



Board of Retirement Regular Meeting

Sacramento County Employees' Retirement System

Agenda Item 17

MEETING DATE: December 18, 2019

SUBJECT: Capital Market Assumptions

SUBMITTED FOR: Consent Deliberation and Action Receive and File

RECOMMENDATION

Staff and Verus recommend the Board receive and file the presentation showing Verus' updated capital market assumptions, and the impact on the risk/returns expectations for SCERS' strategic asset allocation (SAA).

PURPOSE

This item contributes to the effective management and oversight of investment activities.

BACKGROUND

Investment consultants typically generate capital market assumptions (CMAs) annually. CMAs combine 10-year return and standard deviation forecasts for the major segments of asset classes, and also incorporate correlations across assets. Verus develops these assumptions for nearly all segments of the investable universe. The CMAs are used as inputs in asset allocation modeling and the designing of a strategic asset allocation. During the asset liability modeling process, CMAs are applied to various allocations, to arrive at risk and return forecasts for different asset mixes.

Verus recently updated its CMAs for 2020, and will present them at a high level to the Board. The presentation will focus on the methodology utilized to calculate them. For Verus, the general methodology (pages 3-5 of the presentations) is a building blocks approach where the sum of the building blocks equals the expected return of the asset class. Common building block measures for major asset classes include:

- Bonds: yields, inflation forecasts, spreads, and default rates.
- Equities: current yield, historical earnings growth, inflation forecasts, and expected valuation (P/E changes).
- Core real estate: cap rates, real income growth (net of capex), and inflation forecasts.
- Infrastructure: current yield, real income growth, and inflation on earnings.

Private market asset classes use a build-up/spread methodology, which takes the return for a public market equivalent and adds an illiquidity spread premium, as shown on page 5 of the presentation.

The presentation shows the 10-year expected return for a variety of assets, as well as the predicted range of outcomes around the forecasts (pages 6 and 7). The range is tied to volatility, meaning, the higher the range the higher the expected volatility.

Some key takeaways from Verus' expected returns and volatility are:

- There are only five assets that are expected to generate a return at or higher than SCERS' 7.0% assumed rate of return.
 - Private equity; emerging market equities, infrastructure, international developed small cap equities, and international developed market equities.
- Safe haven fixed income/bond assets (Treasuries; core/core plus fixed income; government credit) are expected to return less than 3%.
- Equities (public and private) have the highest range of outcomes (volatility), while fixed income and hedge funds tend to have a lower range of outcomes, which is why the latter often play the role of diversifier within a portfolio.

Detailed forecasts are shown for each of the major asset classes on pages 8-19 of the presentation.

SCERS' Portfolio Expectations

Given that CMAs change from year to year, Verus has also input the updated CMAs into SCERS' current strategic asset allocation, to provide visibility where SCERS stands from a risk/return perspective relative to our 7.0% assumed rate of return. Please note that Verus incorporated CMAs from Cliffwater for the Absolute Return and Real Assets segments, to be consistent with prior modeling in 2016 and 2019. Cliffwater has separate CMAs for growth and diversifying absolute return funds, and for the more granular segments of real assets, such as energy, infrastructure, and agriculture.

A key point to note on slide 20 of the presentation are the drivers of return of an institutional investment portfolio over varying points in time. In 2005, a 50/50 split between U.S. fixed income and public equities had a reasonable expectation to meet a 7% actuarial rate of return. In the years prior to this, fixed income represented an even higher allocation, as yield expectations on bonds were sufficient to meet assumed rates of return. With yields currently under 2% for most bonds, and equities having shown the negative impact they can have on a portfolio in a volatile market environment, most institutional portfolios have shifted to reduced allocations to equities and bonds, and increasing allocations to alternative investments, including private markets, to meet assumed rates of returns. Alternative assets play the role of enhancing returns, increasing cash flows, and improving diversification.

The presentation shows the 2020 return forecasts compared to the 2019 forecasts (page 22). Other than U.S. and International small cap equities and core real estate, all assets saw their

forecasted returns decrease over the year. This is heavily due to increasing valuations and tightening spreads across asset classes, as well as reduced growth expectations.

The reduced return expectations and higher valuations have an impact on SCERS' strategic asset allocation, as shown on slide 23. The last time that Verus calculated SCERS' risk/return characteristics was in June of 2019, using 2019 CMAs, when SCERS made a couple of asset allocation adjustments (added a cash allocation and converted the commodities allocation to a liquid real return allocation). The forecasted 10-year return at that time was 6.83%, with a 10.75% standard deviation, equating to a Sharpe Ratio of 0.48. Using the updated 2020 Verus CMAs, SCERS' forecasted 10-year return drops to 6.48%, with a higher standard deviation of 11.1% and a Sharpe Ratio of 0.46.

It should be noted that CMAs are fluid and change year to year; the aforementioned figures are individual data points in a much wider range of potential outcomes. However, it does point to a trend of reduced return expectations and higher risk expectations as we get later in the cycle and markets continue to rise. This could impact SCERS' ability to meet its current assumed rate of return of 7%.

CONSIDERATIONS/NEXT STEPS

SCERS' actuarial consultant, Segal Advisory, is scheduled to conduct a triennial experience study on SCERS' plan during the spring of 2020. The study typically concludes with a recommended actuarial rate of return (discount rate). The recommendation is based on several assumptions from the asset and liability sides, including CMAs. The CMAs come from a broad group of investment consultants (Verus included).

Another intermediate-term project to note is the next asset liability modeling (ALM) study. The last ALM study occurred in 2016, with an approval in early 2017. SCERS' Master Investment Policy Statement (IPs) identifies conducting an ALM study every 3-5 years. Staff and Verus expect to begin work on the next ALM study in 2021. Both the CMAs and any revisions to the actuarial rate of return will be inputs into the modeling study. Given the number of changes to SCERS' strategic asset allocation that occurred over the past two ALM studies, Staff and Verus don't anticipate major changes during the next study. However, if the actuarial rate of return were to remain at 7%, the current strategic asset allocation could potentially fall short of expectations, which could entail considering more meaningful adjustments to the asset allocation to enhance return expectations.

ATTACHMENT

- Verus Capital Markets Assumption presentation

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/S/

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Reviewed by:

/S/

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**PERSPECTIVES
THAT DRIVE
ENTERPRISE
SUCCESS**



DECEMBER 2019

Sacramento County Employees' Retirement System

Capital Market Assumptions

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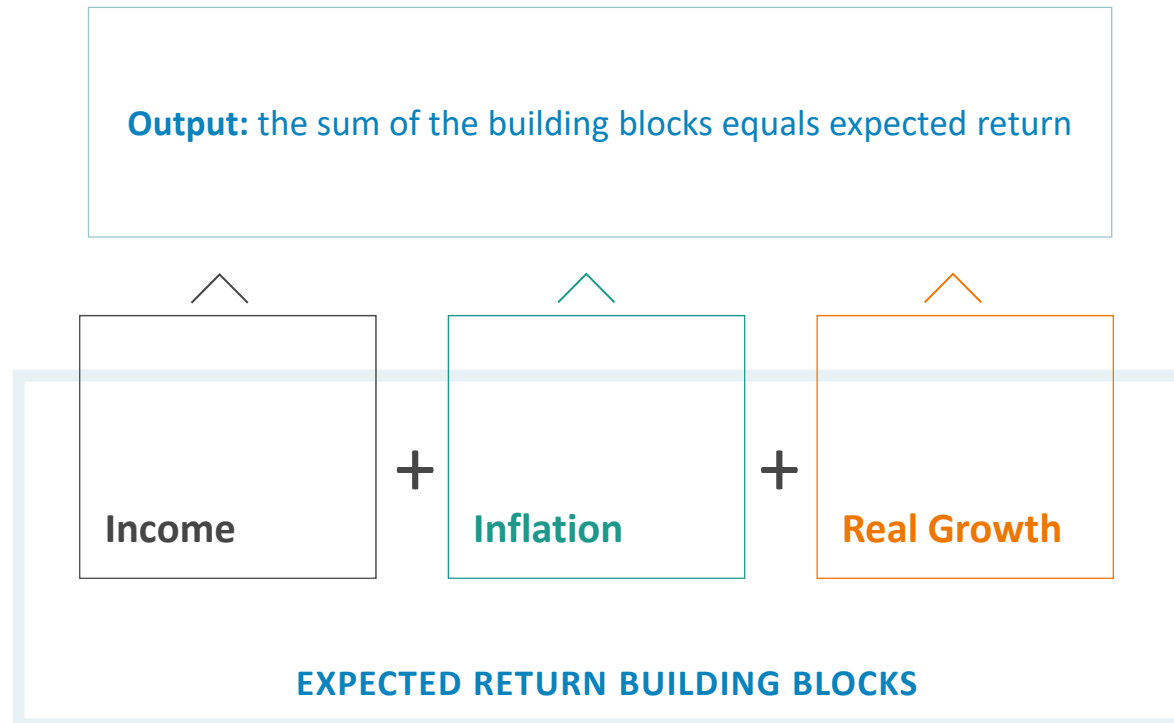
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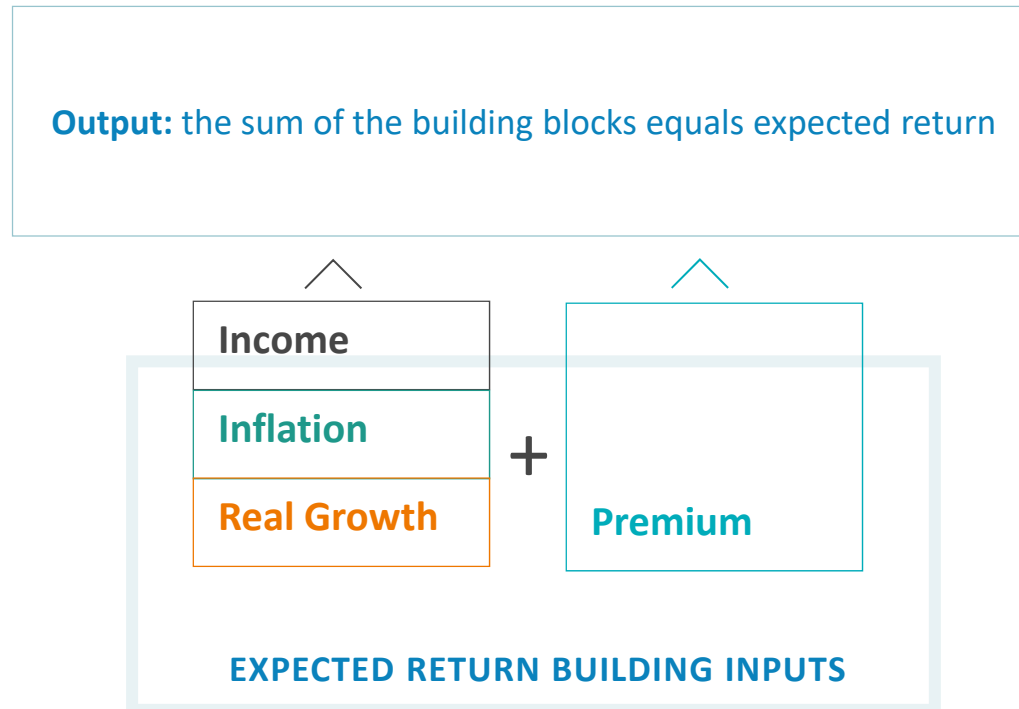
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Building block methodology



For illustrative purposes only

Build-up/spread



Alternative asset classes will in some cases use the build-up + spread methodology

For illustrative purposes only

Expected return methodology

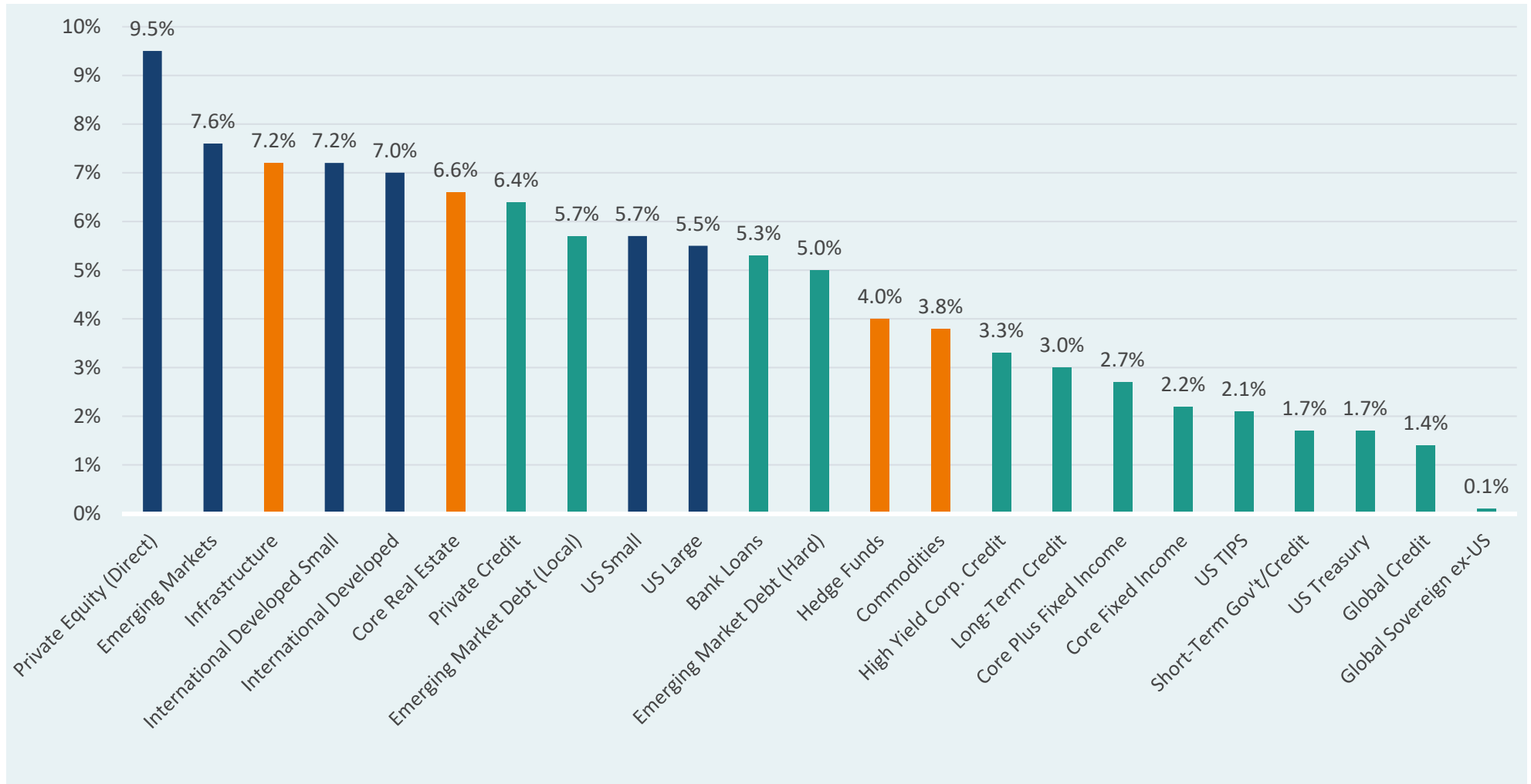
BUILDING BLOCK METHODOLOGY

Cash	Real yield estimate + inflation forecast
Bonds	Nominal bonds: current yield; Real bonds: real yield + inflation forecast
Credit	Current option-adjusted spread + U.S. 10-year Treasury – effective default rate
International Credit	Current option-adjusted spread + foreign 10-year Treasury – effective default rate
Equity	Current yield + real earnings growth (historical average) + inflation on earnings (inflation forecast) + expected P/E change
Commodities	Collateral return (cash) + spot return (inflation forecast) + roll return (assumed to be zero)
Core Real Estate	Cap rate + real income growth – capex + inflation forecast
Infrastructure	Current yield + real income growth + inflation on earnings (inflation forecast)

BUILD-UP/SPREAD METHODOLOGY

Private Equity	U.S. large cap domestic equity forecast * 1.85 beta adjustment
Private Credit	Bank loan forecast + 1.75% private credit premium

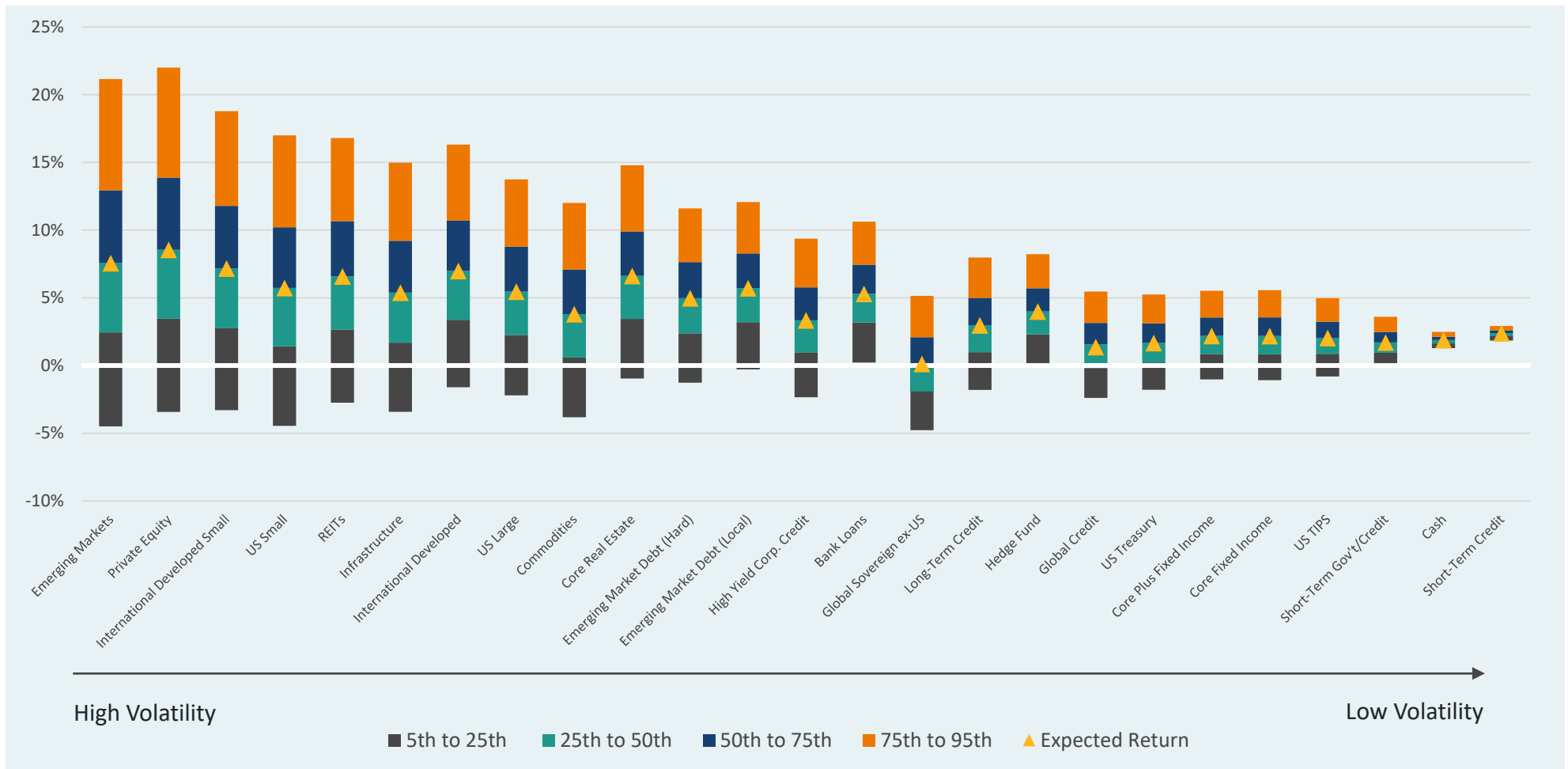
2020 - 10-year expected returns



Source: Verus

Range of likely 10-year outcomes

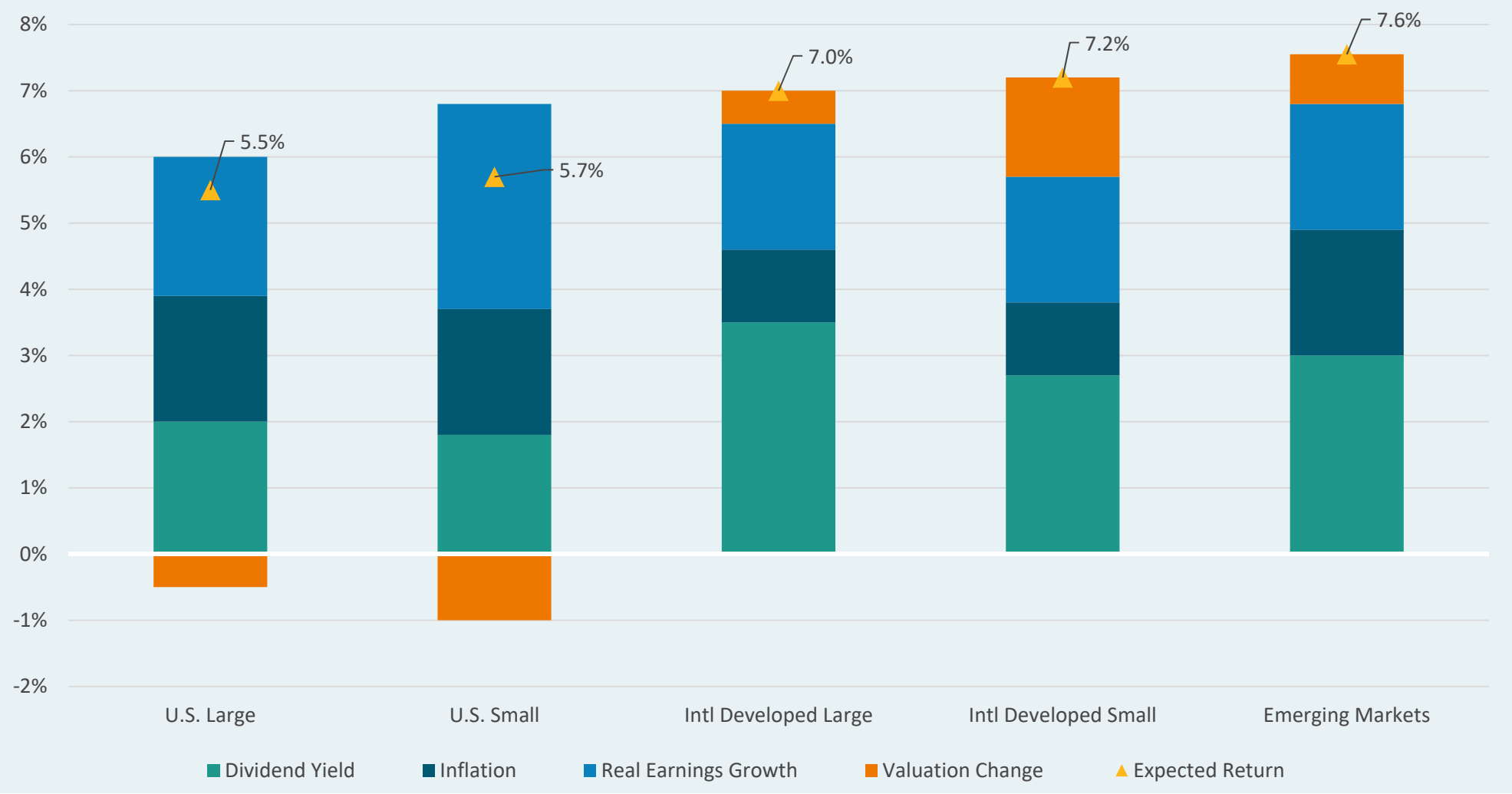
10-YEAR RETURN 90% CONFIDENCE INTERVAL



Source: Verus, MPI

Equity

Equity return forecasts



Source: Verus

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	29.0	45.1	17.5	-	10.5
Regular P/E Ratio	19.5	41.0	16.7	18.7*	13.3
2019 Shiller P/E Change	+1.8%	+5.6%	+9.4%	-	+4.0%
2019 Regular P/E Change	+14.0%	-8.3%	+24.6%	-21.4%	+14.9%
Current Shiller P/E Percentile Rank	81%	93%	34%	-	18%
Current Regular P/E Percentile Rank	74%	90%	46%	18%*	34%
Average of P/E Methods' Percentile Rank	77%	92%	40%	18%*	26%
2019 YTD Return	20.5%	14.2%	12.8%	12.1%	5.9%
Shiller PE History	1982	1988	1982	Not Enough History	2005
Long-Term Average Shiller P/E	22.9	31.1	22.6	-	15.1
Current Dividend Yield	2.0%	1.8%	3.5%	2.7%	3.0%
Long-Term Average Real Earnings Growth	2.1%	3.1%	1.9%	1.9%	1.9%
Inflation on Earnings	1.9%	1.9%	1.1%	1.1%	1.9%
Repricing Effect (Estimate)	-0.5%	-1.0%	0.5%	1.5%	0.8%
Nominal Return	5.5%	5.7%	7.0%	7.2%	7.6%
Inflation Forecast	1.9%	1.9%	1.9%	1.1%	1.9%
Real Return	3.6%	3.8%	5.1%	6.1%	5.7%

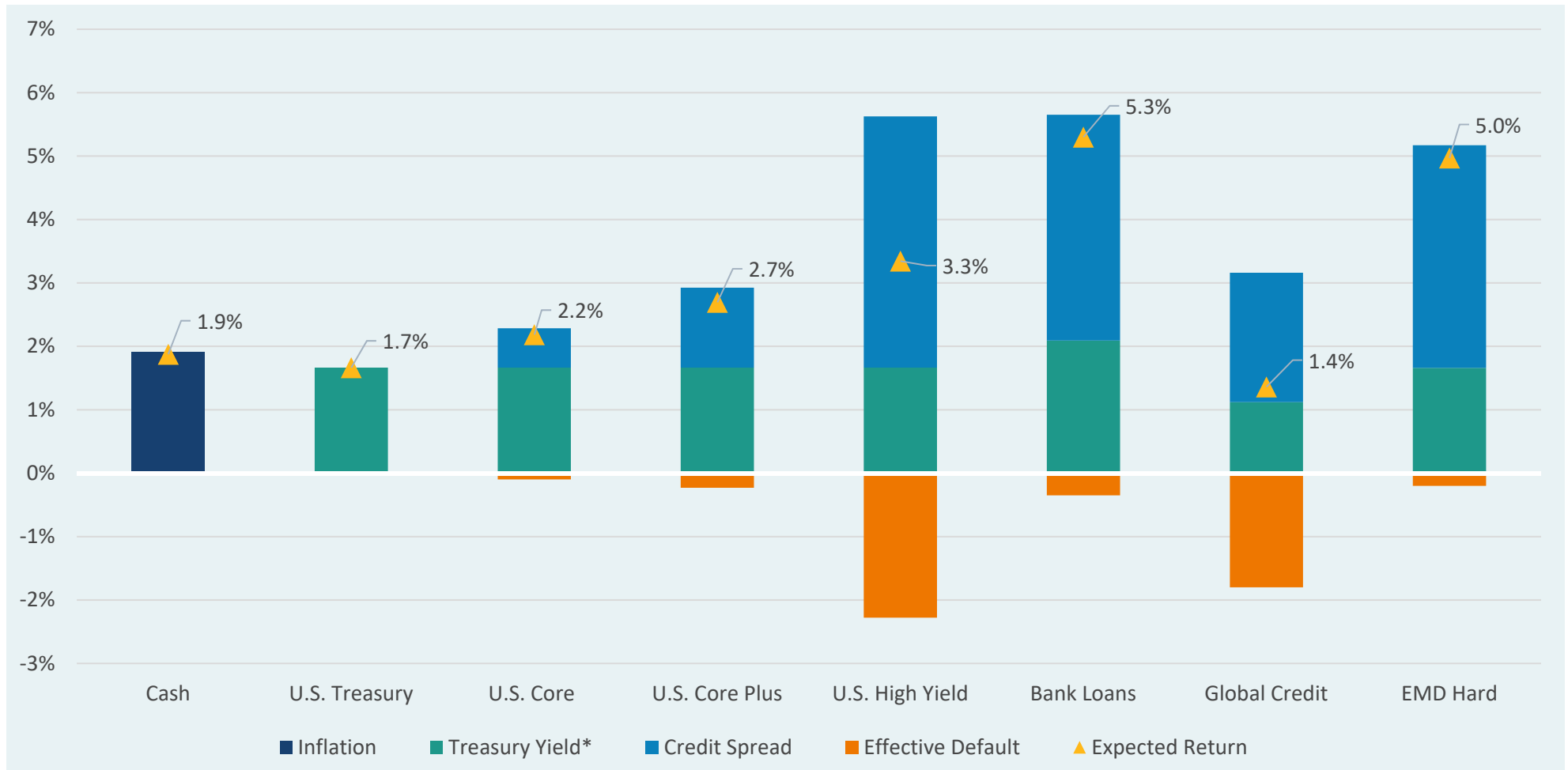
Data as of 9/30/19

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

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

Fixed income

Fixed income return forecasts

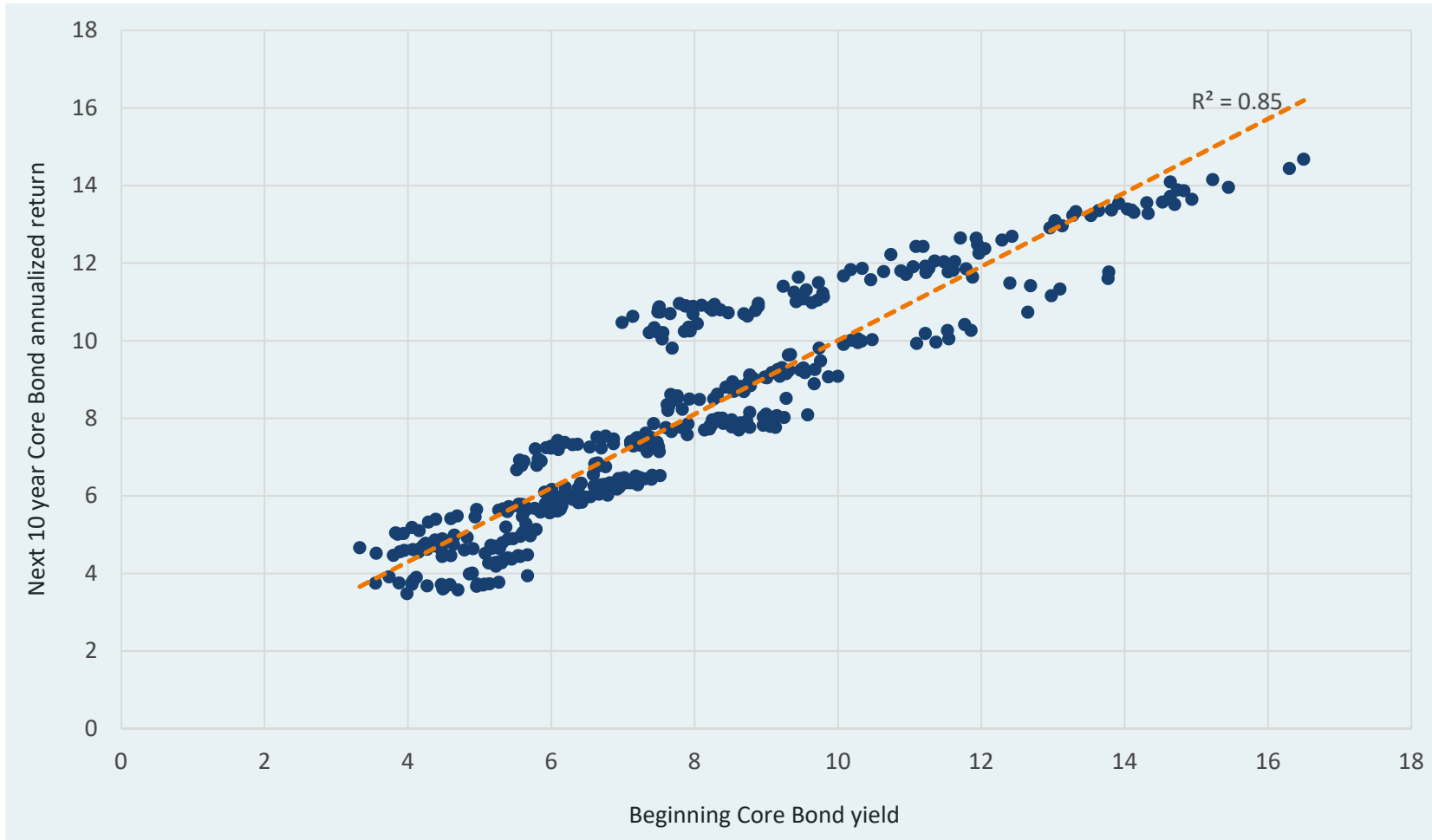


Source: Verus

*Bank loans uses 3-month USD Libor instead of the Treasury yield

Fixed income

CORE FIXED INCOME



Bond yields have been a very accurate predictor of future returns

Source: BBgBarc US Aggregate Index, Verus – performance since 1976

Alternatives

Hedge funds

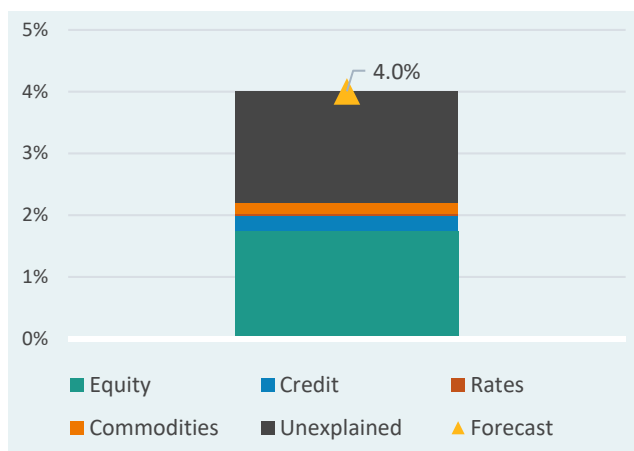
Hedge fund performance variation through time can be partly explained by public market betas (ex: equity, rates, credit, commodities) and partly explained by non-public sources of return (ex: alternative betas, skill, luck). Certain hedge fund strategies can be mostly explained by public market betas, while other types of hedge fund strategies are driven mostly by non-public sources of return.

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 over the next 10 years.

HEDGE FUND FORECAST



Source: Verus, as of 9/30/19

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	+2.2%
Non-Public Market % of Return	+1.8%
Nominal Return	+4.0%
Inflation Forecast	-1.9%
Real Return	+2.1%

Source: Verus, as of 9/30/19

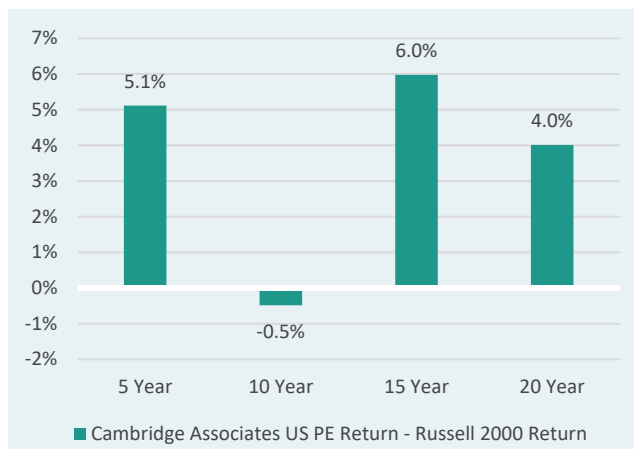
Private equity

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 8.5%. 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 9.5%. Private equity fund-of-fund programs have historically lagged the universe by 1.0%, and we forecast private equity FoF at 7.5% to reflect this drag.

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



Source: Cambridge, Russell, as of 3/31/19

PRIVATE EQUITY IMPLEMENTATION FORECASTS

	10-Year Forecast
Private Equity Universe Forecast	+8.5%
Private Equity FoF Forecast	+7.5%
Private Equity Direct Forecast	+9.5%

Source: Verus, as of 9/30/19

PRIVATE EQUITY UNIVERSE FORECAST

	10-Year Forecast
U.S. Large Cap Forecast	+5.5%
1.85 Beta Multiplier	+3.0%
Nominal Return	+8.5%
Inflation Forecast	-1.9%
Real Return	+6.6%

Source: Verus, as of 9/30/19

Private core real estate/REITS

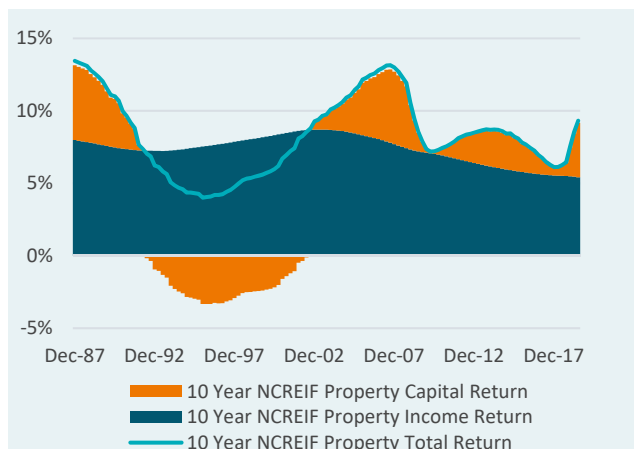
Performance of the NCREIF property index can be decomposed into an income return (cap rate) and capital return. The return coming from income has historically been more stable than the return derived from capital changes.

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 track inflation as higher prices are passed through to rents.

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 smoothing effects. While private real estate appears to be less volatile than REITs, the true risks to investors are 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 6/30/19

PRIVATE REAL ESTATE

	Private Real Estate 10-Year Forecast
Current Cap Rate	+4.4%
Real Income Growth	+2.3%
Capex Assumption	-2.0%
Inflation	+1.9%
Nominal Return	6.6%
Inflation Forecast	-1.9%
Real Return	4.7%

Source: Verus, as of 9/30/19

REITS

	10-Year Forecast
Nominal Return Forecast	6.6%
Inflation Forecast	-1.9%
Real Return	4.7%

Source: Verus, as of 9/30/19

Value-add & opportunistic real estate

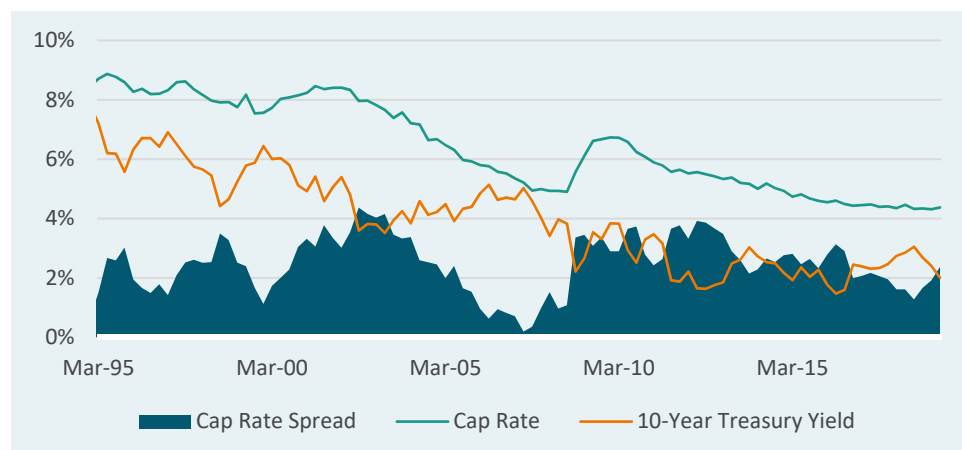
Value-add real estate includes properties which are in need of renovation, repositioning, and/or lease-up. Properties may also be classified as value-add due to their lower quality and/or location. Opportunistic real estate can also include development and distressed or very complex transactions. Greater 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 rest further out on the risk spectrum, 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 6/30/19

FORECAST

	Value-Add 10-Year Forecast	Opportunistic 10-Year Forecast
Premium above core	+2.0%	+4.0%
Current Cap Rate	+4.4%	+4.4%
Real Income Growth	+2.3%	+2.3%
Capex Assumption	-2.0%	-2.0%
Inflation	+1.9%	+1.9%
Nominal Return	8.6%	10.6%
Inflation Forecast	-1.9%	-1.9%
Real Return	6.7%	8.7%

Source: Verus, as of 9/30/19

Infrastructure

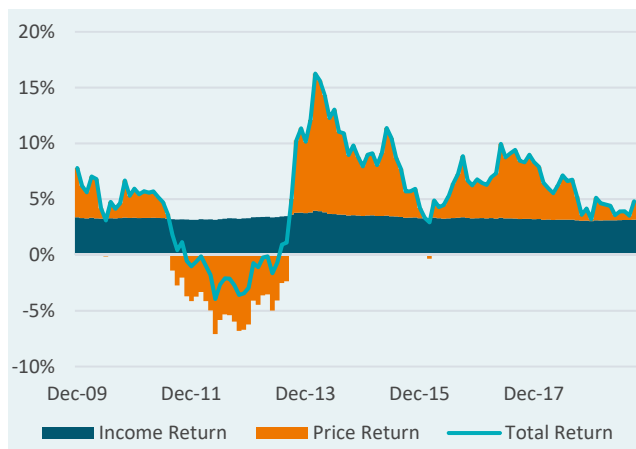
Infrastructure includes a variety of investment types across a subset of industries. There is not one definition for what can be included within infrastructure. The asset class has grown dramatically in the last decade as investors sought assets that might provide more attractive yield relative to fixed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

Similar to real estate investment, income plays a significant role in the returns 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 9/30/19

ADVANCED ECONOMY REAL GDP GROWTH



Source: IMF, as of 9/30/19

FORECAST

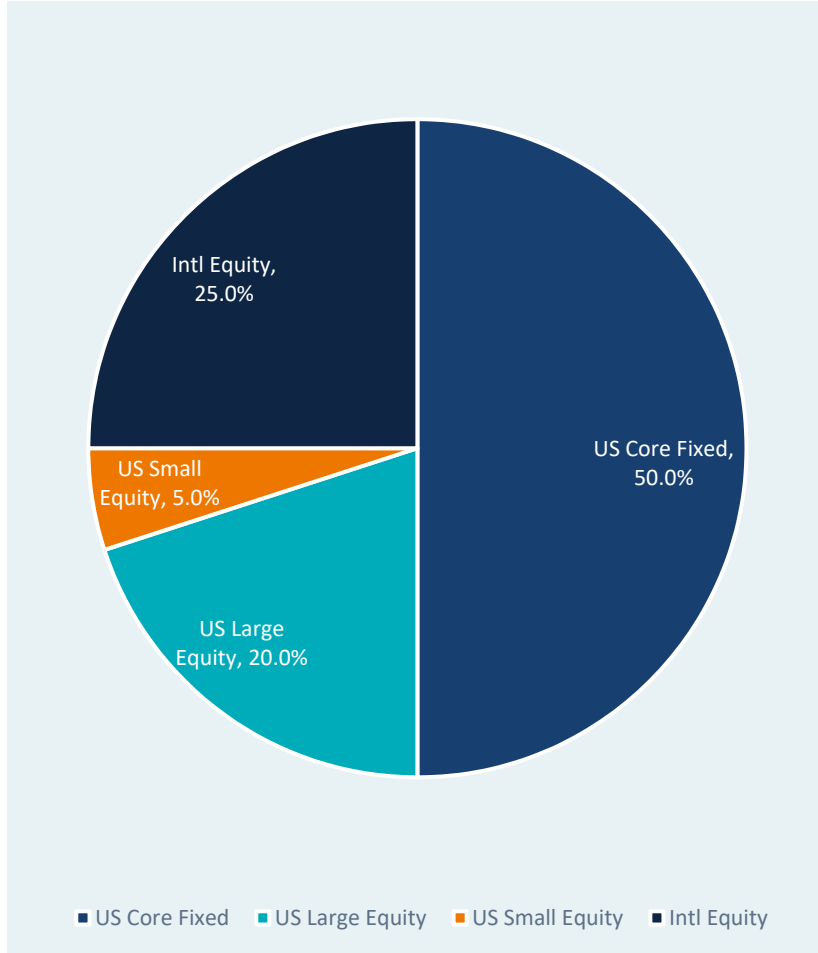
	10-Year Forecast
Inflation	1.7%
Yield	4.1%
Income Growth	1.5%
Nominal Return	7.2%
Global Inflation Forecast	-1.7%
Real Return	5.5%

Source: Verus, as of 9/30/19, may not sum due to rounding

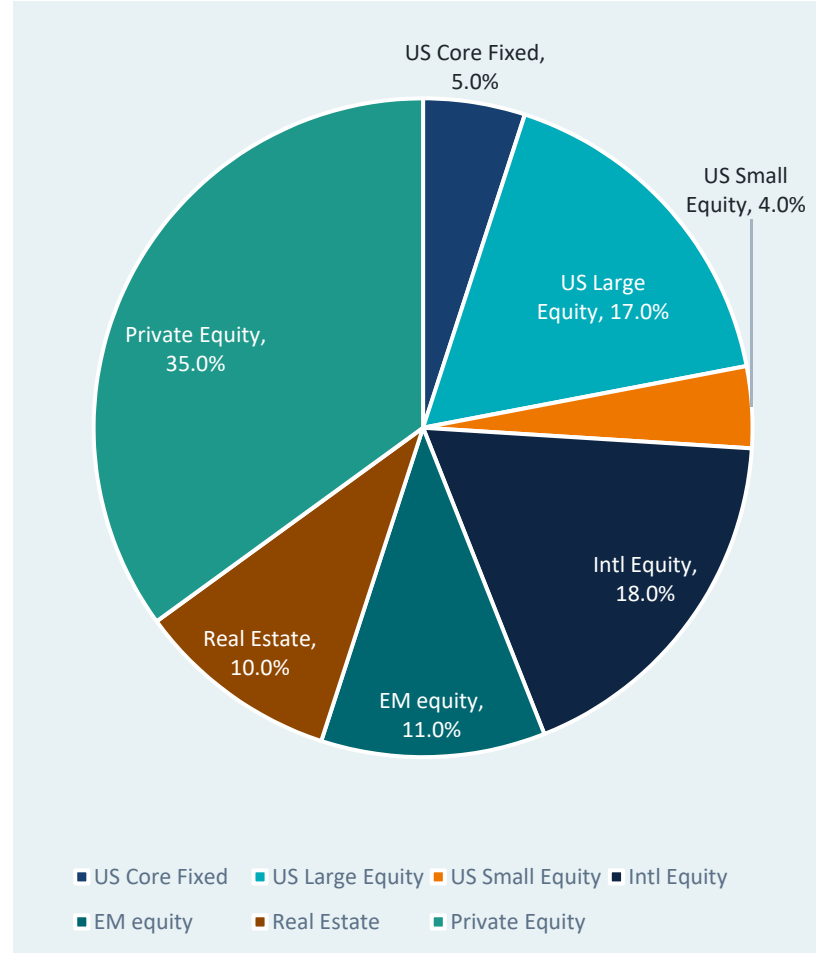
SCERS' portfolio expectations

Achieving a 7.0% rate of return

PORTFOLIO IN 2005



PORTFOLIO IN 2020

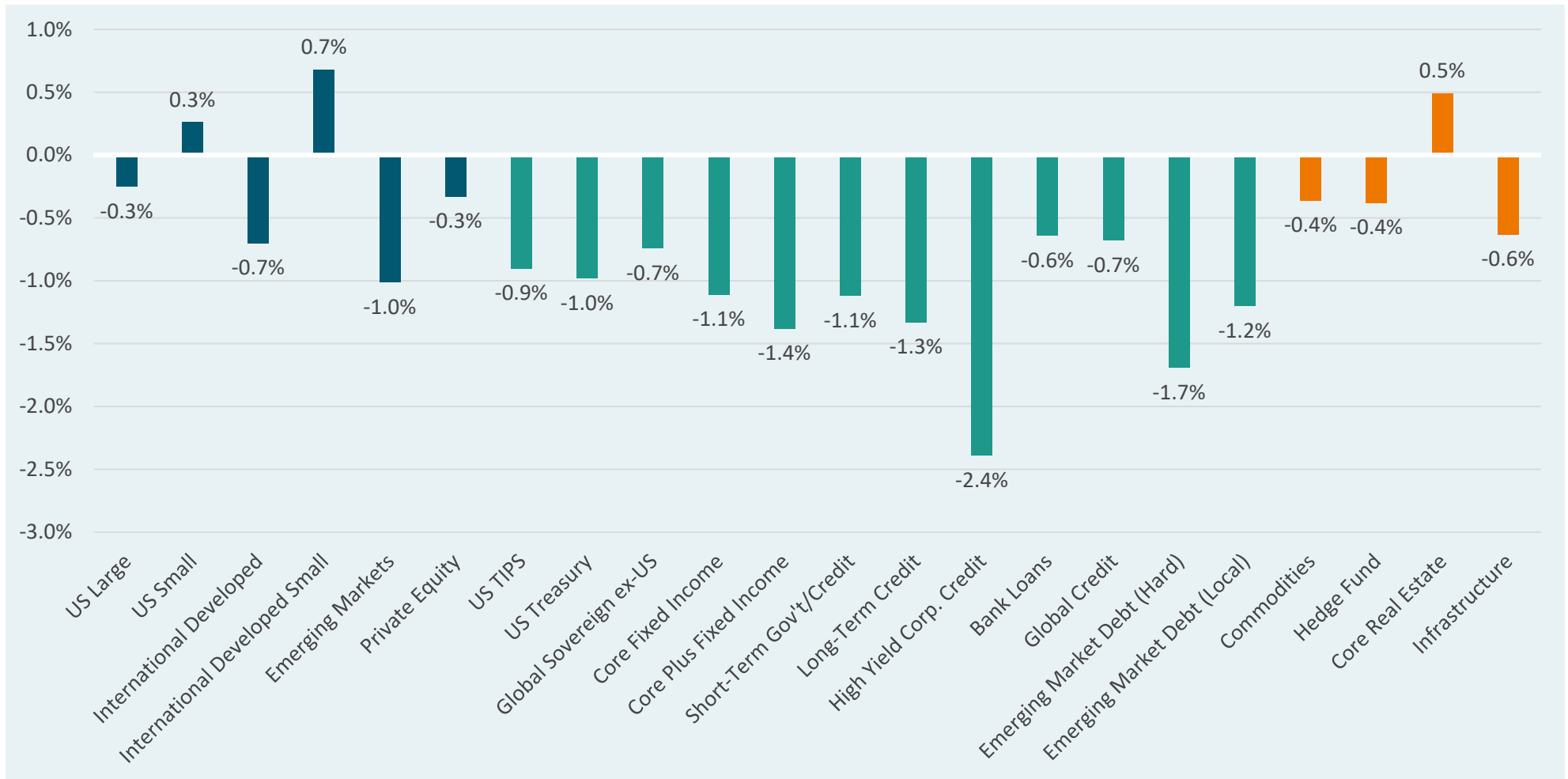


A 50/50 Global equity/Core fixed income portfolio had an expected return of 7.0% in 2005

A 2020 portfolio requires a large allocation to private markets and little in fixed income

Based on Verus CMAs from 2005 and 2020

2020 vs. 2019 return forecast



Note: the year-over-year change is based on the 2020 methodology

Portfolio Expectation

	Policy	Return (g)	Std Dev	Sharpe Ratio
US Large Equity	18.0	5.5	15.4	0.2
US Small Equity	2.0	5.7	21.1	0.2
Intl. Developed Equity	16.0	7.0	17.5	0.3
Emerging Markets Equity	4.0	7.6	25.6	0.2
High Yield Corp. Credit	1.0	3.3	11.3	0.1
Bank Loans	1.0	5.3	10.0	0.3
Private Equity	9.0	9.5	25.7	0.3
Private Credit	4.0	7.0	10.0	0.5
**Absolute Return Growth	3.0	5.8	6.5	0.5
Total Growth	59			
Core Plus Fixed Income	10.0	2.7	8.3	0.1
US Treasury	5.0	1.7	6.7	0.0
Global Fixed Income	3.0	1.4	7.4	-0.1
**Absolute Return Diversifying	7.0	3.9	3.3	0.6
Total Diversifying	24			
Core Real Estate	5.0	6.6	12.4	0.4
Value Add Real Estate	1.0	8.6	17.7	0.4
Opportunistic Real Estate	1.0	10.6	23.2	0.4
**Private Real Asset	1.4	8.7	15.9	0.5
Liquid Real Return	2.0	5.8	11.8	0.4
Total Real Return	16			
Cash	1.0	1.9	1.2	
Total Allocation	100			

	Policy 2019 CMAs	Policy 2020 CMAs
Mean Variance Analysis		
Forecast 10 Year Return	6.83	6.48
Standard Deviation	10.75	11.1
Return/Std. Deviation	0.6	0.6
Sharpe Ratio	0.48	0.46

- Forecasted return fell 35bps from the last policy adjustment in 2019
- 2016/17 ALM study had a 7.2% forecasted portfolio return

*Liquid Proxy is 15% FTSE EPRA NAREIT Dev/ 25% S&P GLB Infrastructure/ 10% S&P GLB Natural Res./ 10% Bloom Roll Select Comm/ 30% BB. US TIPS/ 10% BB US Trsy Floating Rate

** Provided by Cliffwater

Next steps

Considerations/Next steps

- Segal triennial experience study in spring of 2020
 - CMA inputs used in determining a recommended actuarial rate of return
- Next Asset Liability Modeling Study expected in 2021
 - CMA inputs will play a role in determining suitable strategic asset allocation to meet SCERS' actuarial rate of return

Appendix

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	Real yield estimate + inflation forecast	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		Standard Deviation Forecast	Sharpe Ratio Forecast (g)	Sharpe Ratio Forecast (a)	10-Year Historical Sharpe Ratio (g)	10-Year Historical Sharpe Ratio (a)
		Geometric	Arithmetic					
Equities								
U.S. Large	S&P 500	5.5%	6.6%	15.4%	0.23	0.31	1.01	1.02
U.S. Small	Russell 2000	5.7%	7.7%	21.1%	0.18	0.28	0.62	0.67
International Developed	MSCI EAFE	7.0%	8.4%	17.5%	0.29	0.37	0.30	0.37
International Small	MSCI EAFE Small Cap	7.2%	9.3%	21.8%	0.24	0.34	0.46	0.52
Emerging Markets	MSCI EM	7.6%	10.4%	25.6%	0.22	0.33	0.17	0.25
Global Equity	MSCI ACWI	6.4%	7.7%	16.8%	0.27	0.34	0.59	0.63
Private Equity*	Cambridge Private Equity	8.5%	11.3%	25.3%	0.26	0.37	-	-
Fixed Income								
Cash	30 Day T-Bills	1.9%	1.9%	1.2%	-	-	-	-
U.S. TIPS	BBgBarc U.S. TIPS 5-10	2.1%	2.2%	5.4%	0.04	0.06	0.65	0.66
U.S. Treasury	BBgBarc Treasury 7-10 Year	1.7%	1.9%	6.7%	-0.03	0.00	0.68	0.69
Global Sovereign ex U.S.	BBgBarc Global Treasury ex U.S.	0.1%	0.6%	9.7%	-0.19	-0.13	0.10	0.14
Global Aggregate	BBgBarc Global Aggregate	1.2%	1.4%	6.2%	-0.11	-0.08	0.39	0.37
Core Fixed Income	BBgBarc U.S. Aggregate Bond	2.2%	2.4%	6.3%	0.05	0.08	1.08	1.09
Core Plus Fixed Income	BBgBarc U.S. Corporate IG	2.7%	3.0%	8.3%	0.10	0.14	1.21	1.22
Short-Term Gov't/Credit	BBgBarc U.S. Gov't/Credit 1-3 Year	1.7%	1.8%	3.6%	-0.06	-0.03	1.16	1.17
Short-Term Credit	BBgBarc Credit 1-3 Year	1.9%	2.0%	3.6%	0.01	0.03	1.76	1.78
Long-Term Credit	BBgBarc Long U.S. Corporate	3.0%	3.4%	9.4%	0.12	0.16	0.93	0.94
High Yield Corp. Credit	BBgBarc U.S. Corporate High Yield	3.3%	4.0%	11.3%	0.12	0.18	1.25	1.26
Bank Loans	S&P/LSTA Leveraged Loan	5.3%	5.8%	10.0%	0.34	0.39	1.47	1.50
Global Credit	BBgBarc Global Credit	1.4%	1.6%	7.4%	-0.07	-0.03	0.77	0.78
Emerging Markets Debt (Hard)	JPM EMBI Global Diversified	5.0%	5.7%	12.4%	0.25	0.31	1.03	1.03
Emerging Markets Debt (Local)	JPM GBI-EM Global Diversified	5.7%	6.4%	12.0%	0.32	0.37	0.17	0.22
Private Credit	Bank Loans + 175bps	7.0%	7.5%	10.0%	0.51	0.56	-	-
Other								
Commodities	Bloomberg Commodity	3.8%	4.9%	15.4%	0.12	0.20	-0.36	-0.29
Hedge Funds*	HFRI Fund Weighted Composite	4.0%	4.3%	7.7%	0.27	0.31	0.55	0.56
Real Estate Debt	BBgBarc CMBS IG	4.0%	4.3%	7.6%	0.27	0.31	1.55	1.58
Core Real Estate	NCREIF Property	6.6%	7.3%	12.4%	0.38	0.44	1.84	1.89
Value-Add Real Estate	NCREIF Property + 200bps	8.6%	10.0%	17.7%	0.38	0.46	-	-
Opportunistic Real Estate	NCREIF Property + 400bps	10.6%	12.9%	23.0%	0.38	0.48	-	-
REITs	Wilshire REIT	6.6%	8.2%	19.1%	0.25	0.33	0.80	0.83
Global Infrastructure	S&P Global Infrastructure	7.2%	8.6%	17.8%	0.30	0.38	0.52	0.56
Risk Parity	Risk Parity	6.9%	7.4%	10.0%	0.50	0.55	-	-
Currency Beta	MSCI Currency Factor Index	1.8%	1.8%	3.6%	-0.04	-0.02	0.19	0.21
Inflation		1.9%	-	-	-	-	-	-

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.

*Returns highlighted in orange are at or above SCERS' required return