estimates are total nominal annual compound rates of return with 5-10 year horizon. Latest private equity and real estate estimates are for March 31, 2023 due to data availability. Alternative risk premia based on long-term expected industry-wide Sharpe ratio of 0.36 and 7.3% volatility. All estimates gross of fees, except private equity and alternative risk premia, which are net.

## Asset Allocation Case Study

The implications of higher rates on asset allocation will be different for different investors, depending on objectives, constraints and assumptions. In **Exhibit 8** we present a single simplified allocation case study based on the assumption of similar long-term Sharpe ratios for major asset classes, adjusted for breadth (details in the [Appendix](#)). From left to right:

- We start with a theoretical unconstrained optimal allocation that maximizes risk-adjusted return (first column). This portfolio is broadly “risk balanced” (note the large notional bond allocation), but without the use of leverage it has low risk and low expected returns.
- We then consider a more typical constrained portfolio with a 3% real return target, in a low return environment with a negative real cash return as seen in the 2010s (second column). This portfolio is forced to allocate

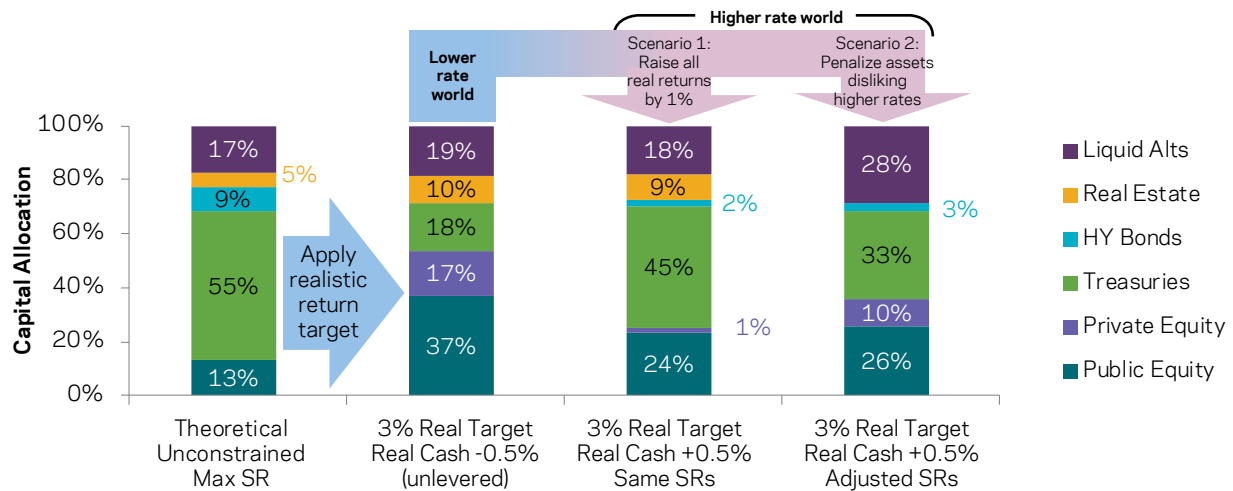
more than half its capital (and nearly 75% of risk) to public and private equity to achieve its return target, with only a small bond allocation.

- Finally, we consider two “higher rates” optimal portfolios:
  - Scenario 1 assumes a 1% rise in expected real return for all assets (i.e., “a higher cash rate tide lifts all asset return boats”). The return target is now a less binding constraint, and the portfolio is free to diversify out of equities to an allocation more similar to the unconstrained case.
  - Scenario 2 applies small Sharpe ratio penalties of -0.06 to public and private equity and real estate, and -0.03 to high yield, directionally consistent with evidence presented in Sections 3 and 5. In this tougher environment, the portfolio must retain more higher-returning assets such as private equity, and the liquid alternatives allocation is higher than in

any of the other scenarios, because by delivering true “cash-plus” returns liquid

alts acquire a relative advantage over other return-seeking assets.<sup>11</sup>

### Exhibit 8: Optimal Capital Allocations under Different Assumptions and Constraints



Source: AQR. For illustrative purposes only. Charts show maximum Sharpe ratio portfolios under various constraints and assumptions. See appendix for full assumptions.

Real investor objectives, constraints and assumptions will differ, but under many

different scenarios a higher cash rate implies a higher allocation to liquid alternatives.

## Concluding Thoughts

Growth and inflation are the main drivers of investment portfolios, and we have written in the past about sensitivities to those variables.<sup>12</sup> But as the dust of the 2022 inflation shock settled in 2023, the most conspicuous transformation in the investment landscape was the level of interest rates. All else equal, a higher cash rate would be good news for investors, because it would allow them to meet return objectives with a better-diversified portfolio. But if history is any guide, all else isn't equal. Equities and illiquid alternatives have tended to underperform when cash rates are higher. Bonds have done a better job of passing the cash rate on to investors, and liquid alternatives have done best of all.

One note of caution: market timing is difficult. Long-term historical patterns don't always persist, especially over shorter horizons. Tactical asset allocation decisions should be scaled according to conviction, and the interest rate level is just one of many potential predictors of excess returns. Strategic diversification is the best defense against changing macroeconomic conditions. But our analysis suggests there are some environments where diversification away from equities is especially valuable. In particular, a higher cash rate environment makes “cash-plus” liquid alternatives more—not less—attractive.

11 The implied Sharpe ratio for the unconstrained portfolio is 0.45, dropping to 0.36 for the concentrated second portfolio. The third portfolio is back up to 0.44, while the fourth with its gloomier but more realistic assumptions achieves 3% real return with a Sharpe ratio of 0.35.

12 See for example Brixton et al. (2023), “A Changing Stock-Bond Correlation: Drivers and Implications.”

## References and Further Reading

- AQR *Alternative Thinking* Q1 2023, “Capital Market Assumptions for Major Asset Classes,” white paper.
- Asvanunt, A., and S. Richardson, 2017, “The Credit Risk Premium,” *Journal of Fixed Income*, 26(3).
- Blanchett, D., 2022, “The Shape of the Expected Equity Risk Premium,” *Journal of Investing*, 31(6).
- Blitz, D., 2022, “Expected Stock Returns When Interest Rates Are Low,” *Journal of Portfolio Management*, 48(7).
- Brixton, A., J. Brooks, P. Hecht, A. Ilmanen, T. Maloney and N. McQuinn, 2023, “A Changing Stock-Bond Correlation: Drivers and Implications,” *Journal of Portfolio Management*, 49(4).
- Campbell, J., and S. Thompson, 2008, “Predicting Excess Stock Returns Out of Sample: Can Anything Beat the Historical Average?,” *Review of Financial Studies*, 21(4).
- Cochrane, J., and M. Piazzesi, 2005, “Bond Risk Premia,” *American Economic Review*, 95(1).
- Fama, E., and R. Bliss, 1987, “The Information in Long-Maturity Forward Rates,” *American Economic Review*, 77(4).
- Goyal, A., and I. Welch, 2008, “A Comprehensive Look at the Empirical Performance of Equity Premium Prediction,” *Review of Financial Studies*, 21(4).
- Ilmanen, A., T. Maloney and A. Ross, 2014, “Exploring Macroeconomic Sensitivities,” *Journal of Portfolio Management*, 40(3).
- Ilmanen, A., 2022, “Investing Amid Low Expected Returns,” Wiley.
- Mendelson, M., J. Huss, T. Maloney, and Z. Mees, 2017, “Asset Allocation in a Low Yield Environment,” *Alternative Investment Analyst Review*, 6(4).

# Appendix

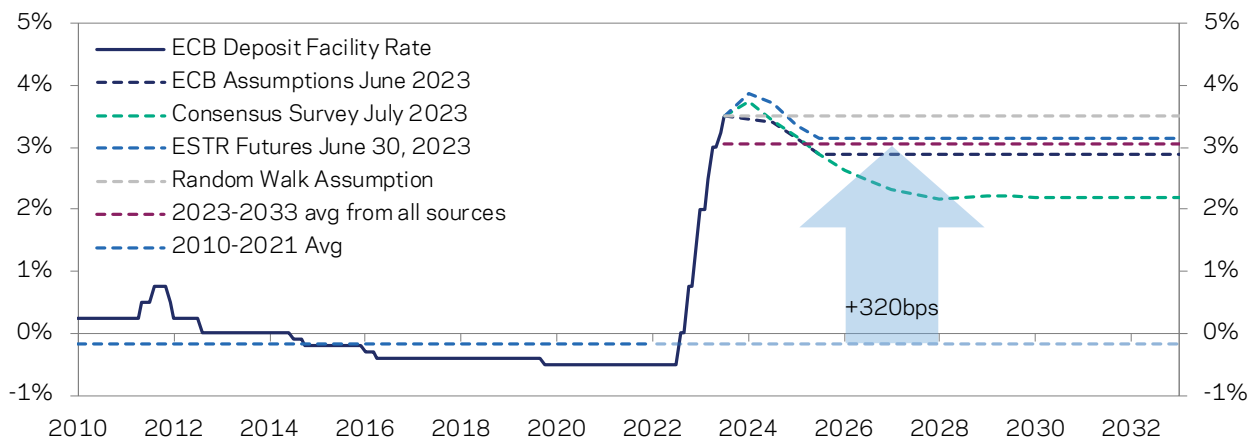
## Interest Rate Projections for Eurozone and U.K.

While most of this article focuses on U.S. interest rate data, **Exhibit A1** shows the equivalent projection data for the eurozone

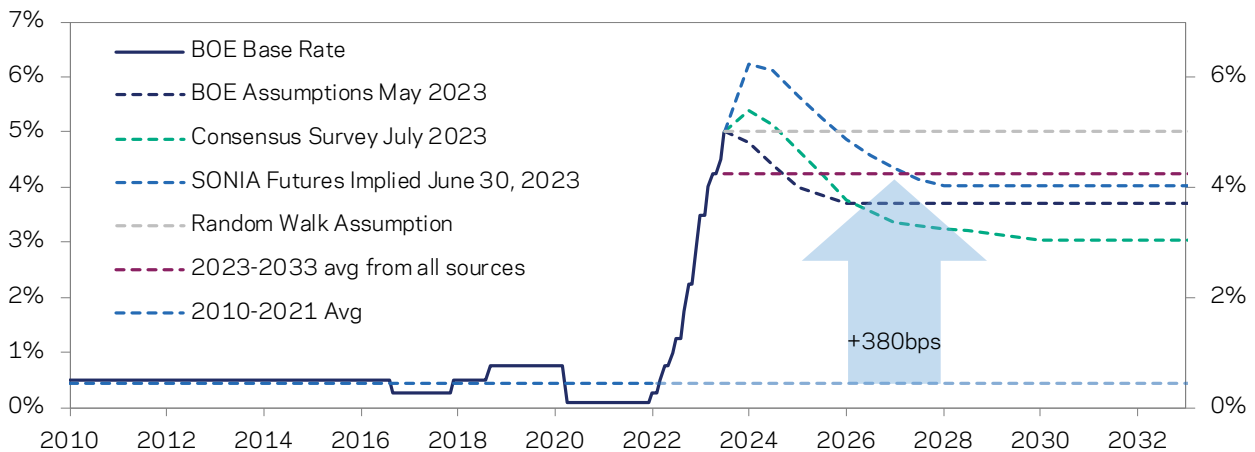
(panel A) and U.K. (panel B). All three regions are facing a higher-rate world.

### Exhibit A1: Not Just the Fed—a Higher-Rate World

#### A. ECB Rate and Various Projections, January 2010 - July 2023



#### B. Bank of England Base Rate and Various Projections, January 2010 - July 2023



Source: Federal Reserve, Consensus Economics, Bloomberg, AQR. Survey forecasts are for 3-month interbank rates.

## Interest Rates and Equity Market Valuation

During higher-rate environments, the equity market has tended to be cheaper (as measured by the Shiller or cyclically-adjusted P/E ratio (CAPE) - see **Exhibit A2** Panel A). This means that when we control for valuations,

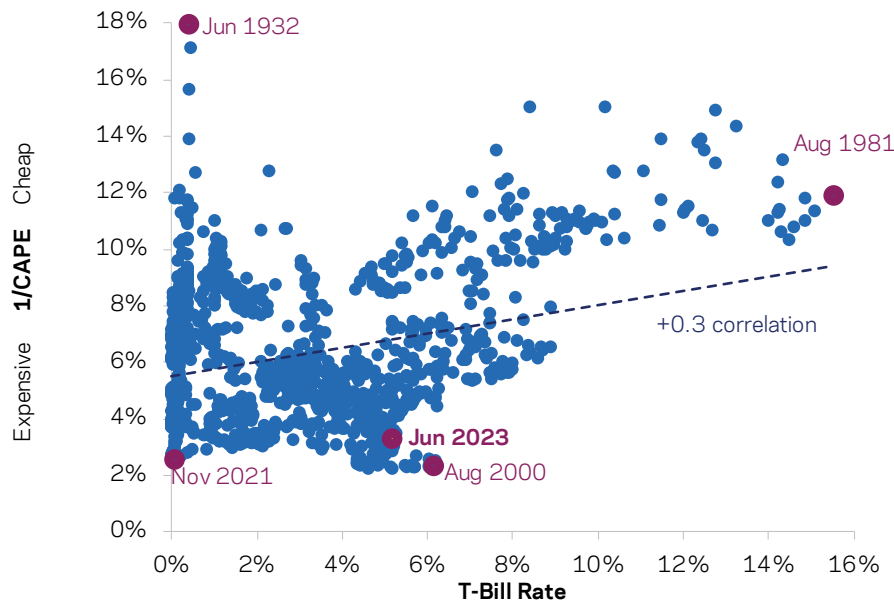
the relationship with interest rates gets even stronger. In a monthly 2-factor regression that includes the T-Bill rate and the inverse of the CAPE, loadings on both predictors are highly significant (t-statistics of -3.2 and

+3.9 respectively). When rates and valuations are both high together—as in

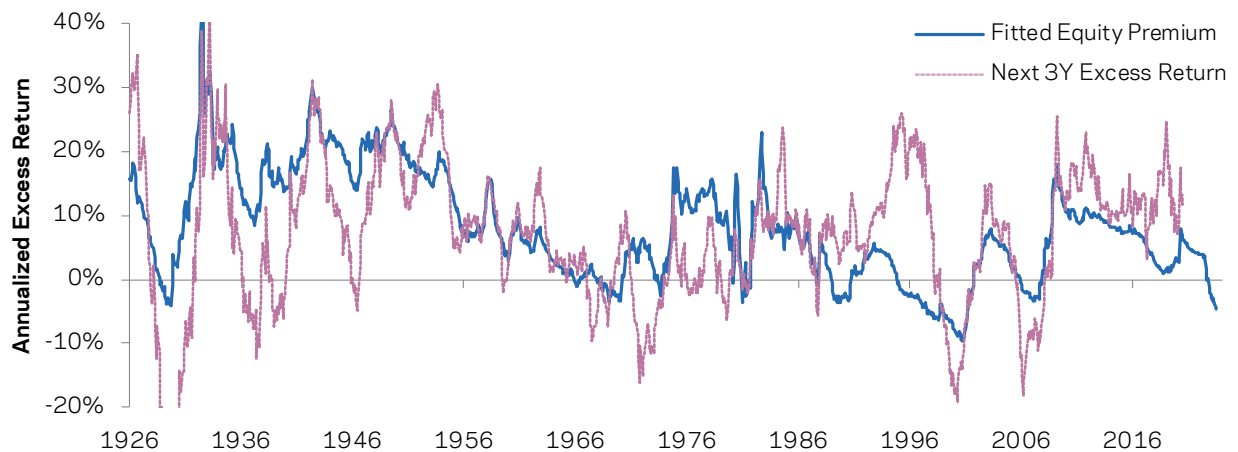
mid-2023—subsequent equity returns have tended to be particularly low (**Exhibit A2** Panel B).

### Exhibit A2: High Rates and High Valuations: Toxic Combination?

A. T-Bill Rate vs CAPE Valuation for U.S. Equities, January 1926 – June 2023



B. Fitted Equity Premium Based on T-Bill Rate and CAPE Valuation, January 1926 – June 2023



Source: Global Financial Data, Federal Reserve, Robert Shiller data library, AQR. U.S. equities is S&P 500 index. Fitted premium in Panel B is based on 1/CAPE and T-Bill rate coefficients in full-sample regression with monthly data. Dashed line shows subsequent 3-year annualized excess-of-cash return.

### Assumptions for Asset Allocation Case Study

Volatility and correlation assumptions are based on monthly historical proxy data from January 1990 to June 2023. Sharpe ratios are based on the assumption of 0.3 for major

asset classes with adjustments for breadth. Assumptions for liquid alternatives are deliberately conservative.



	Volatility	Normal Sharpe Ratio	Higher-Rate SR Adjustment	Public Equity	Private Equity	Treasuries	HY Bonds	Real Estate
<b>Public Equity</b>	15%	0.30	-0.06	<i>Correlations</i>				
<b>Private Equity</b>	20%	0.275	-0.06	0.9				
<b>Treasuries</b>	5%	0.30		0.0	0.0			
<b>HY Bonds</b>	10%	0.275	-0.03	0.7	0.7	0.0		
<b>Real Estate</b>	10%	0.275	-0.06	0.5	0.6	0.2	0.6	
<b>Liquid Alts</b>	8%	0.25		0.2	0.2	0.2	0.2	0.2

### Asset Class Proxies and Data Sources

U.S. 3-month T-Bill rates are from the Federal Reserve. U.S. CPI for calculating real returns is from Robert Shiller's data library.

Investment	Proxy	Source
U.S. Equities	S&P 500 and predecessor U.S. large-cap indices	Bloomberg, GFD
U.S. Treasuries	10-year U.S. Treasury	GFD
U.S. IG Credit	IG credit excess returns from Asvanunt and Richardson until 1988, then Bloomberg Barclays U.S. Corporate IG Excess Return index.	Bloomberg, AQR data library
Private Equity	50% Russell 2000 x 1.2, 50% Cambridge U.S. Private Equity Index	Bloomberg
Real Estate	50% FTSE Nareit All REITs Index (listed), 50% NCREIF Property Index (unlisted)	Bloomberg
Equity Market Neutral	HFRI Equity Hedge: Equity Market Neutral Index	Bloomberg
Trend Following	HFRI Macro: Systematic Diversified Index	Bloomberg
Cash	3-Month T-Bills	GFD

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The **Bloomberg Barclays U.S. Corporate IG Excess Return Index** measures the USD-denominated, investment-grade, fixed-rate, taxable corporate bond market in excess of duration-matched Treasuries.

The **Cambridge Associates U.S. Private Equity Index** is calculated based on data compiled from approximately 2,000 funds, including fully liquidated partnerships, formed between 1986 and 2022.

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