CLIFFWATER

2025 Asset Allocation Report

January 29, 2025

Contents

Executive Summary

This report presents Cliffwater recommendations for asset class return and risk (standard deviation) assumptions, intended for asset allocation studies that set long-term portfolio asset class targets. While these forward-looking or "expected" asset return and risk assumptions are intended for investment horizons of 10 years or longer, they can change as market conditions change and therefore should be used for asset allocation work conducted near the date of the report.[1]

Exhibit 1 on the following page provides Cliffwater return forecasts for the major asset classes as of January 1, 2025 (column 1) and compares them with our year-earlier forecasts on January 1, 2024 (column 2). Also included are the calendar 2024 returns (column 4) for the asset class benchmarks (column 5), which were selected by Cliffwater as representative of each asset class. Decreases (increases) in expected returns are often, but not always, driven by prior performance gains (losses). A full listing of asset class return, risk, and correlation forecasts is provided at the end of this report.

Key observations from our 2025 Asset Allocation Report are:

1. **Stocks** – Year-over-year US stock expected returns increased from 6.95% to 7.70% due to revised assumptions on cash yield from buybacks. Expected returns for non-US stocks also increased from 6.95% one year ago to 7.10% but less than US stocks due to lower earnings growth assumptions.
2. **Rates** – Treasury bond expected returns rose from 3.90% one year ago to 4.55% at year-end. Expected real bond returns have climbed to an attractive 2.20%, equal to a 4.55% expected Treasury return, minus 2.35% expected inflation.
3. **Stock/Bond Spread** – The 3.15% spread between US stock and 10-year Treasury bond expected returns remains relatively unchanged from 3.10% one year ago and remains low compared to the 4.19% average spread for the last 20 years. This change, after more than a decade of wide spreads favoring stocks, implies that asset allocation targets might reduce allocations to stocks in favor of other asset classes.
4. **Credit** – Shrinking credit yield spreads over the past two years have pushed them well below long-term spread averages, making liquid credit less much less attractive.
5. **Inflation** – CPI inflation continues to decline from 6.4% in 2022, 3.3% in 2023, and 2.9% in 2024. The 10-year breakeven (expected) inflation rate however increased over the last year, from 2.20% to 2.35%.
6. **Private Equity** – We expect private equity to generate a net 3% return above public stocks over longer time periods, an achievement documented in our past studies of actual private equity returns.
7. **Hedge Funds** – Our expected return forecast increased from 5.45% to 5.95%, driven by an increase in our expected returns for cash and equities.
8. **Private Debt** – Expected returns for unlevered and levered private debt fell from 7.55% and 9.45%, respectively, one year ago, to 6.95% and 9.15% at year-end due to spread tightening through the year.
9. **Real Estate** – Expected public real estate returns remained unchanged at 6.30% as higher expected inflation offset lower dividend yields. Expected unlevered private real estate returns increased from 6.40% to 7.10% over the year, due to higher cap rates and higher expected inflation. Relative attractiveness is shifting toward private real estate with REIT yields now below cap rates.
10. **Real Assets** – Changes in expected returns for private real assets, notably farmland and infrastructure, remained the same over the past year. Expected returns for commodities rose modestly due to higher cash rates and fell modestly for MLPs due to lower yields.

Overall, our combined expected returns rose from 6.10% to 6.45% year-over-year due to higher inflation and a one-time increase in equity expected returns from higher EPS growth through buybacks.

[1] The terms "expected return" and "return forecast" are used interchangeably throughout the report.

Exhibit 1: Long-Term (10 Years) Expected Returns for Major Asset Classes[2]

	1	2	3	4	5
	Expected % Return*				
	Jan 1, 2025	Jan 1, 2024	YoY % Change	2024 Return	Benchmark Index
Stocks					
US Stocks	7.70	6.95	0.75	24.8%	Russell 3000
Non-US Developed	7.10	6.95	0.15	3.8%	MSCI EAFE
Emerging Markets	7.10	6.95	0.15	7.5%	MSCI EM
Global Equity	7.50	6.95	0.55	17.5%	MSCI ACWI
Rates					
Core US Bonds	4.90	4.55	0.35	0.9%	Bloomberg U.S. Aggregate Bond
IG Corporate	5.35	5.05	0.30	2.1%	Bloomberg U.S. Corporate Bond
10-yr Treasury	4.55	3.90	0.65	-1.8%	Bloomberg 10y U.S. Treasury
10-yr TIPS	4.55	3.90	0.65	1.8%	Bloomberg U.S. TIPS
Credit					
High Yield Bonds	6.15	6.10	0.05	8.1%	Bloomberg U.S. High Yield Bond
Bank Loans	5.65	5.75	-0.10	8.9%	Morningstar LSTA U.S. Leveraged Loan
Public BDCs	8.45	8.80	-0.35	14.0%	Cliffwater BDC
Real Estate					
Public REITs	6.30	6.30	0.00	8.7%	FTSE/NAREIT Equity REITs
Private (Unlevered)	7.10	6.40	0.70	-0.5%	† NCREIF Property (NPI)
Private Partnerships	8.10	7.90	0.20	-3.2%	† NCREIF NFI-ODCE (NOF)
Private Equity					
Diversified	10.50	9.95	0.55	6.6%	† Cambridge US Private Equity
Private Debt					
Unlevered	7.00	7.55	-0.55	8.5%	† Cliffwater Direct Lending (CDLI)
Levered 1:1	9.20	9.45	-0.25	8.1%	† BDC Return on Equity
Hedge Funds					
Diversified	5.95	5.45	0.50	9.7%	HFRI FOF Composite
Other Real Assets					
Commodity Futures	3.35	2.80	0.55	5.3%	Bloomberg Commodity
MLPs	7.30	7.40	-0.10	24.2%	Alerian MLP
Farmland (core)	6.50	6.50	0.00	3.0%	† NCREIF Farmland Property (gross)
Infrastructure	7.25	7.25	0.00	8.6%	† Cambridge Infrastructure
Cash					
3M T-bill	3.35	2.70	0.65	3.7%	3 mo. T-bill
3M SOFR	3.45	2.80	0.65	3.8%	3 mo. SOFR
Inflation	2.35	2.20	0.15	2.9%	CPI-U

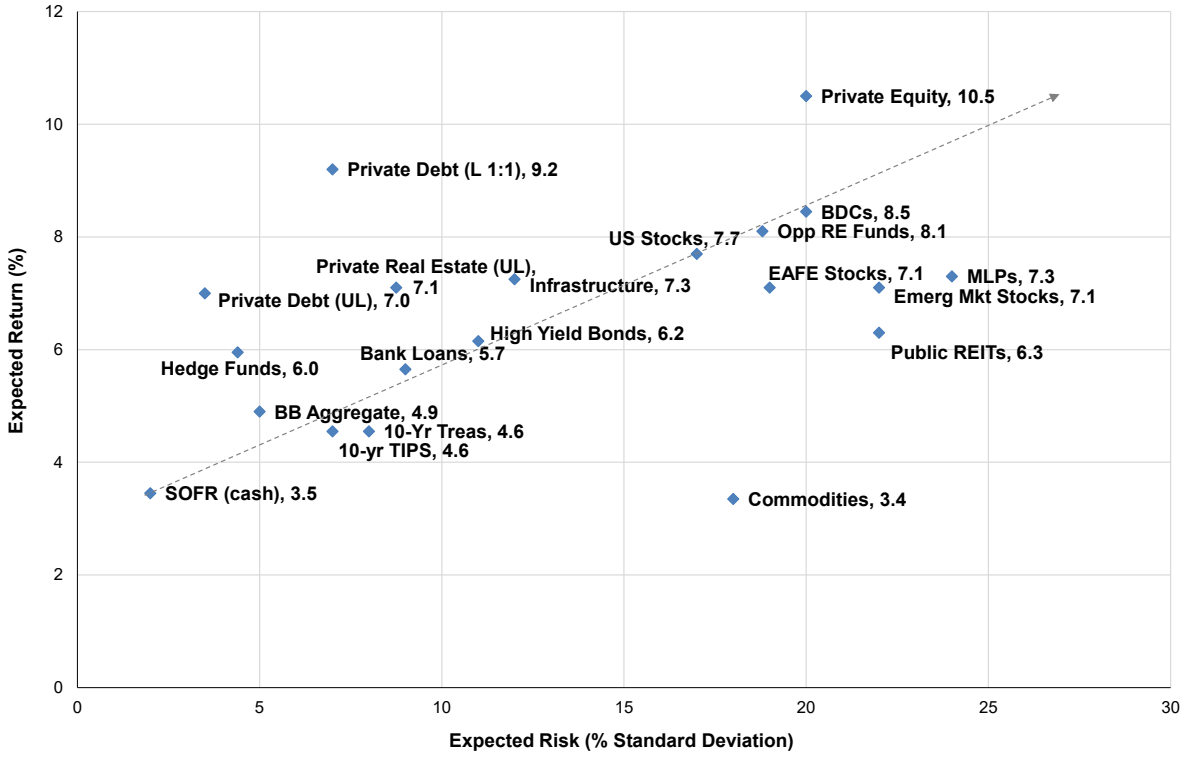
* Expected geometric annual return over the next 10 years, net of fees and expenses

† Performance for 3 quarters ending Sep 30, 2024

[2] There can be no assurance that any expected rates of return or risk will be achieved. Expected rates of return and risk may be based upon assumptions regarding future events and conditions that may prove to be inaccurate. Expected rates of return and risk should not be relied upon as an indication of future performance and should not form the primary basis for an investment decision. The index returns are provided for informational purposes only. Reference to an index does not imply that a portfolio will achieve returns, volatility, or other results similar to the index. Please see additional disclosures at the end of this report.

Exhibit 2 plots Cliffwater's 10-year expected asset class return and risk.

Exhibit 2: 2025 Asset Class *Expected* Return and Risk[3]



The dashed line in Exhibit 2 is known as the "capital market line" representing the market tradeoff between expected return and risk. That line connects the risk-free rate – SOFR in our depiction – and US stocks.

A general observation is that expected returns for most asset classes fall below the 7% to 8% return that is required by most institutions – pensions, endowments, and foundations – to meet their spending/benefit payouts and preserve assets for future beneficiaries. Nonetheless, the expected annual return for a liquid 60% global equity, 40% fixed income portfolio equals 7.38%, which is approximately equal to the cost of capital for most pensions and endowments that desire to earn 5% above the 2.35% expected rate of inflation.

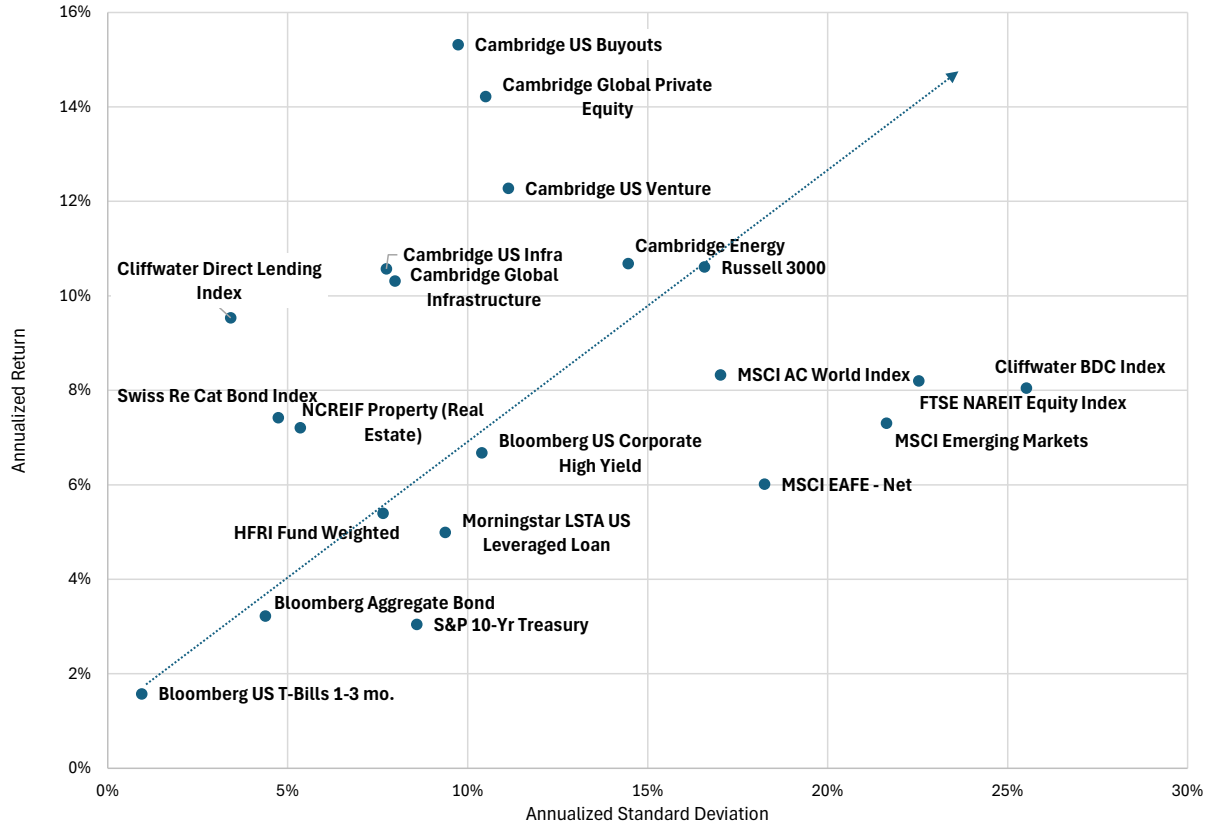
However, a portfolio that is 40% diversified into higher returning private assets, including private equity, private debt, and private real estate, has an expected return equal to 8.30%, but with less liquidity. And a risk-parity portfolio that uses leverage to achieve higher returns might expect a return closer to 8.01%, using Cliffwater expected returns. Of course, the downside of risk parity portfolios are years like 2022 when correlations rise between stocks and bonds and both asset classes experience negative returns.

The expected returns in Exhibit 2 generally fall in the same range as the 20-year historical returns shown in Exhibit 3, particularly for equity-oriented asset classes. Two notable exceptions are the low bond returns of the last 20 years compared to forecasts and the disparity between US and non-US historical equity returns compared to forecasts. The 20-year period was selected because it includes all private asset class options and because it fully incorporates three bull markets and three bear markets.

[3] See footnote 2, above.

Exhibit 3 displays actual historical asset class return and risk for the 20 years ending September 30, 2024.

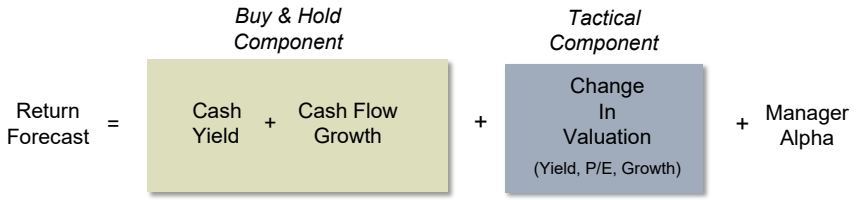
Exhibit 3: 20-Year *Historical* Asset Class Benchmark Return and Risk[4]



Private equity, and US buyouts specifically, reported the highest 20-year return. Among public asset classes, US stocks had the highest return while non-US developed and emerging market stocks badly trailed over the past 20 years. The very poor performance for non-US stocks came primarily after the Financial Crisis and is almost completely attributable to the absence of EPS growth in those markets, which is also reflected in the lack of GDP growth in foreign markets.

Cliffwater Expected Return and Risk Methodology

Cliffwater uses a *fundamental model-based approach* to forecasting asset class returns, simply expressed in the equation below:



We believe that long-term (buy-and- hold) asset class returns come from current cash yield and future cash flow growth, a formulation known as the "Gordon Model." Cliffwater's long-term expected returns (Capital Market Assumptions or CMA) are largely based upon the Gordon Model alone.

[4] See column 5 of Exhibit 1 for the asset class benchmark Cliffwater selected as representative of each asset class.

For example, our expected return on bonds looks at current cash yield, provided through coupons, plus cash flow growth. Coupons don't normally grow, so most of the time, bond expected return equals current cash yield. However, bonds experiencing credit losses will generate negative cash flow growth which we will incorporate into our calculations. On the flip side, cash flow growth could be positive if future reinvestment of coupons is expected to be at a higher rate. We use market forward rates to account for adjustments such as this.

You will find that most of our report focuses on cash yield and growth expectations by asset class to give the reader a firm basis for understanding the underpinnings of our long-term return expectations.

The second tactical component to return is not used in our long-term return assumptions. Tactical return forecasts are derived from expected (short-term) changes in valuation, such as yield or price-earnings multiples. These valuation changes happen frequently but are very difficult to predict. Fortunately, tactical returns from valuation changes average toward zero over longer time periods, such as 10 years, and can be ignored for return forecasting, though they are important in short-term measurements of risk.

Our last component to return is manager alpha. Our practice is to assume manager alpha equals to zero in asset classes that are known to exhibit market efficiency and where active management has proved challenging. For these asset classes, our expected return assumptions reflect what would be earned by a passive (index fund) investor where diversification is broadest, and expenses are small. However, in several alternative asset classes, such as private equity and hedge funds, we do factor in an alpha component in developing long-term expected return. These expected returns from alpha are reexamined annually based upon our measurement of past alpha generation, and changes are made accordingly.

Cliffwater return volatility and correlation forecasts rely upon calculations using monthly historical returns when the asset class is liquid and broadly captured by an index that is accepted industry wide. However, returns for many of the major alternative asset classes, including private equity, private debt, and real estate, are quarterly in frequency with values determined by accounting or appraisal standards that frequently understate true volatility and correlation. This occurs because valuations done by professionals, as opposed to market traders, tend to be less frequent and backward-looking. The result is a time series of returns (values) that exhibit lower periodic change and serial correlation, which together is characterized as "smoothing."

We statistically "unsmooth" the asset returns for those indices representing private asset classes. While the full description of our unsmoothing procedure is outside the scope of this report, we follow a framework described by Nesbitt (2019).[5] The remainder of this report reviews how the assumptions were developed for the individual asset classes.

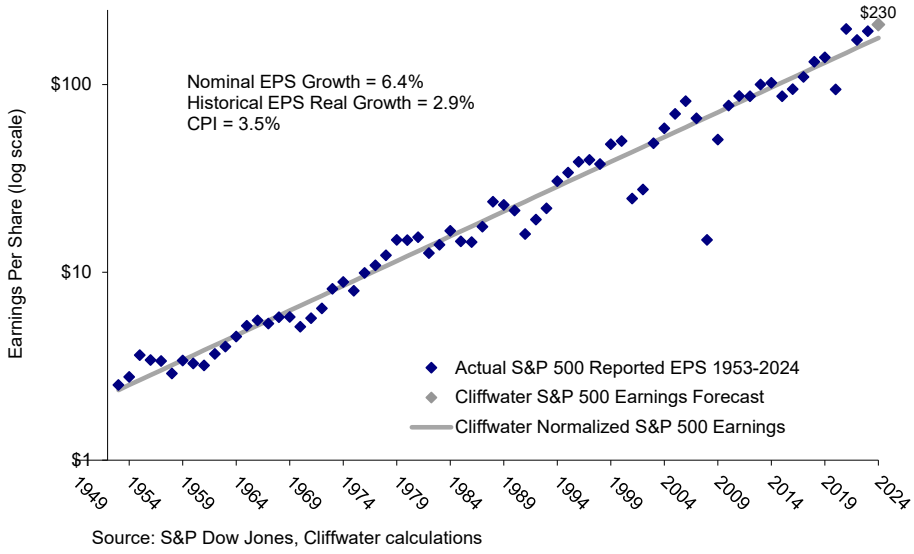
US Stocks

Cliffwater's long-term US stock return forecast equals 7.70%, an increase from 6.95% forecast last year. The large increase in expected return is the result of large increases in earnings during 2024 and the addition of buyback yield to dividend yield. We recently conducted a 14-year study on global stock markets with an emphasis on buybacks. For example, US stocks have engaged in buybacks that average approximately 2% per year. Together with dividends, payouts to shareholders have regularly exceeded 3% per year.

Fortunately, long-term earnings growth has been largely predictable. Exhibit 4 shows historical S&P 500 earnings per share.

[5] "*Forecasting Risk for Illiquid Asset Classes*", Cliffwater Research (October 2019)

Exhibit 4: Historical S&P 500 Reported Earnings



Source: S&P Dow Jones, Cliffwater calculations

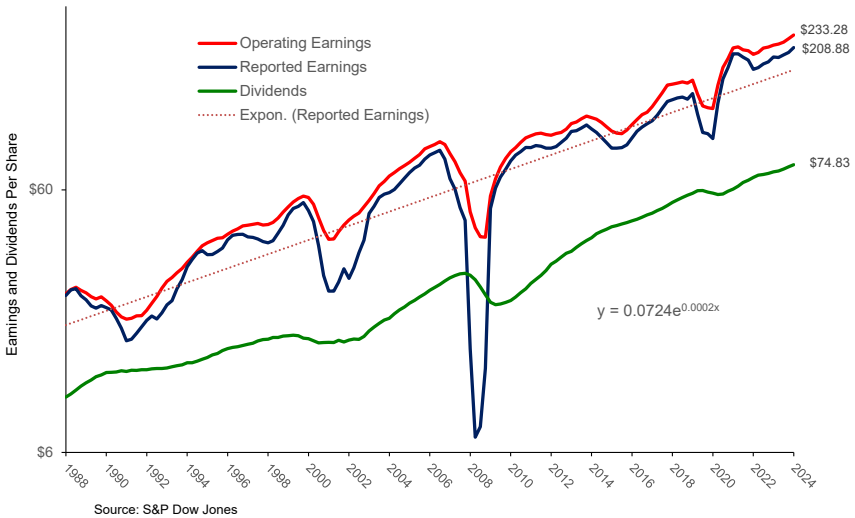
Long-term nominal earnings growth has averaged 6.4% per year over the 73 years shown, comprised of approximately 2.9% real growth and 3.5% inflation. The 2.9% real earnings growth is roughly in-line with real US GNP growth over the same period.

In forecasting future earnings growth, we use a somewhat lower 2.10% real growth assumption and a 2.35% long-term inflation assumption. Together this gives a nominal future earnings growth forecast equal to 4.45%.

The final input is future dividends, which is largely a function of earnings and the dividend payout ratio. Exhibit 5 provides data describing the relationship between S&P 500 earnings and dividends. Two earnings definitions, operating and reported, are plotted. Reported earnings are those typically cited by the financial press and include ongoing revenues and expenses as well as one-time write-offs. Operating earnings take out one-time write-offs and are thought by some to better represent profits going forward.

Exhibit 5 compares reported and operating earnings over the past 36 years.

Exhibit 5: Relationship between S&P 500 Operating Earnings, Reported Earnings, and Dividends



Source: S&P Dow Jones

Not only are S&P 500 earnings per share volatile, but also the disparity between operating earnings and reported earnings, with wide differences during market downturns. However, expectations are that the two measures will converge as write-downs abate. Historically, reported earnings average approximately 87% of operating earnings and dividends (repurchases included) average 45% of reported earnings. We believe that reported earnings are a better reflection of the potential to pay dividends and consequently we focus on that earnings definition.

Exhibit 6 summarizes our stock inputs and reports our 7.70% and 7.10% expected returns for US and non-US stocks, respectively.

Exhibit 6: Expected Stock Return Inputs as of December 31, 2024

	US Stocks	Non-US Stocks
Dividend Yield	1.25%	3.10%
Buyback Yield	2.00	0.65
GDP Growth	2.10	1.00
Inflation	2.35	2.35
Total Expected Return	**7.70%**	**7.10%**

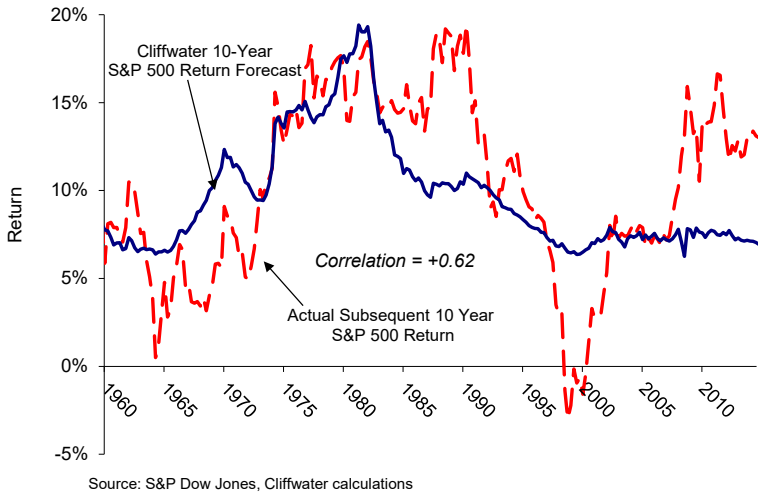
Dividend yields for non-US stocks have historically exceeded US stock dividend yields, consistent with the lower growth in non-US markets. However, US companies have relied more heavily on buybacks to supplement shareholder cash needs when compared to non-US companies.

We expect earnings to grow at a 4.45% and 3.35% annual rate for US and non-US companies, respectively. Non-US earnings growth has badly trailed US earnings growth and we expect that to continue though future growth disparity won't be as high as past rates.

Forecast versus Actual Return

The dividend discount model has proven to be a very effective, though imperfect, tool for forecasting long-term stock returns. The historical accuracy of this method is demonstrated in Exhibit 7.

Exhibit 7: Cliffwater 10-Year S&P 500 Return *Forecast* versus *Actual* 10-Year S&P 500 Returns[6]



Source: S&P Dow Jones, Cliffwater calculations

[6] The Cliffwater return forecast shown is calculated by applying the current Cliffwater return forecast methodology to historically available market information. It does not reflect actual performance of any account(s) managed by Cliffwater. Cliffwater may change its return forecast methodology at any time and the Cliffwater return forecast should not be used to predict the actual future performance of any Cliffwater account.

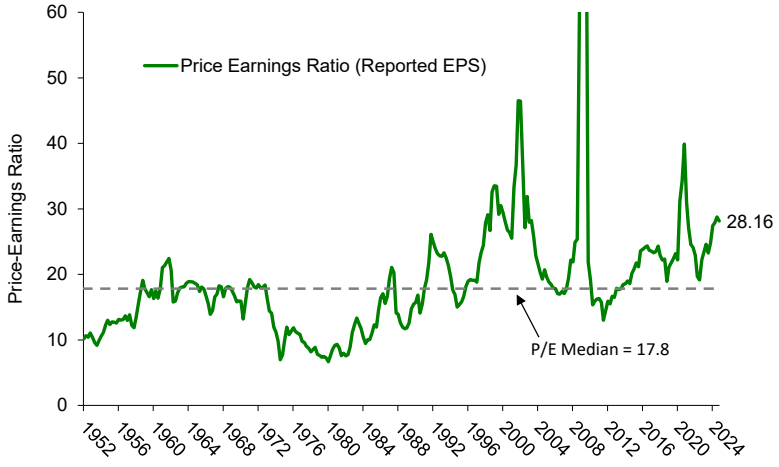
The solid blue line in Exhibit 7 plots our 10-year return forecast for stocks (S&P 500) from 1960 through 2014. The dashed red line plots actual 10-year subsequent returns. For example, the first data points are for January 1, 1960. The forecasted S&P 500 10-year return using data from January 1, 1960 would be 8.25% and the actual return for the subsequent 1960-1969 period was 8.19%. The final two data points correspond to a forecasted return of 7.05% at January 1, 2015, the last date for which there is a 10-year subsequent return history, and an actual return of 13.10% for the 2014 to 2024 period. The correlation between forecasted and actual return is 0.62 (R-squared of 38%) for the entire period, which we believe demonstrates that our forecasting methodology for stocks is powerful for asset allocation studies whose purpose is setting long-term policy.

Exhibit 7 shows three periods where Cliffwater's forecasting approach materially overstated or understated subsequent returns. Return forecasts using data from the mid- and late-1960s exceeded subsequent returns. This was caused by the severe 1973-74 bear market when price-earnings ratios dropped to 7.0. The opposite occurred in the late 1980s and early 1990s when a technology bubble in the late 1990s caused stock prices to skyrocket. Our stock return forecast was again too high using data for the 10-year period ending 2010 due to market drawdowns in 2000-02 and 2008. Cliffwater return forecasts are less likely to be accurate during periods when changes in investor sentiment produce wide swings in price-earnings multiples, which a dividend discount model does not capture. That has been true over the most recent 10-year period.

Exhibit 8 shows S&P 500 price-earnings multiples over the last 72 years. Over that period, they average 17.8 but have been subject to significant swings, falling to 7 during the 1970s, climbing to 46 at their peak in 1999 (except for a price-earnings spike in 2009 as earnings fell from write-offs and recession), then falling again to 13 at the end of 2008.

Today, price-earnings ratio equals 28.2, measured by reported earnings, which represent a 58% premium to the 17.8 historical median price-earnings multiple. Last year the price-earnings ratio stood at a 38% premium to the historical median.

Exhibit 8: S&P 500 Price-Earnings Ratios, 1952 to 2024



Source: S&P Dow Jones, Cliffwater calculations

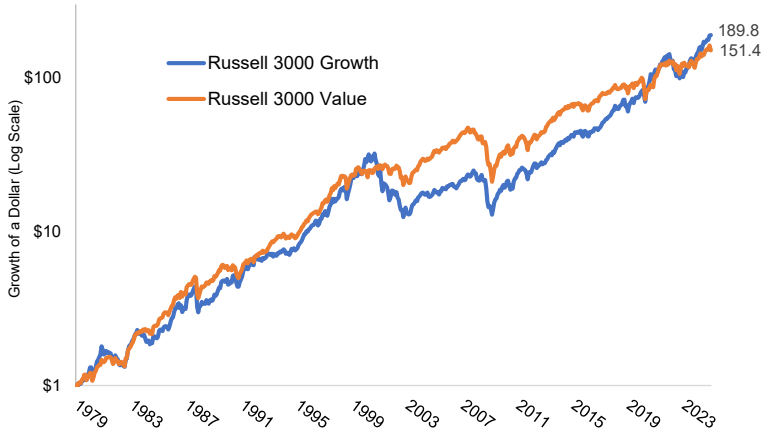
Growth Stocks versus Value Stocks

The segmentation of US stocks into growth and value was initially proposed over 40 years ago to accommodate managers that focus on one or the other and the desire to better benchmark their performance. Since that time a lot of attention has been given to forecasting their relative performance. History has informed investors that (1) long-term performance is roughly equal among growth and value

stocks, (2) no investment approach has survived that can tactically time the difference in growth and value stock performance, and (3) active management has struggled equally in the growth and value categories.

Exhibit 9 shows cumulative returns for Russell 3000 growth and value stocks over a 46-year period through 2024. As the graph illustrates, the recent attention to growth stock outperformance mostly reflects a catch-up from the prior underperformance rather than a long-term performance separation from value stocks.

Exhibit 9: Growth Stocks versus Value Stocks, 1978 to 2024

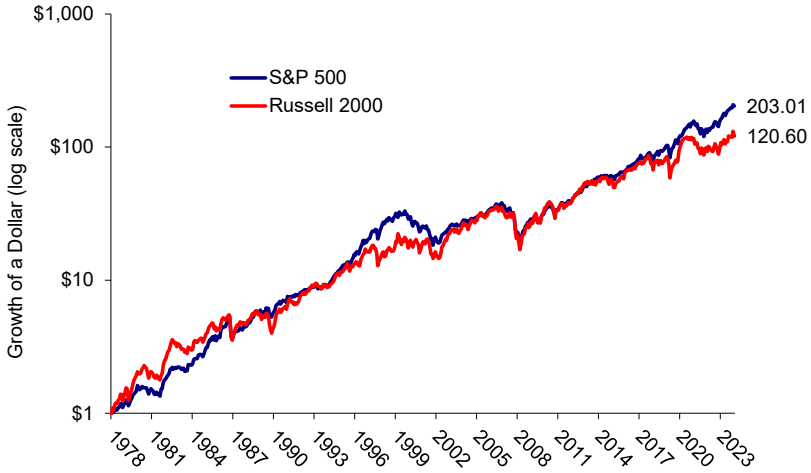


Over the entire 46-year period, growth stocks have earned a 12.08% annualized return, higher than the 11.53% return earned by value stocks.

Large-Cap Stocks versus Small-Cap Stocks

Over 46 years of providing return forecasts at Cliffwater and other institutions, Cliffwater professionals have often been asked why we use the same return forecast for large and small stocks when most other advisory firms have higher expected returns for small stocks compared to large stocks. While the theory that higher beta small stocks should perform above lower-beta larger stocks is reasonable, the fact is that small stocks have not outperformed large stocks over the 46 years for which accurate small stock records have been kept. In fact, large stocks have outperformed small stocks over the entire 46 years, as shown in Exhibits 10 and 11.

Exhibit 10: Large Stocks (S&P 500) versus Small Stocks (Russell 2000), 1978 to 2024



Source: S&P Dow Jones, FTSE Russell

Exhibit 11: Return and Risk for Large- and Small-Cap Stocks, Dec 1978 to Dec 2024

	S&P 500	Russell 2000
Annual Return	12.24%	10.98%
Annual Risk	15.16%	19.86%

Source: S&P Dow Jones, FTSE Russell

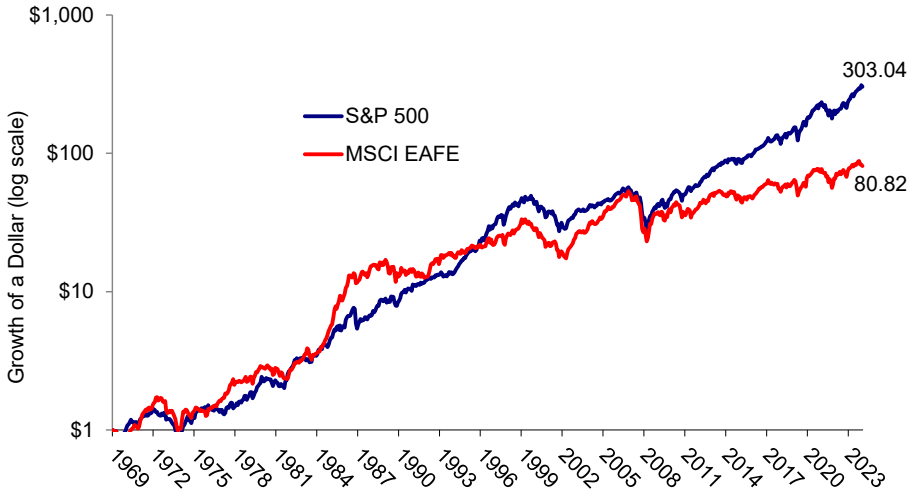
Exhibit 10 illustrates the strong performance of small-cap stocks in the late 1970s and early 1980s. During the last half of the 1990s large-cap stocks surged. Since the early 2000s through 2015, large- and small-cap stocks largely moved together. More recently, large-cap stocks have outperformed, primarily due to the Magnificent 7 phenomenon. Exhibit 11 reports a higher return for large stocks compared to small stocks over the entire 46-year period, and large stocks have experienced much less volatility. Our conclusion is to use the same expected return for large- and small-cap stocks and, without a difference in expected return, we recommend that a single US equity asset class be used for asset allocation forecasting and that equity return and risk assumptions represent the entire capitalization weighted US equity market.

Non-US Equity (Developed Markets)

Cliffwater is assuming a 7.10% return for non-US stocks, 0.60% below our return assumption for US stocks. Studies of the major global stock markets, which date back over a century, show that the non-US markets perform no better than the US market when returns are measured over long periods of time. In fact, the US market was the best-performing market of all the developed stock markets during the prior century.

Exhibit 12 illustrates the long-term performance of US stocks (S&P 500) and non-US stocks (MSCI EAFE) starting December 31, 1969, the longest period for which MSCI EAFE returns are available. The graph clearly shows a consistent and higher trajectory for US stocks. EAFE stocks, by comparison, have been on a lower trajectory since the early 1990s, consistent with long-term differences in earnings growth.

Exhibit 12: S&P 500 and MSCI EAFE Returns, Dec 1969 to Dec 2024



Source: S&P Dow Jones, MSCI Indices

Exhibit 13 provides return, risk and correlation for the US market (S&P 500) and non-US developed market (MSCI EAFE) over this period. The historical 10.95% annual return for the S&P 500 is 2.64% above the MSCI EAFE return of 8.31%. The difference in risk between the S&P 500 and MSCI EAFE indices is small at 15.34% and 16.75%, respectively, and it is worth noting that the US market has had both lower volatility and higher return compared to all developed stock markets combined.

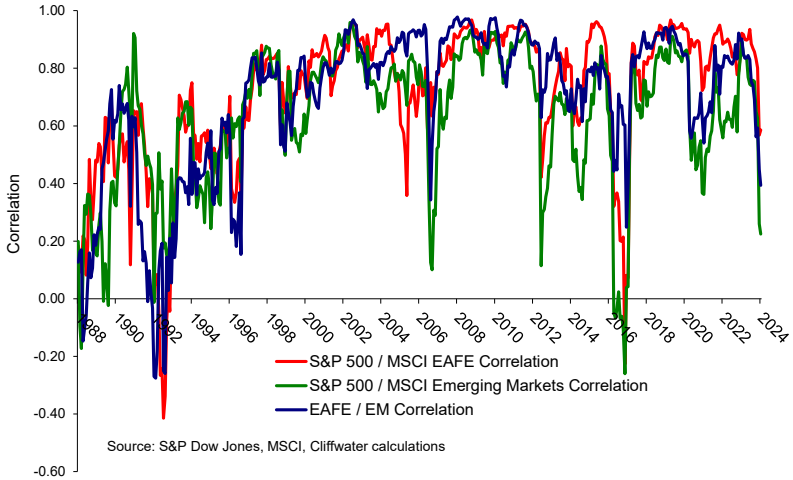
Exhibit 13: S&P 500 and MSCI EAFE Return and Risk, 1970 to 2024

	S&P 500	MSCI EAFE
Annual Return	10.95%	8.31%
Annual Risk	15.34%	16.75%
Correlation w/S&P		0.66
10 Yr. Correlation w/S&P		0.86

Source: S&P Dow Jones, MSCI

Geographic diversification by balancing US and non-US stocks into an equity portfolio has been accepted practice among institutional investors over many years. The belief is that by doing so, risk can be significantly reduced. Unfortunately, the benefits from global diversification greatly diminished around 2000 and have generally remained low (high correlation) except for a few short-term spikes. Exhibit 14 captures these diversification shifts visually by showing cross correlations between the S&P 500, the MSCI EAFE, and the MSCI Emerging Markets indices over the last 35 years starting January 1988, when the MSCI Emerging Markets Index was first published. Current correlations across the three regional indices recently dropped, which generally happens when US stocks are performing well. Unfortunately, those correlations increase during periods when US stocks drop.

Exhibit 14: Rolling 12-Month Correlations between US, MSCI EAFE, and Emerging Market Equity Indices, 1989 to 2024



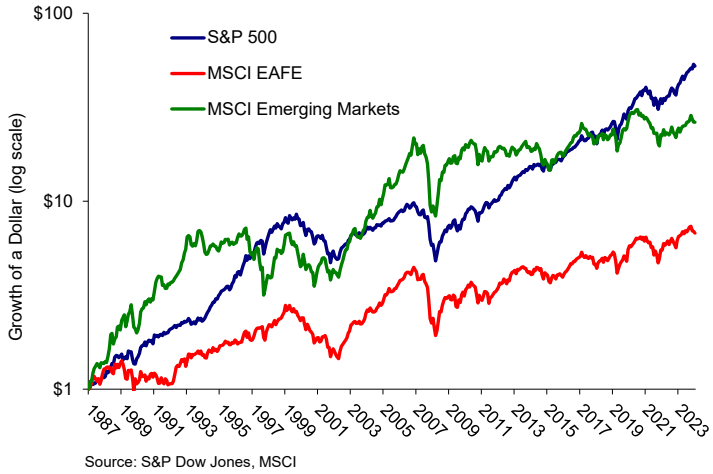
Recent return correlations among the global equity markets averaged 0.72 during the last 10 years, meaning that global diversification benefits dwindled compared to the 1980s and 1990s when correlations averaged less than 0.50. From a portfolio perspective, equity risk declines by roughly 20% (i.e., from an 18% standard deviation to a 14.7% standard deviation) from global diversification at a 0.50 correlation. At a 0.90 correlation, global diversification reduces equity risk by only 4% (i.e., from an 18% standard deviation to a 17.4% standard deviation). At a 0.72 correlation level of the past 10 years, equity risk declines by 7%, from 18.0% to 16.7%, from global diversification. Support for global equity diversification has been eroding considering these high correlations and poor performance, but some investors view the significantly lower price-earnings ratios outside the US as support for a tactical overweight to non-US stocks.

Non-US Equity (Emerging Markets)

Cliffwater is forecasting a 7.10% return for the emerging stock markets, equal to our return forecast for non-US developed equity markets. Exhibit 15 shows the performance of the US, non-US developed, and the emerging stock markets, measured by S&P 500, the MSCI EAFE, and the MSCI Emerging Markets indices,

respectively, for the period 1988 through 2024. The starting date is when MSCI first calculated equity index returns for the emerging markets. Over this 36-year period, the emerging equity markets earned an annualized return 2.05% below the S&P 500 Index.

Exhibit 15: Emerging Market, MSCI EAFE, and S&P 500 Returns, 1988 to 2024



Source: S&P Dow Jones, MSCI

Exhibit 16 contains return, risk, and correlation statistics for the three indices over the entire 36-year period.

Exhibit 16: S&P, MSCI EAFE, Emerging Market Return and Risk, 1988 to 2024

	S&P 500	MSCI EAFE	MSCI Emerging Markets
Annual Return	11.29%	5.30%	9.24%
Annual Risk	14.67%	16.71%	21.88%
Correlation w/S&P		0.76	0.66
Correlation w/EAFE			0.71

Source: S&P Dow Jones, MSCI

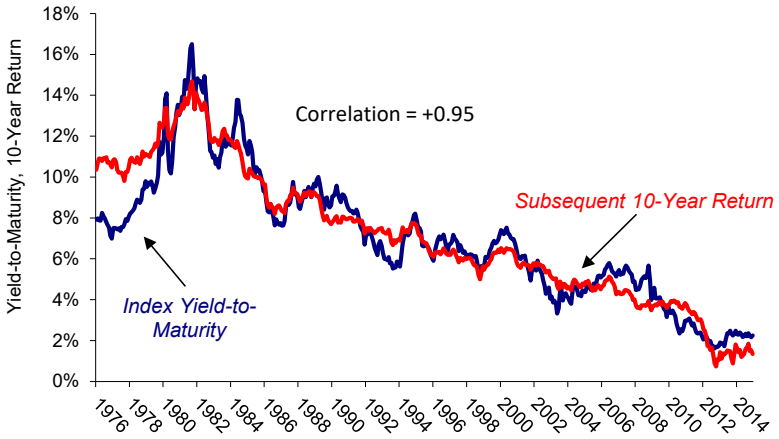
It has been customary for institutional investors to assume a higher return on more volatile emerging market stocks compared to US and other developed markets. However, 36 years of data suggest otherwise and, therefore, Cliffwater recommends a higher long-term return assumption for US compared to non-US equities.

US Bonds

Cliffwater's long-term return forecast for US bonds is 4.90%, equal to the Bloomberg U.S. Aggregate Bond Index's yield-to-maturity at year-end, which is up from the 4.55% expected return from the prior year.

Cliffwater relies upon the bond market's yield-to-maturity to forecast 10-year bond returns. Exhibit 17 shows that yield-to-maturity has been a very reliable methodology for forecasting future bond returns, with a 0.95 correlation between forecast and actual returns. The blue line plots the monthly yield-to-maturity for the Bloomberg US Aggregate Bond Index starting January 1, 1976, and ending December 31, 2014. These yields are used as our forecasts for bond returns over subsequent 10-year periods, which are shown by the red line. For example, the final date on the x-axis is December 31, 2014, when our bond return forecast – equal to the yield-to-maturity on the Bloomberg US Aggregate Bond Index – was 2.25% (blue line). The actual bond return for the subsequent 10-year period ending December 31, 2024, was 1.35% (red line).

Exhibit 17: Cliffwater 10-Year Bloomberg US Aggregate Bond Return *Forecast* (Index Yield-to-Maturity) versus *Actual* Subsequent 10-Year Bloomberg U.S. Aggregate Bond Return[7]

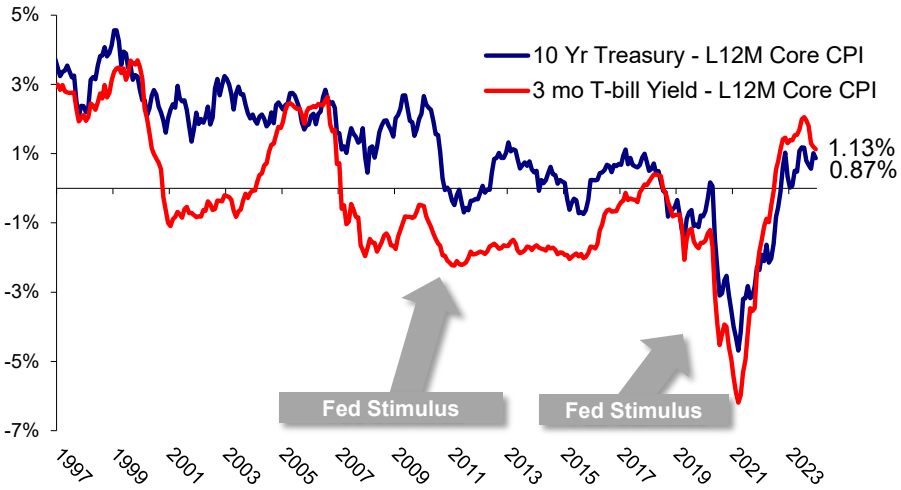


Source: Bloomberg Indices, Cliffwater calculations

We believe the graph shows that our use of yield-to-maturity to predict future bond returns works very well over a 10-year horizon.

Exhibit 18 plots real interest rates over the past 27 years. The red line shows real short-term rates while the blue line shows real long-term (10-year) rates. Real rates are calculated by subtracting trailing 12-month inflation from nominal yields.

Exhibit 18: Real Interest Rates on Short and Long Maturity Treasuries, Dec 1997 to Dec 2024



Source: Bloomberg Barclays, Bureau of Labor Statistics, Cliffwater calculations

Short-term real rates typically are negative during recessions, driven by Fed policy to stimulate the economy. What was different after the Financial Crisis was the depth and prolonged length of negative real short-term rates. Since that time, the Fed has largely kept short-term real interest rates in negative territory and long-term interest rates well below their historical levels.

[7] The Cliffwater return forecast shown is calculated by applying the current Cliffwater return forecast methodology to historically available market information. It does not reflect actual performance of any account(s) managed by Cliffwater. Cliffwater may change its return forecast methodology at any time and the Cliffwater return forecast should not be used to predict the actual future performance of any Cliffwater account.

As we noted in our last ten Asset Allocation Reports, we stated that Treasury rates had been distorted to the low side – at least by any historical measure – and that this condition presented investment risks that do not fall under the investor-driven speculative bubble category. We have written that the risk is that rising rates could bring down all asset prices and that the length and severity of such a change could cause market disruptions. The bad news is that these conditions reversed in 2022 and bonds had a hard fall, producing a three-sigma negative return equal to -13.4%. However, real yields remained negative with equally high inflation rates until mid-year 2023 when real yields turned positive and remained there.

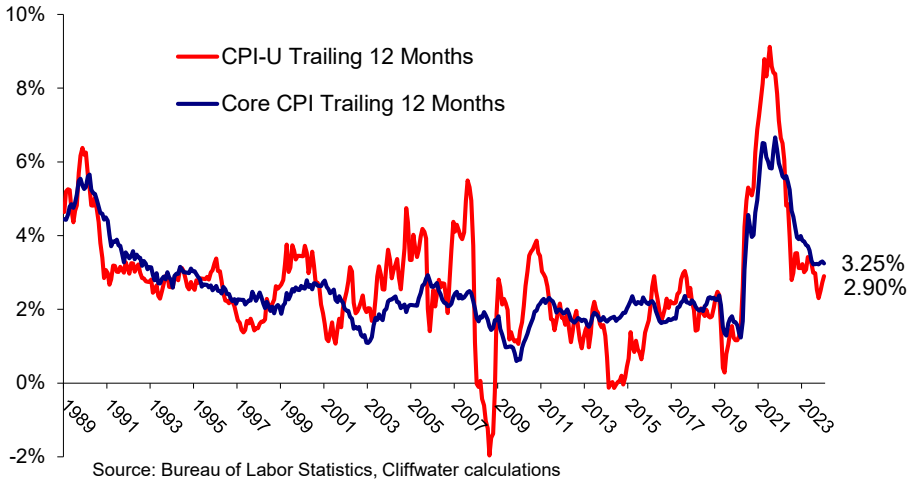
Cash Equivalents

Cliffwater is forecasting average cash equivalent returns (SOFR) of 3.45% over the next 10 years, up from a 2.80% forecast last year. For T-bills, we forecast a lower return of 3.35% over the next 10 years. Cash equivalent yields historically tracked inflation until the GFC, after which they [have] remained well below inflation for over a decade. Since 2022, cash yields have risen and remained high and well above inflation as the Fed tries to drive inflation down to its 2.50% target.

Inflation and Treasury Inflation Protection Securities ("TIPS")

Exhibit 19 plots trailing 12-month inflation covering the last 35 years. Two measures of inflation are displayed: CPI-U, the most common measure, and core CPI, which excludes more volatile food and energy prices. Over the past two years headline inflation decelerated, with CPI-U peaking at 9.22% and ending 2024 at 3.30%. Core CPI climbed to a high of 6.67% in 2022 and ended 2024 at 3.25%, both above the 2.5% Fed target.

Exhibit 19: Trailing 12-Month Inflation (CPI), Dec 1989 to Dec 2024



Source: Bureau of Labor Statistics, Cliffwater calculations

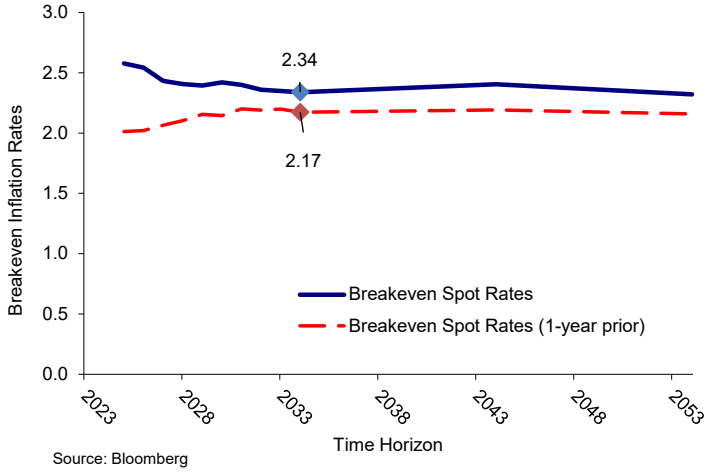
Cliffwater's inflation forecast is 2.35%, which reflects long-term market-based expectations measured through yield differences between TIPS and nominal Treasury bonds.

TIPS are bonds issued by the US Treasury that, like traditional nominal Treasury bonds, come with a coupon, principal amount, and maturity. However, unlike nominal Treasuries, the stated principal of TIPS increases (decreases) monthly by the rate of CPI inflation (deflation). The monthly adjustment in principal for inflation not only protects the final payment's value from erosion due to inflation, but coupon payments are regularly adjusted upwards with inflation since the coupon rate is applied to the inflation-adjusted principal value. Given these unique features, many institutional investors place TIPS in an asset class separate from bonds, either self-standing or incorporated into a "real asset" portfolio of investments that is expected to provide a hedge against inflation.

The difference in yields between Treasury bonds and TIPS is commonly referred to as the *breakeven inflation rate* because it is the rate of inflation over the life of the TIPS that would produce a return equal to the return on the Treasury bonds. And because the TIPS and Treasuries are otherwise almost identical, most institutional investors use the breakeven inflation rate as the consensus market forecast for inflation.

Exhibit 20 plots breakeven inflation rates across maturities, extending out 30 years. Time horizon, or maturity, is shown on the horizontal axis and breakeven inflation on the vertical axis. A curve is fitted to the data to get a clearer picture of how inflation expectations change as the time horizon increases. The breakeven inflation curve from our prior year report is also included (red dashed line). As shown, the breakeven curve as of December 31, 2024 has shifted upward compared to the breakeven curve from December 31, 2023. Also note that the line slopes downward, indicating that the market believes the Fed will not have immediate success and inflation will take several years to get back under control.

Exhibit 20: "Breakeven" Inflation Rate Curve



Source: Bloomberg

Cliffwater uses the market "breakeven" rate as its inflation forecast.

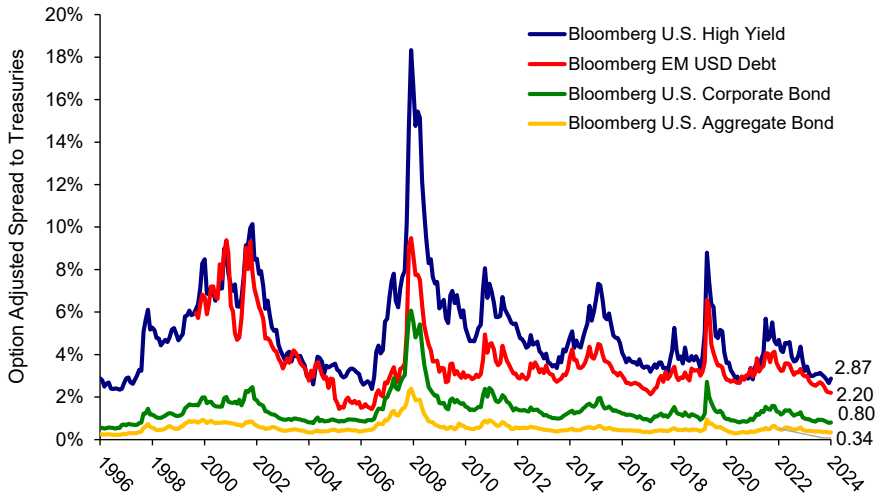
The two breakeven curves are *spot* rates that show breakeven inflation rates from the beginning date at December 31, 2024 to the December-end date identified on the horizontal axis. Our expected return on TIPS is identical to comparable maturing Treasury bonds since we assume inflation would add to the TIPS return just enough to offset their lower quoted yields. Hence our 2025 expected return forecast for 10-year TIPS is 4.55%, equal to our expected return on the 10-year Treasury bond.

High Yield Bonds, Bank Loans, and Emerging Market Debt

Year-over-year, high yield bond option-adjusted spreads (OAS) continued to tighten. Exhibit 21 plots US high yield bond spreads to comparable maturity Treasuries (blue line) since 1996. Over the past year, high yield bond spreads (OAS) tightened from 3.23% one year ago to 2.87% on December 31, 2024.

Similarly, yield spreads on emerging market debt, investment grade corporate bonds, and the Bloomberg US Aggregate Bond Index declined proportionally.

Exhibit 21: Yield Spreads on Bloomberg US High Yield, Emerging Market USD Debt, U.S. Corporate Bond, and US Aggregate Bond Indices, Dec 1996 to Dec 2024



Note: Bloomberg EM USD Debt inception in Aug 2000

Exhibit 21 shows the recent spiking of credit spreads across the Bloomberg Emerging Market USD Debt, US Corporate Bond (investment grade), and US Aggregate Bond indices followed by the 2023 and 2024 reversal.

The volatility in credit spreads over time is apparent from Exhibit 21 and raises the question whether credit spread returns can be enhanced, or risk mitigated, by timing investments to spread levels. While tactical spread timing is not part of our long-term return forecasts, we have developed tactical models that incorporate time changing spreads to see if return can be enhanced. Our findings show that spread timing can produce modest but inconsistent tactical gains over time.

Exhibit 22 provides a comparison of current yield spreads with historical median spreads for the major bond indices. Note that current yield spread levels are now well below their historical averages.

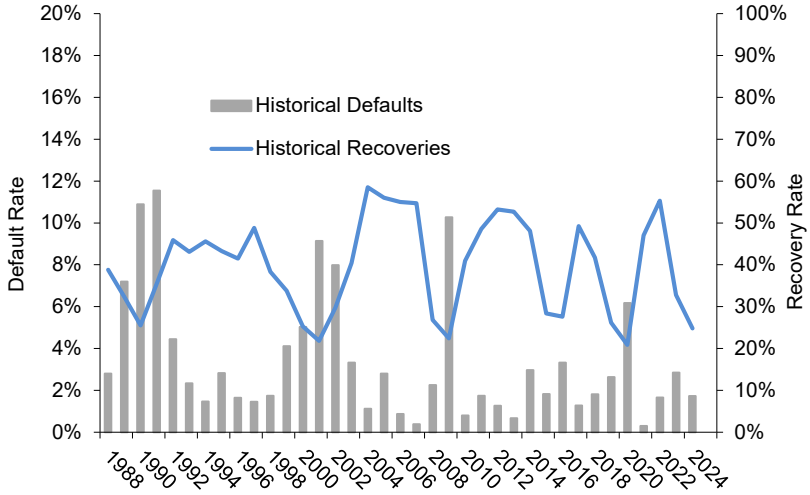
Exhibit 22: Current versus Historical (Dec 1996 to Dec 2024) Option-Adjusted Yield Spreads

	Bloomberg U.S. High Yield Bond	Bloomberg EM USD Debt	Bloomberg U.S. Corporate Bond	Bloomberg U.S. Aggregate Bond
Current Spread	2.87	2.20	0.80	0.34
Historical Median	4.15	3.26	1.18	0.47
Difference	-1.28	-1.06	-0.38	-0.13

Source: Bloomberg Barclays

Exhibit 23 provides 35 years of historical high yield default and recovery rates.

Exhibit 23: Historical High Yield Bond Default and Recovery Rates, 1988 to 2024



Source: JP Morgan, Cliffwater forecasts

Default rates (left scale) equal the value of debt defaulting each year divided by the par value of debt outstanding. Recovery rates (right scale) equal the market value of the bonds defaulting divided by their par value. Default rates have historically averaged under 3.6% but vary inversely with the business cycle, peaking at 10% and 12% levels during the 1990 and 2000 recessions. Recovery rates averaged 40% but fell during periods of recession when default rates are high. Default rates fell to 1.73% in 2024 from a post-COVID high of 2.84% in 2023. However, offsetting falling defaults are falling recovery rates from 33% in 2023 to 25% in 2024.

Exhibit 24 shows our 10-year return forecast for high yield bonds and broadly syndicated bank loans.

Exhibit 24: Expected 10-Year Bank Loan and High Yield Bond Return Inputs

	Bank Loans	High Yield Bonds
T-Bill Yield	3.35%	3.35%
Duration Spread	0.00	0.50
Credit Spread	3.20	4.00
Default Rate less Recoveries	(0.90)	(1.70)
Total Expected Return	**5.65%**	**6.15%**

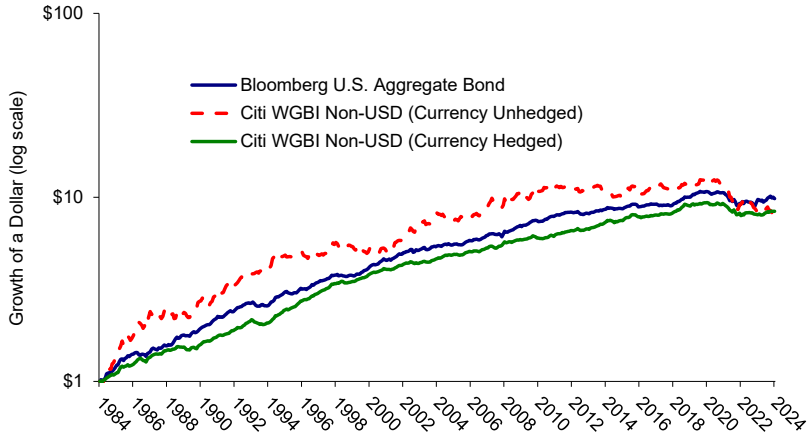
High yield bonds benefit from a 50-basis point additional return from their longer duration as well as a generous 4.00% long-term average credit spread. However, losses from defaults are higher due to the absence of covenants and a subordinated position in the capital structure of issuing companies.

Non-US Bonds

Non-US bonds should produce equivalent returns as US bonds for similar interest rate and credit risk according to capital market pricing theory. Differences in interest rates do exist across nations but they are largely due to differences in inflation expectations which are offset by movements in exchange rates. When currency is hedged, credit risk is the same, and if capital flows freely, US and non-US bond returns should be identical. However, the investment character of the US and non-US markets is not identical. Foremost is the fact that government debt represents a much larger fraction of the non-US bond markets when compared to the US bond market and consequently, yields on US bond indices are fractionally higher. This should produce somewhat higher realized returns for US bonds. Exhibit 25, which graphs realized US and non-US bond returns over a 40-year period, supports this view.

Exhibit 25: US and Non-US Bond Returns, Dec 1984 to Dec 2024

Non-US gov't debt is more a currency play than a diversificati on strategy.



Source: Citigroup, Bloomberg Barclays

Returns are plotted for the Bloomberg US Aggregate Bond Index and the Citi World Government Bond Non-US Dollar (WGBI Non-USD) Index, currency hedged and unhedged. Note the strong similarity between the Bloomberg US Aggregate Bond and the hedged Citi WGBI Non-USD. The small differences are likely explained by differences in credit spreads. The correlation between the two indices is a relatively high 0.67, as reported in Exhibit 26, and their risk levels are similar as well.

Exhibit 26: Non-US Bond Return and Risk, 1985 to 2024

	Annual Return	Annual Risk	Correlation w/ Bloomberg U.S. Aggregate
Bloomberg U.S. Aggregate Bond	5.88%	4.42%	
Citi WGBI Non-USD			
Currency Unhedged	5.42%	9.42%	0.48
Currency Hedged	5.46%	3.49%	0.67

Source: Bloomberg, Citigroup

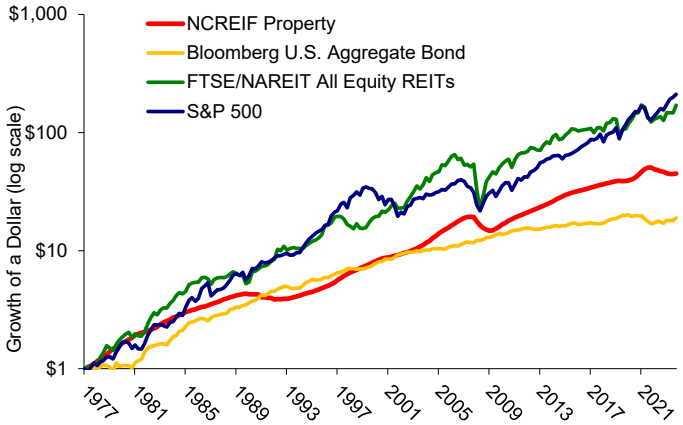
Our expected return for both unhedged and hedged non-US bonds is 4.50%, lower than our 4.90% expected return for core US bonds. The 0.40% difference reflects a difference in credit risk and higher costs associated with non-US investments. There is no reason to expect currency exposure will accrue to the future benefit or detriment of investors and, therefore, we forecast a 0% return to non-US currency exposure. This is known as interest rate parity.

Real Estate (Direct Property, REITS, and Partnerships)

Institutional investment in real estate has three forms. The first is separately managed accounts. This form of ownership is used by very large public and private pension funds, generally using an unleveraged or limited leverage buy-and-hold strategy. The NCREIF Property Index measures the performance of this real estate strategy. A second form of real estate investing is through publicly traded REITs (Real Estate Investment Trusts). REIT investing first gained popularity in the 1990s and the FTSE/NAREIT All Equity REIT Index tracks 156 separate equity REITS with a combined market capitalization of approximately $1.4 trillion as of December 31, 2024, larger than the $824 billion value for the NCREIF Property Index as of September 30, 2024. Finally, real estate private partnerships seek higher private equity-like returns through opportunistic investing that may include multiple strategies.

Exhibit 27 graphs performance for the NCREIF Property Index containing unlevered separate account properties and the FTSE/NAREIT All Equity REITs Index of public equity REITs over a 47-year period from December 1977 through September 2024 and compares them to US stock and bond index returns.

Exhibit 27: Real Estate Index Performance, Dec 1977 to Sept 2024



Source: NCREIF, FTSE/NAREIT, S&P Dow Jones, Bloomberg

Public REITs and private real estate have both been strong performing asset classes but with considerable volatility for what some view as a "safe" asset class.

There are three observations to note. First, the FTSE/NAREIT All Equity REITs Index of publicly traded REITs has produced returns roughly equal to stocks and above the NCREIF Property Index of direct investments in properties, which has performed midway between stocks and bonds over the entire period. Second, REITs have tended to behave differently than stocks. This relatively low correlation was particularly noticeable during the 2000 technology bubble, when REITs performed well just as the bubble burst. However, like other equity-oriented asset classes, REITs fell in line with stocks during the Global Financial Crisis and subsequent recession. And finally, returns of direct investments in property, measured by the NCREIF Property Index, exhibit lower volatility. This lower risk is partly driven by lag effects in the real estate appraisal valuation process that dampen reported price changes for properties in the NCREIF Property Index. It is also driven by differences in leverage; REITs are roughly 50% levered while the NCREIF Property Index returns are reported largely on an unlevered basis.

Exhibit 28 provides additional return and risk detail for real estate and public market indices.

Returns of direct investments in property (NCREIF Property Index) in Exhibit 28 average four percentage points above bond returns (Bloomberg U.S. Aggregate Bond Index) for the last 25 years but well below REIT returns (FTSE/NAREIT All Equity REITs Index).

The similarity in long-term returns between REITs and the S&P 500 as shown in Exhibit 28 might suggest an expected return for REITs that is equal to our 7.70% forecast for the US stock market. However, the Exhibit also reveals some sharp departures between the return series over shorter time periods that we believe can be forecast. For many years we have used a model that relies on the yield difference between REITs and 10-year Treasuries to help understand whether REITs are attractive. The idea is simple. When the yield spread between REITs and the 10-year Treasury bond is wide, either REITs are attractive or Treasuries are unattractive.

This simple comparative yield model should work better for REITs than for stocks generally because REIT earnings and dividends are more stable, a trait caused by the fact that REITs pay out in dividends almost all earnings – approximately 90% of operating earnings – to maintain their exemption from corporate tax. Other common stocks pay out a much lower 45% of earnings in the form of dividends, which creates earnings growth but also greater uncertainty in future dividends. REITs in contrast should have zero real earnings growth because of the high payout ratio and their long-term expected return should simply equal their dividend yield plus expected inflation, with no additional earnings growth component.

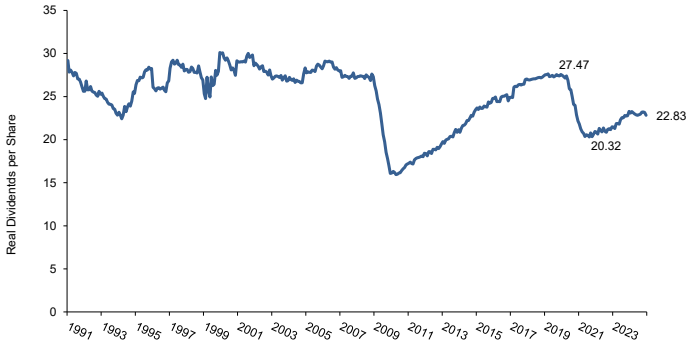
Exhibit 28: Historical Real Estate Return, Risk, Adjusted Risk[8], and Correlation

Periods ending Sep 2024	NCREIF Property	Bloomberg U.S. Aggregate Bond	FTSE/ NAREIT All Equity REITs	S&P 500
Annualized Return:				
Last 25 years	7.67%	4.06%	10.06%	8.20%
Last 10 years	5.88%	1.84%	7.78%	13.38%
Risk:				
Last 25 years	4.84%	4.32%	20.85%	16.73%
Last 10 years	4.15%	5.23%	18.50%	15.66%
Adjusted Risk:				
Last 25 years	10.84%			
Last 10 years	9.29%			
Correlations:				
NCREIF Property				
Last 25 years	1.00	-0.17	0.19	0.04
Last 10 years	1.00	-0.30	0.00	-0.25
NAREIT				
Last 25 years	0.19	0.20	1.00	0.68
Last 10 years	0.00	0.48	1.00	0.77

Source: NCREIF, Bloomberg, FTSE/NAREIT, S&P 500

Real dividends per share for the FTSE/NAREIT Equity REITs Index are plotted in the blue line in Exhibit 29. The period extends from 1991 through 2024.

Exhibit 29: Dividend per Share (CPI adjusted) for the FTSE/NAREIT Equity REITs Index
Dec 1991 to Dec 2024



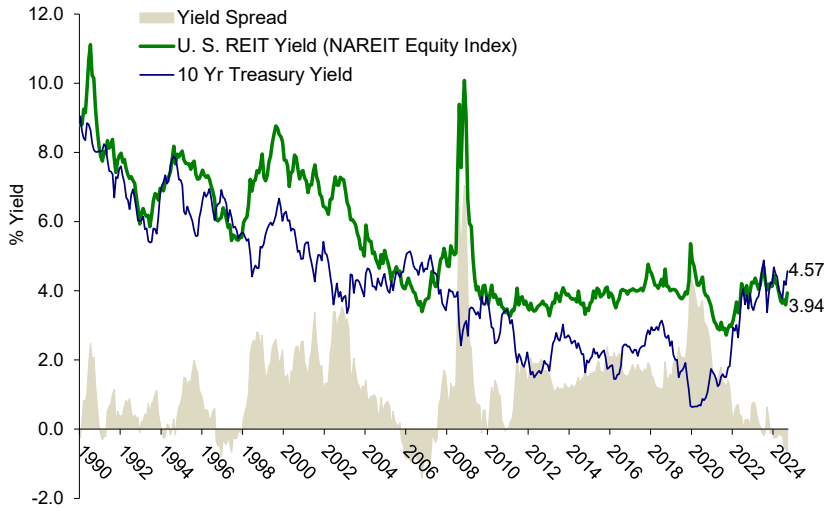
Source: FTSE/NAREIT, FRED, Cliffwater calculations

As expected, REIT dividends (and therefore earnings too) display no real growth over the 30-year period. However, real dividends did experience two distinct cycles. The first was the real estate boom of the late 1980s followed by the bust of the early 1990s. The second is the Global Financial Crisis, from which an earnings recovery was completed in 2019. Inflation-adjusted dividends had averaged around $25 per share (left scale) but fell to a low of $15 per share in 2009. They rebounded to roughly $27 per share but again fell to $20 per share in 2022. Since then, REIT earnings have struggled to rebound.

[8] Risk calculations for private real estate, private equity, and timber are based upon quarterly appraisals that likely understate the true risk of these investments because they likely do not fully incorporate market changes. This "stickiness" in valuation from quarter to quarter can be measured by the correlation between returns for one quarter with those of prior quarters. The greater the correlation, the less market-like the valuations are likely to be and the more understated traditional risk measures will be. To correct for this, Cliffwater adjusts the measured standard deviation for the correlations between quarterly periods to arrive at an "adjusted risk" measure that approximates what risk would be if valuations were based on market prices rather than appraised values.

Exhibit 30 provides a 34-year history of REIT and 10-year Treasury yields. Over most periods, REIT yields were higher than 10-year Treasuries. During periods of exceedingly high (low) yield spreads, REITs performed well (poorly). On December 31, 2024, the spread between REIT and 10-year Treasury yields was -0.63%, a strong historical signal that either REITS are overvalued or Treasuries are undervalued.

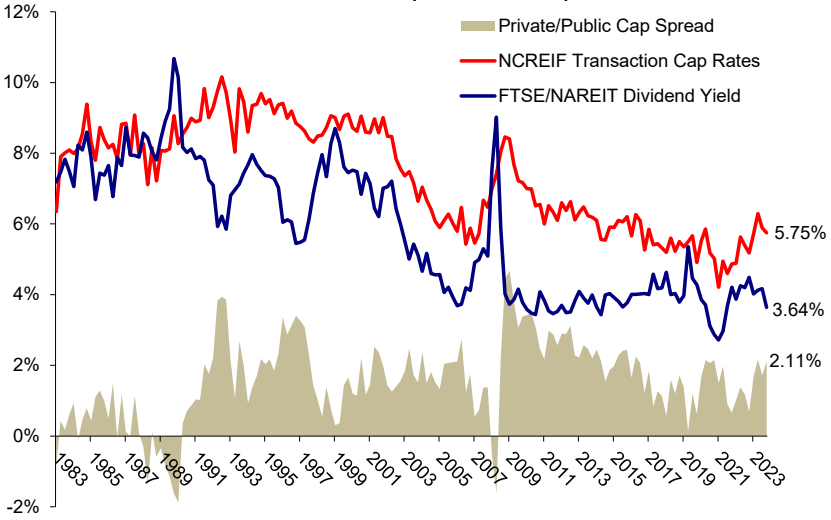
Exhibit 30: Historical Yields for FTSE/NAREIT Equity REIT Index and 10-Year Treasuries
Dec 1990 to Dec 2024



Direct Investments in Property (Unlevered)

Exhibit 31 compares NCREIF Property Index cap rates, equal to net operating income ("NOI") divided by the current market (transactional) value of the NCREIF Index, a measure of cash yield, with REIT dividend yields (represented by the FTSE/NAREIT All Equity REITs Index's dividend yield). The NCREIF Property Index transactional cap rate was 5.75% on September 30, 2024, the latest date for which NCREIF data is available. By comparison, the REIT dividend yield was 3.64% on September 30, 2024, a 2.11% difference with NCREIF Property Index transactional cap rates. The average historical difference between NCREIF Property Index transactional cap rates and REIT dividend yields is 1.91% over the last 20 years.

Exhibit 31: Comparison of NCREIF Property Index Cap Rates and FTSE/NAREIT Equity REITs Index
Dividend Yields, Sep 1983 to Sep 2024



Source: NCREIF, FTSE/NAREIT

Cliffwater's expected long-term return for direct, unlevered real estate is 7.10%. We arrive at that value by assuming that earnings on direct properties will rise annually at the expected inflation rate. Adding a 2.35% expected inflation to the 5.75% market value cap rate, and subtracting 1.00% for investment fees and expenses, gives an expected return of 7.10%.

Private Opportunistic Real Estate Partnerships

Real estate partnership investing is akin to private equity where invested capital is pooled through a limited partnership vehicle with a limited life and strong incentives for the general partner (manager) to invest capital and realize returns over a five to seven-year horizon.

Real estate partnerships are generally divided into three groups – "core," "value-added," and "opportunistic" – which are differentiated by their level of risk as measured by use of leverage, current income, and market risk. Opportunistic real estate partnerships were the most popular among return oriented institutional investors, totaling two-thirds of all real estate offerings.

Exhibit 32 provides performance for opportunistic real estate partnerships from Cambridge Associates, covering the period from December 2004 through September 2024.

Exhibit 32: Opportunistic Real Estate Partnership Performance, Dec 2004 to Sep 2024[9]

	Cambridge Opportunistic Real Estate Index	NCREIF Property Index
Return	9.73%	7.21%
Risk	8.79%	5.35%

Exhibit 32 supports the view that higher risk opportunistic real estate partnerships should outperform core unlevered real estate. Over the 20-year period, opportunistic partnerships outperformed direct buy-and-hold property investments by 2.52%.

Our expected return for opportunistic real estate partnerships is 8.10%, equal to our 7.10% expected return for private real estate plus a 1.00% excess return. Judged against the short history of opportunistic real estate returns, our 1.00% excess return forecast is conservative relative to what has been demonstrated in the past.

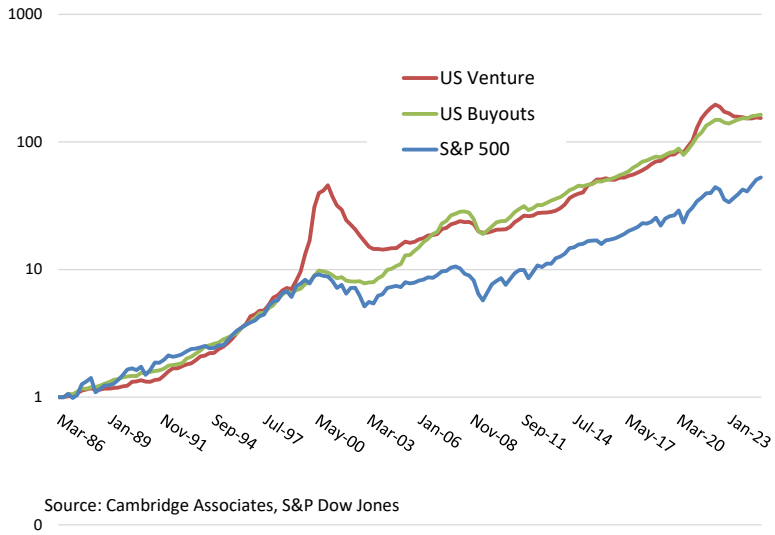
Private Equity

Private equity is commonly divided into four subcategories: US Buyout, Venture Capital, Distressed, and Non-US Private Equity. Each subcategory can be further broken down. For example, buyouts can be subdivided into large, middle and small. Venture capital is further divided into early-, mid-, and late-stage. Non-US private equity is geographically divided into Europe, Asia and Emerging Markets. Our forecast for Diversified Private Equity is intended to reflect a diversified portfolio that includes all the subcategories but with US buyouts having the largest weight.

Exhibit 33 depicts performance for the Cambridge Associates' US Buyout and US Venture indices from March 31, 1986, the inception of the US Buyout index, through September 30, 2024, together with the public equity performance for the S&P 500 index.

[9] See footnote 11, below.

Exhibit 33: Private and Public Equity Returns, March 1986 to Sept 2024



The graph shows that the largest categories of private equity, US buyouts and US venture capital, exceeded the S&P 500, particularly over the past 30 years. Exhibit 34 reports annualized private equity returns from March 1986, when return data for US buyouts was first available and the most recent 10 years.

Exhibit 34: US Buyout, Venture, and S&P 500 Returns, Risk, and Adjusted Risk[10]
(periods ending Sep 2024)

	U.S. Buyouts*	U.S. Venture Capital*	S&P 500
Return			
Last 10 years	16.16%	17.11%	13.38%
Inception (37.5 yrs)	14.15%	13.98%	11.01%
Risk			
Inception (37.5 yrs)	9.59%	20.68%	16.16%
Adjusted Risk			
Inception (37.5 yrs)	12.95%	27.92%	16.26%

* Cambridge Associates Indices (linked quarterly returns)
Source: Cambridge Associates, S&P Dow Jones, Cliffwater calculations

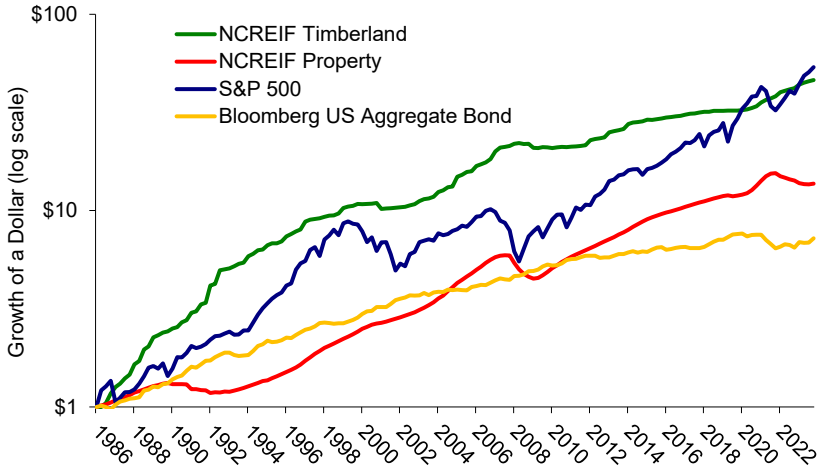
Cliffwater forecasts a 10.50% annual return for a diversified portfolio combining both buyouts and venture capital, equal to 3.00% above our 7.50% global equity return forecast. Our surveys of private equity portfolios managed by large institutional pension systems show that they have been able to earn returns 3% above public stock returns, after fees, by investing in a diversified portfolio of institutional quality buyout and venture capital partnerships.[11]

Farmland/Timber

A few pensions and endowments invest in timber partnerships to further diversify their portfolios. Investments are made through partnership vehicles like private equity and managed by Timber Investment Management Organizations ("TIMOs").

[10] See footnote 11, below.
[11] "*Long-Term Private Equity Performance; 2000-2024*", Cliffwater Research, January 2025.

Exhibit 35: Timber Returns, 1987 to Sep 2024



Source: NCREIF, S&P Dow Jones, Bloomberg Barclays

Exhibit 35 plots NCREIF Timberland Index investment returns from 1987 through September 2024. The NCREIF Timberland Index, like the NCREIF Property Index, is based upon manager supplied appraised values, net operating income, and capital expenditures. Timberland performance far exceeded stocks and bonds during the 1987 through 1992 period, followed by more modest subsequent returns.[12]

Exhibit 36 provides returns for timber and other asset classes over the past ten years and from the inception of the NCREIF Timberland Index.

Exhibit 36: Timber Returns, Risk, and Adjusted Risk[13] (periods ending Sep 2024)

	NCREIF Timberland	NCREIF Property	Bloomberg US Aggregate Bond	S&P 500
Annualized Return:				
Last 10 years	5.90%	5.88%	1.84%	13.38%
Last 37.75 years	10.69%	7.18%	5.37%	11.13%
Risk:				
Last 10 years	2.82%	4.15%	5.23%	15.66%
Adjusted Risk:				
Last 10 years	5.11%	9.29%		

Source: NCREIF, S&P Dow Jones, Bloomberg

Timber investments are subject to wide performance swings due to cyclical timber pricing and the business cycle. Strong 1987-1995 and 2003-2006 performance periods have been followed by modest 1996-2002 and 2006-2013 performance periods. Cliffwater's long-term return forecast for unlevered timber is 5.85%, broken down as follows:

	Earnings yield (net)	1.50%
+	Expected inflation	2.35
+	Real growth	2.00
=	Expected total return	5.85%

[12] Protection of the spotted owl in the Northwest during this period was one factor boosting timber prices.
[13] See footnote 11, above.

Unlike Timberland, whose weak returns over the last decade have deterred investors, Farmland is a growing institutional asset class with an expected return equal to 6.50%. NCREIF maintains a Farmland Index consisting of 1,031 properties with an aggregate value equal to $17 billion. The NCREIF Farmland Index begins in 1991 and reports a cumulative annualized return equal to 10.23%. Over the past ten years ending September 2024 the NCREIF Farmland Index earned a much lower 6.72% annualized return. As with the other NCREIF indices, Farmland returns are gross of investment management fees.

Commodities

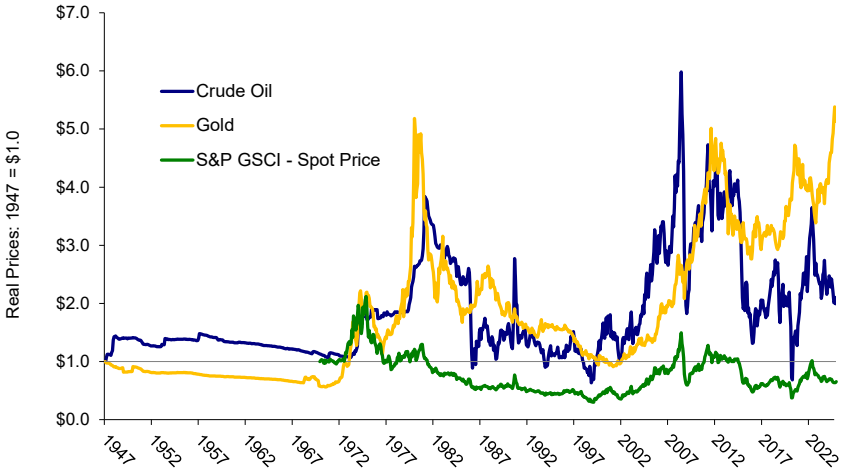
Investor interest in commodities stems from inflation concerns and potential diversification benefits.

Spot Commodities

Commodities consist of investments in various perishables (e.g., grains, food) and non-perishables (e.g., metals, energy), generally by holding futures contracts or swaps that are fully collateralized by cash equivalents. The most commonly used index of tradable commodities is the S&P Goldman Sachs Commodity Index ("S&P GSCI"), a production-weighted index of 24 commodities grouped into the following five categories with the announced weights for 2025: Energy (58%), Livestock (8%), Agriculture (19%), Industrial Metals (10%), and Precious Metals (5%). S&P GSCI returns began in 1969. Other commodity indices are available that give less weight to the energy sector, most notably the Bloomberg Commodity Index which has a 30% weight to the energy sector for 2025.

Most investment professionals agree that there is no long-term real, or inflation-adjusted, return from holding physical (or "spot") commodities. We illustrate this in Exhibit 37, where we plot prices for two commodities (oil and gold) over a 77-year period. Oil is selected for its economic importance and gold for its perception as a store of wealth. We also plot the S&P GSCI spot price. The prices for the two commodities and the S&P GSCI spot price have been adjusted for inflation so that trends with no growth mean that prices increase with the rate of inflation.

Exhibit 37: Crude Oil, Gold and S&P GSCI Spot Prices in Constant Dollars, Dec 1946 to Dec 2024



Source: S&P GSCI, Bureau of Labor Statistics, Bloomberg
Note: S&P GSCI inception date in 1969

Spot commodities (green line) have not offered long term real returns.

The graph suggests no systematic upward trend in the spot price of these commodities though, unquestionably, both oil and gold exhibit severe price spikes. The first was during the Arab Oil Embargo in the 1970s and the second during the last decade of Middle East oil disruptions. As we have suggested repeatedly in prior Asset Allocation Reports, the question for investors in gauging long-term returns is whether pricing will return to inflation-adjusted levels, through increased production, substitution, or as in the case of gold, reduced speculative demand. Our own view has been that real commodity (oil, gold)

prices will decline from peak levels either through inflation or declining prices, though we have expressed no expectation about timing.

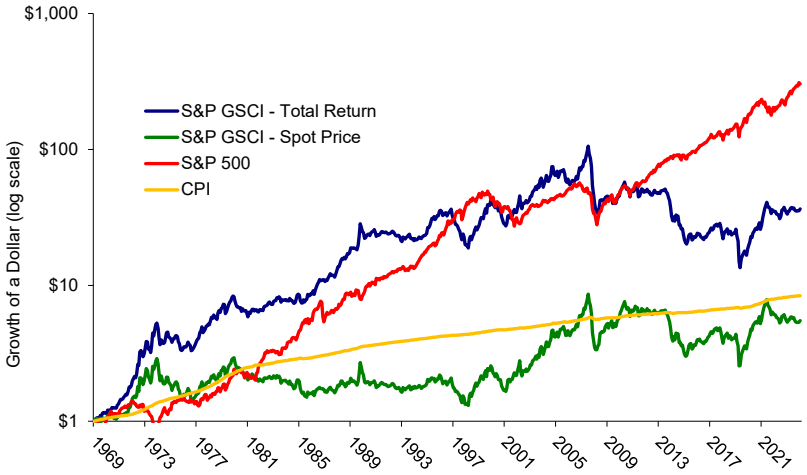
The lack of a long-term real return to oil and gold extends to the broader group of commodities. This is illustrated in Exhibit 37 where the return from the inflation-adjusted S&P GSCI spot price is plotted from inception of the S&P GSCI in 1969. Spot price returns over this entire period have fluctuated greatly in real value and now represent 65% ($0.65) of their ($1.00) real value in December 1969. However, we believe there is no perceptible real return trend to spot commodities and deviations from the 0% real return horizontal line reflect shorter term market supply and demand conditions.

Commodity Futures

An investment in commodity futures can produce returns different from spot commodity returns even though the same commodity is being priced. Commodity futures can produce returns above spot price returns if futures prices are systematically below (expected future) spot prices. Such a condition, referred to as "backwardation," will create long-term real returns as has been exhibited in the performance for the total return of the S&P GSCI.

The total return of the S&P GSCI, which represents an investment in commodity futures, has produced returns well above CPI over its 55-year history and, until the Financial Crisis, equal to the returns achieved by the S&P 500, as Exhibit 38 shows. Because the futures market is a zero-sum market, for such a result to occur there must be a redistribution of wealth from futures sellers (hedgers) to futures buyers (speculators). Historical real returns near 3% for the S&P GSCI suggest commodity futures may earn real returns as well as provide diversification benefits.

Exhibit 38: S&P GSCI Total Return and Spot Price, S&P 500 and CPI, 1969 to 2024

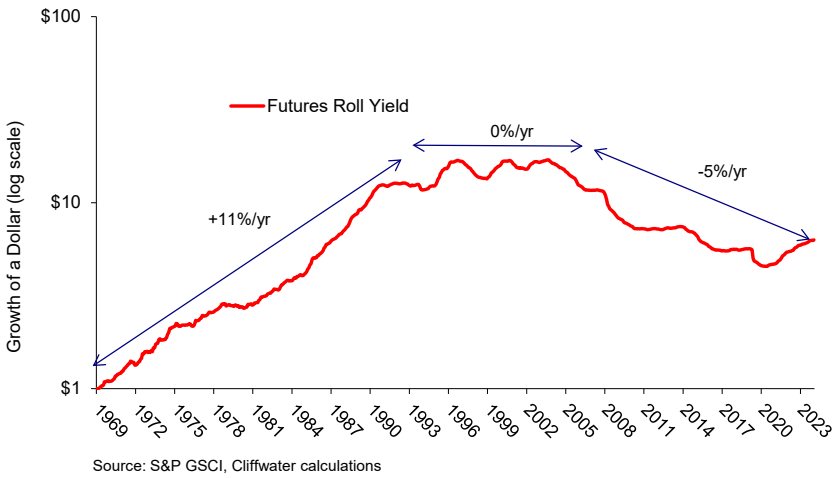


Source: S&P Dow Jones, S&P GSCI, Bureau of Labor Statistics

While some advisors assume significant positive real returns to commodities, we have warned for many years that historical favorable commodity futures returns have been driven by a positive roll yield (from backwardation in the forward commodity curves) and rebalancing. We said that this condition changed around 1999 and that a systematic real return would be much more difficult to achieve and would depend upon a real return in spot prices. Historically, commodity (spot) returns for most of their history and on a cumulative basis since 1969 failed to keep up with CPI.

Exhibit 39 plots the cumulative return from commodity futures roll, which explains all the past real return to commodity futures. As we described above, the roll yield cumulative return turned negative beginning in 2005 and since that time has been significantly negative, averaging -5% per year, meaning that commodity futures returns trailed spot returns.

Exhibit 39: Commodity Futures Roll Yield, 1969 to 2024



Source: S&P GSCI, Cliffwater calculations

Commodity future returns in Exhibit 38 above mirror the futures roll yield diagramed in Exhibit 39.

Our expected return for commodity futures, therefore, is a modest 3.35%, which is a combination of our 3.35% expected T-bill return plus our forecast for no roll yield. Despite the low expected return, we have shown that commodity futures potentially bring diversification benefits to a portfolio which can be enough to warrant a small allocation to commodities within a portfolio.

Investments in a diversified portfolio of commodity futures such as the S&P GSCI are risky, with standard deviations that are greater than stocks depending on the commodity benchmark. And, as we suggest above, expected returns are likely to be low. Exhibit 40 reports return, risk, and correlations for the S&P GSCI as compared to the S&P 500. For example, over the past 10 years, the standard deviations of the S&P GSCI and S&P 500 returns were 21.69% and 15.36%, respectively. However, in a portfolio context, commodities are not as risky despite their high volatility because of their beneficial correlations with other assets classes. The correlations between the S&P GSCI and the S&P 500 are 0.15 and 0.40 for the 55-year and 10-year periods, respectively.

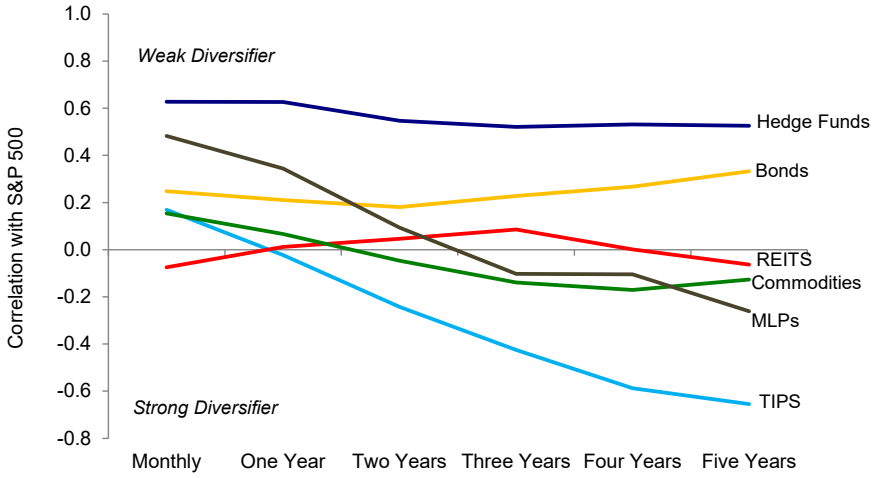
Exhibit 40: Commodity Return, Risk, and Correlations, Dec 1969 to Dec 2024

	Annual Return	Risk	Correlation with S&P 500	Correlation to CPI
Long Term - Jan 1970 to Dec 2024 (55 Yrs)				
S&P GSCI	6.76%	20.23%	0.15	0.20
S&P 500	10.95%	15.34%	1.00	-0.08
CPI Inflation	3.94%	1.15%	-0.08	1.00
Ten Years ending Dec 2024:				
S&P GSCI	1.24%	21.69%	0.40	0.37
S&P 500	13.10%	15.36%	1.00	0.01
CPI Inflation	2.98%	1.06%	0.01	1.00

Source: S&P Dow Jones, S&P GSCI, Bureau of Labor Statistics, Cliffwater calculations

Commodities possess attractive diversifying characteristics. As “real assets,” they tend to perform well when financial assets do not. This tendency is documented in Exhibits 41 and 42 where the correlations for several asset classes are plotted for several time horizons against equities, as measured by the total return of the S&P 500, and inflation, as measured by CPI.

Exhibit 41: Correlation to S&P 500 Index, 1970 to 2024



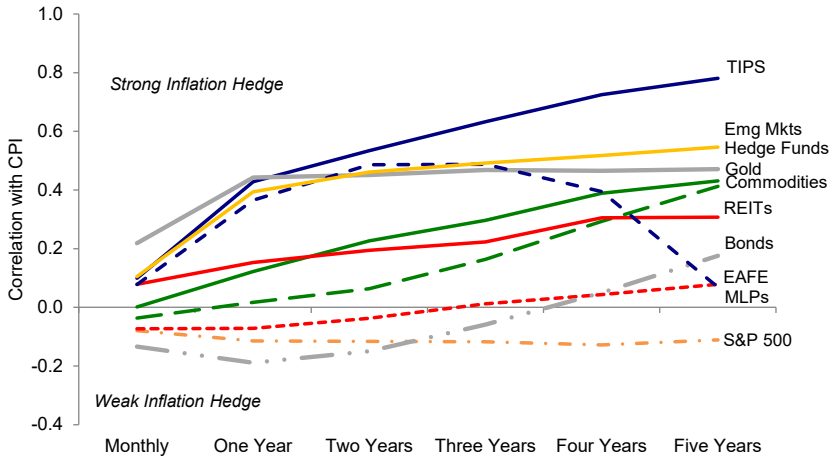
Source: S&P Dow Jones (S&P 500), HFRI (Hedge Funds), Bloomberg (Bonds and TIPS), Alerian (MLPs), FTSE/NAREIT (REITS), S&P GSCI (Commodities), Cliffwater calculations. See Exhibit 43 for representative indices.

Exhibit 41 demonstrates which asset classes are effective equity diversifiers by displaying correlations to the S&P 500 over varying time horizons. The full time period examined is 1970 to 2024. Note that as the horizon increases from one month to five years, the correlation of commodity returns to the S&P 500 falls from slightly positive for one month to negative for three and five years. The graph also illustrates how TIPS are the most effective diversifier against equity exposure over longer time horizons.

One reason commodities have a low correlation with equities is their tendency to correlate positively with inflation. This trait is shown in Exhibit 42 where asset class return correlations are measured directly against CPI.

Exhibit 42 reveals which asset classes are "real" and which are not. TIPS, emerging markets, hedge funds, REITs, and commodities (S&P GSCI) are inflation hedges. Stock and bond returns do not hedge inflation and show negative correlations with inflation over most time horizons. MLPs fall somewhere in the middle. REITs behave more like stocks over short and intermediate time periods but exhibit improved inflation hedging characteristics over long time periods.

Exhibit 42: Inflation Hedging Capacity of Selected Asset Classes, 1970 to 2024



Source: Bureau of Labor Statistics (CPI), Bloomberg (TIPS, Bonds), MSCI (Emg Mkts, EAFE), HFRI (Hedge Funds), Bloomberg (Gold), S&P Dow Jones (S&P 500, Commodities), FTSE/NAREIT (REITs), Alerian (MLPs), Cliffwater calculations. See Exhibit 43 for representative indices.

Exhibit 43 reports inflation hedging values for the asset classes depicted in Exhibit 42, including a calculation of "inflation beta," the sensitivity of return to changes in CPI.

Exhibit 43: Calculation of Inflation Beta

Period	S&P 500	MSCI EAFE	MSCI Emerging Markets	Bloomberg U.S. Aggregate Bond	Bloomberg Barclays U.S. TIPS	FTSE/ NAREIT All Equity REITs	S&P GSCI	HFRI Fund Weighted Composite	Alerian MLP	Gold
Correlation with CPI Inflation										
Monthly	-0.08	-0.07	0.00	-0.13	0.10	-0.04	0.22	0.08	0.08	0.11
One Year	-0.11	-0.07	0.12	-0.19	0.43	0.02	0.44	0.15	0.37	0.39
Two Years	-0.12	-0.04	0.23	-0.15	0.53	0.06	0.45	0.19	0.49	0.46
Three Years	-0.12	0.01	0.30	-0.06	0.63	0.16	0.47	0.22	0.49	0.49
Four Years	-0.13	0.04	0.39	0.05	0.72	0.29	0.47	0.31	0.39	0.52
Five Years	-0.11	0.08	0.43	0.18	0.78	0.41	0.47	0.31	0.07	0.55
Ratio of Standard Deviation to CPI Standard Deviation										
Monthly	11.85	12.94	16.91	4.19	3.64	13.42	15.64	4.25	17.05	14.96
One Year	5.66	7.18	9.26	2.43	1.92	6.45	8.72	2.85	8.38	8.95
Two Years	4.36	6.52	6.84	2.09	1.63	5.03	7.51	2.08	6.51	8.77
Three Years	3.89	6.23	6.41	1.96	1.53	4.41	6.57	1.63	5.70	8.66
Four Years	3.84	6.34	6.32	1.93	1.48	4.15	5.93	1.52	5.60	7.96
Five Years	3.88	6.18	6.41	1.93	1.46	4.09	4.96	1.61	0.43	6.23
CPI Inflation Beta (=correlation x ratio of standard deviations)										
Monthly	-0.95	-0.94	0.02	-0.56	0.36	-0.49	3.41	0.33	1.33	1.57
One Year	-0.65	-0.51	1.13	-0.46	0.82	0.11	3.86	0.44	3.06	3.52
Two Years	-0.51	-0.25	1.55	-0.31	0.87	0.32	3.39	0.40	3.17	4.05
Three Years	-0.46	0.08	1.90	-0.12	0.97	0.72	3.08	0.36	2.78	4.26
Four Years	-0.49	0.28	2.46	0.10	1.07	1.22	2.76	0.47	2.21	4.12
Five Years	-0.43	0.49	2.76	0.34	1.14	1.69	2.34	0.49	0.03	3.40

Source: S&P Dow Jones, MSCI, Bloomberg, FTSE NAREIT, S&P GSCI, HFRI, Alerian, Bloomberg, Bureau of Labor Statistics, Cliffwater calculations

In summary, despite Cliffwater's low return expectations for commodities, their high correlation to inflation and low correlation to equities make them a potentially useful diversifying asset class that investors with inflation sensitive payouts may choose to consider for a modest portfolio allocation.

Hedge Funds[14]

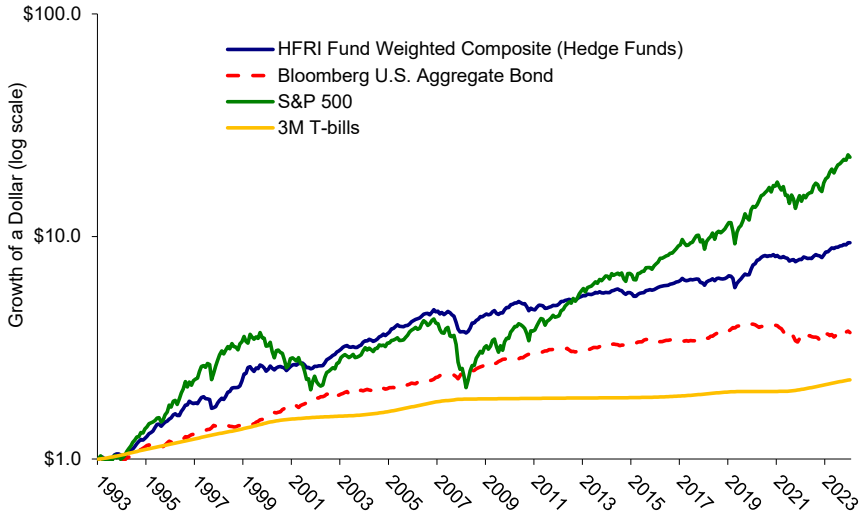
Traditional asset classes like stocks and bonds derive most, if not all, of their returns from the types of security they represent. Buy-and-hold returns generated by these traditional asset classes are referred to as "beta." Hedge funds, on the other hand, derive most of their return from "alpha" which is generated by active management employing investment strategies that are very different from traditional long only investment approaches. Examples of hedge fund investment strategies include convertible arbitrage, merger arbitrage, long-short equity, and tactical asset allocation. Aside from investment strategy, hedge funds are unique from the other asset classes presented in our report in two respects: (1) flexibility to invest in a broad range of securities and (2) the ability to short securities.

The unique features of hedge funds make forecasting their return and risk more challenging because it requires making assumptions about the ability of hedge fund managers to produce alpha return. While we also forecast alpha for private equity and opportunistic real estate, alpha represents a smaller proportion of return compared to hedge funds.

[14] See Cliffwater's research report "Constructing a Portfolio of Hedge Funds: April 2011" for a more complete discussion of hedge fund investing.

Our hedge fund forecasting process begins with examining historical hedge fund returns. Hedge Fund Research, Inc. ("HFRI") is a well-known firm that tracks hedge fund performance. Exhibit 44 shows net-of-fee returns for their hedge fund index for the period 1993 through 2024. While returns for the HFRI Fund Weighted Composite Index[15] go back to 1990, it was only in 1994 that "survivorship bias" was minimized by retaining performance of funds that stopped reporting to the Index. While academics still question the integrity of these published hedge fund index returns, we believe that the returns reported by HFRI are generally representative of hedge fund portfolio returns found in practice.

Exhibit 44: Hedge Fund Performance, 1993 to 2024



Source: HFRI, Bloomberg, S&P Dow Jones, Bank of America Merrill Lynch

We believe the investment attractiveness of hedge funds is apparent from Exhibits 44 and 45. Over the past 31 years the HFRI Fund Weighted Composite Index produced returns between stocks and bonds but with a level of volatility that is much closer to bonds. As a result, the HFRI Fund Weighted Composite Index has produced a return-to-risk ratio equal to 1.12, about 50% higher than the 0.70 ratio for the S&P 500.

Exhibit 45: Hedge Fund Return and Risk, 1993 to 2024

Index	Annual Return	Risk	Return/ Risk
Hedge Funds (HFRI Fund Weighted Composite)	7.49%	6.66%	1.12
S&P 500	10.60%	15.07%	0.70
Bloomberg U.S. Aggregate Bond	4.31%	4.17%	1.03
3M T-bills	2.68%	0.64%	

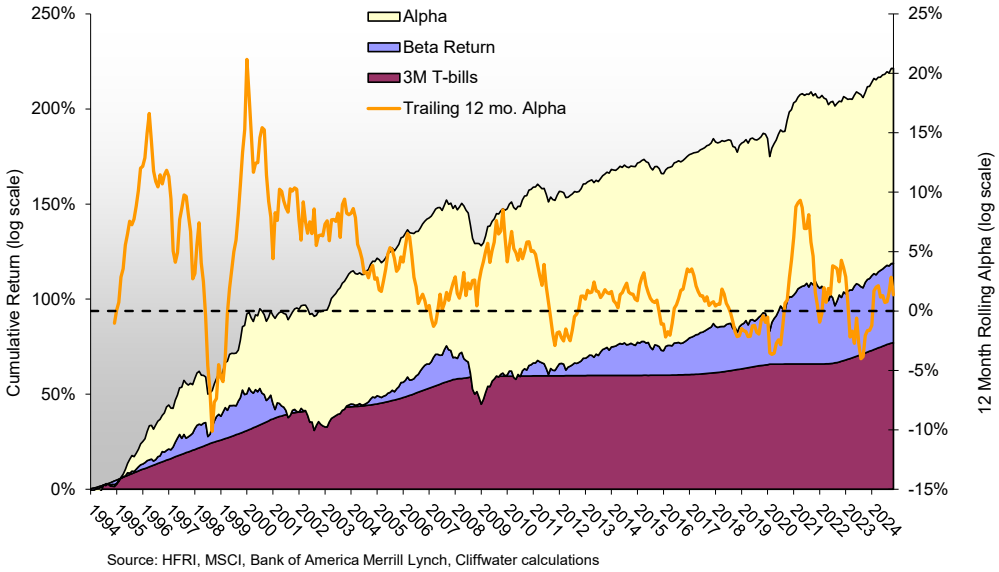
Source: HFRI, Bloomberg, S&P Dow Jones, Bank of America Merrill Lynch

In Exhibit 46, we divide the HFRI Fund Weighted Composite Index cumulative return, shown in Exhibit 44, into its three component returns: T-bills (cash), beta, and alpha. T-bills (red area) represent the risk-free return that is a component of all asset classes. The beta return (blue area) is estimated monthly by multiplying the trailing 36-month equity beta for the HFRI Fund Weighted Composite Index by the difference between MSCI ACWI and T-bill returns. Equity beta as calculated for the HFRI Fund Weighted Composite Index over the 31 years averages 0.36 and varies from a low of 0.18 to a high of 0.52.

[15] The HFRI Fund Weighted Composite Index is an equal weighting of approximately 3,000 hedge funds. Many users misinterpret the term "Fund Weighted" to mean asset-weighted.

While the HFRI Fund Weighted Composite Index returns are the same in Exhibits 44 and 46, they are expressed in log form (continuously compounded) in Exhibit 46, causing the vertical axis scales to be different though the cumulative returns look the same in both graphs. The change to log returns in Exhibit 46 makes it easier to conduct return attribution.

Exhibit 46: Sources of Hedge Fund Returns – Alpha, Beta, and T-bills, 1994 to 2024



Source: HFRI, MSCI, Bank of America Merrill Lynch, Cliffwater calculations

The top line in Exhibit 46 shows cumulative percentage return for the HFRI Fund Weighted Composite Index, which is the combination of the alpha, beta, and T-bills area segments. In combination, the three return segments grew 221% over the entire 31-year period, the cumulative (log) return of the HFRI Fund Weighted Composite Index. Visual inspection shows that the two largest components of the HFRI Fund Weighted Composite Index return were alpha, the top segment, and T-bills, the bottom segment, with returns from beta being the smallest component. Annualized, the component returns for the 31-year period are shown in Exhibit 47, where they are again converted back to the more familiar compound annual return form.

Exhibit 47: Sources of HFRI Fund Weighted Composite Index Return

	Hedge Fund Return Attribution Periods ending December 2024			
Return Source	31 Years	10 Years	5 Years	1 Year
Alpha	3.48%	0.94%	1.74%	1.46%
Beta*	1.42%	2.65%	2.97%	3.93%
T-bills	2.51%	1.71%	2.36%	4.83%
Total	7.40%	5.30%	7.07%	10.22%
Alpha Risk	3.56%	2.88%	3.78%	2.17%
Inf Ratio	0.98	0.33	0.46	0.67

* Beta measured relative to MSCI ACWI Index

Source: Bank of America Merrill Lynch, MSCI, HFRI, Cliffw ater calculations

Note: Amounts may not sum due to rounding

Our analysis shows that alpha and T-bills have been the two dominant contributors to long-term hedge fund returns. Beta contributed a smallish 1.42% to the 7.40% annual hedge fund return since December 31, 1993.

Alpha contributed 3.48% annually to hedge fund returns over the last 31 years. To better understand the consistency of alpha generation by hedge funds and the degree of accuracy with which we can forecast its level, we also plot a line in Exhibit 46 showing the trailing 12-month alpha whose values are represented in the right-hand scale.

Alpha turned negative in 2008 but recovered sharply in 2009 and found roughly its long-term average in 2010. This pattern is not unique and mirrors the Asian/Russian Debt Crisis in 1997-99 which produced even greater losses for hedge fund alpha followed by a rapid recovery in 2000-01. The European sovereign crisis hit in 2011 and again hedge fund performance weakened, and returns were negative for all of 2011. Hedge fund returns bounced back in 2012, but alpha has been generally modest and below historical averages over the last five years. Most recently, hedge fund alpha returns have been stronger.

Investors do not always hold a diversified cross-section of hedge fund strategies as represented by the HFRI or other composite indices but instead may utilize one hedge fund strategy such as equity long/short. Therefore, we provide forecasts for seven commonly used hedge fund strategies and use industry-like weights to roll up into one overall hedge fund return and risk forecast.

Our seven hedge fund strategies are:

1. *Market Neutral*. These include convertible arbitrage, fixed income arbitrage, and equity market neutral strategies that are intended to earn positive returns regardless of market direction by hedging away all stock or bond market risk.
2. *Credit/Distressed*. These hedge funds invest long and short in higher risk debt securities (corporate, mortgage, asset-backed, and other) and sometimes equity in troubled and/or post-bankruptcy companies.
3. *Event Driven*. These are generally equity but sometimes debt securities of companies undergoing some corporate action such as a spinoff, merger, or other short-term event.
4. *Equity Long/Short*. These are equity managers that invest long and short in common stocks.
5. *Macro-Discretionary*. These are managers that engage in tactical allocations driven by fundamental relative value analysis in currencies, commodities, and stock and bond indices.
6. *Macro-Systematic (CTA)*. These are trend following managers who display strong performance during periods of high market stress or when markets make major moves up or down.
7. *Multistrategy*. Hedge funds employing several hedge fund strategies and opportunistically move capital among strategies as they perceive relative opportunity.

Exhibit 48 provides a detailed accounting of Cliffwater's forecasts for hedge fund return and risk by strategy and by return component (T-bill, beta, and alpha).

Exhibit 48: Expected Sources of Hedge Fund Return and Risk as of Dec 31, 2024

	1	2	3	4	5	6	7	8	9	10	11
			Beta				Alpha			T-bill+Beta+Alpha	
Hedge Fund Strategy	Model Weights	3M T-bill return	Equity Beta*	Credit Beta**	Beta Return	Beta Risk	Alpha Return	Alpha Risk	Info Ratio	Total Return	Total Risk
Market Neutral	20.0%	3.35%	-0.05	0.00	-0.21%	0.90%	1.58%	3.52%	0.45	4.72%	3.63%
Credit/Distressed	15.0%	3.35%	0.10	0.40	1.34%	4.96%	1.35%	3.11%	0.43	6.04%	5.86%
Event Driven	12.5%	3.35%	0.25	0.15	1.38%	5.47%	2.13%	4.91%	0.43	6.86%	7.35%
Equity Long/Short	25.0%	3.35%	0.35	0.00	1.45%	6.30%	2.15%	4.50%	0.48	6.95%	7.74%
Macro-Discretionary	7.5%	3.35%	0.10	0.00	0.42%	1.80%	2.10%	4.70%	0.45	5.87%	5.03%
Macro-Systematic	5.0%	3.35%	0.05	0.00	0.21%	0.90%	1.24%	8.25%	0.15	4.80%	8.30%
Multistrategy	15.0%	3.35%	0.10	0.15	0.76%	2.87%	1.50%	3.46%	0.43	5.61%	4.49%
Hedge Fund Portfolio	100.0%	3.35%	0.15	0.10	0.85%	3.34%	1.77%	2.95%	0.60	5.97%	4.49%

* MSCI All Country World Index (MSCI ACWI) expected return equal to 7.50%

** Morningstar LSTA US Leveraged Loan Index expected return equal to 5.65%

Individual hedge fund strategy weights are contained in column 1. These weights are set by Cliffwater generally annually to represent optimal allocations for a diversified hedge fund portfolio. They are not index weights, per se, but will generally be similar to weightings found in commercial hedge fund indices.

Column 2 contains our expected 3.35% cash (T-bill) return. This is the same return across all strategies. Columns 3 and 4 show our equity and credit beta forecasts which are based upon historical analysis of strategy returns. For example, we expect equity long/short hedge funds to have an equity beta equal to 0.35 and credit beta equal to 0.00. The overall hedge fund portfolio beta values are a weighted average of strategy betas where the weights are those in column 1.

Column 5 shows our expected beta returns for strategies and the overall hedge fund portfolio. These return components are calculated by multiplying the beta values in columns 3 and 4 times our expected equity and bank loan excess returns. For example, the expected 1.45% beta return for equity long/short equals the 0.35 expected equity beta multiplied by 4.15%, the expected excess return on global stocks (7.50% minus 3.35%). The beta risk values in column 6 are derived from the expected beta values in columns 3 and 4 and the risk forecasts for equities and bank loans.

Columns 7, 8, and 9 provide our alpha return and risk forecasts. These are based upon a detailed historical analysis of our internal hedge fund strategy returns. Combining all strategies in the bottom row shows that our alpha forecast for a diversified hedge fund portfolio is 1.77%. Alpha risk for the combined hedge fund portfolio, shown in the bottom row in column 8, equals 2.95%. A key performance metric is information ratio, shown in column 9. It measures risk-adjusted alpha and equals alpha return divided by alpha risk. Our expected hedge fund portfolio information ratio equals 0.60, which we believe should be considered attractive relative to most other asset classes.

Finally, columns 10 and 11 provide total return and risk forecasts, by combining returns and risks for cash (T-bills), beta, and alpha. Risk forecasts also combine the three components and incorporate correlation assumptions which are not shown in Exhibit 48 but are available upon request. We forecast a 10-year return equal to 5.97% for a diversified hedge fund portfolio with an expected risk equal to 4.49%. We round values to a 5.95% hedge fund expected return.

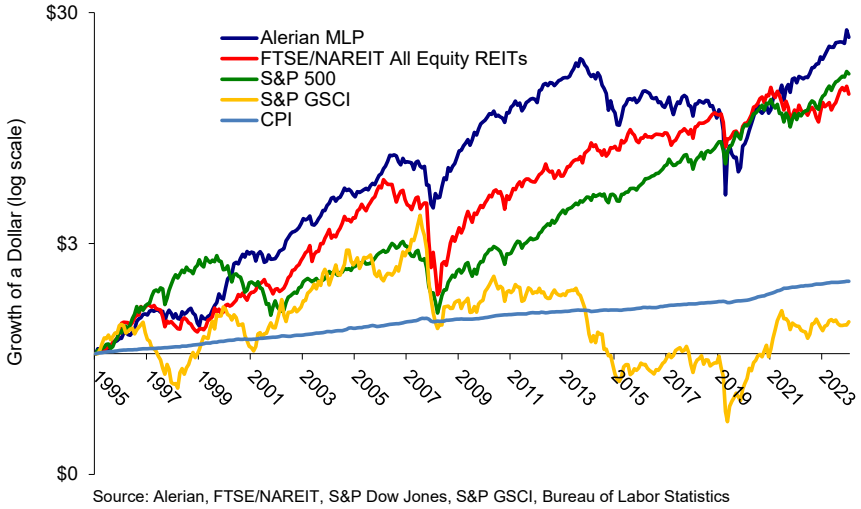
MLPs (Master Limited Partnerships)

Created by Congress in the 1980s, these publicly traded partnership interests are tax-free at the entity level provided that 90% of their income comes from natural resources such as oil, natural gas, coal, timber. Income generating MLP activities include exploration & production and mining as well as midstream services such as gathering & processing, transportation, storage, and distribution, but exclude most downstream services such as gas stations and utilities.

There are approximately 60 tax-advantaged MLPs in the market, traded primarily on the New York and NASDAQ exchanges. The most referenced MLP index is the Alerian MLP Index, a float-adjusted capitalization-weighted index of the 18 largest MLPs with a total capitalization of $272 billion as of December 2024 and a December 1995 start date.

MLPs show strong equity-like performance over their entire history but, as shown in Exhibits 49 and 50, MLPs have experienced a sharp drawdown beginning in 2014 which has continued through 2021 but turned around in 2022.

Exhibit 49: MLP Performance versus Other Asset Classes, Dec 1995 to Dec 2024



Source: Alerian, FTSE/NAREIT, S&P Dow Jones, S&P GSCI, Bureau of Labor Statistics

Exhibit 50 shows return, risk, and correlation for MLPs compared to other asset classes beginning in 1995, when the Alerian MLP was created.

MLP returns are modestly sensitive to changes in oil prices over their entire history but have moved more closely with energy prices in recent years. Oil betas for the four asset classes and CPI are reported in section (c) of Exhibit 50. Betas are shown because they include both correlation and volatility. The S&P GSCI, as expected, has the highest oil beta, equal to 0.52. The betas drop off significantly for the S&P 500, REIT, and MLP indices, though the Alerian MLP Index would rank second in beta sensitivity to oil with a beta equal to 0.23.

Exhibit 50: MLP Return and Risk versus Other Asset Classes (periods ending Dec 2024)

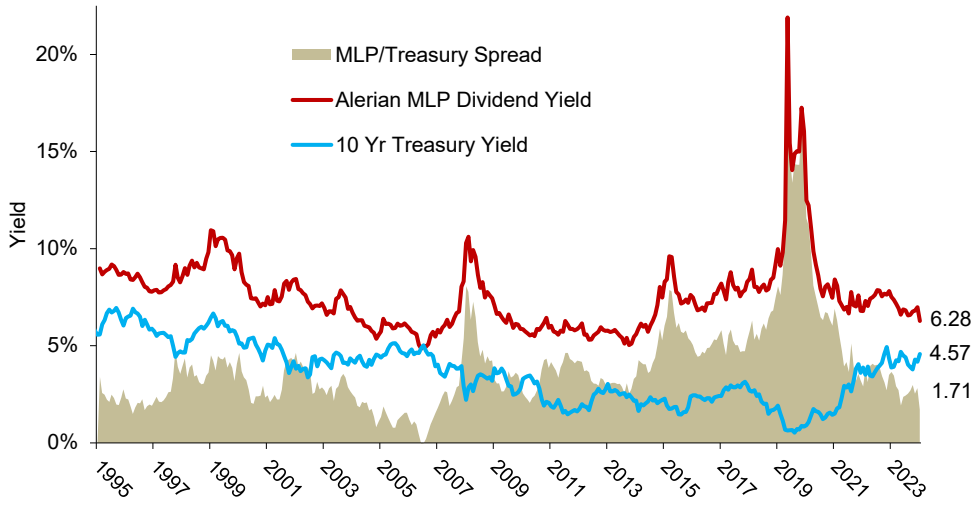
	Alerian MLP	FTSE/NAREIT All Equity REITs	S&P 500	CPI	S&P GSCI
	(a) Returns ending December 2024				
1 Year	24.41%	8.73%	25.02%	2.49%	9.25%
3 Years	27.27%	-2.20%	8.94%	4.11%	9.63%
5 Years	15.56%	4.27%	14.53%	4.13%	7.12%
10 Years	3.67%	5.68%	13.10%	2.98%	1.24%
Since Jan 1996 (29 Yrs)	11.50%	9.34%	10.10%	2.52%	1.10%
Year 2008	-36.93%	-37.74%	-37.01%	-0.04%	-46.49%
	(b) Risk and Correlation since Jan 1996				
Risk	22.06%	19.83%	15.39%	1.03%	22.26%
Correlations:					
MLPs	1	0.40	0.48	0.07	0.39
REITs	0.40	1	0.62	0.04	0.21
S&P 500	0.48	0.62	1	0.01	0.30
CPI	0.07	0.04	0.01	1	0.35
S&P GSCI	0.39	0.21	0.30	0.35	1
	(c) Sensitivity to Oil Prices since Jan 1996				
Oil Beta	0.23	0.09	0.12	0.01	0.52

Source: Alerian, FTSE/NAREIT, S&P Dow Jones, S&P GSCI, Bureau of Labor Statistics, Cliffwater calculations

The primary interest in MLPs is their high current yield. A high yield appeals to investors who want liquidity and/or current income and provides some inflation protection as cash flow can be reinvested at higher rates during periods of rising inflation.

In Exhibit 51, we compare cash yields for MLPs and 10-year Treasuries.

Exhibit 51: MLP and Treasury Yield Comparison, 1996 to 2024



Source: Alerian, Bloomberg Barclays, FTSE/NAREIT, Bloomberg

MLP yields were attractive relative to Treasuries over the last several years. However, the recent combination of higher Treasury yields and lower MLP yields from recent price gains have reduced the MLP yield spread over Treasuries. The current yield spread equals 1.71%, down from 3.49% one year ago and below the 3.95% historical average spread. Our expected return for MLPs is 7.30%, which incorporates yield, growth from inflation, and fees.

Private Debt and BDCs

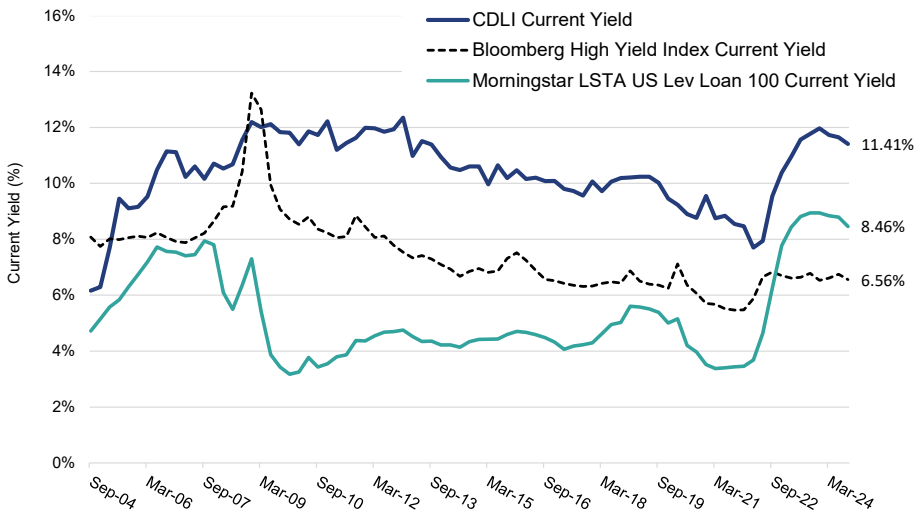
US Middle Market Corporate Lending (Direct Lending)

Private middle market lending (private debt) has been a fast-growing asset class in recent years for four reasons: expected returns are high single digit, volatility is low relative to other asset classes with similar expected returns, cash returns are almost immediate in the form of current yield with mitigated J-curve effects versus typical private equity investments, and yields increase with interest rates due to floating rate structures. This last reason means that private debt should perform well in a rising interest rate environment, unlike traded credit like investment grade bonds and high yield bonds.

Exhibit 52 reports yields for unlevered private debt, represented by the Cliffwater Direct Lending Index, together with high yield bonds.[16] The Cliffwater Direct Lending Index is comprised of over 17,000 middle market corporate loans representing over $393 billion in asset value on September 30, 2024. The Index is unlevered and gross of fees. Further information on the CDLI can be found at www.CliffwaterDirectLendingIndex.com.

[16] See Private Debt: Yield, Safety and the Emergence of Alternative Lending, Stephen L. Nesbitt, (John Wiley & Sons, 2023), for an extensive discussion on private debt and the Cliffwater Direct Lending Index.

Exhibit 52: Yield Comparison of Direct Lending and High Yield Bonds, Sept 2004 to Sept 2024[17]



Gross yields for direct lending have averaged 4 percentage points above traded high yield bonds over the last 15 years.

Exhibit 52 shows direct lending yields, measured by the CDLI, that have been consistently higher than yields for broadly syndicated (traded) high yield bonds and bank loans, with gross yield spreads averaging 4.07% and 4.73%, respectively, over the 10 years ending September 30, 2024.

Direct lending, like private equity, is an actively managed asset class with fees and expenses that will lower return. On the other hand, direct lending managers often finance some of their loan portfolio (use leverage) to enhance return. Exhibit 53 illustrates the expected return from an actively managed direct lending portfolio that uses some leverage (1.0 times net assets) and where typical fees and expenses are netted from interest income.

[17] Cliffwater research, as of September 30, 2024. The Cliffwater Direct Lending Index (the "CDLI") seeks to measure the unlevered, gross of fees performance of U.S. middle market corporate loans, as represented by the underlying assets of public and private Business Development Companies, subject to certain eligibility requirements. The CDLI is asset-weighted by reported fair value. Any information presented prior to the Launch Date (September 30, 2015) of the CDLI is back-tested. The CDLI performance has been prepared for informational purposes only. Past performance is not indicative of future returns. "3Yr Takeout Yield" is calculated by assuming that all loans will be repaid at par in three years, which represents the average life of direct loans. The index returns are provided for information only. Reference to an index does not imply that a portfolio will achieve returns, volatility or other results similar to the index. Please see additional disclosures at the end of the report.

Exhibit 53: Calculations underlying Cliffwater Direct Lending Expected Return[18]

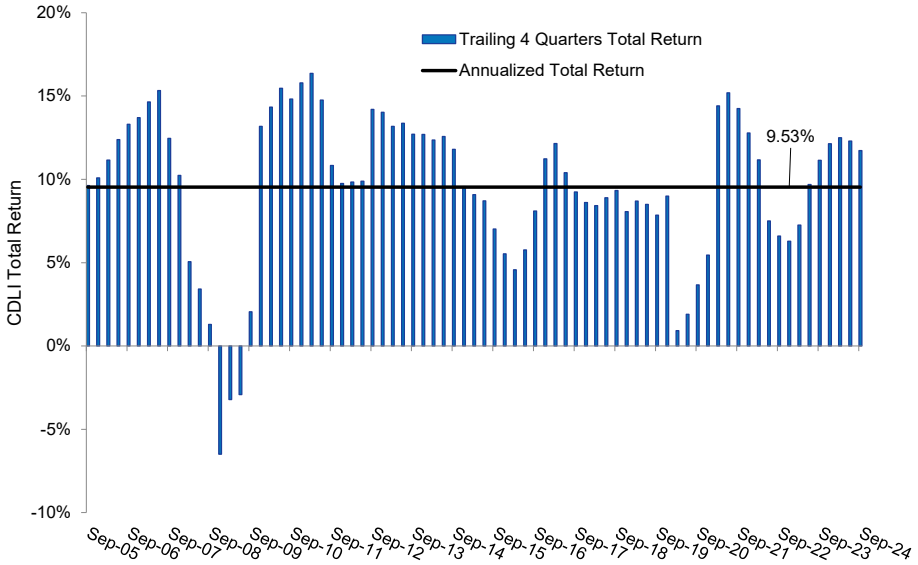
(1) Loan Assumptions		
Loan Interest Income	8.95%	
Fee Income (OID)	0.50%	
Credit Losses	0.50%	
(2) Leverage Assumptions		
Cost of Debt	5.30%	5.30%
Leverage Amount	0.00x	1.00x
(3) Fee Assumptions		
Mgmt Fees (Gross Assets)	1.00%	1.00%
Operating Expenses (NAV)	0.20%	0.40%
Incentive Fee	10%	10%
Preferred Return	0%	6%
(4) Expected Return Calculation		
	Unlevered	Levered
Unlevered Portfolio Yield	8.95%	8.95%
+ Loan Origination Income	0.50%	0.50%
+ Effect of Leverage	0.00%	9.45%
- Interest Cost of Leverage	0.00%	-5.30%
= *Gross Levered Yield*	9.45%	13.60%
- Expected Credit Losses	-0.50%	-1.00%
- Estimated Mgmt Fees	-1.00%	-2.00%
- Other Expenses	-0.20%	-0.40%
- Estimated Incentive Fee	-0.78%	-1.02%
= *Net Expected Return*	**6.98%**	**9.18%**

Expected returns for unlevered and levered direct lending equal 6.98% and 9.18%, respectively.

Exhibit 54 shows past performance for the CDLI from its inception. The CDLI has an inception annualized return equal to 9.53% with modest volatility.

[18] The Cliffwater return forecast shown is calculated by applying the current Cliffwater return forecast methodology to currently available market information and the use of Cliffwater's professional judgment. Due to the forward-looking nature of the forecast, it is necessarily speculative and may prove to be inaccurate. The return forecast reflects expected returns for the entire direct lending asset class and not for specific investments within the asset class. Specific investments within the asset class will perform differently and may underperform the forecasted returns. The forecasted returns do not reflect actual performance of any account(s) managed by Cliffwater. Cliffwater may change its return forecast methodology at any time and the Cliffwater return forecast should not be used to predict the actual future performance of any Cliffwater account.

Exhibit 54: Cliffwater Direct Lending Index Performance, Rolling Four Quarter, Sept 2005 to Sept 2024[19]



Business Development Companies

Publicly traded Business Development Companies (or "BDCs") are exchange-traded companies that invest in middle market private debt and can be accessed as a complement to or substitute for private debt. BDCs are very much like REITs and MLPs, though their assets are private debt instead of real estate and midstream energy, respectively. BDCs were created by Congress in 1980, under Section 54 of the Investment Company Act of 1940, to stimulate private investment in middle market US companies. Congress gave the BDC structure the advantage of electing to be exchange-traded with a tax-free pass-through of investment income, but with some restrictions, including:

- SEC registration and oversight
- At least 70% of assets limited to non-public debt and equity in U.S. corporations
- Maximum leverage equal to net asset value (NAV)
- Annual distribution of at least 90% of income to shareholders
- Certain portfolio diversification constraints

BDCs, therefore, are in many ways like REITs and MLPs in their cash generating investment characteristics that originally appealed to yield-hungry retail investors but have since found institutional interest as the number and size of offerings grew.

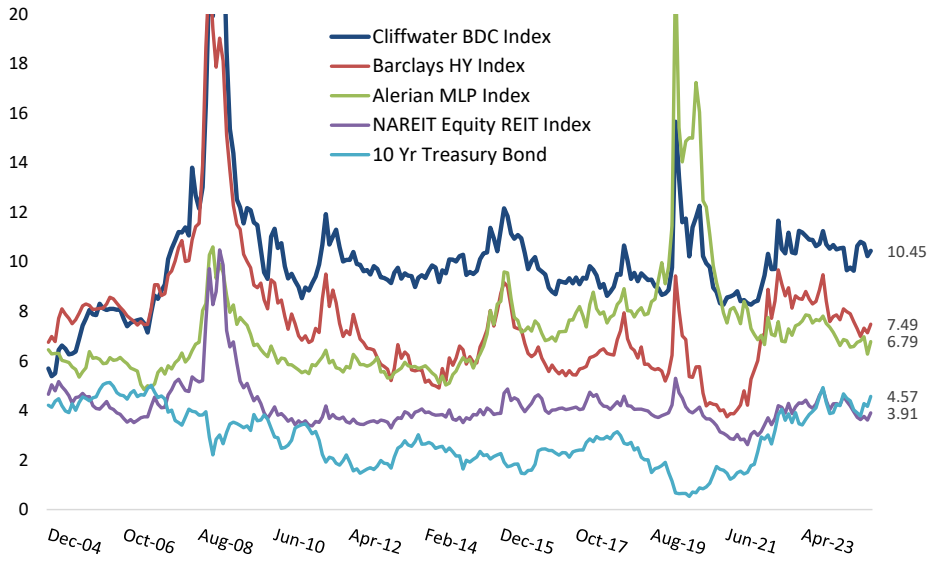
There are 41 publicly traded BDCs with a combined market capitalization equal to $71 billion in the Cliffwater BDC Index as of December 31, 2024, representing a small fraction of the $1 trillion direct lending market. By market capitalization, BDC size is less than other publicly traded yield-oriented instruments. However, we expect the BDC market to grow, both from investor demand for yield, the growth of non-bank middle market financing, and the general trend toward securitization of private assets.

As illustrated in Exhibit 55, BDCs were priced attractively at year-end, with a 10.45% dividend yield. BDCs have consistently yielded well above other yield-oriented asset classes over the last 10 years. Particularly

[19] Any information presented prior to the Launch Date (September 30, 2015) of the CDLI is back-tested. The performance of the CDLI has been prepared for informational purposes only. Past performance is not indicative of future returns.

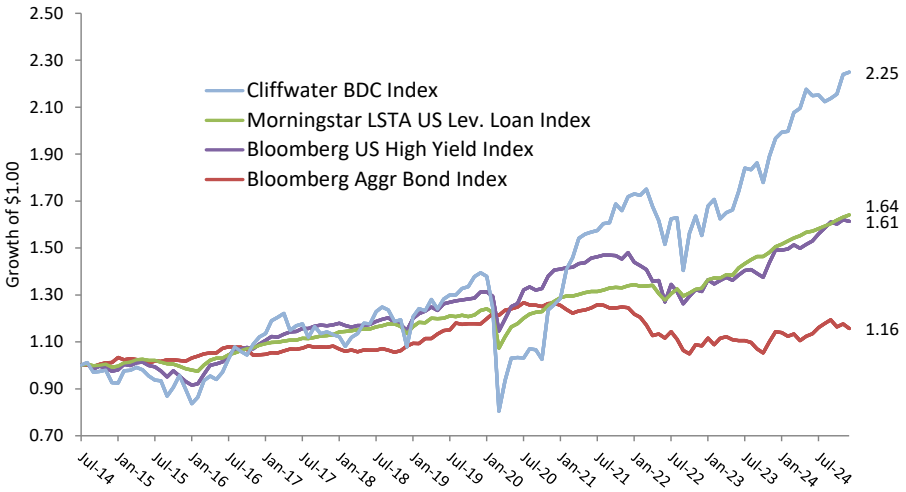
relevant is the comparison to high yield bonds as both are credit driven asset classes. BDCs have historically offered significant additional cash yield compared to high yield bonds. The BDC yield spread to high yield bonds equaled 2.96% on December 31, 2024. Cliffwater is forecasting an 8.45% long-term return for a portfolio of public BDCs, which is 2.30% above the 6.15% high yield bond forecast.

Exhibit 55: Comparison of Yields across Selected Asset Classes (Dec 2004 to Dec 2024)[20]



The Cliffwater BDC Index return over the last 10 years is shown in Exhibit 56 along with two credit-oriented indices (Bloomberg U.S. High Yield Bond Index and Morningstar LSTA U.S. Leveraged Loan Index) and the Bloomberg U.S. Aggregate Bond Index, as a measure of investment grade bond performance.

Exhibit 56: Return Comparison of BDC, High Yield, Levered Loan, and Investment Grade Bonds, June 30, 2014 to Dec 31, 2024



[20] The Cliffwater BDC Index (the "CWBDC") measures the performance of lending-oriented, exchange-traded Business Development Companies, subject to certain eligibility criteria. The CWBDC is a capitalization-weighted index calculated daily using publicly available closing share prices and reported dividend payouts. Any information presented prior to the Launch Date (January 1, 2015) of the CWBDC is back-tested. The performance of the CWBDC has been prepared for informational purposes only. Past performance is not indicative of future returns. Please see additional disclosures at the end of the report.

BDCs performed better than the other bond indices over the last 10.5 years, earning a 8.03% annualized return. By comparison, the Bloomberg U.S. High Yield Bond, Morningstar LSTA U.S. Leveraged Loan, and Bloomberg U.S. Aggregate Bond indices returned 4.66%, 4.83%, and 1.40%, respectively.

Exhibit 56 also illustrates the higher volatility found with BDCs compared to high yield bonds and bank loans. For example, the annualized return standard deviation equaled 19.69% for the Cliffwater BDC Index over the 10.5-year period as compared to 7.48%, 5.36%, and 4.95% for the Bloomberg U.S. High Yield Bond Index, the Morningstar LSTA US Leveraged Loan Index, and the Bloomberg Aggregate Bond Index, respectively. We believe the higher BDC risk level is likely to gradually decline as the BDC market grows in market capitalization and institutional participation.

Infrastructure

Like real estate, we divide institutional infrastructure investments into three categories:

1. Core – These are brownfield assets with current contracted cash flows which are inflation linked, GDP insensitive, or Public Private Partnerships ("PPP"). Investment in core infrastructure assets is highly competitive with lower targeted returns and limited growth characteristics. Core infrastructure investments have traditionally been in OECD countries. Leverage and efficient operation are the primary levers used to support performance.

   PPPs are investment structures that allow a government entity to partner with a private contractor and investor to build and manage infrastructure assets deemed essential to a community. The structure provides for an arms-length negotiation of the private investment required return. The contract will also provide for an efficient and privately constructed turnkey operating asset with underwriting guarantees by the construction company. The ownership of the asset remains with the government entity with the private investor and operator retaining the right to operate the asset over a pre-determined period. PPPs have long durations ranging from 20 to 100 years that are well matched to the long-term liabilities of pension funds. The private partners of the PPP will collect the cash flows from the operation of the asset and will be held to operating standards. PPPs will have varying levels of risk including construction and in some cases a level of demand risk through user pay systems.

2. Core Plus – These include mostly brownfield assets plus some greenfield opportunities which together provide a mix of current and future cash flows which are inflation-linked and GDP insensitive. Core Plus infrastructure assets allow institutional investors to target higher total returns by risking capital on new or additional development of existing brownfield infrastructure assets. Direct investors are less likely to target core plus assets due to the additional skill sets required to develop greenfield assets. Some investors may also venture into non-OECD countries where major infrastructure assets can be acquired and efficiently managed. Investors have recently allocated substantial capital to core plus strategies where there is a larger universe of investment opportunities that includes both public and private assets. Core plus assets will have a substantial amount of contracted revenues.

3. Value Add – These may include non-operating properties, properties in development, and properties with shorter or no contracts. Consequently, they have little or no correlation to inflation, high GDP risk, and greater operational risk. Value Add infrastructure includes the broadest set of investment opportunities and has included non-traditional infrastructure assets that may be considered traditional private equity assets. Value Add investors are willing to acquire uncontracted assets and transform the businesses into core and core plus assets by establishing growth initiatives and executing long term client contracts.

Expected return and risk on a portfolio of infrastructure assets depends largely upon the mix of property categories. Cliffwater forecasts a 7.25% expected return for infrastructure, the same as one year ago.

Recommended Asset Class Return, Risk, and Correlation Forecasts

CovMatrixName			Average Return (%)	Annual Risk (%)	U.S. Stocks	Non-US Developed	Emerging Markets	Global Equity	Core U.S. Bonds	IG Corporate	10-yr Treasury	3M SOFR (Cash)	10-yr TIPS	High Yield Bonds	Bank Loans	Emerging Market Debt	Private Real Estate (UL)	Public REITs	Private RE Partnerships	Diversified Private Equity	Diversfiied Hedge Funds	Energy Funds
U.S. Stock		U.S. Stocks	7.70	17.00	1.00																	
EAFE Stocks	Stocks	Non-US Developed	7.10	19.00	0.85	1.00																
Emerg Mkt Stocks		Emerging Markets	7.10	22.00	0.85	0.80	1.00															
Global Stocks ACW		Global Equity	7.50	17.00	0.90	0.90	0.85	1.00														
BB Aggregate	Fixed Income	Core U.S. Bonds	4.90	5.00	0.20	0.15	0.15	0.15	1.00													
Inv Grade Corp		IG Corporate	5.35	5.60	0.45	0.25	0.30	0.25	0.87	1.00												
10-Yr Treas		10-yr Treasury	4.55	4.87	0.20	0.20	0.20	0.20	0.85	0.65	1.00											
SOFR (cash)		3M SOFR (Cash)	3.45	3.47	0.00	0.00	0.05	0.00	0.05	0.05	0.00	1.00										
10-yr TIPS		10-yr TIPS	4.55	4.80	0.30	0.25	0.25	0.25	0.80	0.70	0.65	-0.05	1.00									
High Yield Bonds		High Yield Bonds	6.15	6.76	0.65	0.60	0.60	0.60	0.20	0.50	0.20	-0.15	0.30	1.00								
Bank Loans		Bank Loans	5.65	6.06	0.55	0.10	0.40	0.40	0.05	0.30	-0.20	0.20	0.30	0.80	1.00							
Emerg Mkt Debt		Emerging Market Debt	5.40	5.65	0.55	0.60	0.60	0.60	0.55	0.75	0.30	-0.15	0.55	0.70	0.40	1.00						
Private Real Estate	Alternatives	Private Real Estate (UL)	7.10	7.48	8.75	0.50	0.45	0.40	0.45	0.00	0.15	0.00	0.00	0.30	0.65	0.40	0.25	1.00				
Public REITs		Public REITs	6.30	8.72	22.00	0.70	0.65	0.65	0.65	0.15	0.15	0.00	-0.15	0.20	0.65	0.40	0.50	0.75	1.00			
Opp RE Funds		Private RE Partnerships	8.10	9.34	15.75	0.50	0.45	0.40	0.45	0.05	0.05	0.00	0.00	0.70	0.50	0.50	0.10	0.75	0.65	1.00		
Private Equity		Diversified Private Equity	10.50	12.50	20.00	0.80	0.70	0.60	0.70	0.20	0.25	0.20	0.00	0.30	0.65	0.50	0.25	0.70	0.60	0.60	1.00	
Hedge Funds		Diversified Hedge Funds	5.95	6.05	4.40	0.70	0.70	0.65	0.70	0.00	0.30	0.00	-0.10	0.15	0.70	0.80	0.55	0.20	0.55	0.20	0.30	1.00
Energy Funds		Energy Funds	10.50	15.31	31.00	0.60	0.20	0.40	0.45	0.00	0.25	0.30	0.00	0.30	0.50	0.30	0.10	0.30	0.60	0.50	0.80	0.30
Farmland		Farmland	6.50	7.11	11.00	0.10	0.10	0.10	0.10	-0.10	-0.10	0.00	0.10	-0.10	-0.10	-0.10	-0.10	0.05	0.05	0.05	0.35	0.00
Commodities		Commodity Futures	3.35	4.97	18.00	0.35	0.50	0.55	0.45	0.05	0.25	-0.05	0.35	0.35	0.30	0.35	0.10	0.25	0.10	0.10	0.20	0.60
Infrastructure		Infrastructure	7.25	7.97	12.00	0.70	0.65	0.55	0.50	0.00	0.10	0.00	0.40	0.60	0.60	0.60	0.25	0.70	0.60	0.60	0.50	0.80
MLPs		MLPs	7.30	10.18	24.00	0.50	0.50	0.54	0.51	-0.05	0.20	-0.20	0.15	0.65	0.65	0.40	0.35	0.35	0.35	0.50	0.60	0.80
Private Debt (UL)		Private Debt (UL)	6.95	7.01	3.50	0.65	0.60	0.60	0.60	0.00	0.50	-0.15	0.30	0.80	0.80	0.70	0.65	0.65	0.70	0.80	0.70	0.00
Private Debt (L 1:1)		Private Debt (L:1.0)	9.15	9.40	7.00	0.65	0.60	0.60	0.60	0.00	0.50	-0.15	0.30	0.80	0.80	0.70	0.65	0.65	0.70	0.80	0.70	0.00
BDCs		Public BDCs	8.45	10.45	20.00	0.80	0.75	0.70	0.80	0.00	0.30	-0.10	0.10	0.75	0.50	0.40	0.70	0.70	0.70	0.80	0.75	0.00
Buyout	Sub-strategies	Buyouts	10.00	11.45	17.00	0.85	0.85	0.85	0.90	0.20	0.45	0.20	0.00	0.30	0.65	0.55	0.55	0.50	0.70	0.50	0.80	0.70
Venture		Venture Capital	12.00	16.50	30.00	0.70	0.70	0.60	0.70	0.20	0.25	0.20	0.00	0.30	0.65	0.50	0.55	0.50	0.70	0.50	0.90	0.70
Enhanced Lending		Enhanced Lending	9.95	10.07	4.95	0.50	0.45	0.45	0.45	0.19	0.40	-0.15	-0.15	0.30	0.70	0.70	0.60	0.55	0.55	0.60	0.70	0.60
Absolute Return HFs		Absolute Return HFs	5.35	5.41	3.34	0.42	0.42	0.42	0.42	0.04	0.30	-0.14	0.10	-0.02	0.35	0.35	0.25	0.22	0.22	0.22	0.20	0.71
Market Neutral		Market Neutral HFs	4.72	4.79	3.63	0.40	0.40	0.40	0.40	0.00	0.20	-0.10	0.00	0.00	0.20	0.20	0.10	0.30	0.30	0.30	0.00	0.50
Credit/ Distressed		Credit/ Distressed HFs	6.04	6.21	5.86	0.60	0.60	0.60	0.60	0.20	0.50	-0.30	-0.10	0.00	0.80	0.80	0.60	0.30	0.30	0.30	0.50	0.70
Event Driven		Event Driven HFs	6.86	7.12	7.26	0.75	0.75	0.75	0.75	0.20	0.40	-0.30	0.00	-0.10	0.60	0.60	0.40	0.40	0.40	0.30	0.60	0.80
Equity L/S		Equity L/S HFs	6.95	7.24	7.64	0.85	0.85	0.85	0.85	0.20	0.40	-0.30	0.00	-0.10	0.40	0.40	0.40	0.40	0.40	0.30	0.70	0.70
Macro		Macro (Discretionary) HFs	5.87	5.99	4.84	0.10	0.10	0.10	0.10	0.00	0.10	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.40
Macro CTA		Macro (Trend) HFs	4.80	5.14	8.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00
Multi Strat		Multi Strategy HFs	5.61	5.71	4.49	0.50	0.50	0.50	0.50	0.00	0.40	-0.20	0.00	0.00	0.50	0.50	0.40	0.20	0.20	0.20	0.40	0.50
CPI		CPI	2.35	2.37	2.20	-0.10	-0.05	0.40	0.00	-0.20	-0.15	-0.25	0.70	0.80	-0.05	0.30	0.00	0.35	0.35	0.35	-0.10	0.50

		Farmland	Commodity Futures	Infrastructure	MLPs	Private Debt (UL)	Private Debt (L:1.0)	Public BDCs	Buyouts	Venture Capital	Enhanced Lending	Absolute Return HFs	Market Neutral HFs	Credit/ Distressed HFs	Event Driven HFs	Equity L/S HFs	Macro (Discretionary) HFs	Macro (Trend) HFs	Multi Strat HFs	CPI
Stocks	U.S. Stocks																			
	Non-US Developed																			
	Emerging Markets																			
	Global Equity																			
Fixed Income	Core U.S. Bonds																			
	IG Corporate																			
	10-yr Treasury																			
	3M SOFR (Cash)																			
	10-yr TIPS																			
	High Yield Bonds																			
	Bank Loans																			
	Emerging Market Debt																			
Alternatives	Private Real Estate (UL)																			
	Public REITs																			
	Private RE Partnerships																			
	Diversified Private Equity																			
	Diversfiied Hedge Funds																			
	Energy Funds																			
	Farmland	1.00																		
	Commodity Futures	0.00	1.00																	
	Infrastructure	0.00	0.20	1.00																
	MLPs	0.00	0.40	0.40	1.00															
	Private Debt (UL)	-0.10	0.35	0.60	0.65	1.00														
	Private Debt (L:1.0)	-0.10	0.35	0.60	0.65	0.97	1.00													
	Public BDCs	-0.10	0.35	0.60	0.60	0.90	0.90	1.00												
Sub-strategies	Buyouts	0.00	0.35	0.70	0.50	0.65	0.80	0.80	1.00											
	Venture Capital	0.00	0.35	0.70	0.50	0.65	0.80	0.80	0.80	1.00										
	Enhanced Lending	-0.10	0.35	0.40	0.40	0.80	0.70	0.70	0.70	0.70	1.00									
	Absolute Return HFs	0.00	0.35	0.33	0.22	0.35	0.35	0.38	0.42	0.42	0.35	1.00								
	Market Neutral HFs	0.00	0.30	0.30	0.30	0.20	0.20	0.40	0.40	0.40	0.20	0.65	1.00							
	Credit/ Distressed HFs	0.00	0.60	0.60	0.30	0.80	0.80	0.50	0.60	0.60	0.80	0.59	0.26	1.00						
	Event Driven HFs	0.00	0.60	0.40	0.30	0.60	0.60	0.65	0.75	0.75	0.60	0.52	0.10	0.76	1.00					
	Equity L/S HFs	0.00	0.40	0.40	0.30	0.40	0.40	0.75	0.85	0.85	0.40	0.53	0.00	0.71	0.85	1.00				
	Macro (Discretionary) HFs	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.00	0.80	0.40	0.30	0.42	0.42	1.00			
	Macro (Trend) HFs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.15	0.00	0.01	0.18	0.32	1.00		
	Multi Strategy HFs	0.00	0.50	0.40	0.20	0.50	0.50	0.40	0.50	0.50	0.50	0.76	0.18	0.87	0.84	0.80	0.70	0.19	1.00	
	CPI	0.30	0.35	0.20	0.20	0.30	0.30	0.10	-0.10	-0.10	0.30	0.14	0.10	0.00	-0.10	-0.10	0.10	0.20	0.00	1.00

Disclosures

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Cliffwater Index Disclosures

The Cliffwater Direct Lending Index (the "CDLI") seeks to measure the unlevered, gross of fees performance of U.S. middle market corporate loans, as represented by the underlying assets of Business Development Companies ("BDCs"), including both exchange-traded and unlisted BDCs, subject to certain eligibility requirements. The CDLI is asset-weighted index that is calculated on a quarterly basis using financial statements and other information contained in the U.S. Securities and Exchange Commission ("SEC") filings of all eligible BDCs. Cliffwater believes that the CDLI is representative of the direct lending asset class.

The Cliffwater BDC Index (the "CWBDC" and, together with the CDLI, each an "Index") measures the performance of lending-oriented, exchange-traded BDCs, subject to certain eligibility criteria. The CWBDC is a capitalization-weighted index that is calculated on a daily basis using publicly-available closing share prices and reported dividend payouts. Cliffwater believes that the CWBDC is representative of the BDC asset class.

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Any information presented prior to the Launch Date (September 30, 2015 with respect to the CDLI and January 1, 2015 with respect to the CWBDC) of an Index is back-tested. Back-tested performance is not actual performance, but is hypothetical. Unless otherwise indicated, the back-tested calculations are based on the same methodology that was in effect when the Index was officially launched. Please refer to the methodology paper for the Index (available at www.CliffwaterDirectLendingIndex.com with respect to the CDLI and www.BDCs.com with respect to the CWBDC) for more details about the Index, including the Base Date/Value (September 30, 2004 at 1,000 with respect each Index) and the Launch Date of the Index and the manner in which the Index is reconstituted and the eligibility criteria for the Index.

Prospective application of the methodology used to construct an Index may not result in performance commensurate with any back-tested returns shown. The back-test period does not necessarily correspond to the entire available history of an Index. Another limitation of back-tested hypothetical information is that generally the back-tested calculation is prepared with the benefit of hindsight. Back-tested data reflect the application of an Index methodology and selection of Index constituents in hindsight. No hypothetical record can completely account for the impact of financial risk in actual trading. For example, there are numerous factors related to the financial markets in general which cannot be, and have not been, accounted for in the preparation of any Index information set forth, all of which can affect actual performance.

When Cliffwater was unable to determine the nature of a BDC’s investments because of limited information included in historical SEC filings, Cliffwater did not apply the portfolio composition criteria for each Index (a substantial majority (approximately 75%) of reported total assets are represented by direct loans made to corporate borrowers, as categorized by each BDC and subject to Cliffwater’s discretion) to the BDC. All other eligibility criteria were applied to determine whether to include the BDC in the historical Index composition and return. In addition, the criteria regarding the timing of SEC filings was not applied for periods prior to the Launch Date of each Index. CDLI returns generally are published 75 days after calendar quarter-end.

Each Index is derived from sources that are considered reliable, but Cliffwater does not guarantee the veracity, currency, completeness or accuracy of the Index or other information furnished in connection with the Index. An Index may include inaccuracies or typographical errors. Due to various factors, including the inherent possibility of human or mechanical error, the accuracy, completeness, timeliness and correct sequencing of such information and the results obtained from its use are not guaranteed by Cliffwater.

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Benchmark Index Definitions

For each asset class, Cliffwater has selected a benchmark index that it believes is representative of the asset class based on various considerations, including the return/risk characteristics. Below is information regarding the benchmark index that was selected for each asset class.

Stocks – U.S. Stocks: The Russell 3000 Index is a capitalization-weighted stock market index that seeks to track the entire U.S stock market. It measures the performance of the 3,000 largest publicly held companies incorporated in the United States based on market capitalization.

Stocks – Non-U.S. Developed: The MSCI EAFE Index is an equity index which captures large and mid cap representation across developed markets countries around the world, excluding the United States and Canada. With over 900 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

Stocks – Emerging Markets: The MSCI Emerging Markets Index (MSCI EM) captures large and mid cap representation across 23 Emerging Markets (EM) countries. With over 800 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

Stocks – Global Equity: The MSCI All Country World Index (MSCI ACWI) captures large and mid cap representation across 23 developed markets and 23 emerging markets countries. With over 2,400 constituents, the index covers approximately 85% of the global investable equity opportunity set.

Rates – Core U.S. Bonds: The Bloomberg U.S. Aggregate Bond Index represents securities that are SEC-registered, taxable, and dollar denominated. The index covers the U.S. investment grade fixed rate bond market, with index components for government and corporate securities, mortgage pass-through securities, and asset-backed securities.

Rates – IG Corporate: The Bloomberg U.S. Corporate Index represents publicly issued U.S. corporate and specified foreign debentures and secured notes. Securities must be rated investment-grade (Baa3/BBB- or higher) by at least two of the following ratings agencies: Moody's, S&P, Fitch, have at least one year to final maturity regardless of call features and have at least $250 million par amount outstanding.

Rates – 10-yr Treasury: The Bloomberg 10y U.S. Treasury Bellwether Index is a universe of 10-Year U.S. Treasury bonds. The index assumes reinvestment of all distributions and interest payments.

Rates – 10-yr TIPS: The Bloomberg 5-10y U.S. TIPS Index is a universe of 5-10-Year U.S. Treasury Inflation Protected Securities ("TIPS").

Credit – High Yield Bonds: The Bloomberg U.S. Corporate High Yield Index (Bloomberg High Yield) measures the USD-denominated, high yield, fixed-rate corporate bond market. Securities are classified as high yield if the middle rating of Moody's, Fitch and S&P is Ba1/BB+/BB+ or below. Bonds from issuers with an emerging markets country of risk, based on the indices' EM country definition are excluded.

Credit – Bank Loans: The Morningstar LSTA U.S. Leveraged Loan Index is a market value-weighted index designed to measure the performance of the institutional leveraged loan market in the United States based upon market weightings, spreads and interest payments, including Term Loan A, Term Loan B and Second Lien tranches.

Credit – Emerging Market Debt: The J.P. Morgan EMBI Global Diversified Index is a market-capitalization weighted, total-return index tracking the traded market for U.S.-dollar-denominated Brady bonds, Eurobonds, traded loans, and local market debt instruments issued by sovereign and quasi-sovereign entities. It covers more of the eligible instruments than the EMBI limits on secondary market trading liquidity and limits the weights of those index countries with larger debt stocks by only including a specified portion of these countries eligible current face amounts of debt outstanding.

Credit – Public BDCs: The Cliffwater BDC Index measures the performance of lending-oriented, exchange-traded Business Development Companies, subject to certain eligibility criteria. The index is a capitalization-weighted index that is calculated on a daily basis using publicly-available closing share prices and reported dividend payouts.

Real Estate – Public REITS: The FTSE/NAREIT All Equity REITs Index is a free-float adjusted, market capitalization-weighted index of U.S. Equity REITs. Constituents of the Index include all tax-qualified REITs with more than 50 percent of total assets in qualifying real estate assets other than mortgages secured by real property.

Real Estate – Private RE (Unlevered): The NCREIF Property Index is a quarterly time series composite total rate of return measure of investment performance of a very large pool of individual commercial real estate properties acquired in the private market for investment purposes only. All properties in the index have been acquired, at least in part, on behalf of tax-exempt institutional investors.

Real Estate – Private Partnerships: The Cambridge Opportunistic Real Estate Index is based on data compiled from global institutional-quality opportunistic real estate funds, including fully liquidated partnerships, formed between 1988 and 2017.

Private Equity – Diversified: The Cambridge Global Private Equity and Venture Capital Index is based on horizon returns data compiled from global institutional-quality buyout, growth equity, private equity energy, venture capital and mezzanine funds, including fully liquidated partnerships, formed between 1986 and 2017.

Private Equity – Buyout: The Cambridge U.S. Buyout Index is based on horizon returns data compiled from U.S. institutional-quality buyout funds, including fully liquidated partnerships, formed between 1986 and 2017.

Private Equity – Venture Capital: The Cambridge Global Venture Capital Index is based on horizon returns data compiled from global institutional-quality venture capital funds, including fully liquidated partnerships, formed between 1981 and 2017.

Private Equity – Energy: The Cambridge Global Energy Index is based on horizon returns data compiled from global institutional-quality venture capital funds, including fully liquidated partnerships, formed between 1981 and 2017.

Private Debt – Unlevered: The Cliffwater Direct Lending Index (CDLI) seeks to measure the unlevered, gross of fees performance of U.S. middle market corporate loans, as represented by the underlying assets of public and private Business Development Companies, subject to certain eligibility requirements. The index is asset-weighted by reported fair value.

Hedge Funds – Diversified: The HFRI FOF Composite Index tracks the performance of Fund of Funds that invest with multiple managers through funds or managed accounts. The strategy designs a diversified portfolio of managers with the objective of significantly lowering the risk (volatility) of investing with an individual manager.

Hedge Funds – Absolute Return: The HFRI FOF Conservative Index tracks the performance of 'Conservative' Fund of Funds that invest with multiple managers through funds or managed accounts. FOFs classified as 'Conservative' exhibit one or more of the following characteristics: seeks consistent returns by primarily investing in funds that generally engage in more 'conservative' strategies such as Equity Market Neutral, Fixed Income Arbitrage, and Convertible Arbitrage; exhibits a lower historical annual standard deviation than the HFRI Fund of Funds Composite Index.

Hedge Funds – Directional: The HFRI FOF Strategic Index tracks the performance of 'Strategic' Fund of Funds that invest with multiple managers through funds or managed accounts. FOFs classified as 'Strategic' exhibit one or more of the following characteristics: seeks superior returns by primarily investing in funds that generally engage in more opportunistic strategies such as Emerging Markets, Sector specific, and Equity Hedge; exhibits a greater dispersion of returns and higher volatility compared to the HFRI Fund of Funds Composite Index.

Other Real Assets – Commodity Futures: The Bloomberg Commodity Index (BCOM) is calculated on an excess return basis and reflects commodity futures price movements. The index rebalances annually weighted 2/3 by trading volume and 1/3 by world production and weight-caps are applied at the commodity, sector and group level for diversification.

Other Real Assets – MLPs: The Alerian MLP Index is a float-adjusted, capitalization-weighted index, whose constituents represent approximately 85% of total float-adjusted market capitalization of publicly traded Master Limited Partnerships.

Other Real Assets – Farmland: The NCREIF Farmland Property Index is a quarterly time series composite return measure of investment performance of a large pool of individual farmland properties acquired in the private market for investment purposes only. All properties in the Farmland Index have been acquired, at least in part, on behalf of tax-exempt institutional investors.

Other Real Assets – Timber: The NCREIF Timberland Index is a quarterly time series composite return measure of investment performance of a large pool of individual timber properties acquired in the private market for investment purposes only. All properties in the Timberland Index have been acquired, at least in part, on behalf of tax-exempt institutional investors.

Other Real Assets – Infrastructure: The Cambridge Infrastructure Index is based on horizon returns data compiled from institutional-quality infrastructure funds, including fully liquidated partnerships, formed between 1993 and 2017.

Cash – 3M T-bill: The BofA Merrill Lynch U.S. 0-3M Treasury Bill Index tracks the performance of the U.S. dollar denominated U.S. Treasury bills publicly issued in the U.S. domestic market with a remaining term to final maturity of less than 3 months.

Cash – 3M SOFR - 3-Month SOFR futures are consecutive quarterly contracts reflecting SOFR expectations between IMM dates, listings extend out 10 years, providing a term structure to fulfill risk management needs.

Inflation: The CPI-U produced by the Bureau of Labor Statistics tracks monthly changes in the prices paid by urban consumers for a representative basket of goods and services.

Other Indices:

S&P 500: The Standard and Poor's 500 Index is a capitalization-weighted index of 500 stocks. The index is designed to measure performance of the broad domestic economy through changes in the aggregate market value of 500 stocks representing all major industries.

Russell 2000: The Russell 2000 Index is a capitalization-weighted stock market index that seeks to track U.S. small-cap companies. It measures the performance of approximately the 2,000 smallest publicly held companies within the Russell 3000 Index (see above for definition).

HFRI Fund Weighted Composite: The HFRI Fund Weighted Composite Index is a global, equal-weighted index of over 2,000 single-manager funds that report to HFR Database. Constituent funds report monthly net of all fees performance in U.S. Dollars and have a minimum of $50 million under management or a 12-month track record of active performance. The index does not include funds of hedge funds.

S&P GSCI Commodities: The S&P GSCI Index is a tradable, world-production weighted index that is based on the average quantity of production of each commodity in the index, over the last five years of available data that tracks the performance of front-month commodity futures.

Citi WGBI Non-USD: The Citi World Government Bond Index (WGBI) Non-USD Index measures the performance of fixed-rate, local currency, investment grade sovereign bonds, excluding USD denominated securities.

Bloomberg EM USD: The Bloomberg EM USD Index is a hard currency Emerging Markets debt index that includes USD denominated debt from sovereign, quasi-sovereign, and corporate EM issuers. The index is broad-based in its

coverage by sector and by country, and reflects the evolution of EM benchmarking from traditional sovereign bond indices to Aggregate-style benchmarks that are more representative of the EM investment choice set.

Bloomberg U.S. TIPS: The Bloomberg U.S. TIPS index consists of Inflation-Protection securities issued by the U.S. Treasury with at least one year to final maturity and at least $250 million par amount outstanding.

Gold: The Bloomberg XAU ticker serves as our data source for historical spot gold prices.

U.S. Dollar: The U.S. Dollar Index (DXY) is an index of the value of the United States dollar relative to a basket of foreign currencies.