
Verus
PERSPECTIVES
THAT DRIVE
ENTERPRISE
SUCCESS
NOVEMBER 2020
2021 Capital Market Assumptions

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Verus

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Summary

Methodology

CORE INPUTS

— We use a fundamental building block approach based on several inputs, including historical data and academic research to create asset class return forecasts.
— For most asset classes, we use the long-term historical volatility after adjusting for autocorrelation.
— Correlations between asset classes are calculated based on the last 10 years. For illiquid assets, such as private equity and private real estate, we use BarraOne correlation estimates.

Asset	Return Methodology	Volatility Methodology*
Inflation	25% weight to the University of Michigan Survey 5-10 year ahead inflation expectation and the Survey of Professional Forecasters (Fed Survey), and the remaining 50% to the market's expectation for inflation as observed through the 10-year TIPS breakeven rate	-
Cash	75% * current federal funds rate + 25% * U.S. 10-year Treasury yield	Long-term volatility
Bonds	Nominal bonds: current yield; Real bonds: real yield + inflation forecast	Long-term volatility
International Bonds	Current yield	Long-term volatility
Credit	Current option-adjusted spread + U.S. 10-year Treasury – effective default rate	Long-term volatility
International Credit	Current option-adjusted spread + foreign 10-year Treasury – effective default rate	Long-term volatility
Private Credit	Bank loan forecast + 1.75% private credit premium**	Long-term volatility
Equity	Current yield + real earnings growth (historical average) + inflation on earnings (inflation forecast) + expected P/E change	Long-term volatility
Intl Developed Equity	Current yield + real earnings growth (historical average) + inflation on earnings (intl. inflation forecast) + expected P/E change	Long-term volatility
Private Equity	US large cap domestic equity forecast * 1.85 beta adjustment	1.2 * Long-term volatility of U.S. small cap
Commodities	Collateral return (cash) + spot return (inflation forecast) + roll return (assumed to be zero)	Long-term volatility
Hedge Funds	Return coming from traditional betas + 15-year historical idiosyncratic return	Long-term volatility
Core Real Estate	Cap rate + real income growth – capex + inflation forecast	65% of REIT volatility
REITs	Core real estate	Long-term volatility
Value-Add Real Estate	Core real estate + 2%	Volatility to produce Sharpe Ratio (g) equal to core real estate
Opportunistic Real Estate	Core real estate + 4%	Volatility to produce Sharpe Ratio (g) equal to core real estate
Infrastructure	Current yield + real income growth + inflation on earnings (inflation forecast)	Long-term volatility
Risk Parity	Expected Sharpe Ratio * target volatility + cash rate	Target volatility

**Long-term historical volatility data is adjusted for autocorrelation (see Appendix)*

***The private credit premium is generated by illiquidity, issuer size, and lack of credit rating*

10-year return & risk assumptions

Asset Class	Index Proxy	Ten Year Return Forecast Geometric	Ten Year Return Forecast Arithmetic	Standard Deviation Forecast	Sharpe Ratio Forecast (g)	Sharpe Ratio Forecast (a)	10-Year Historical Sharpe Ratio (g)	10-Year Historical Sharpe Ratio (a)
Equities								
U.S. Large	S&P 500	5.1%	6.3%	15.7%	0.31	0.38	0.99	0.99
U.S. Small	Russell 2000	5.2%	7.3%	21.4%	0.23	0.33	0.51	0.58
International Developed	MSCI EAFE	5.2%	6.7%	17.9%	0.28	0.36	0.27	0.34
International Small	MSCI EAFE Small Cap	4.4%	6.7%	22.4%	0.19	0.29	0.43	0.49
Emerging Markets	MSCI EM	5.4%	8.3%	25.5%	0.20	0.32	0.11	0.19
Global Equity	MSCI ACWI	5.2%	6.6%	17.3%	0.29	0.37	0.58	0.62
Private Equity*	Cambridge Private Equity	9.3%	12.1%	28.1%	0.35	0.46	-	-
Fixed Income								
Cash	30 Day T-Bills	0.2%	0.2%	1.2%	-	-	-	-
U.S. TIPS	BBgBarc U.S. TIPS 5-10	1.1%	1.2%	5.3%	0.15	0.18	0.66	0.67
U.S. Treasury	BBgBarc Treasury 7-10 Year	0.7%	0.9%	6.7%	0.07	0.10	0.67	0.68
Global Sovereign ex U.S.	BBgBarc Global Treasury ex U.S.	0.2%	0.6%	9.6%	-0.01	0.04	0.09	0.12
Global Aggregate	BBgBarc Global Aggregate	1.1%	1.3%	6.1%	0.14	0.17	0.38	0.39
Core Fixed Income	BBgBarc U.S. Aggregate Bond	1.5%	1.6%	4.0%	0.31	0.36	1.02	1.01
Core Plus Fixed Income	BBgBarc U.S. Universal	2.2%	2.3%	4.0%	0.49	0.50	1.13	1.12
Short-Term Gov't/Credit	BBgBarc U.S. Gov't/Credit 1-3 Year	0.7%	0.8%	3.6%	0.14	0.16	1.23	1.22
Short-Term Credit	BBgBarc Credit 1-3 Year	1.0%	1.1%	3.6%	0.21	0.23	1.23	1.22
Long-Term Credit	BBgBarc Long U.S. Corporate	2.2%	2.6%	9.3%	0.21	0.25	0.76	0.77
High Yield Corp. Credit	BBgBarc U.S. Corporate High Yield	3.4%	4.0%	11.3%	0.28	0.34	0.82	0.83
Bank Loans	S&P/LSTA Leveraged Loan	2.9%	3.2%	9.5%	0.28	0.32	0.66	0.67
Global Credit	BBgBarc Global Credit	0.3%	0.6%	7.4%	0.01	0.05	0.63	0.64
Emerging Markets Debt (Hard)	JPM EMBI Global Diversified	5.2%	6.0%	12.7%	0.39	0.45	0.60	0.63
Emerging Markets Debt (Local)	JPM GBI-EM Global Diversified	4.3%	5.0%	12.2%	0.33	0.39	-0.01	0.05
Private Credit	Bank Loans + 175bps	4.6%	5.2%	11.2%	0.39	0.45	-	-
Other								
Commodities	Bloomberg Commodity	2.2%	3.4%	15.9%	0.13	0.20	-0.47	-0.41
Hedge Funds*	HFRI Fund Weighted Composite	3.8%	4.1%	7.8%	0.46	0.49	0.47	0.49
Real Estate Debt	BBgBarc CMBS IG	2.2%	2.5%	7.5%	0.26	0.30	1.18	1.17
Core Real Estate	NCREIF Property	5.8%	6.5%	12.6%	0.44	0.50	2.06	1.99
Value-Add Real Estate	NCREIF Property + 200bps	7.8%	9.1%	17.1%	0.44	0.52	-	-
Opportunistic Real Estate	NCREIF Property + 400bps	9.8%	11.8%	21.6%	0.44	0.54	-	-
REITs	Wilshire REIT	5.8%	7.5%	19.3%	0.29	0.38	0.46	0.52
Global Infrastructure	S&P Global Infrastructure	7.8%	9.4%	18.8%	0.40	0.49	0.28	0.35
Risk Parity	Risk Parity	5.2%	5.9%	10.0%	0.50	0.56	-	-
Currency Beta	MSCI Currency Factor Index	1.2%	1.3%	3.5%	0.28	0.30	0.15	0.16
Inflation		2.0%	-	-	-	-	-	-

Investors wishing to produce expected geometric return forecasts for their portfolios should use the arithmetic return forecasts provided here as inputs into that calculation, rather than the single-asset-class geometric return forecasts. This is the industry standard approach, but requires a complex explanation only a heavy quant could love, so we have chosen not to provide further details in this document – we will happily provide those details to any readers of this who are interested.

**Return expectations differ depending on method of implementation*

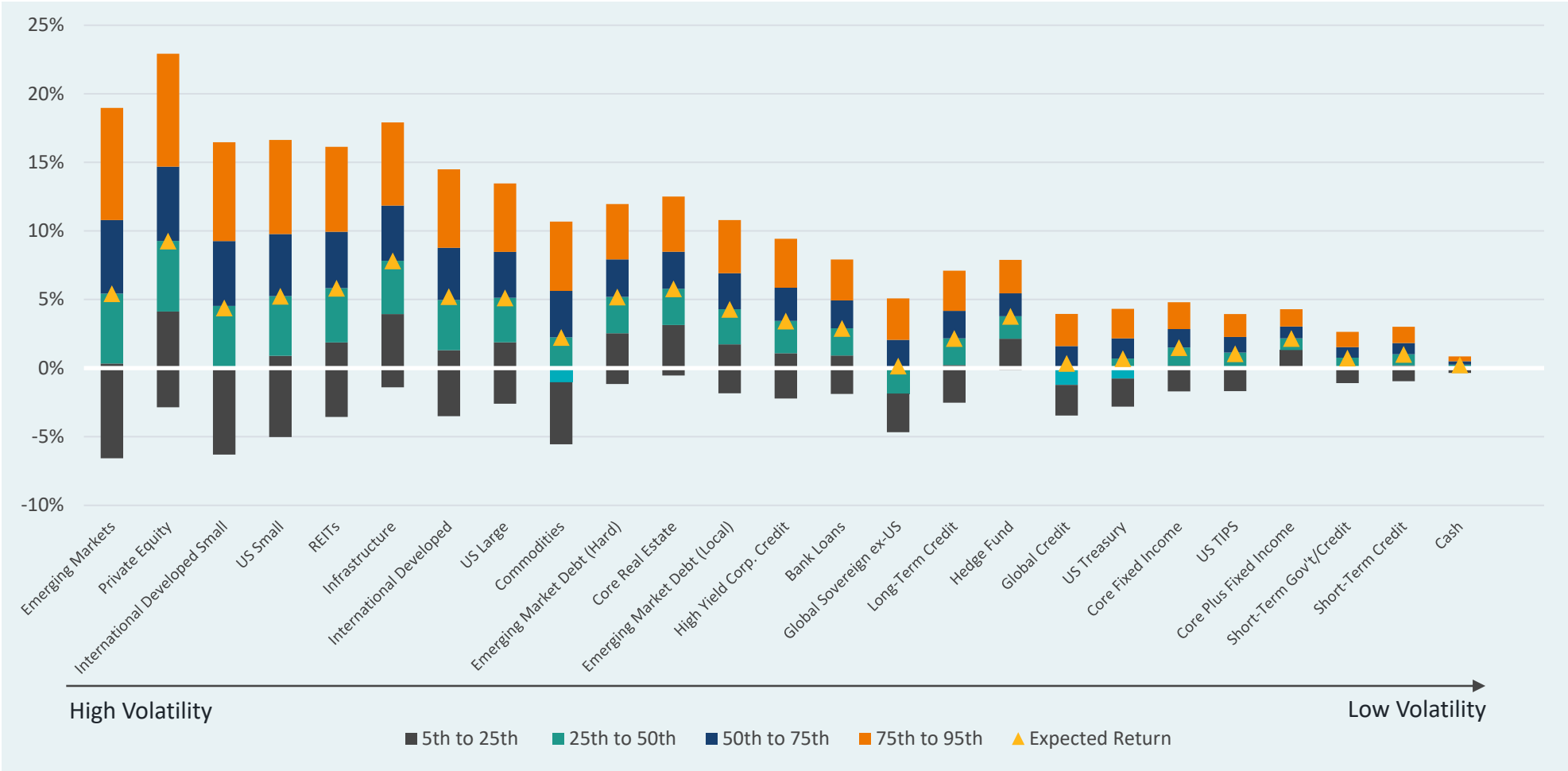
Correlation assumptions

	Cash	US Large	US Small	Intl Large	Intl Small	EM	Global Equity	PE	US TIPS	US Treasury	Global Sovereign ex-US	US Core	Core Plus	Short-Term Gov't/Credit	Short-Term Credit	Long-Term Credit	US HY	Bank Loans	Global Credit	EMD USD	EMD Local	Commodities	Hedge Funds	Real Estate	REITs	Infrastructure	Risk Parity	Currency Beta
Cash	1.0																											
US Large	-0.2	1.0																										
US Small	-0.2	0.9	1.0																									
Intl Large	-0.1	0.9	0.8	1.0																								
Intl Small	-0.2	0.9	0.8	1.0	1.0																							
EM	-0.1	0.7	0.7	0.8	0.8	1.0																						
Global Equity	-0.2	1.0	0.9	1.0	0.9	0.9	1.0																					
PE	-0.2	0.6	0.6	0.6	0.6	0.5	0.7	1.0																				
US TIPS	0.0	0.1	0.1	0.2	0.2	0.3	0.2	0.1	1.0																			
US Treasury	0.2	-0.4	-0.5	-0.4	-0.4	-0.3	-0.4	-0.2	0.7	1.0																		
Global Sovereign ex-US	0.1	0.2	0.1	0.3	0.3	0.5	0.3	0.0	0.6	0.3	1.0																	
US Core	0.1	-0.1	-0.2	-0.1	-0.1	0.1	-0.1	0.0	0.8	0.9	0.5	1.0																
Core Plus	0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.0	0.8	0.7	0.6	0.9	1.0															
Short-Term Gov't/Credit	0.4	-0.1	-0.2	0.0	-0.1	0.1	0.0	-0.2	0.6	0.7	0.5	0.8	0.8	1.0														
Short-Term Credit	0.0	0.4	0.4	0.4	0.4	0.5	0.4	0.0	0.5	0.2	0.5	0.5	0.8	0.7	1.0													
Long-Term Credit	0.0	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.7	0.5	0.5	0.8	0.9	0.5	0.6	1.0												
US HY	-0.2	0.8	0.7	0.8	0.8	0.8	0.8	0.5	0.4	-0.2	0.4	0.2	0.4	0.1	0.7	0.5	1.0											
Bank Loans	-0.3	0.7	0.7	0.6	0.7	0.6	0.7	0.4	0.2	-0.3	0.2	0.0	0.2	0.0	0.6	0.4	0.9	1.0										
Global Credit	-0.1	0.6	0.5	0.7	0.7	0.7	0.7	0.4	0.6	0.1	0.7	0.5	0.6	0.4	0.8	0.7	0.8	0.6	1.0									
EMD USD	-0.2	0.5	0.5	0.6	0.6	0.7	0.6	0.4	0.6	0.1	0.5	0.5	0.6	0.3	0.7	0.6	0.8	0.7	0.9	1.0								
EMD Local	0.0	0.5	0.4	0.7	0.7	0.8	0.7	0.4	0.4	0.0	0.6	0.3	0.4	0.3	0.5	0.4	0.7	0.5	0.8	0.8	1.0							
Commodities	-0.1	0.5	0.5	0.6	0.6	0.6	0.6	0.3	0.2	-0.3	0.4	-0.1	0.0	0.0	0.3	0.1	0.6	0.5	0.5	0.5	0.6	1.0						
Hedge Funds	-0.2	0.8	0.8	0.8	0.9	0.7	0.9	0.6	0.2	-0.4	0.2	0.0	0.2	0.0	0.5	0.3	0.8	0.8	0.7	0.6	0.5	0.5	1.0					
Real Estate	-0.1	0.5	0.5	0.4	0.5	0.4	0.5	0.4	0.1	-0.1	0.1	0.0	-0.1	0.0	0.1	0.0	0.3	0.3	0.4	0.3	0.3	0.3	0.4	1.0				
REITs	-0.2	0.6	0.6	0.6	0.6	0.5	0.6	0.5	0.4	0.1	0.3	0.4	0.4	0.2	0.5	0.5	0.6	0.6	0.7	0.6	0.5	0.4	0.5	0.8	1.0			
Infrastructure	-0.2	0.8	0.7	0.8	0.8	0.7	0.8	0.7	0.4	-0.2	0.5	0.2	0.4	0.2	0.6	0.5	0.8	0.7	0.8	0.8	0.7	0.5	0.7	0.3	0.7	1.0		
Risk Parity	-0.1	0.6	0.6	0.7	0.6	0.6	0.7	0.3	0.4	0.0	0.4	0.2	0.5	0.3	0.6	0.5	0.8	0.6	0.7	0.7	0.6	0.6	0.7	0.0	0.5	0.7	1.0	
Currency Beta	0.0	0.2	0.2	0.1	0.1	0.1	0.2	0.0	0.0	-0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	1.0

Note: Correlation assumptions are based on the last ten years. Private Equity and Real Estate correlations are especially difficult to model – we have therefore used BarraOne correlation data to strengthen these correlation estimates.

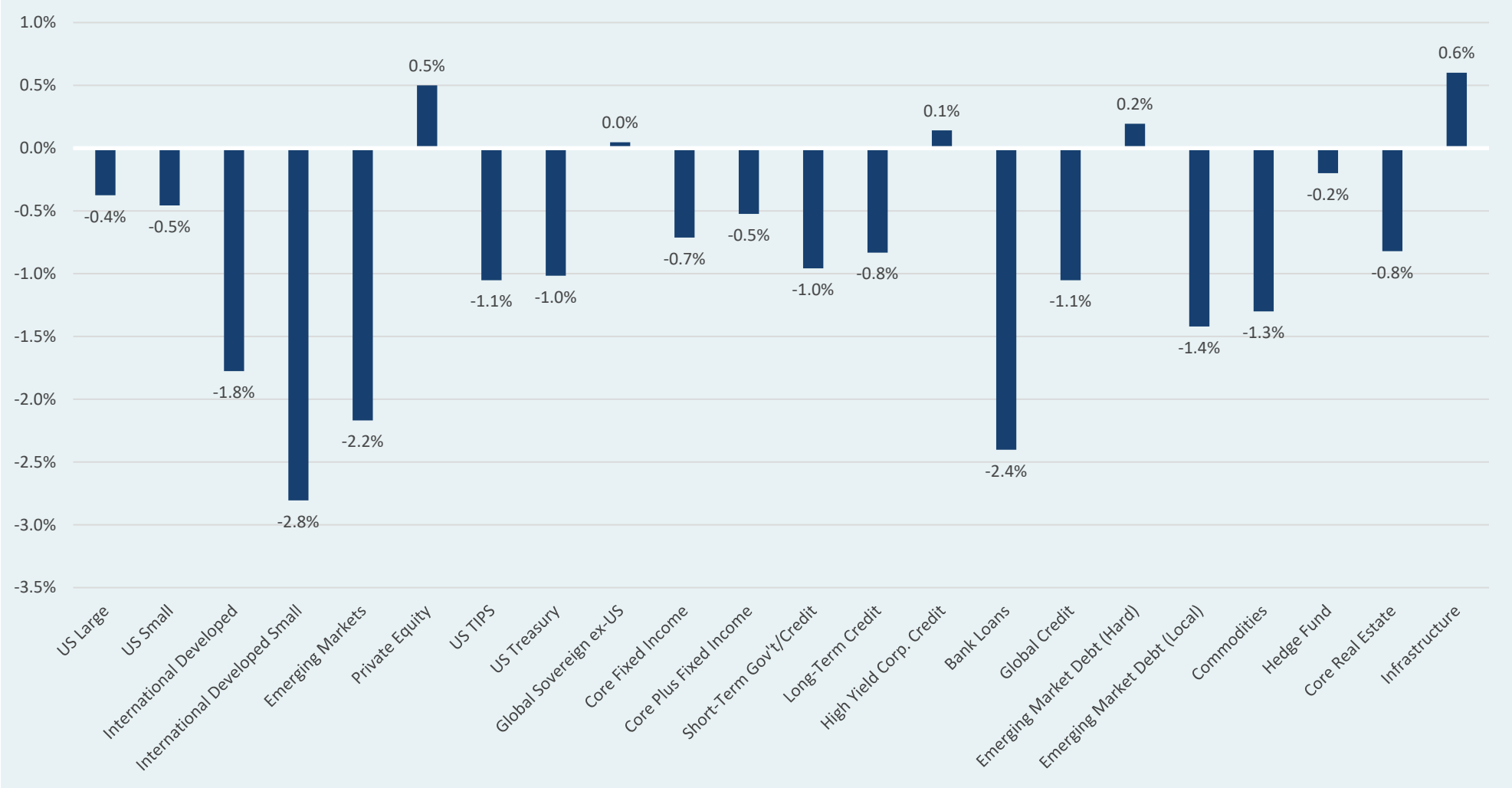
Range of likely 10-year outcomes

10-YEAR RETURN 90% CONFIDENCE INTERVAL



Source: Verus, MPI

2021 vs. 2020 return forecast



Note: year-over-year change of the select group of asset classes above is based on the 2020 CMA methodology

Relevant forecast changes

— Fixed income return expectations fell markedly across most asset classes as bond yields headed towards zero. Equity return expectations also fell due to a corporate earnings recession and quick recovery in prices, both of which pushed valuations significantly higher. Most of our fixed income forecasts are 0.5-1.5% lower, while our equity forecasts are 0.4-2.8% lower.

— Inflation expectations were mixed during the year. The U.S. TIPS breakeven inflation rate increased from 1.5% to 1.7%, and household inflation expectations (University of Michigan) rose from 2.4% to 2.7%. However, the Survey of Professional Forecasters moved in the opposite direction, indicating a decrease from 2.20% to 2.04%. Overall, our inflation forecast increased very slightly from 1.9% to 2.0%. Inflation is an important component of the performance of asset classes such as equities, real estate, and commodities. It is important to note that inflation expectations affect *nominal* returns, rather than *real* returns.

— Credit spreads spiked in March and April as the spread of COVID-19 contributed to extreme market volatility. Although spreads later moved back towards normal levels, they remain elevated and supportive of long-term return expectations. Core fixed income spreads increased from 62 bps to 90 bps, and high yield spreads rose from 396 bps to 551 bps.

— The yield curve fell as the Federal Reserve brought interest rates down to zero. The short end of the curve felt most of this move, though the longer end of the curve was also considerably impacted. As indicated by the Federal Reserve, interest rates will likely be kept at 0% for the foreseeable future. The three-month U.S. dollar LIBOR reference rate fell from 2.09% to 0.23%.

— Emerging market hard and local currency debt forecasts were mixed. Hard currency-denominated debt spreads to U.S. Treasury yields jumped from 351 bps to 471 bps, although the broader 1% fall in interest rates brought expectations down commensurately, leading to little overall change. The yield of local-denominated debt fell from 6.0% to 4.6% alongside the broader fixed income market.

All data cited above is as of 9/30/20

Inflation

Inflation

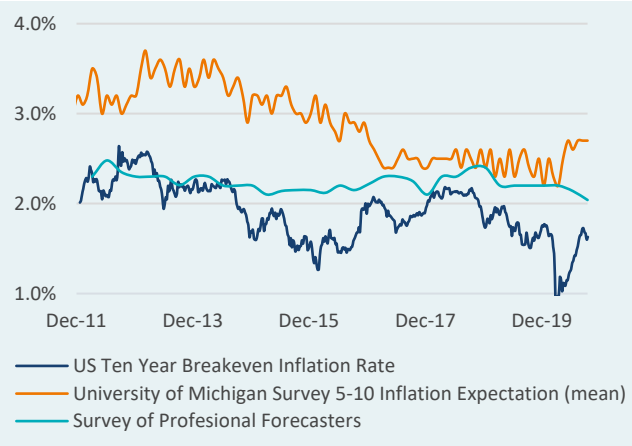
We use a weighted average of market expectations (50%), consumer expectations (25%), and professional forecasts (25%) to create a 10-year inflation forecast. The market's expectations for 10-year inflation can be inferred by taking the difference between the U.S. 10-year Treasury yield and the 10-year Treasury Inflation-Protected (TIPS) yield (referred to as the breakeven inflation rate).

Inflation fell suddenly in the first half of 2020 as COVID-19 led to a global economic slowdown. In the third quarter inflation increased to a normal level as the broader economic recovered. Investors generally expect the low inflation environment to continue well into the future.

Consumer inflation expectations decoupled from investor inflation expectations during the year. While investors are pricing lower-for-longer inflation, American households are expecting 2.7% long-term inflation—the highest forecast since 2016. Inflation expectations from the Survey of Professional Forecasters fell from 2.20% to 2.04% over the year.

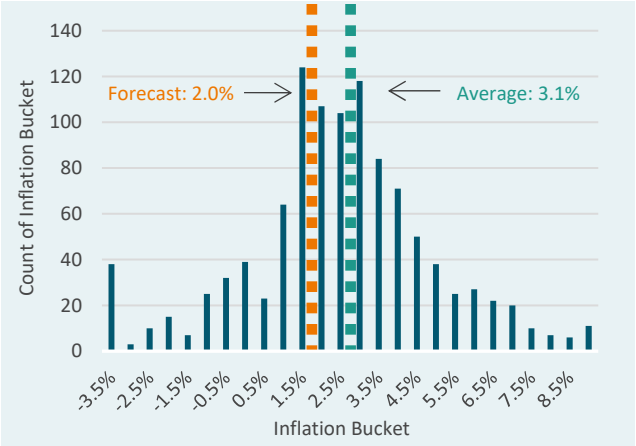
Our inflation forecast increased very slightly from 1.9% to 2.0%.

INFLATION EXPECTATIONS



Source: U. of Michigan, Philly Fed, as of 9/30/20

U.S. 10-YR ROLLING AVERAGE INFLATION SINCE 1923



Source: Bloomberg, as of 9/30/20

FORECAST

	10-Year Forecast
University of Michigan Survey *(25% weight)*	+2.7%
Survey of Professional Forecasters *(25% weight)*	+2.0%
US 10-Year TIPS Breakeven Rate *(50% weight)*	+1.6%
Inflation Forecast	2.0%

Source: Verus, as of 9/30/20

Fixed income

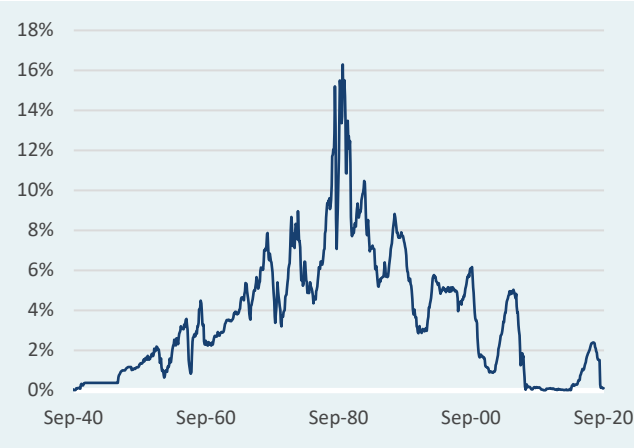
Cash

The U.S. Treasury yield curve collapsed to nearly zero in the first half of 2020, but the curve retained steepness similar to that experienced in recent years. Unprecedented monetary policy and central bank involvement in the markets has led bond yields towards zero, or negative, in most developed countries. As indicated by the Federal Reserve, interest rates will likely be kept at 0% for the foreseeable future. This brings the real cash rate deeply negative.

The return of cash seems to have decoupled from the rate of inflation in the current environment, as zero or negative interest rates have become the new normal. We believe that the current federal funds rate, as well as the steepness of the U.S. Treasury yield curve, may provide guidance regarding the future longer-term cash return. We place a 75% forecasting weight on the current federal funds rate and a 25% weight to the 10-year U.S. Treasury.

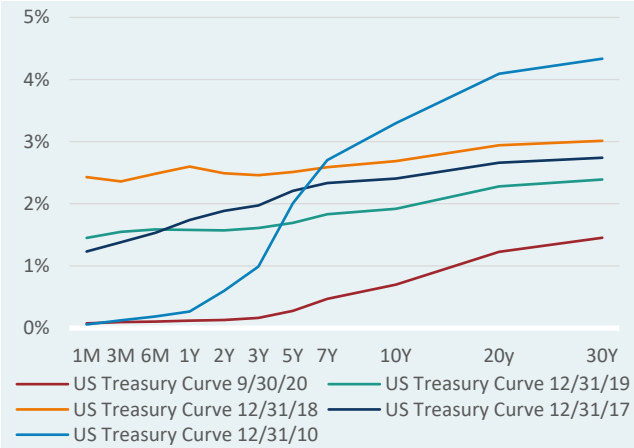
Applying these relationships result in a 10-year cash forecast of 0.2%.

CASH YIELD (3-MONTH T-BILL)



Source: FRED, as of 9/30/20

U.S. TREASURY YIELD CURVE



Source: Bloomberg, as of 9/30/20

FORECAST

	10-Year Forecast
Cash	+0.2%
Inflation Forecast	-2.0%
Real Return	-1.8%

Source: Verus, as of 9/30/20

Rates

We forecast the return from rates based upon the current 10-year Treasury yield, with all cash flows reinvested at the current yield. The 10-year yield fell from 1.7% to 0.7% through September.

U.S. Treasury yields remain high relative to other developed nations, specifically Japan and Germany, though less so since U.S. rates collapsed during the COVID-19 pandemic. Investors generally believe U.S. yields will stay lower-for-longer, though the Federal Reserve has expressed no interest in bringing rates into negative territory, which may limit significant downward movement from this point. The U.S. yield curve remains surprisingly flat.

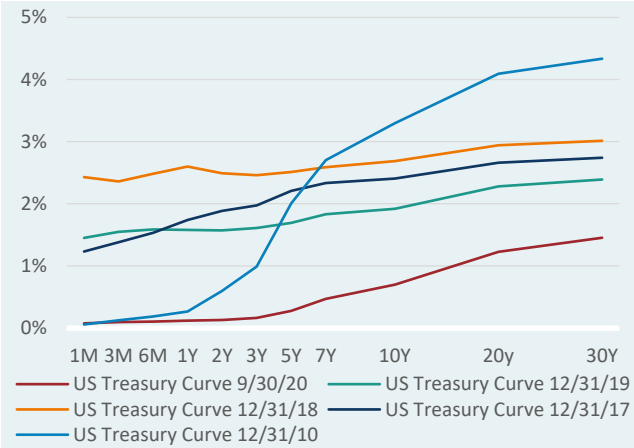
Developed world central banks have began to recognize the limitations of monetary policy in spurring economic growth, and many have commented on the need for greater fiscal policy support. It appears that interest rates in many countries have hit or are close to hitting a natural floor.

Our expectations are for a 0.7% return over the next ten years, in line with the current U.S. 10-year Treasury yield.

U.S. 10-YR TREASURY YIELD

Source: Bloomberg, as of 9/30/20

U.S. TREASURY YIELD CURVE



Source: Bloomberg, as of 9/30/20

FORECAST

	10-Year Forecast
U.S. 10-Year Treasury	+0.7%
Inflation Forecast	-2.0%
Real Return	-1.3%

Source: Verus, as of 9/30/20

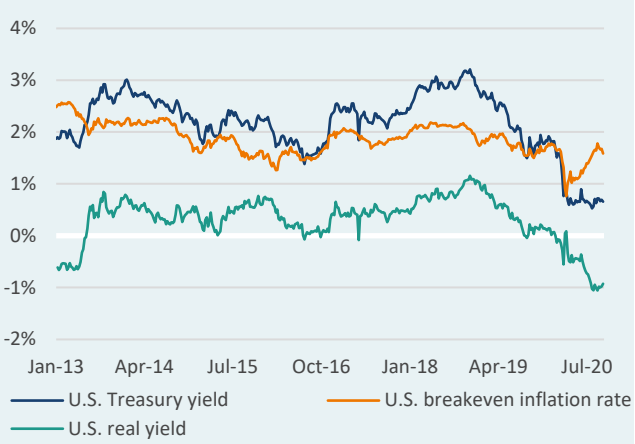
Real rates

TIPS provide high sensitivity to duration (interest rate risk) over short periods and track inflation (CPI) fairly well over longer periods. Changing inflation expectations, demand for inflation protection, and rate movements contribute to the price volatility of TIPS. Currently, future inflation is expected to be mild, there is low demand for inflation protection, and interest rates arguably cannot move much lower.

The U.S. 10-year real yield fell into deeply negative territory in 2020, along with falling interest rates. While inflation expectations bounced back in Q3 to prior levels, interest rates have stayed depressed. The breakeven inflation rate bottomed at 0.5% in March, but recovered to 1.64% in the third quarter.

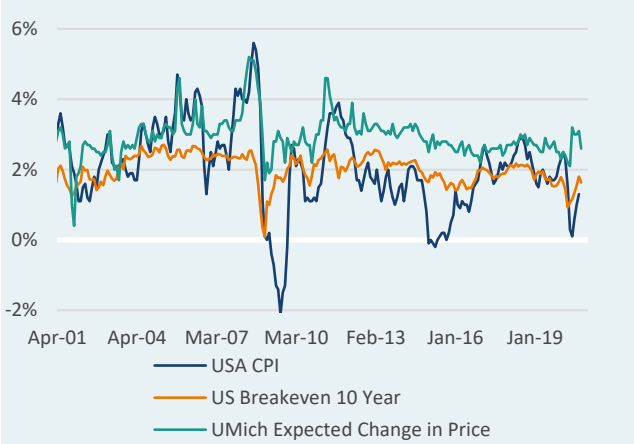
To arrive at a nominal 10-year forecast, we add the current real TIPS yield to our 10-year inflation forecast. Our real rates forecast fell into deeply negative territory from 0.14% to -0.95% as nominal interest rate collapsed and inflation expectations are relatively unchanged from one year prior.

NOMINAL YIELD VS. REAL



Source: Bloomberg, as of 9/30/20

INFLATION EXPECTATIONS



Source: Bloomberg, as of 9/30/20

FORECAST

	10-Year Forecast
U.S. 10-Year TIPS Real Yield	-0.95%
Inflation Forecast	+2.00%
Nominal Return	1.05%

Source: Verus, as of 9/30/20

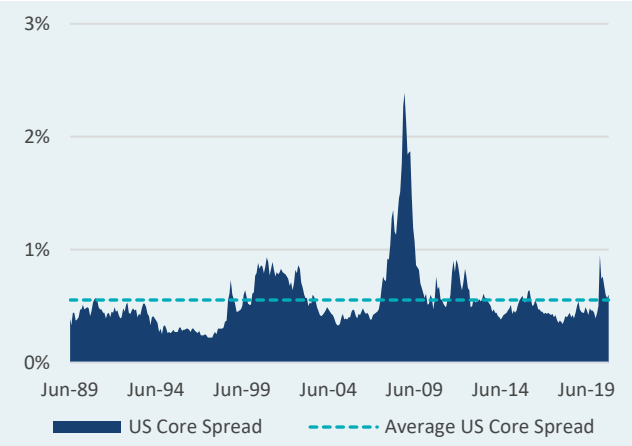
Core fixed

Credit fixed income return is composed of a bond term premium (duration) and credit spread. The bond term premium is represented by the 10-year U.S. Treasury yield.

We use default rates and credit spreads for each respective fixed income category to provide our 10-year return forecast. Our default rate assumption is derived from a variety of sources, including historical data and academic research. The effective default that is subtracted from the return forecast is based on our assumed default and recovery rates.

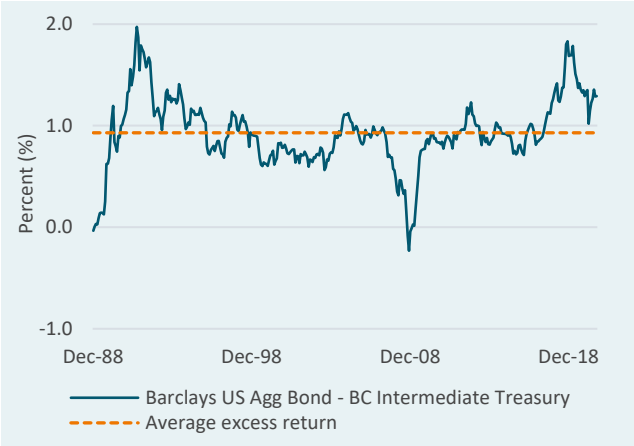
Core fixed income spreads increased from 62 bps to 90 bps over the year, but remain below the 30-year average of 1.25%. Although higher credit spreads have bolstered core fixed income expectations slightly, materially lower interest rates had a greater impact, bringing our forecast from 2.2% to 1.5%.

U.S. CORE CREDIT SPREAD



Source: Barclays, as of 9/30/20

ROLLING EXCESS RETURN (10-YR)



Source: Barclays, as of 9/30/20

FORECAST

	10-Year Forecast
Barclays U.S. Option-Adjusted Spread	+0.9%
Effective Default	-0.1%
U.S. 10-Year Treasury	+0.7%
Nominal Return	1.5%
Inflation Forecast	-2.0%
Real Return	-0.5%

Source: Verus, as of 9/30/20

Credit summary

	Core	Long-Term Credit	Global Credit	High Yield*	Bank Loans*	EM Debt (USD)	EM Debt (Local)	Private Credit	Real Estate Debt
Index	BBgBarc U.S. Aggregate	BBgBarc Long U.S. Corporate	BBgBarc Global Credit	BBgBarc U.S. High Yield	S&P LSTA	JPM EMBI	JPM GBI-EM	S&P LTSA + 1.75%	BBgBarc CMBS IG
Method	OAS + U.S. 10-Year	OAS + U.S. 10-Year	OAS + Global 10-Year Treasuries	OAS + U.S. 10-Year	LIBOR + Spread	OAS + U.S. 10-Year	Current Yield	Bank Loans+ 1.75% private premium	LIBOR + Spread
Spread to	Intermediate U.S. Treasury	Long-Term U.S. Treasury	Global Long-Term Treasuries	Intermediate U.S. Treasury	LIBOR	Intermediate U.S. Treasury	-	-	LIBOR
Default Assumption	-0.5%	-4.5%	-3.0%	-	-	-0.5%	-0.5%	-	-3.7%
Recovery Assumption	80%	95%	40%	-	-	60%	40%	-	47%
Spread	0.9%	1.7%	1.7%	5.5%	5.3%	4.7%	-	-	4.0%
Yield	-	-	-	-	-	-	4.6%	-	-
Risk Free Yield	0.7%	0.7%	0.4%	0.7%	0.2%	0.7%	-	-	0.2%
Effective Default	-0.1%	-0.2%	-1.8%	-2.8%	-2.6%	-0.2%	-0.3%	-	-2.0%
Nominal Return	1.5%	2.2%	0.3%	3.4%	2.9%	5.2%	4.3%	4.6%	2.2%
Inflation Forecast	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Real Return	-0.5%	0.2%	-1.6%	1.4%	0.9%	3.2%	2.3%	2.6%	0.2%

**We assume half of the spread of higher risk credit will be lost to defaults, as this has roughly been the case throughout history.*

Source: Verus

Equities

Equities

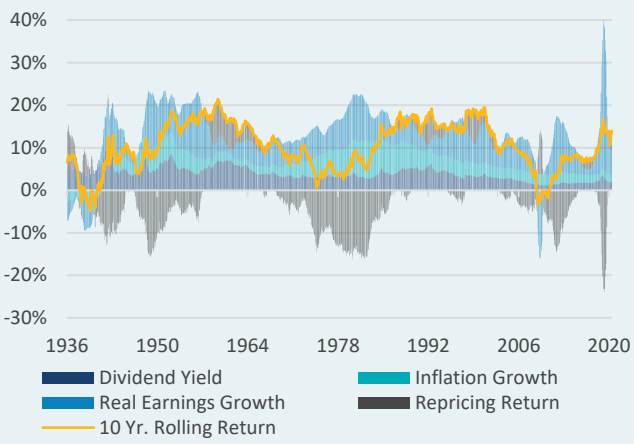
Investment returns in the equity space can be broken down into earnings growth, dividend yield, inflation, and repricing. Over the very long-term, repricing represents a small portion of return to equity investors, but over shorter time frames, the impacts on return can vary considerably.

If investors are willing to pay more for earnings, it could signal that investors are more confident in positive earnings growth going forward, while the opposite is true if investors pay less for earnings. It is somewhat surprising that investor confidence varies so much given that the long-term earnings growth is relatively stable.

Investor confidence in earnings growth can be measured using both the Shiller P/E ratio and the trailing 12-month P/E ratio. We take an average of these two valuations metrics when determining our repricing assumption. In short, if the P/E ratio is too high (low) relative to history, we expect future returns to be lower (higher) than the long-term average. Implicit in this analysis is the assumption that P/E's will exhibit mild mean reversion over 10 years.

We make a conservative repricing estimate given how widely repricing can vary over time. We then skew the repricing adjustment because the percentage change in index price is larger with each incremental rise in valuations when P/E's are low, compared to when they are high.

TRAILING 10-YR S&P 500 RETURN COMPOSITION



Source: Shiller, Standard & Poor's, as of 6/30/20

U.S. LARGE SHILLER P/E

Source: Shiller, S&P 500, as of 9/30/20

P/E REPRICING ASSUMPTION

Average P/E Percentile Bucket	Lower P/E	Upper P/E	Repricing Assumption
Lower 10%	-	10	2.00%
10% - 20%	10	13	1.50%
20% - 30%	13	15	0.75%
30% - 45%	15	18	0.50%
45% - 55%	18	19	0.0%
55% - 70%	19	21	-0.25%
70% - 80%	21	22	-0.50%
80% - 90%	22	24	-0.75%
Top 10%	24	-	-1.00%

Source: Verus

Global equity

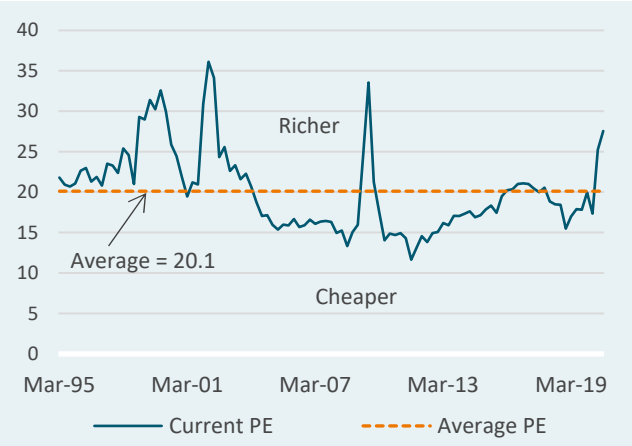
Global Equity is a combination of U.S. large, international developed, and emerging market equities. We can therefore combine our existing return forecasts for each of these asset classes to arrive at our global equity return forecast.

We use the MSCI ACWI Index as our benchmark for global equity and apply the country weights of this index to determine the weightings for our global equity return calculation. As with other equity asset classes, we use the historical standard deviation of the benchmark (MSCI ACWI Index) for our volatility forecast.

The valuation of global equities are driven by the richness/cheapness of the underlying markets, as indicated by the current price-to-earnings ratio.

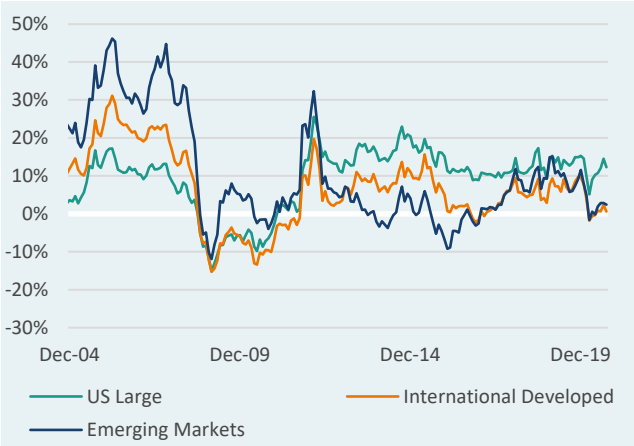
Our return building blocks produce a local return forecast for international equities. For investors who wish to incorporate market implied currency movements into the return forecast, please see the adjustments and explanation in the Appendix.

GLOBAL EQUITY P/E RATIO HISTORY



Source: MSCI, as of 9/30/20

MARKET PERFORMANCE (3-YR ROLLING)



Source: MSCI, Standard & Poor's, as of 9/30/20

FORECAST

Market	Weight	CMA return
U.S. Large	60%	5.1%
Developed Large	29%	5.2%
Emerging Markets	11%	5.4%
Global Equity Forecast		5.2%

Source: Verus, weights rescaled to equal 100%, as of 9/30/20

Equity summary

	U.S. Large	U.S. Small	EAFE	EAFE Small	EM
Index	S&P 500	Russell 2000	MSCI EAFE Large	MSCI EAFE Small	MSCI EM
Method	Building Block Approach: current dividend yield + historical average real earnings growth + inflation on earnings + repricing				
Current Shiller P/E Ratio	30.8	43.1	17.0	-	11.2
Regular P/E Ratio	26.0	13,764**	34.6	28.6	20.1
2020 Shiller P/E Change	+6.2%	-4.4%	-2.9%	-	+6.7%
2020 Regular P/E Change	+33.3%	+33,571%	+207.1%	+53%	+51.1%
Current Shiller P/E Percentile Rank	86%	91%	32%	-	34%
Current Regular P/E Percentile Rank	94%	100%	97%	63%*	93%
Average of P/E Methods' Percentile Rank	90%	95%	64%	63%*	63%
2020 YTD Return	5.6%	-8.7%	-7.1%	-4.2%	-1.2%
Shiller PE History	1982	1988	1982	Not Enough History	2005
Long-Term Average Shiller P/E	23.1	31.4	22.4	-	14.8
Current Dividend Yield	1.8%	1.3%	2.8%	2.3%	2.3%
Long-Term Average Real Earnings Growth	2.4%	2.9%	1.8%	1.6%	1.4%
Inflation on Earnings	2.0%	2.0%	0.8%	0.8%	2.0%
Repricing Effect (Estimate)	-1.0%	-1.0%	-0.3%	-0.3%	-0.3%
Nominal Return	5.1%	5.2%	5.2%	4.4%	5.4%
Inflation Forecast	2.0%	2.0%	0.8%	0.8%	2.0%
Real Return	3.1%	3.2%	4.4%	3.6%	3.4%

Data as of 9/30/20

**Average trailing P/E from previous 12 months is used*

***Earnings have fallen to nearly zero, which is the cause of this extremely high figure (the denominator of the Price/Earnings equation is nearly zero)*

NOTE: For all equities, we exclude data prior to 1972, which allows for a more appropriate comparison between data sets

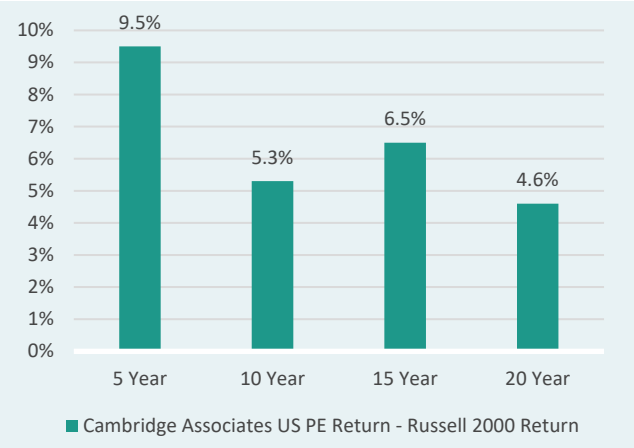
Private equity

Private equity and public equity returns have been correlated historically because the underlying economic forces driving these asset class returns are quite similar. The return relationship between the two can vary in the short-term, but over the long-term investors have received a premium, driven by leverage, concentrated factor exposure (smaller and undervalued companies), skill, and possibly illiquidity.

Historically, the beta of private equity relative to public equities has been high. We use a beta assumption of 1.85 to U.S. large cap equities in our capital market forecast.

Private equity performance typically differs based on the implementation approach. We provide a 10-year forecast for the entire private equity universe of 9.3%. Direct private equity programs have historically outperformed the broader universe by approximately 1.0%, and we forecast direct private equity accordingly with a forecast of 10.3%. Private equity fund-of-fund (FoF) programs have historically lagged the universe by 1.0%, and we forecast private equity fund-of-funds at 8.3% to reflect this drag.

PRIVATE EQUITY EXCESS RETURN (PE – U.S. SMALL CAP EQUITY)



Source: Cambridge, Russell, as of 3/31/20

PRIVATE EQUITY IMPLEMENTATION FORECASTS

	10-Year Forecast
Private Equity Universe Forecast	9.3%
Private Equity FoF Forecast	8.3%
Private Equity Direct Forecast	10.3%

Source: Verus, as of 9/30/20

PRIVATE EQUITY UNIVERSE FORECAST

	10-Year Forecast
U.S. Large Cap Forecast	+5.1%
1.85 Beta Multiplier	+4.2%
Nominal Return	9.3%
Inflation Forecast	-2.0%
Real Return	7.3%

Source: Verus, as of 9/30/20

Real assets / alternatives

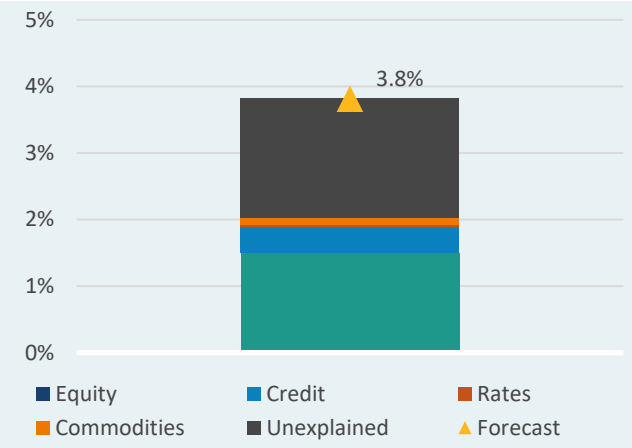
Hedge funds

Hedge fund performance variation through time can be partly explained by public market betas (ex: equity, rates, credit, etc.) and partly explained by non-public sources of return (ex: alternative betas, skill, luck). Certain hedge funds can be mostly explained by public market betas, while others are driven mostly by non-public sources of return. We do not believe hedge funds should be thought of as an asset class, and in most cases we recommend benchmarking and modeling individual hedge funds in line with the underlying asset class exposure set (equity hedge funds modeled as equity exposure, fixed income hedge funds modeled as fixed income exposure, etc.) Our forecast for "hedge funds" that we show here can be thought of as a forecast of the broad universe of hedge funds.

To forecast hedge fund returns, we identified the portion of historical hedge fund performance that can be attributed to public market betas, and the portion of hedge fund returns that cannot be attributed to public market beta. This means our forecast has two components: the public market return (explained return) and the non-public market return (unexplained return).

To forecast the public market beta portion of hedge funds, we take the historical sensitivity of hedge funds to equity, rates, credit, and commodities and pair these with our current 10-year public market forecasts for each asset class. To forecast the non-public market return portion of hedge funds (unexplained return) we simply assume the historical performance contribution of these sources will continue.

HEDGE FUND FORECAST



Source: Verus, as of 9/30/20

HEDGE FUND PUBLIC MARKET SOURCES OF RETURN (EXPLAINED RETURN)
Equity
Rates
Credit
Commodities

HEDGE FUND NON-PUBLIC SOURCES OF RETURN (UNEXPLAINED RETURN)
Alternative betas
Skill
Luck

Source: Verus

FORECAST

	10-Year Forecast
Public Market % of Return	+2.0%
Non-Public Market % of Return	+1.8%
Nominal Return	+3.8%
Inflation Forecast	-2.0%
Real Return	+1.8%

Source: Verus, as of 9/30/20

Private core real estate/REITS

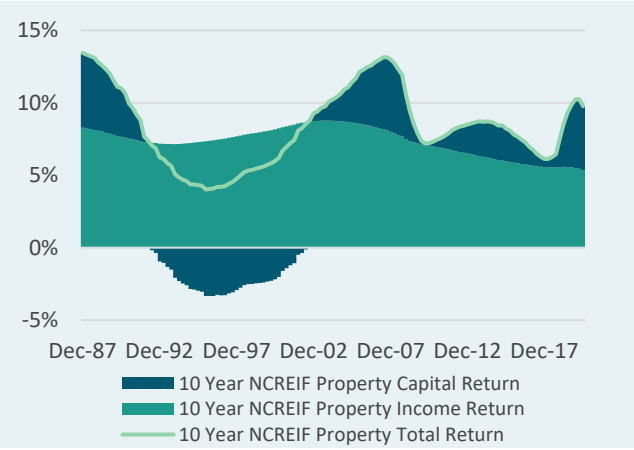
Performance of the NCREIF property index can be decomposed into an income return (cap rate) and capital return. The return coming from income has historically been more stable than the return derived from capital changes.

The cap rate is the ratio of earnings less expenses to price and does not include extraordinary expenses. A more accurate measure of the yield investors receive should include non-recurring capital expenditures; we assume a 2.0% capex expenditure. We also assume income growth will roughly equal the rate of broad economic growth, and we use GDP forecasts as an estimate for future income growth.

Private real estate and REITs have provided very similar returns over the long-term. Investors should be careful when comparing risk-adjusted returns of publicly traded assets to returns of appraisal priced assets, due to data problems and smoothing effects. While private real estate appears to be less volatile than REITs, the true risks to investors are likely very similar.

We assume the effects of leverage and liquidity offset each other. Therefore, our return forecast is the same for private real estate and REITs.

TRAILING 10-YR NCREIF RETURN COMPOSITION



Source: NCREIF, as of 6/30/20

PRIVATE REAL ESTATE

	Private Real Estate 10-Year Forecast
Current Cap Rate	+4.1%
Real Income Growth	+1.7%
Capex Assumption	-2.0%
Inflation	+2.0%
Nominal Return	5.8%
Inflation Forecast	-2.0%
Real Return	3.8%

Source: Verus, as of 9/30/20

REITS

	10-Year Forecast
Nominal Return Forecast	5.8%
Inflation Forecast	-2.0%
Real Return	3.8%

Source: Verus, as of 9/30/20

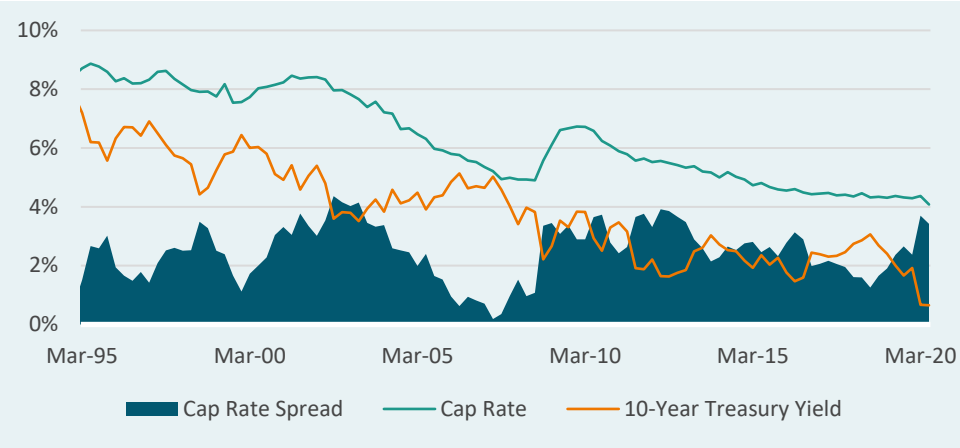
Value-add & opportunistic real estate

Value-add real estate includes properties which are in need of renovation, repositioning, and/or lease-up. Properties may also be classified as value-add due to their lower quality and/or location. Opportunistic real estate can also include development and distressed or very complex transactions. Greater amounts of leverage are usually employed within these strategies. Leverage increases beta (risk) by expanding the purchasing power of property managers via a greater debt load, which magnifies gains or losses. Increased debt also results in greater interest rate sensitivity. An increase/decrease in interest rates may result in a write-up/write-down of fixed rate debt, since debt holdings are typically marked-to-market.

Performance of value-add real estate is composed of the underlying private real estate market returns, plus a premium for additional associated risk, which is modeled here as 200 bps above our core real estate return forecast. Performance of opportunistic real estate strategies rests further out on the risk spectrum, and is modeled as 400 bps above the core real estate return forecast.

Additional expected returns above core real estate are justified by the higher inherent risk of properties which need improvement (operational or physical), price discounts built into properties located in non-core markets, illiquidity, and the ability of real estate managers to potentially source attractive deals in this less-than-efficient marketplace.

CAP RATE SPREADS



Source: NCREIF, Bloomberg, as of 6/30/20

FORECAST

	Value-Add 10-Year Forecast	Opportunistic 10-Year Forecast
Premium above core	+2.0%	+4.0%
Current Cap Rate	+4.1%	+4.1%
Real Income Growth	+1.7%	+1.7%
Capex Assumption	-2.0%	-2.0%
Inflation	+2.0%	+2.0%
Nominal Return	7.8%	9.8%
Inflation Forecast	-2.0%	-2.0%
Real Return	5.8%	7.8%

Source: Verus, as of 9/30/20

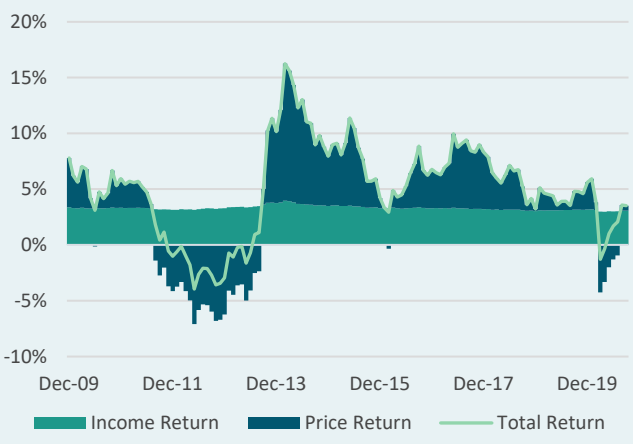
Infrastructure

Infrastructure includes a variety of investment types across a subset of industries. There is not one definition for what can be included within infrastructure. The asset class has grown dramatically during the last decade as investors sought assets that might provide more attractive yield relative to fixed income along with the potential for inflation protection.

Similar to real estate investment, income plays a significant role in the returns which investors receive. Income yields are currently lower than average due to higher prices and competition in the space, which might reasonably be expected to translate into lower expected future returns.

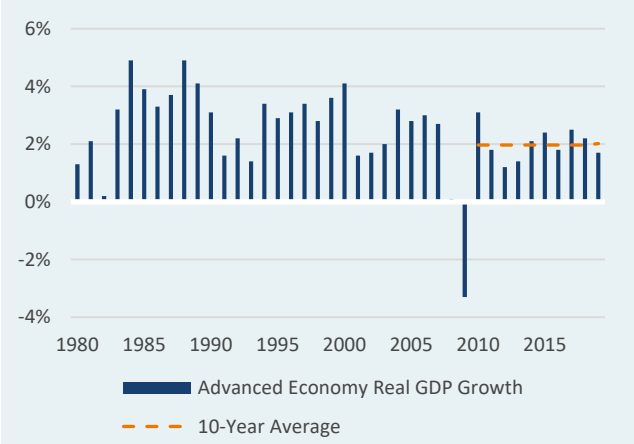
Due to the discount rate effect, infrastructure asset valuations would generally be negatively affected by material increases in interest rates. Because leverage is used in this space, higher interest rates would also impact investors in the form of higher borrowing costs.

5-YR ROLLING RETURN COMPOSITION



Source: S&P Global Infrastructure Index, as of 9/30/20

ADVANCED ECONOMY REAL GDP GROWTH



Source: IMF, as of 9/30/20

FORECAST

	10-Year Forecast
Inflation	1.7%
Yield	4.1%
Income Growth	2.0%
Nominal Return	7.8%
Global Inflation Forecast	-1.7%
Real Return	6.2%

Source: Verus, as of 9/30/20

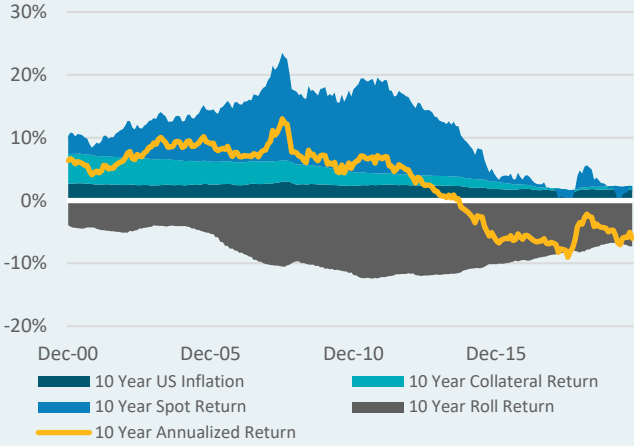
Commodities

Commodity returns can be decomposed into three sources: collateral return (cash), spot changes (inflation), and roll yield.

Roll return is generated by either backwardation or contango present in futures markets. Backwardation occurs when the futures price is below the spot price, which results in positive yield. Contango occurs when the futures price is above the spot price, and this results in a loss to commodity investors. Historically, futures markets have fluctuated between backwardation and contango but with a net-zero effect over the very long-term (since 1877). Therefore, roll return is assumed to be zero in our forecast. Over the most recent 10-year period, roll return has been negative, though this is likely the result of multiple commodity crises and a difficult market environment.

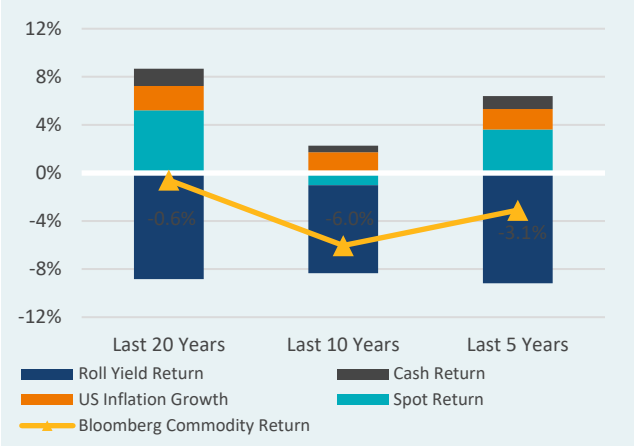
Our 10-year commodity forecast combines collateral (cash) return with spot return (inflation) to arrive at the nominal return, and subtracts out inflation to arrive at the real return.

TRAILING 10YR BLOOMBERG COMMODITY RETURN COMPOSITION (%)



Source: MPI, Bloomberg, as of 9/30/20

BLOOMBERG COMMODITY RETURN COMPOSITION (%)



Source: MPI, Bloomberg, as of 9/30/20

FORECAST

	10-Year Forecast
Collateral Return (Cash)	+0.2%
Roll Return	+0.0%
Spot Return (Inflation)	+2.0%
Nominal Return	2.2%
Inflation Forecast	-2.0%
Real Return	0.2%

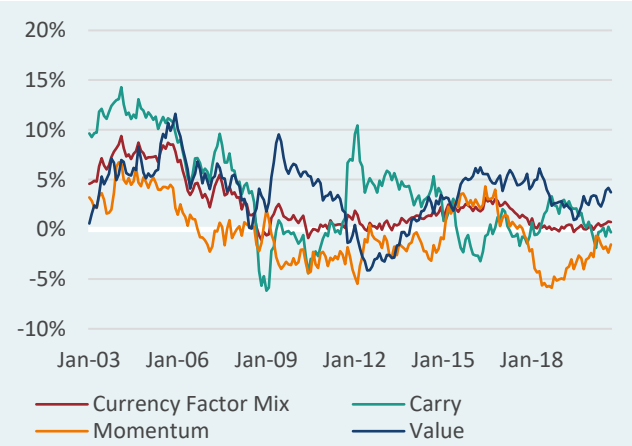
Source: Verus, as of 9/30/20

Currency beta

Currency beta is a long-short portfolio of G10 currencies constructed by investing in three equally weighted factors: carry, momentum, and value. A significant amount of academic research has concluded that these factors demand a risk premium in the currency market. Studies have also shown that currency beta explains a high portion of active currency managers' returns, indicating it may be a good neutral starting point or benchmark for currency investing. Currency beta portfolios gain exposure to the carry, momentum, and value factors in a systematic and transparent manner. For more detailed information on currency beta, please contact your consultant.

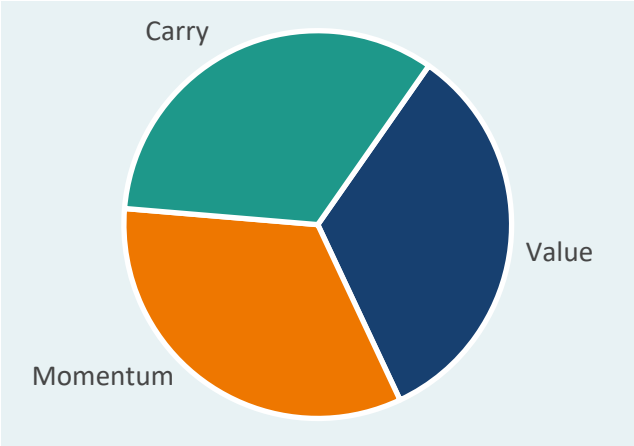
We model each factor in the currency beta portfolio separately, and then take a weighted average to get an overall return forecast. For the carry portfolio, the main driver of returns is the yield an investor receives from holding currencies with relatively higher interest rates. We therefore use a 12-month average of the portfolio's yield as the expected return. For value, our return forecast assumes a certain level of mean reversion to PPP fair value based on historical data. Lastly, for momentum, we simply assume the average historical return due to lack of long-term fundamental return drivers. Short-term volatility levels typically drive returns in the momentum portfolio, which is difficult to model in a 10-year return forecast.

3-YEAR ROLLING PERFORMANCE



Source: MSCI, as of 9/30/20

CURRENCY BETA CONSTRUCTION



Source: Verus

RETURN FORECAST

Factor	Weight	Return Forecast	Weighted return
Carry	33.3%	1.5%	0.5%
Momentum	33.3%	-0.5%	-0.17%
Value	33.3%	2.6%	0.9%
Currency Beta			**1.2%**

Source: Verus, as of 9/30/20

Risk parity

Risk parity is built upon the philosophy of allocating to risk premia rather than to asset classes. Because risk parity by definition aims to diversify risk, the actual asset allocation can appear very different from traditional asset class allocation.

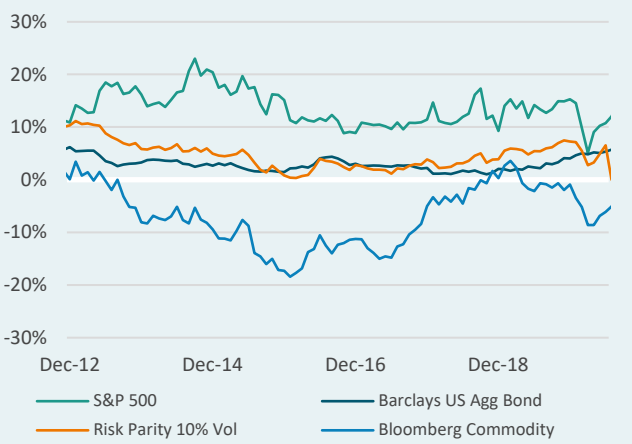
We model risk parity using an assumed Sharpe Ratio of 0.5, which considers the historical performance of risk parity. This assumed Sharpe Ratio is higher than other asset class forecasts, but is consistent with these forecasts because *portfolios* of assets tend to deliver materially higher Sharpe Ratios than individual assets. An assumed Sharpe Ratio of 0.5 brings us to an expected return of 5.2%.

The expected return of Risk Parity is determined by this Sharpe Ratio forecast, along with a 10% volatility assumption.

We used the S&P Risk Parity 10% Volatility Index to represent risk parity correlations relative to the behaviors of each asset class. Risk parity funds are suggested to be better able to withstand various difficult economic environments - reducing volatility without sacrificing return, over longer periods.

It is difficult to arrive at a single model for risk parity , since strategies can differ significantly across firms/strategies. Risk parity almost always requires explicit leverage. The amount of leverage will depend on the specific strategy implementation style, as well as expected correlations and volatility.

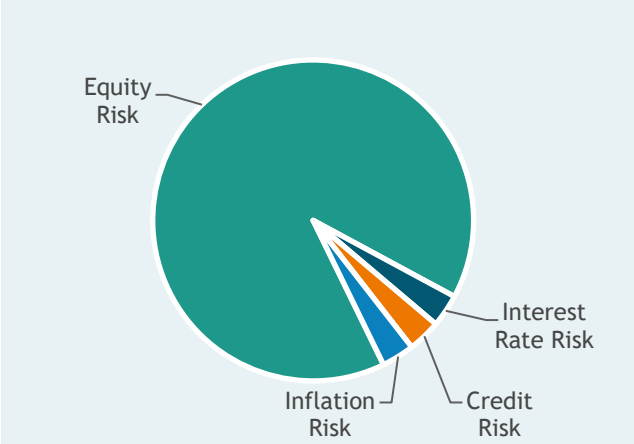
VS. TRADITIONAL ASSET CLASSES (3YR ROLLING)



Source: MPI, as of 6/30/20

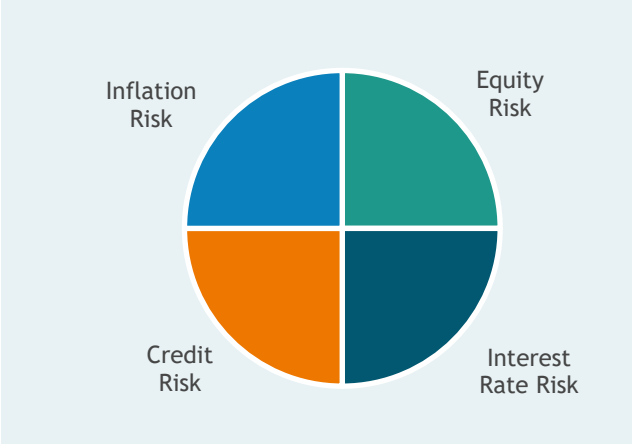
Note: Risk parity is modeled here as S&P Risk Parity 10% Vol Index

TRADITIONAL ASSET ALLOCATION



Source: Verus

RISK PARITY



Source: Verus

Appendix

30-year return & risk assumptions

— Occasionally investors may have a specific need for longer-term capital market forecasts. We have developed a set of 30-year assumptions to meet those needs.
— The return forecasts below have been constructed using our existing building block approach, but with longer-term inputs. Risks and correlations are estimated using the same approach as our 10-year forecasts, using full-history autocorrelation-adjusted realized risk and past 10 year realized correlations.
— These return figures must be thought of separately from our 10-year forecasts, and are not meant to imply performance for the 20 years *beyond* our 10 year forecasts.
— Please reach out to your Verus consultant with questions regarding whether 30-year Capital Market Assumptions might be appropriate for your needs.

Asset Class	Index Proxy	Thirty Year Return Forecast		Standard Deviation Forecast	Sharpe Ratio Forecast (g)	Sharpe Ratio Forecast (a)
		Geometric	Arithmetic			
Equities						
U.S. Large	S&P 500	5.5%	6.7%	15.7%	0.33	0.40
U.S. Small	Russell 2000	5.7%	7.7%	21.4%	0.24	0.34
International Developed	MSCI EAFE	5.4%	6.9%	17.9%	0.28	0.36
International Small	MSCI EAFE Small Cap	4.5%	6.8%	22.4%	0.18	0.28
Emerging Markets	MSCI EM	5.4%	8.3%	25.5%	0.19	0.31
Global Equity	MSCI ACWI	5.4%	6.7%	17.3%	0.28	0.36
Private Equity*	Cambridge Private Equity	9.9%	12.7%	25.7%	0.37	0.48
Fixed Income						
Cash	30 Day T-Bills	0.4%	0.4%	1.2%	-	-
U.S. TIPS	BBgBarc U.S. TIPS 5 - 10	1.5%	1.6%	5.3%	0.19	0.22
U.S. Treasury	BBgBarc Treasury 7-10 Year	1.5%	1.7%	6.7%	0.15	0.18
U.S. 30-year Treasuries	BBgBarc U.S. Treasury 20+ Year	1.5%	2.2%	12.6%	0.08	0.14
Global Sovereign ex U.S.	BBgBarc Global Treasury ex U.S.	0.7%	1.2%	9.6%	0.03	0.07
Global Aggregate	BBgBarc Global Aggregate	1.2%	1.4%	6.1%	0.12	0.15
Core Fixed Income	BBgBarc U.S. Aggregate Bond	2.4%	2.5%	4.0%	0.48	0.53
Core Plus Fixed Income	BBgBarc U.S. Corporate IG	3.0%	3.1%	4.0%	0.65	0.66
Short-Term Gov't/Credit	BBgBarc U.S. Gov't/Credit 1 - 3 year	1.6%	1.7%	3.6%	0.33	0.35
Short-Term Credit	BBgBarc Credit 1-3 Year	2.3%	2.3%	3.6%	0.52	0.53
Long-Term Credit	BBgBarc Long U.S. Corporate	2.9%	3.4%	9.3%	0.27	0.31
High Yield Corp. Credit	BBgBarc U.S. Corporate High Yield	4.3%	4.9%	11.3%	0.34	0.39
Bank Loans	S&P/LSTA Leveraged Loan	2.4%	2.8%	9.5%	0.21	0.25
Global Credit	BBgBarc Global Credit	1.0%	1.3%	7.4%	0.08	0.12
Emerging Markets Debt (Hard)	JPM EMBI Global Diversified	5.7%	6.5%	12.7%	0.42	0.48
Emerging Markets Debt (Local)	JPM GBI EM Global Diversified	4.3%	5.0%	12.2%	0.31	0.37
Private Credit	Bank Loans + 175bps	4.1%	4.7%	11.2%	0.33	0.38
Other						
Commodities	Bloomberg Commodity	2.2%	3.4%	15.9%	0.11	0.19
Hedge Funds*	HFRI Fund Weighted Composite	4.3%	4.6%	7.8%	0.49	0.53
Real Estate Debt	BBgBarc IG CMBS	2.2%	2.5%	7.5%	0.24	0.28
Core Real Estate	NCREIF Property	5.6%	6.3%	12.6%	0.41	0.47
Value-Add Real Estate	NCREIF Property + 200bps	7.6%	8.9%	17.1%	0.42	0.49
Opportunistic Real Estate	NCREIF Property + 400bps	9.6%	11.6%	21.6%	0.42	0.52
REITs	Wilshire REIT	5.6%	7.3%	19.3%	0.27	0.35
Global Infrastructure	S&P Global Infrastructure	7.8%	9.4%	18.8%	0.39	0.48
Risk Parity	Risk Parity	5.4%	5.9%	10.0%	0.50	0.55
Currency Beta	MSCI Currency Factor Index	2.3%	2.4%	3.5%	0.53	0.55
Inflation		1.8%	-	-	-	-

Investors wishing to produce expected geometric return forecasts for their portfolios should use the arithmetic return forecasts provided here as inputs into that calculation, rather than the single-asset-class geometric return forecasts. This is the industry standard approach, but requires a complex explanation only a heavy quant could love, so we have chosen not to provide further details in this document – we will happily provide those details to any readers of this who are interested.

**Private Equity and Hedge Fund return expectations differ if implemented through a direct program versus a fund of funds vehicle*

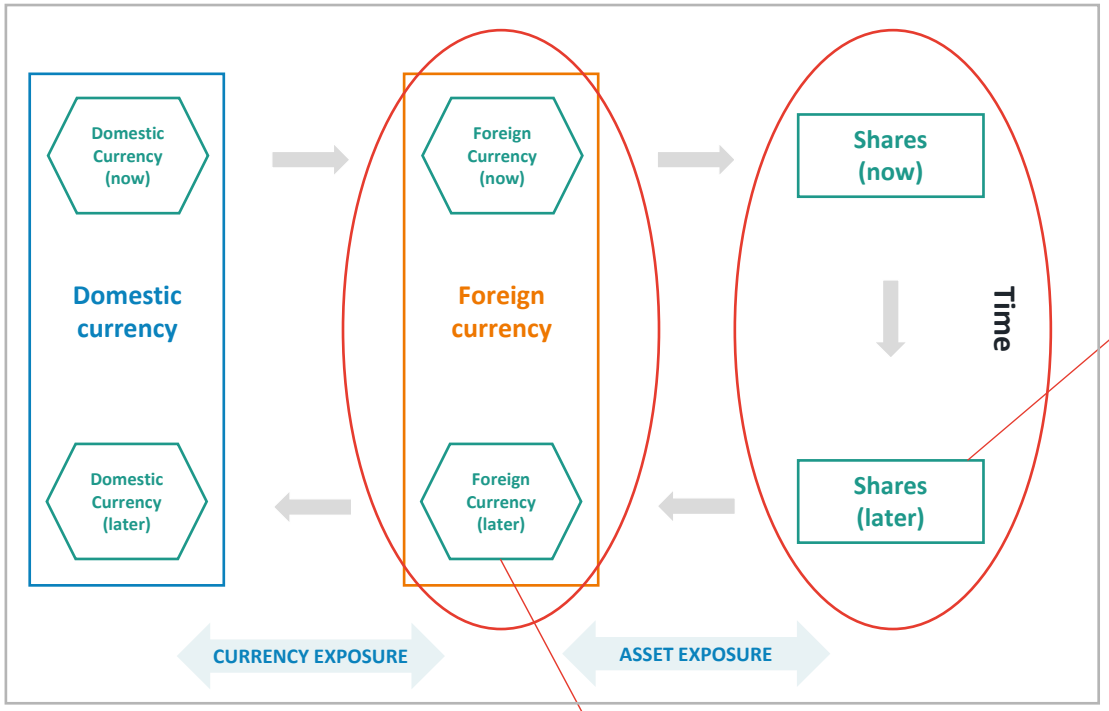
10-year return forecasts with currency adjustment

Asset Class	Index Proxy	Ten Year Return Forecast (Geometric)			Standard Deviation Forecast
		CMA Forecast	Currency Adjustment	Total	
Equities					
International Developed Equity Unhedged	MSCI EAFE	5.2%	1.0%	6.3%	17.9%
International Developed Equity Hedged	MSCI EAFE Hedged	5.2%	1.0%	6.2%	15.9%
International Small Equity Unhedged	MSCI EAFE Small Cap	4.4%	1.0%	5.4%	22.4%
International Small Equity Hedged	MSCI EAFE Small Cap Hedged	4.4%	1.0%	5.4%	19.7%
Fixed Income					
Global Sovereign ex U.S. Unhedged	BBgBarc Global Treasury ex U.S.	0.2%	0.9%	1.1%	9.6%
Global Sovereign ex U.S. Hedged	BBgBarc Global Treasury ex U.S. Hedged	0.2%	0.9%	1.1%	3.8%
Global Credit Unhedged	BBgBarc Global Credit	0.3%	0.3%	0.6%	7.4%
Global Credit Hedged	BBgBarc Global Credit Hedged	0.3%	0.3%	0.6%	5.0%

The currency adjustment is the market implied price change for major currency pairs based on forward contract pricing. Since the market implied spot price change and the cost/gain from hedging are both derived from pricing in the forward market, they are one and the same. Therefore, the currency adjustment is the same for both unhedged and hedged forecasts. See the following slides for the more detail on the currency adjustment methodology.

Explanation of the currency adjustment

Our fundamental building block approach produces a return forecast in local currency. In order to create useable forecasts for non-U.S. dollar-denominated assets, we must make an assumption about future foreign exchange rates.



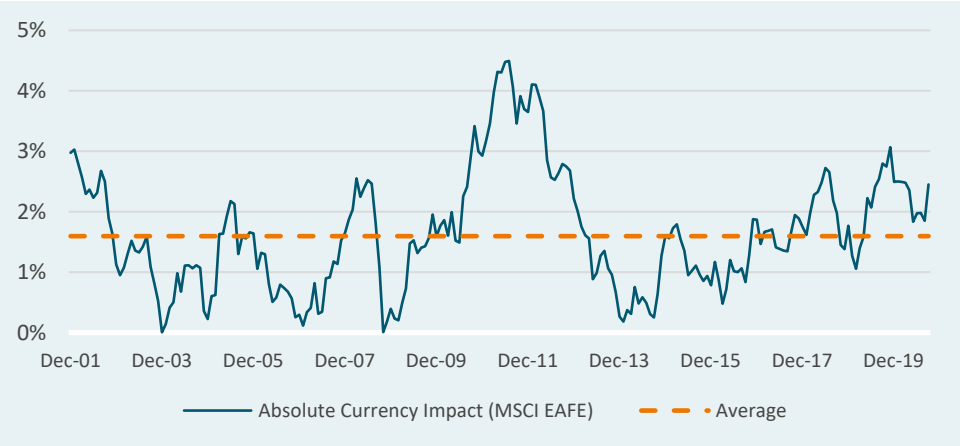
Step 1: Forecast the expected return of the foreign asset in local currency terms

Step 2: Make an assumption on the ending foreign currency exchange rate

Explanation of the currency adjustment

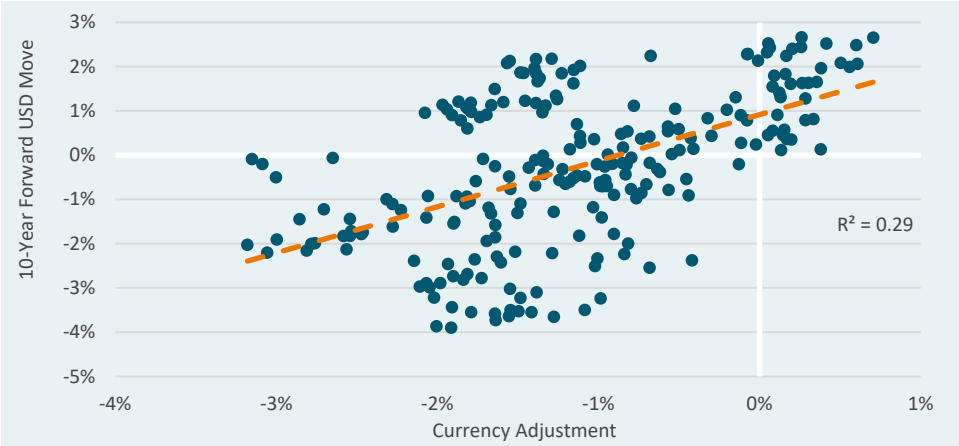
— There are two options to adjust a local currency return forecast to a U.S. dollar forecast: make a specific exchange rate forecast or take market pricing based on the forward curve
  - It is important to note that ignoring currency is making a specific assumption that the current exchange rate will be unchanged over the next 10 years, which has rarely been the case throughout history
— Markets price future exchange rates in the forward market, which represents the SPOT currency price for FORWARD delivery
— Forward currency contracts are priced based on the interest rate differential between two currencies – interest rate differentials reflect a significant amount of information, including growth, inflation, and monetary policy expectations
— A currency with a higher interest rate is priced to depreciate relative to a currency with a lower interest rate
— We adjust our local currency return forecasts based on forward market pricing because we believe this is the neutral, "no opinion" position, rather than making a specific forecast
— Historically, this currency adjustment has had a positive relationship with 10-year forward exchange rate movements

10-YEAR ROLLING ABSOLUTE CURRENCY PERFORMANCE IMPACT



Source: Verus, MSCI, as of 9/30/20

CURRENCY ADJUSTMENT VS. FORWARD USD MOVEMENT



Source: Verus, Bloomberg, using data since 1989, based on the MSCI EAFE Index

Autocorrelation adjustment

- We adjust all volatility forecasts that use the long-term historical volatility for autocorrelation.
- Autocorrelation occurs when the future returns of a time series are described (positively correlated) by past returns.
- Time series with positive autocorrelation exhibit artificially low volatility, while time series with negative autocorrelation exhibit artificially high volatility.
- Many asset classes that we tested showed positive autocorrelation, meaning the volatility forecasts that we use in the forecasting process are too low for those asset classes.
- The result of this process was that several asset classes have higher volatility forecasts than if we had made no adjustment for autocorrelation.

Russell 2000 autocorrelation, among many asset classes, is statistically significant

Notices & disclosures

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