

Executive Team

Dominic D. Brown, CPA, CFE
Chief Executive Officer

Daryn Miller, CFA
Chief Investment Officer

Jennifer Zahry, JD
Chief Legal Officer

Matthew Henry, CFE
Chief Operations Officer



Board of Retirement

Juan Gonzalez, Chair
Tyler Whitezell, Vice-Chair
Jeanine Adams
David Couch
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Joseph D. Hughes
Jordan Kaufman
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Traco Matthews
Dustin Contreras, Alternate
Chase Nunneley, Alternate
Robb Seibly, Alternate

March 25, 2022

Members, Board of Retirement
Employee Bargaining Units
Requesting News Media
Other Interested Parties

Subject: Meeting of the Kern County Employees' Retirement Association Investment Committee

Ladies and Gentlemen:

A meeting of the Kern County Employees' Retirement Association Investment Committee will be held on Thursday, March 31, 2022 at 8:30 a.m. via teleconference pursuant to California Government Code section 54953, subdivision (e).

How to Participate: Listen to or View the Board Meeting

To listen to the live audio of the Board meeting, please dial one of the following numbers and enter ID# 841-9366-8907:

- (669) 900-9128; U.S. Toll-free: (888) 788-0099 or (877) 853-5247

To access live audio and video of the Board meeting, please use the following:

- <https://us02web.zoom.us/j/84193668907?pwd=OVhtL2FsMDBiZnlzWFhHclhzdFVEUT09>
- Passcode: 495804

Items of business will be limited to the matters shown on the attached agenda. If you have any questions or require additional service, please contact KCERA at (661) 381-7700 or send an email to administration@kcera.org.

Sincerely,

Dominic D. Brown
Chief Executive Officer

Attachment

AGENDA:

All agenda item supporting documentation is available for public review on KCERA's website at www.kcera.org following the posting of the agenda. Any supporting documentation that relates to an agenda item for an open session of any regular meeting that is distributed after the agenda is posted and prior to the meeting will also be available for review at the same location.

**AMERICANS WITH DISABILITIES ACT
(Government Code §54953.2)**

Disabled individuals who need special assistance to listen to and/or participate in the teleconference meeting of the Board of Retirement may request assistance by calling (661) 381-7700 or sending an email to administration@kcera.org. Every effort will be made to reasonably accommodate individuals with disabilities by making meeting materials and access available in alternative formats. Requests for assistance should be made at least two (2) days in advance of a meeting whenever possible.

ROLL CALL

1. [Discussion and appropriate action on the annual asset allocation review presented](#) by Scott Whalen, CFA, Verus, Chief Investment Officer Daryn Miller, CFA, and Senior Retirement Investment Officer Brian Long, CFA – RECOMMEND THE BOARD OF RETIREMENT APPROVE ASSET ALLOCATION

PUBLIC COMMENTS

2. The public is provided the opportunity to comment on agenda items at the time those agenda items are discussed by the Committee. This portion of the meeting is reserved for persons to address the Committee on any matter not on this agenda but under the jurisdiction of the Committee. Committee members may respond briefly to statements made or questions posed. They may ask a question for clarification and, through the Chair, make a referral to staff for factual information or request staff to report back to the Committee at a later meeting. Speakers are limited to two minutes. Please state your name for the record prior to making a presentation.

REFERRALS TO STAFF, ANNOUNCEMENTS OR REPORTS

3. On their own initiative, Committee members may make a brief announcement, refer matters to staff, subject to KCERA's rules and procedures, or make a brief report on their own activities.
4. Adjournment



**PERSPECTIVES
THAT DRIVE
ENTERPRISE
SUCCESS**



MARCH 2022

Capital Efficiency and Strategic Asset Allocation

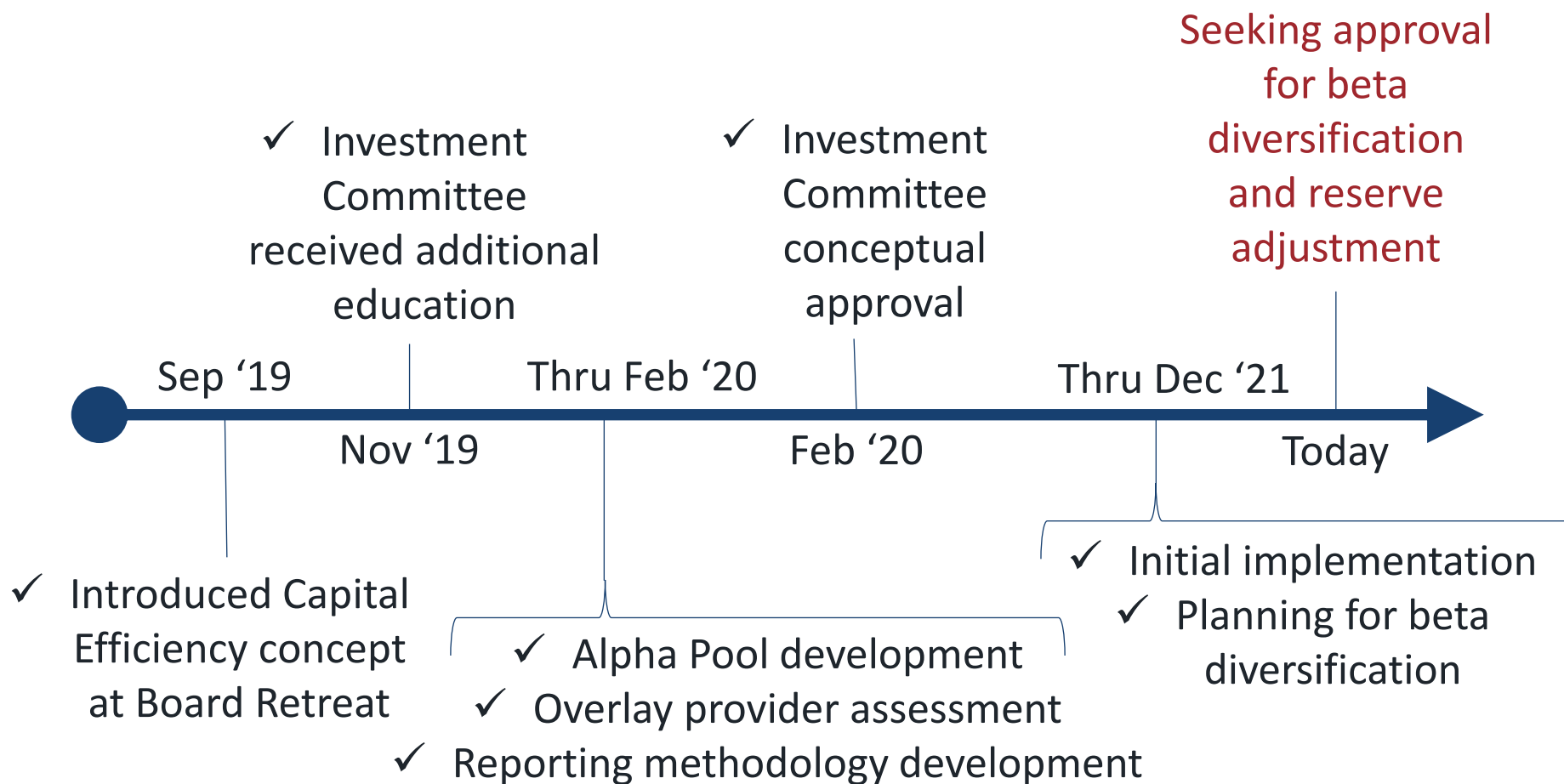
Kern County Employees' Retirement Association

Session objectives

- Review 2022 Capital Market Assumptions
- Approve modifications to Capital Efficiency Program
 - Beta exposure diversification
 - Commodities beta implementation
- Approve revised SAA targets and allocation ranges
- Approve benchmark adjustments
- Review potential next steps

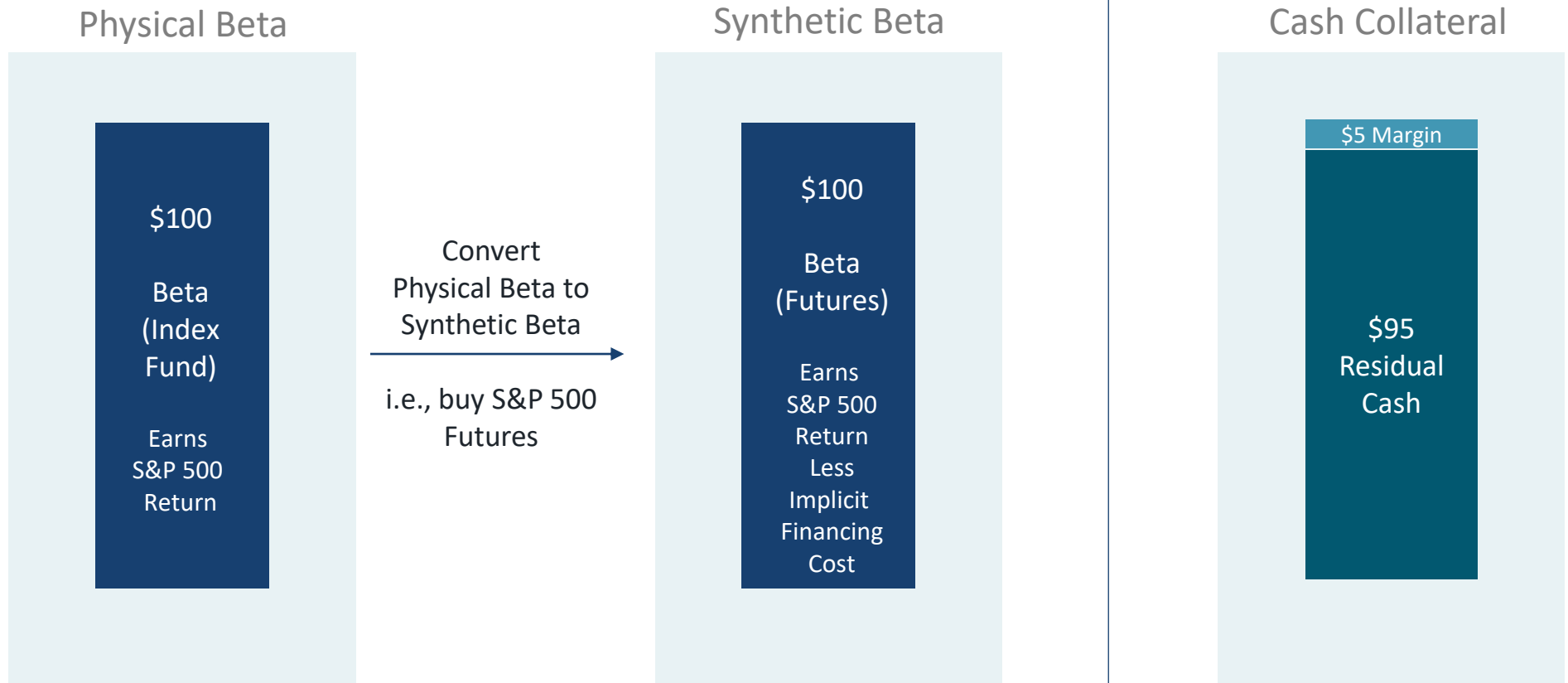
Capital efficiency program adjustments

Program timeline



Capital efficiency mechanics

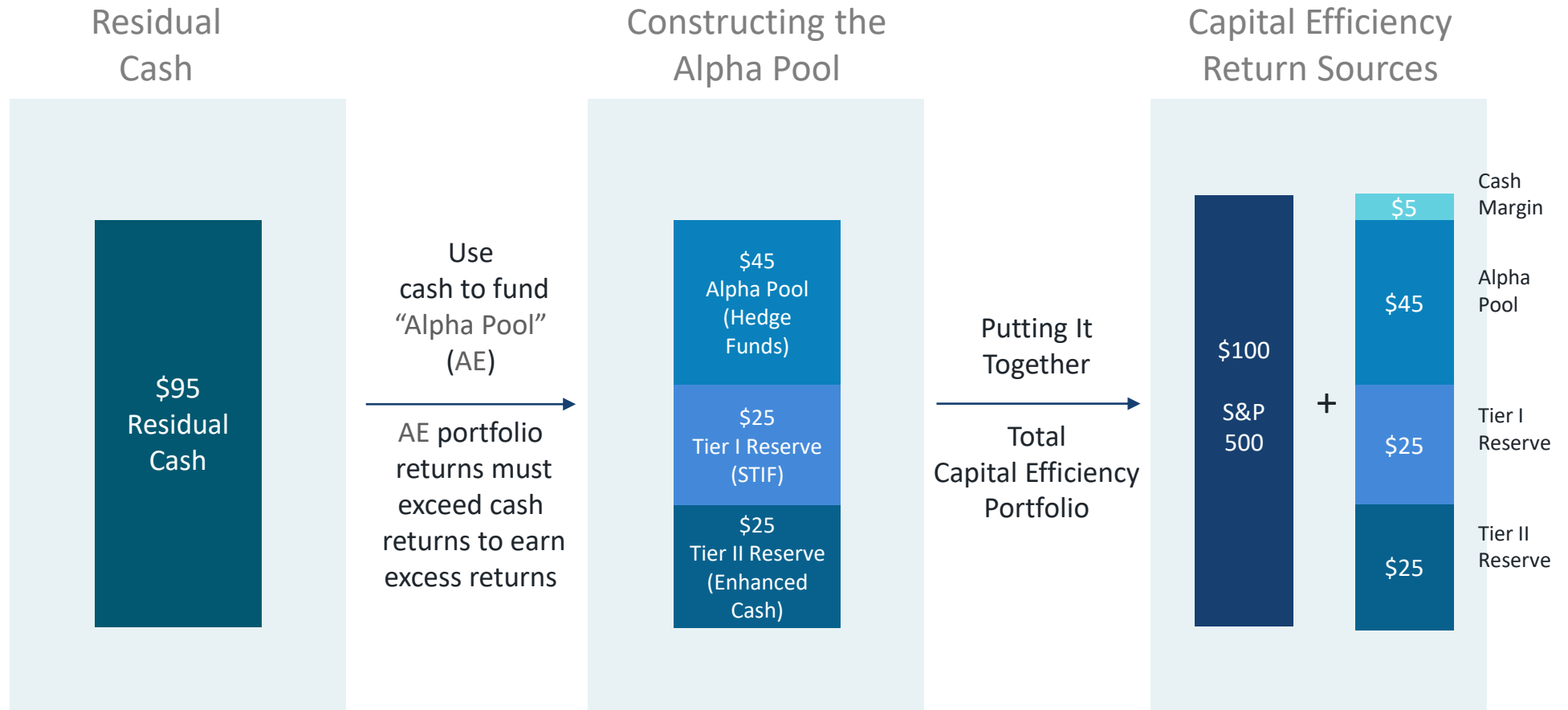
Step One: Create Synthetic Beta Portfolio (single Beta solution)



Big Question: What do we do with Residual Cash?

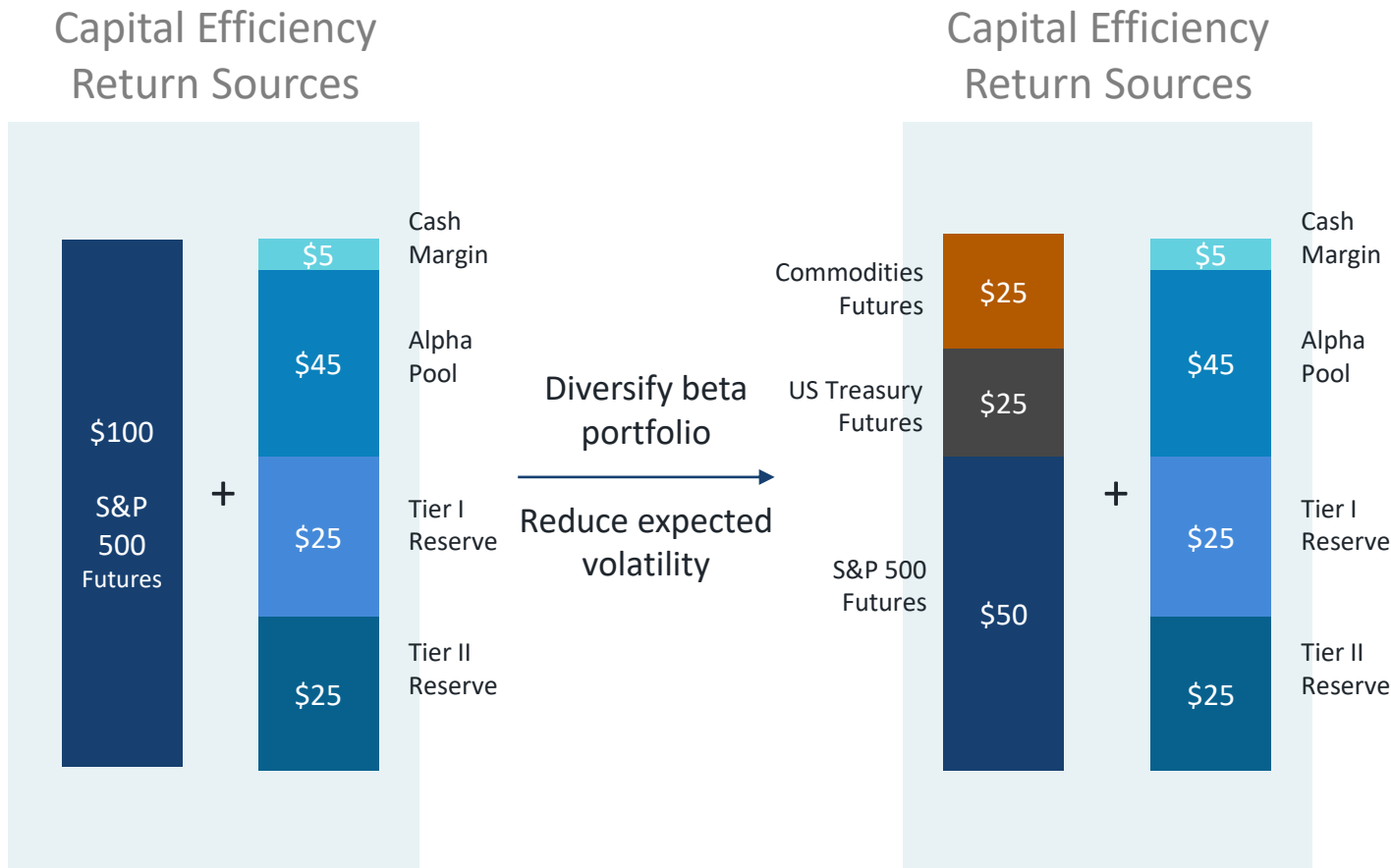
Capital efficiency mechanics

Step Two: Integrating Alpha



Capital efficiency mechanics

Diversifying Beta beyond S&P 500



- Beta to be sourced from three highly liquid markets, rather than just one
 - S&P 500 futures
 - US Treasury futures
 - Commodities futures
- Using only highly liquid markets helps ensure best index tracking during extreme events
- Lower Beta volatility leads to potential for more efficient collateral utilization

Why diversify the beta portfolio?

— Advantages

- Diversification = lower volatility = lower cash reserve requirements (currently very conservative)
- Greater flexibility: ability to replace other challenged sources of traditional alpha with Capital Efficiency alpha, i.e., no longer restricted to US large cap equity

— Disadvantage: modest increase in operational risk (if beta manager fails to maintain required market exposures)

Why beta portfolio volatility matters

- Due to opportunities for arbitrage, a liquid futures contract closely tracks the underlying index. Downward price movements are generally the same as they are in an index fund (may be some timing differences during extreme events, e.g., Oct 1987).
- Unlike an index fund, additional collateral must be posted to cover those short-term futures losses (variation margin)
- At 25% of capital, the level I reserve is currently more than adequate to cover the greatest single-day loss in the history of the S&P 500 (-20.5% on 10/19/87)
- The 25% level II reserve is sized to provide approximately six months of rebalancing flexibility in the event of a sustained S&P 500 drawdown
- A more diversified beta portfolio would have less downside risk, thus **requiring smaller reserves to provide the same level of safety**, and leaving more capital available for allocation to the alpha pool

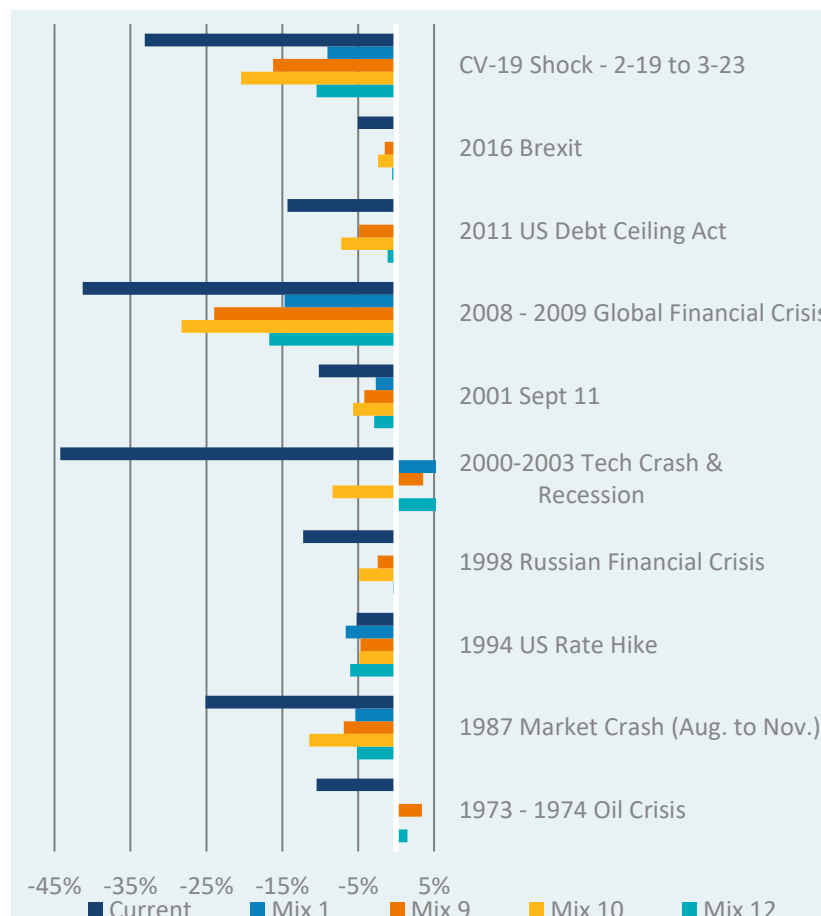
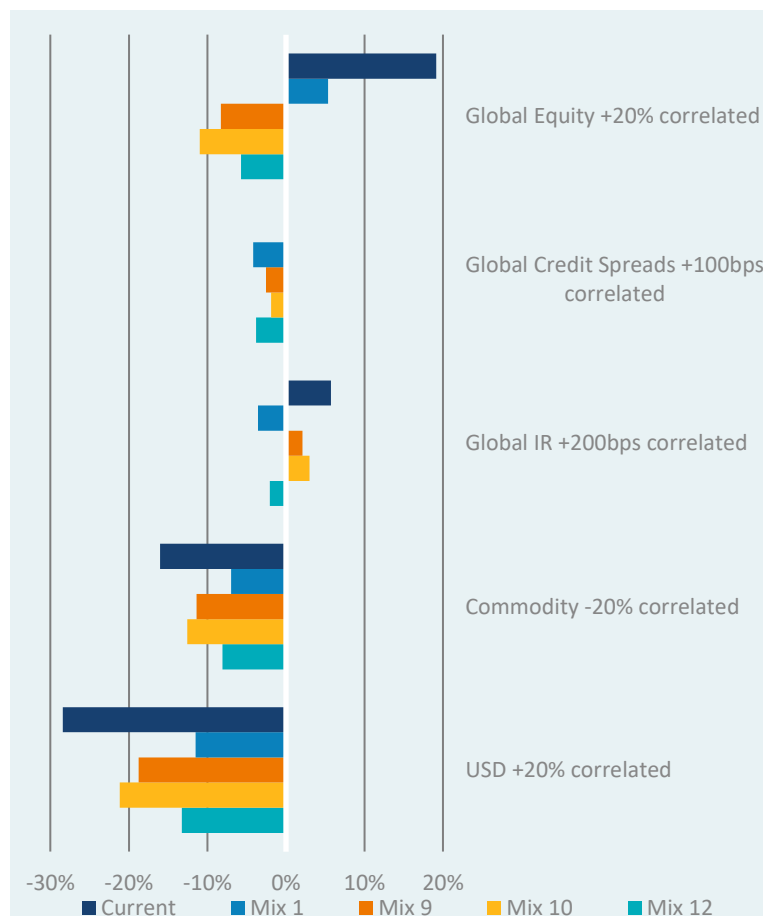
Reducing beta portfolio volatility

- KCERA Investment Staff and Verus considered many alternative beta portfolios, using three different risk models to examine the volatility reduction provided by increasing proportions of the two new asset classes (US Treasuries and commodities)
- From left-to-right below, we show how eventually putting more than half of the beta portfolio in a 10-year Treasury index (along with some commodities), results in a significantly more risk-efficient beta portfolio (Mix 1), cutting one model's downside risk estimate by more than half

						Verus 2021 CMA's (10 Yr)			
	Current	Mix 10	Mix 9	Mix 12	Mix 1	Return (g)	Return (a)	Standard Deviation	Sharpe Ratio (a)
US Large Cap	100	50	33	25	25	5.1	6.3	15.7	0.38
US Treasury	0	25	33	50	55	0.7	0.9	6.7	0.10
Commodities	0	25	33	25	20	2.2	3.4	15.9	0.20
Total	100	100	100	100	100				
Mean Variance Analysis (Lognormal)									
Forecast 10 Year Return	5.1	3.8	3.2	2.7	2.6				
Standard Deviation	15.7	9.9	8.6	6.4	5.8				
Sharpe Ratio (a)	0.38	0.39	0.38	0.40	0.42				
1 year 99% VaR	-25.3	-16.9	-14.9	-11.0	-10.0				

Additional risk modeling

- Using a Barra factor model, we also examined the drawdown reduction that the various alternative beta portfolios would have provided under both historical scenarios and single factor shocks



Only in the "1994 US Rate Hike" scenario did Mix 1 experience a greater drawdown than the current 100% S&P beta portfolio

Right-sizing the reserves

Excessive liquidity reserves are a source of inefficiency

- As with traditional asset classes, the fund rebalances *into* the Capital Efficiency beta portfolio after a bad quarter, and *out of* it after a good quarter
- In this context, the reserves are a buffer that prevents forced rebalancing *during* the quarter
- Therefore, estimating the worst-case one-quarter drawdown in the beta portfolio gives us an additional yardstick for sizing the reserves
- We examine both historical data and risk model simulations, and note that currently, a reserve large enough to completely cover the worst 1-quarter drawdown (-29.7%) is also large enough to cover the worst 1-day drawdown (-20.5%, as previously noted)

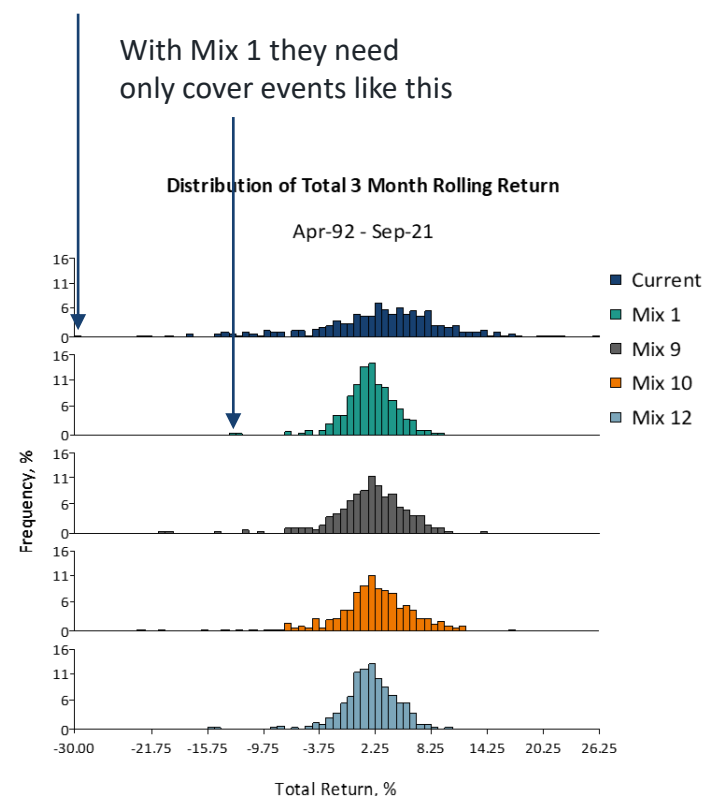
3-month total return (%)	Current	Mix 1	Mix 9	Mix 10	Mix 12
Historical worst ¹	-29.7	-13.4	-20.7	-23.0	-15.3
Barra 3-sd event ² (99.7 percentile)	-38.0	-13.0	-19.1	-22.8	-14.2
MPI 3-sd event ³ (99.7 percentile)	-35.5	-15.2	-23.6	-26.4	-17.5

¹ Full common index history, Apr 1992 to Sep 2021

² MAC.L model Monte Carlo simulation, 90-day 99.7 percentile outcome

³ Downside Log-Stable simulation, 3-month 99.7 percentile outcome

Currently the reserves cover events like this



Right-sizing the reserves (cont'd)

KCERA Staff worked with Parametric to assess an appropriate reserve level given a more diversified (lower risk) mix of Beta sources. They dimensioned risk through three separate historical lenses.

Adverse One-Day Moves

	One Standard Deviation	Two Standard Deviations	Three Standard Deviations
Portfolio Change (%)	-0.41%	-0.83%	-1.26%

Worst-Case Scenarios

	One-Day	Five-Day	Ten-Day	Twenty-Day
End Date	October 15, 2008	October 10, 2008	March 18, 2020	October 24, 2008
Portfolio Change (%)	-3.17%	-7.72%	-10.93%	-12.95%

Margin Call Analysis

Margin Level	1%	2%	3%	4%	5%	6%	7%	8%
Cumulative Margin Calls	15	10	3	2	1	1	1	1

KCERA Staff and Verus agree that a reserve cushion of 30% of program capital should be more than sufficient to cover any portfolio variability

Source: Parametric
Timeframe: December 2006 to December 2021

Commodities beta implementation

The current commodities strategy managed by Wellington can be repurposed to provide the exact same commodities exposure while freeing up capital for investment in the alpha pool

- The Wellington commodities fund currently held in the KCERA portfolio deploys a fully collateralized, futures-based investment strategy to gain broad exposure across the commodities complex (e.g., energy, agriculture, industrial metals)
- The futures positions are collateralized by high quality and highly liquid cash equivalents (e.g., U.S. Treasury obligations, U.S. Agency obligations, repurchase agreements)
- The “cash” collateral can be reduced to free up funds for investment in the alpha pool, similar to what Parametric does currently with the equity exposure

The strategy would change from full to partial collateralization

Strategic asset allocation review

2022 capital market assumptions

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	Levered gross return (LIBOR + spread + original issuance discounts) – management fees – carried interest	Estimated 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 + 3%	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)

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	5.3%	6.4%	15.7%	0.31	0.39	1.21	1.19
U.S. Small	Russell 2000	5.3%	7.4%	21.6%	0.23	0.32	0.77	0.81
International Developed	MSCI EAFE	6.1%	7.6%	17.9%	0.32	0.40	0.52	0.57
International Small	MSCI EAFE Small Cap	4.7%	6.9%	22.2%	0.19	0.29	0.66	0.71
Emerging Markets	MSCI EM	6.1%	8.9%	25.3%	0.23	0.34	0.32	0.40
Global Equity	MSCI ACWI	5.7%	7.1%	17.3%	0.31	0.39	0.84	0.86
Private Equity	Cambridge U.S. Private Equity	9.5%	12.4%	26.0%	0.35	0.46	-	-
Private Equity (Direct)	Cambridge U.S. Private Equity	10.5%	13.4%	26.0%	0.39	0.50	-	-
Private Equity (Fund of Funds)	Cambridge U.S. Private Equity	8.5%	11.4%	26.0%	0.31	0.42	-	-
Fixed Income								
Cash	30 Day T-Bills	0.4%	0.4%	1.2%	-	-	-	-
U.S. TIPS	Bloomberg U.S. TIPS 5-10	1.7%	1.8%	5.3%	0.25	0.27	0.59	0.60
U.S. Treasury	Bloomberg Treasury 7-10 Year	1.5%	1.7%	6.8%	0.16	0.20	0.43	0.45
Global Sovereign ex U.S.	Bloomberg Global Treasury ex U.S.	0.5%	1.0%	9.5%	0.01	0.06	-0.01	0.02
Global Aggregate	Bloomberg Global Aggregate	1.4%	1.6%	6.1%	0.16	0.20	0.28	0.30
Core Fixed Income	Bloomberg U.S. Aggregate Bond	2.2%	2.3%	4.1%	0.44	0.46	0.80	0.80
Core Plus Fixed Income	Bloomberg U.S. Universal	2.4%	2.5%	4.0%	0.50	0.51	0.82	0.83
Short-Term Gov't/Credit	Bloomberg U.S. Gov't/Credit 1-3 Year	1.5%	1.6%	3.6%	0.31	0.33	1.07	1.06
Short-Term Credit	Bloomberg Credit 1-3 Year	1.6%	1.7%	3.6%	0.34	0.35	1.25	1.24
Long-Term Credit	Bloomberg Long U.S. Corporate	2.4%	2.8%	9.4%	0.21	0.26	0.67	0.70
High Yield Corp. Credit	Bloomberg U.S. Corporate High Yield	3.1%	3.7%	11.2%	0.24	0.30	1.01	1.00
Bank Loans	S&P/LSTA Leveraged Loan Index	2.3%	2.7%	9.3%	0.20	0.25	0.82	0.83
Global Credit	Bloomberg Global Credit	1.5%	1.8%	7.3%	0.15	0.19	0.67	0.68
Emerging Markets Debt (Hard)	JPM EMBI Global Diversified	5.2%	5.9%	12.6%	0.38	0.44	0.66	0.68
Emerging Markets Debt (Local)	JPM GBI-EM Global Diversified	4.2%	4.9%	12.2%	0.31	0.37	0.04	0.09
Private Credit	S&P LSTA Leveraged Loan Index	6.8%	7.8%	14.6%	0.44	0.51	-	-
Private Credit (Direct Lending - Unlevered)	S&P LSTA Leveraged Loan Index	5.0%	5.5%	10.5%	0.44	0.49	-	-
Private Credit (Direct Lending - Levered)	S&P LSTA Leveraged Loan Index	8.0%	9.4%	17.4%	0.44	0.51	-	-
Private Credit (Credit Opportunities)	S&P LSTA Leveraged Loan Index	7.0%	8.0%	15.0%	0.44	0.51	-	-
Private Credit (Junior Capital / Mezzanine)	S&P LSTA Leveraged Loan Index	8.8%	10.4%	19.0%	0.44	0.53	-	-
Private Credit (Distressed)	S&P LSTA Leveraged Loan Index	9.0%	12.6%	29.1%	0.30	0.42	-	-

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.

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					
Other								
Commodities	Bloomberg Commodity	3.0%	4.2%	15.9%	0.16	0.24	-0.25	-0.18
Hedge Funds	HFRI Fund Weighted Composite	3.8%	4.1%	7.7%	0.44	0.48	0.88	0.49
Hedge Funds (Fund of Funds)	HFRI Fund of Funds Composite	2.8%	3.1%	7.7%	0.31	0.35	-	-
Hedge Funds (Equity Style)	Custom HFRI Benchmark Mix*	4.5%	5.6%	15.0%	0.27	0.34	-	-
Hedge Funds (Credit Style)	Custom HFRI Benchmark Mix*	3.6%	4.1%	10.1%	0.32	0.37	-	-
Hedge Funds (Asymmetric Style)	Custom HFRI Benchmark Mix*	2.3%	2.4%	4.9%	0.39	0.41	-	-
Real Estate Debt	Bloomberg CMBS IG	2.1%	2.4%	7.4%	0.23	0.27	1.12	1.11
Core Real Estate	NCREIF Property	6.5%	7.2%	12.5%	0.49	0.54	2.08	2.02
Value-Add Real Estate	NCREIF Property + 200bps	8.5%	9.8%	16.7%	0.49	0.56	-	-
Opportunistic Real Estate	NCREIF Property + 300bps	9.5%	11.1%	18.7%	0.49	0.57	-	-
REITs	Wilshire REIT	6.5%	8.2%	19.3%	0.32	0.40	0.67	0.72
Global Infrastructure	S&P Global Infrastructure	6.6%	8.0%	17.6%	0.35	0.43	0.45	0.51
Risk Parity	S&P Risk Parity 10% Vol Index	5.4%	5.9%	10.0%	0.50	0.55	-	-
Currency Beta	MSCI Currency Factor Index	0.8%	0.9%	3.4%	0.12	0.13	0.24	0.25
Inflation		2.5%	-	-	-	-	-	-

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.

*To represent hedge fund styles, we use a combination of HFRI benchmarks: Equity Style = 33% HFRI Fundamental Growth, 33% HFRI Fundamental Value, 33% HFRI Activist. Credit Style = 20% HFRI Distressed/Restructuring, 20% HFRI Credit Arbitrage, 20% HFRI Fixed Income-Corporate, 20% HFRI Fixed Income-Convertible Arbitrage, 20% HFRI Fixed Income-Asset Backed. Asymmetric Style = 50% HFRI Relative Value, 50% HFRI Macro

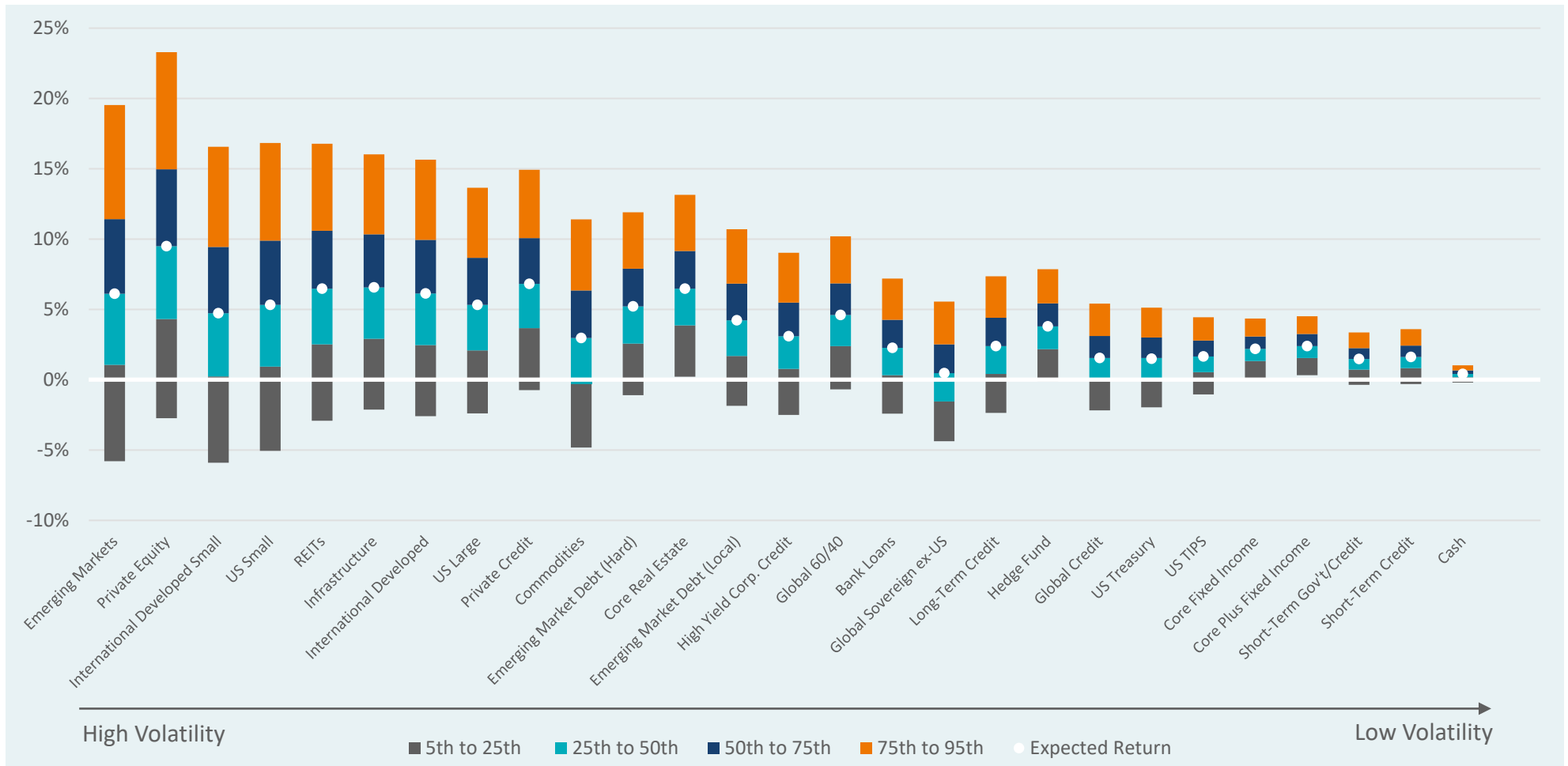
Correlation assumptions

	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	-0.2	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	0.7	0.6	0.6	0.6	0.6	0.7	1.0																							
US TIPS	0.0	0.2	0.1	0.2	0.2	0.3	0.2	0.2	1.0																						
US Treasury	0.2	-0.3	-0.4	-0.3	-0.3	-0.2	-0.3	-0.2	0.7	1.0																					
Global Sovereign ex-US	0.1	0.2	0.1	0.3	0.4	0.5	0.3	0.1	0.6	0.4	1.0																				
US Core	0.2	0.0	-0.1	0.0	0.0	0.1	0.0	0.0	0.8	0.9	0.6	1.0																			
Core Plus	0.1	0.2	0.1	0.2	0.2	0.3	0.2	0.1	0.8	0.8	0.6	1.0	1.0																		
Short-Term Gov't/Credit	0.4	-0.1	-0.1	0.0	0.0	0.1	0.0	-0.1	0.6	0.7	0.5	0.8	0.7	1.0																	
Short-Term Credit	0.0	0.4	0.4	0.4	0.4	0.5	0.4	0.0	0.6	0.3	0.5	0.6	0.7	0.6	1.0																
Long-Term Credit	0.0	0.3	0.2	0.3	0.3	0.4	0.3	0.1	0.7	0.6	0.5	0.8	0.9	0.5	0.7	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	0.5	0.1	0.7	0.6	1.0														
Bank Loans	-0.3	0.6	0.7	0.6	0.7	0.6	0.7	0.3	0.3	-0.3	0.2	0.1	0.3	0.0	0.6	0.4	0.9	1.0													
Global Credit	-0.1	0.6	0.5	0.7	0.7	0.8	0.7	0.3	0.6	0.2	0.7	0.5	0.7	0.4	0.8	0.8	0.8	0.6	1.0												
EMD USD	-0.2	0.6	0.5	0.7	0.7	0.7	0.7	0.4	0.6	0.1	0.6	0.5	0.7	0.3	0.7	0.7	0.8	0.7	0.9	1.0											
EMD Local	0.0	0.6	0.5	0.7	0.7	0.8	0.7	0.4	0.4	0.0	0.7	0.3	0.5	0.3	0.6	0.5	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	0.3	-0.1	0.1	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	0.8	0.7	0.8	0.6	0.2	-0.3	0.2	0.0	0.2	0.0	0.5	0.4	0.8	0.7	0.6	0.6	0.5	0.5	1.0								
Real Estate	-0.2	0.6	0.6	0.5	0.5	0.5	0.6	0.4	0.2	-0.1	0.2	0.1	0.1	-0.1	0.1	0.2	0.4	0.3	0.3	0.4	0.4	0.3	0.5	1.0							
REITs	-0.2	0.7	0.6	0.6	0.6	0.5	0.7	0.5	0.5	0.1	0.3	0.4	0.5	0.2	0.5	0.5	0.7	0.5	0.6	0.6	0.5	0.3	0.5	0.7	1.0						
Infrastructure	-0.2	0.8	0.7	0.8	0.8	0.7	0.8	0.7	0.4	-0.1	0.5	0.3	0.4	0.2	0.6	0.5	0.8	0.7	0.8	0.8	0.8	0.5	0.7	0.3	0.7	1.0					
Risk Parity	-0.1	0.7	0.6	0.7	0.7	0.7	0.8	0.4	0.5	0.0	0.4	0.3	0.5	0.3	0.7	0.5	0.8	0.7	0.7	0.8	0.7	0.7	0.7	0.4	0.6	0.8	1.0				
Currency Beta	0.0	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	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.

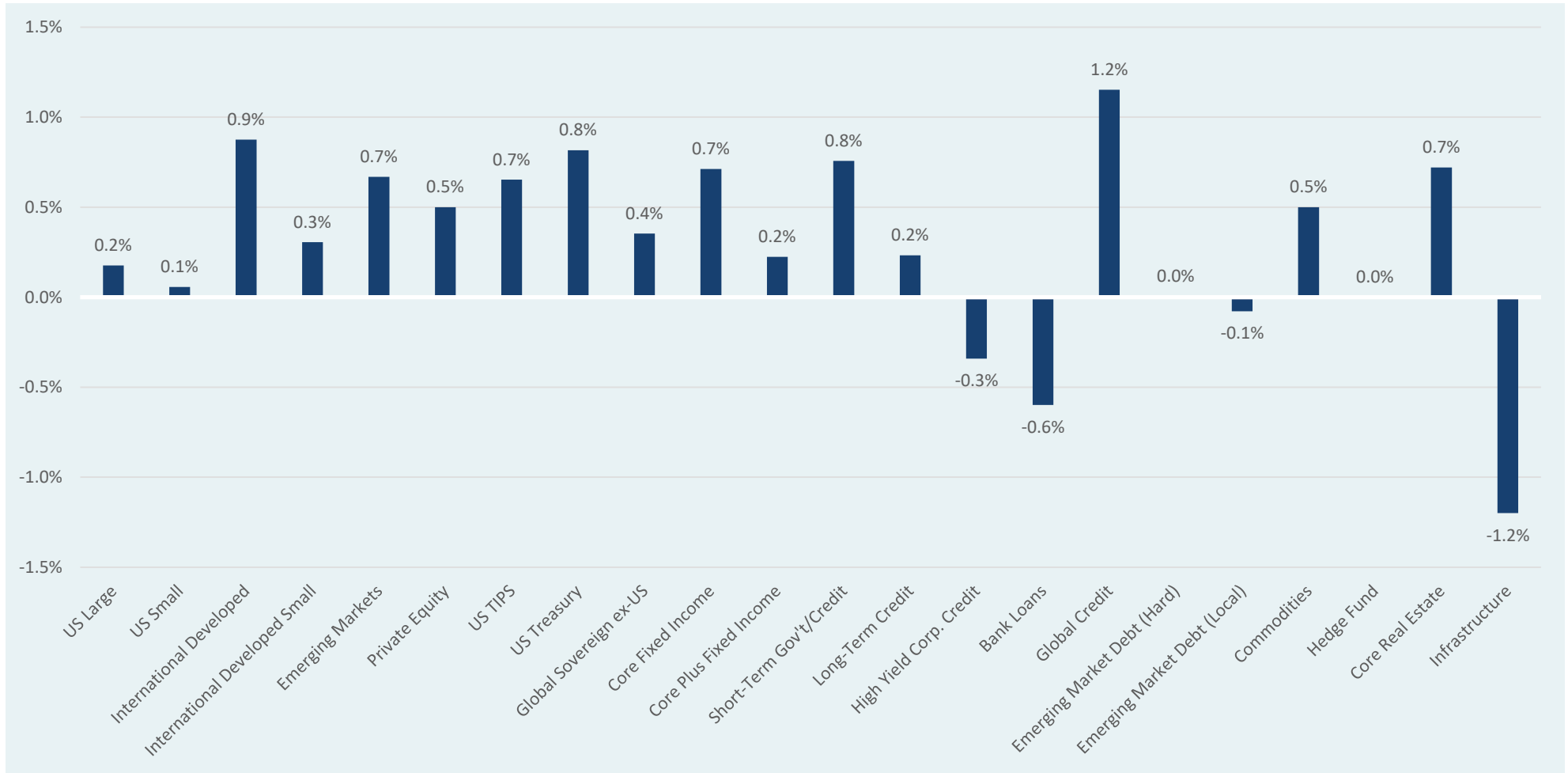
Range of likely 10-year outcomes

10-YEAR RETURN 90% CONFIDENCE INTERVAL



Source: Verus, MPI

2022 vs. 2021 return forecast



Source: Verus, as of 9/30/21

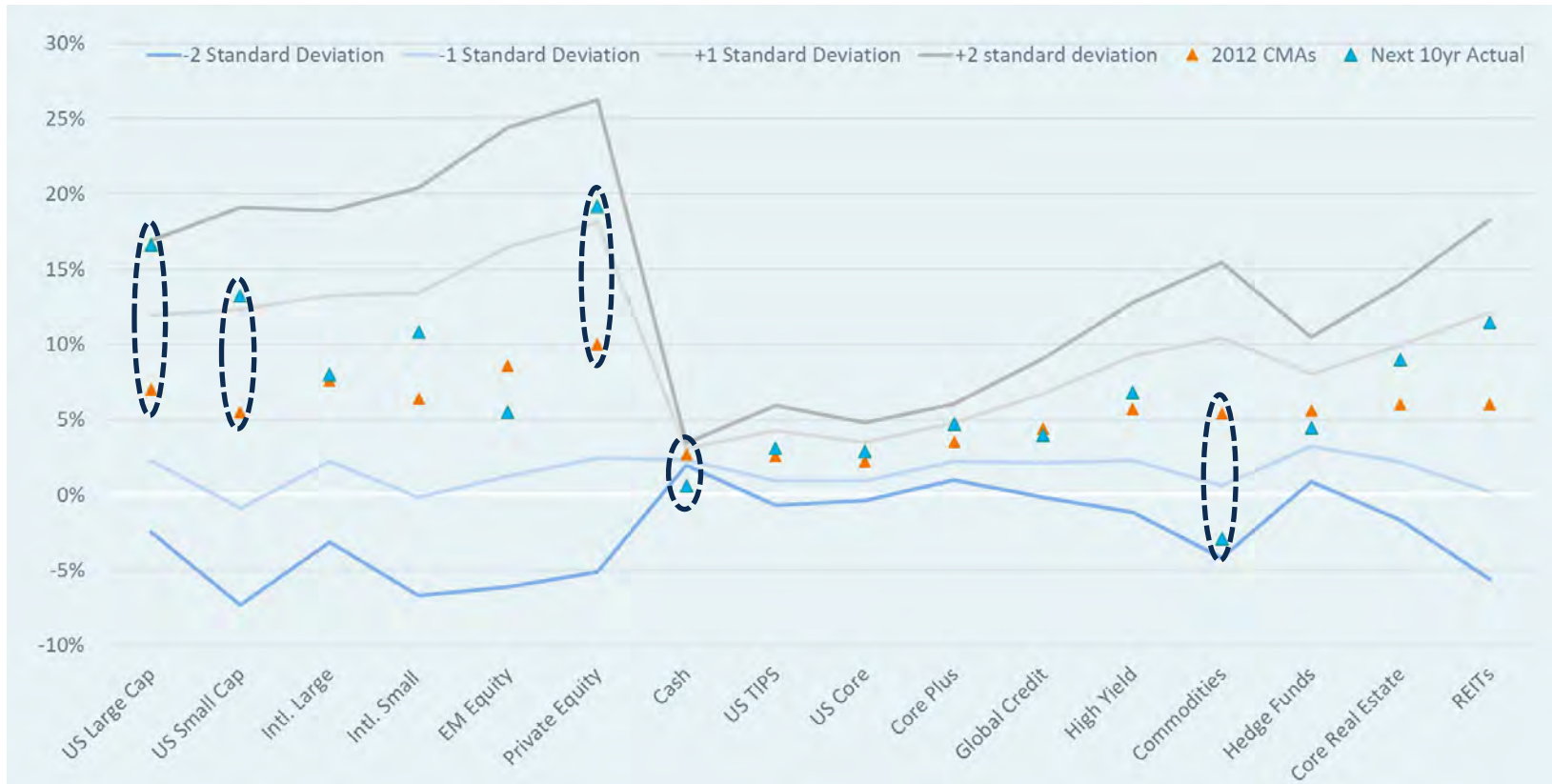
Relevant forecast changes

- The return expectations of higher quality fixed income increased, as bond yields recovered from pandemic lows. On the other hand, riskier fixed income forecasts were generally lower due to extremely tight credit spreads. Equity return expectations increased modestly as valuations fell and inflation moved higher.
- Inflation expectations increased materially throughout the year as price pressures ramped up and year-over-year growth in U.S. consumer prices reached 5.4% in September. The U.S. TIPS breakeven inflation rate increased from 1.6% to 2.4%, as inflation expectations surpassed pre-COVID levels in the first quarter. Household inflation expectations (University of Michigan) jumped and have tracked much more closely to current inflation levels, moving from 2.7% to 3.0%. The Survey of Professional Forecasters also increased from 2.0% to 2.4%. Overall, our inflation forecast increased from 2.0% to 2.5%. Inflation is an important component of the performance of asset classes such as equities, real estate, and commodities. It is worth noting that inflation expectations affect *nominal* returns, rather than *real* returns.
- Credit spreads have steadily trended lower as markets recovered and the social and business risks from COVID-19 subsided. Spreads are now at historically tight levels, though this may be reflective of very muted credit default activity. Core fixed income spreads came in slightly from 90 bps to 81 bps, and high yield spreads fell from 551 bps to 323 bps.
- The long end of the yield curve increased as the 10-year U.S. Treasury yield climbed from 0.68% to 1.49%. The short end of the curve remained anchored at zero, though as the economy has improved, the market has priced in Fed interest rate hikes as early as 2022. The three-month U.S. dollar LIBOR reference rate showed little change, moving from 0.23% to 0.13%.
- Emerging market hard and local currency debt forecasts were mixed. Hard currency-denominated debt spreads to U.S. Treasury yields decreased from 471 bps to 392 bps. The yield of local-denominated debt fell very slightly from 4.6% to 4.5%.

All data cited above is as of 9/30/21

A brief review of forecasting error

Verus 2012 10-Year Capital Market Assumptions vs. Actual Experience



Although Verus' 10-year CMA's were within the statistical range of expected outcomes overall, they missed the mark in a number of important areas

	Experience		Expected	
	#	%		%
Total 2012 CMA's	16			
w/in 1 std dev	11	69%	↔	67%
w/in 2 std dev	15	94%	↔	95%
w/in 3 std dev	16	100%	↔	99%

SAA analysis

Mean variance analysis

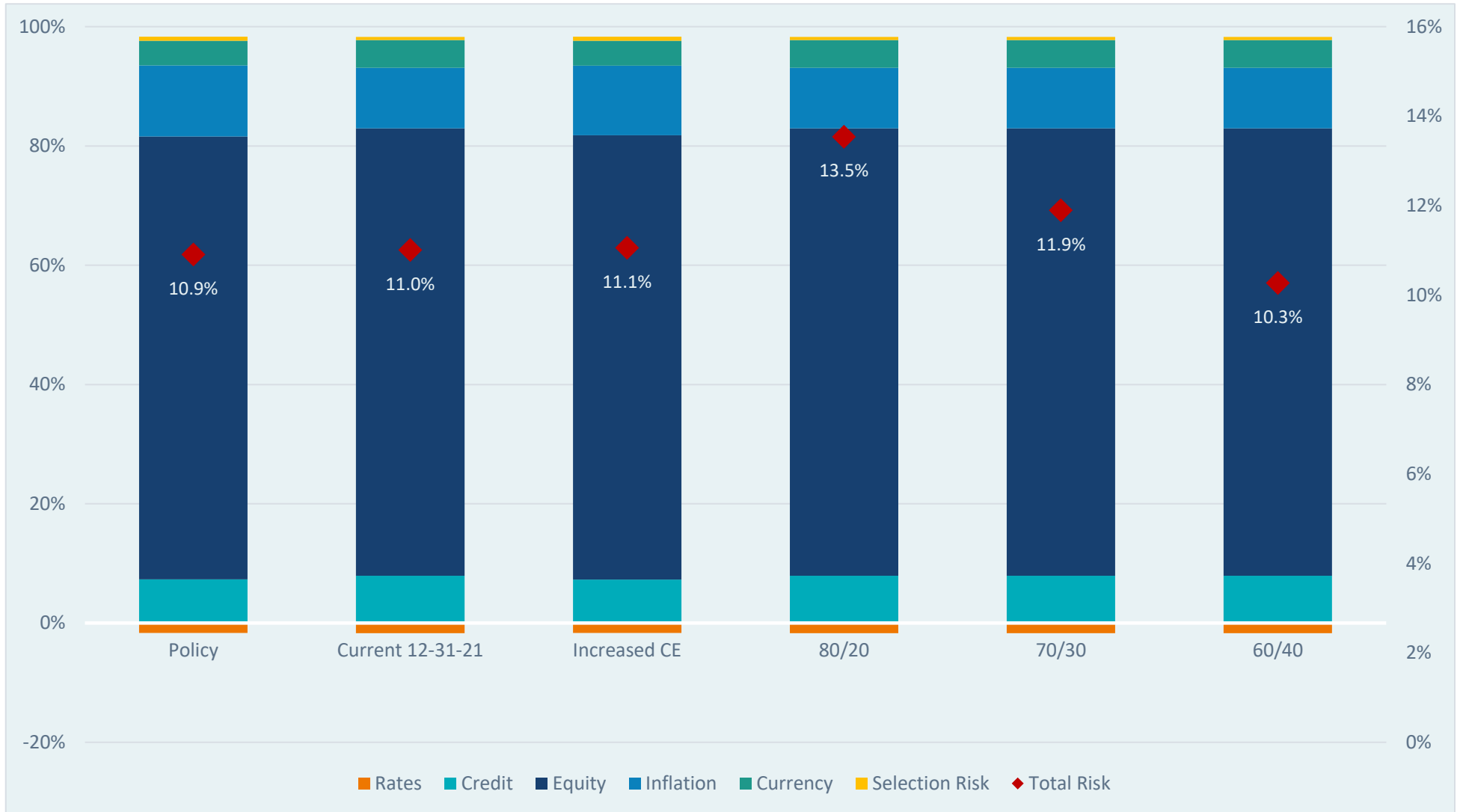
	Policy	Current 12-31-21	Increased Cap Eff	80/20	70/30	60/40	Verus 2022 CMA's (10 Yr)			
							Return (g)	Return (a)	Standard Deviation	Sharpe Ratio (a)
Global Equity ¹	37.0	42.4	37.0	80.0	70.0	60.0	5.7	7.1	17.3	0.39
Total Equity	37	42	37	80	70	60				
Core Fixed Income	4.0	4.1	4.0	0.0	0.0	0.0	2.2	2.3	4.1	0.46
Core Plus Fixed Income	10.0	7.9	10.0	20.0	30.0	40.0	2.4	2.5	4.0	0.51
High Yield Corp. Credit	6.0	5.8	6.0	0.0	0.0	0.0	3.1	3.7	11.2	0.30
Emerging Market Debt ²	4.0	4.7	4.0	0.0	0.0	0.0	4.7	5.4	12.4	0.41
Total Fixed Income	24	23	24	20	30	40				
Commodities	4.0	5.4	4.0	0.0	0.0	0.0	3.0	4.2	15.9	0.24
Core Real Estate	5.0	5.4	5.0	0.0	0.0	0.0	6.5	7.2	12.5	0.54
Private Real Estate	5.0	1.4	5.0	0.0	0.0	0.0	9.0	10.5	17.7	0.57
Midstream	5.0	5.3	5.0	0.0	0.0	0.0	7.9	11.8	29.8	0.38
Total Real Assets	19	18	19	0	0	0				
Hedge Fund	10.0	10.0	10.0	0.0	0.0	0.0	3.8	4.1	7.7	0.48
Private Equity	5.0	2.1	5.0	0.0	0.0	0.0	9.5	12.4	26.0	0.46
Private Credit ³	5.0	5.5	5.0	0.0	0.0	0.0	7.7	9.1	17.5	0.50
Total Non-Public Investments	20	18	20	0	0	0				
Alpha Pool	5.0	4.8	8.0	0.0	0.0	0.0	3.8	4.1	7.7	0.48
Cash	-5.0	-4.8	-8.0	0.0	0.0	0.0	0.4	0.4	1.2	-
Total Allocation	100	100	100	100	100	100				

	Policy	Current 12-31-21	Increased Cap Eff	80/20	70/30	60/40
Mean Variance Analysis						
Forecast 30 Year Return	6.0	5.7	6.1	5.2	5.0	4.7
Standard Deviation	12.0	12.6	12.3	14.1	12.5	10.9
Return/Std. Deviation	0.5	0.5	0.5	0.4	0.4	0.4
1st percentile ret. 1 year	-18.4	-19.6	-18.7	-22.7	-20.2	-17.7
Sharpe Ratio	0.51	0.47	0.51	0.40	0.41	0.43

Source: MPI and Verus

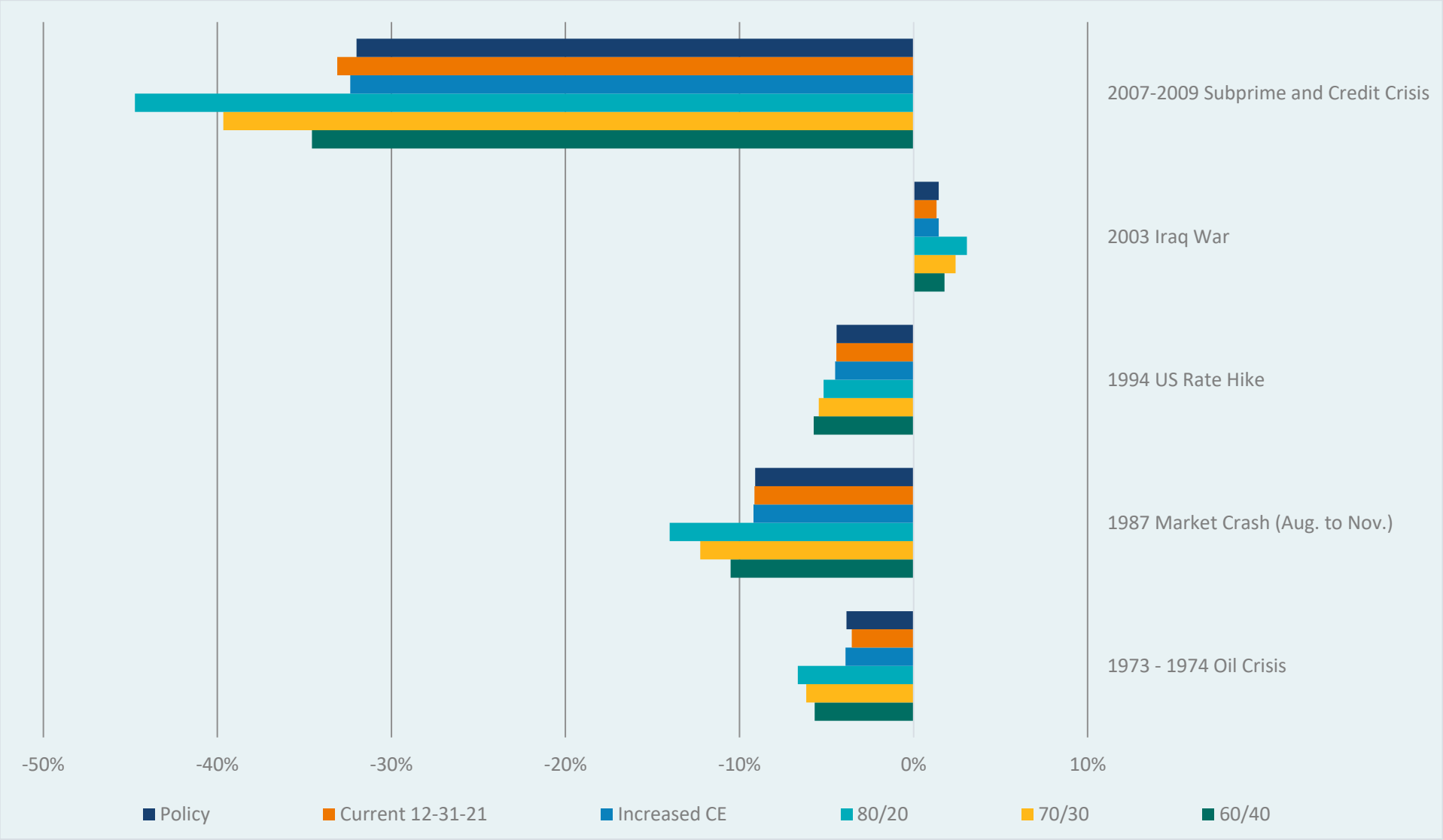
¹ Includes opportunistic equity strategies; ² Includes hard and local EMD; ³ Includes direct lending, credit opportunities and distressed credit

Risk decomposition



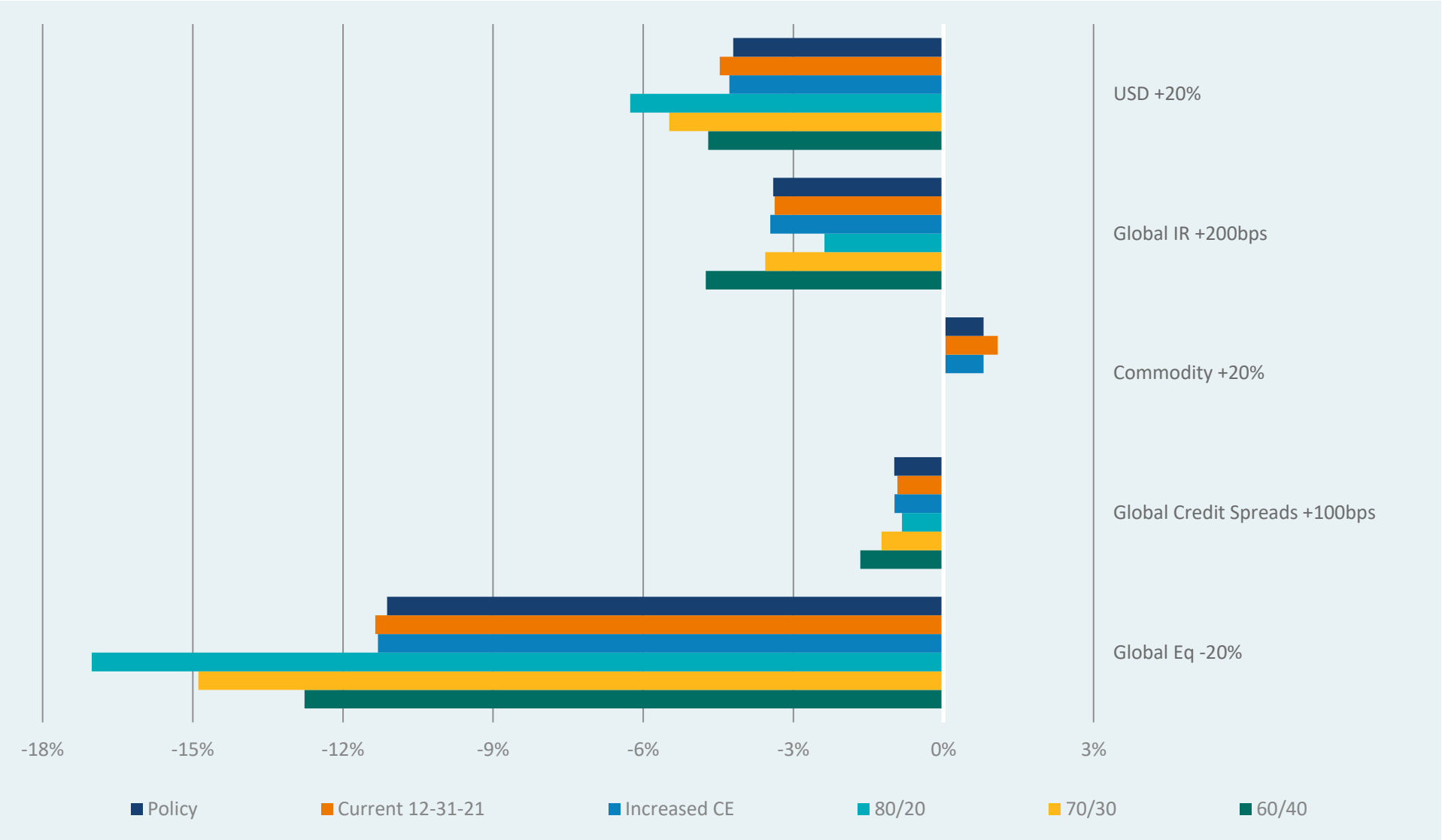
Source: Barra

Scenario analysis



Source: Barra

Stress tests



Source: Barra

Allocation Ranges

Asset Class	Current	Proposed	Current Range		Proposed Range		
	Allocation	Allocation	Low	High	Low	High	
Global Equity	37%	37%	32%	46%	26%	48%	Increases range to +/-11% from +9%/-5%
Fixed Income	24%	24%	20%	34%	14%	34%	Changes range to +/-10% from +10%/-4%
Core Fixed Income	4%	4%	12%	25%	8%	25%	Reduces low end of range to 8% from 12%
Core Plus Fixed Income	10%	10%					
HY Corp Credit	6%	6%	3%	9%	2%	9%	Reduces low end of range to 2% from 3%
Emerging Market Debt	4%	4%	1%	7%	1%	7%	
Core Real Estate	5%	5%	3%	7%	2%	8%	Increases range to +/-3% from +/-2%
Commodities	4%	4%	0%	6%	0%	8%	Increases range to +/-4% from +2%/-4%
Midstream Energy	5%	5%	0%	7%	0%	8%	Increases high end of range to 7% from 8%
Hedge Funds	10%	10%	5%	15%	5%	15%	
Alpha Pool	5%	8%	0%	7%	2%	10%	Increases range to +2%/-6% from +2%/-5%
Private Equity	5%	5%	0%	10%	0%	10%	
Private Credit	5%	5%	0%	10%	0%	10%	
Private Real Estate	5%	5%	0%	10%	0%	10%	
Cash exposure	-5%	-8%	-7%	5%	-10%	5%	Increases range to +13%/-2% from +10%/-2%
TOTAL	100%	100%					

Increasing selected allocation ranges will provide KCERA Investment Staff with additional flexibility to respond to market variability

Benchmark adjustments

Benchmarks

— Domestic Equity Composite

- Change from Russell 3000 to MSCI USA IMI
- Reasoning – Change to all MSCI indexes for provider consistency across equity composites

— Global Equity Composite

- Change from MSCI ACWI IMI GD (Gross of Dividend withholding tax) to MSCI ACWI IMI ND (net of dividend withholding tax)
- Reasoning – GD is more appropriate for actively managed portfolios. Since the international equity portfolio is now largely passively managed, the ND benchmark is more appropriate.

— Emerging Market Debt

- Change from 50 JPM EMBI Global Div/ 50 JPM GBI EM to 50 JPM EMBI Global Div/50 JPM GBI EM Global Div
- Reasoning – The GBI EM Global provides for a cap on maximum exposure and increased diversification and is also more widely utilized

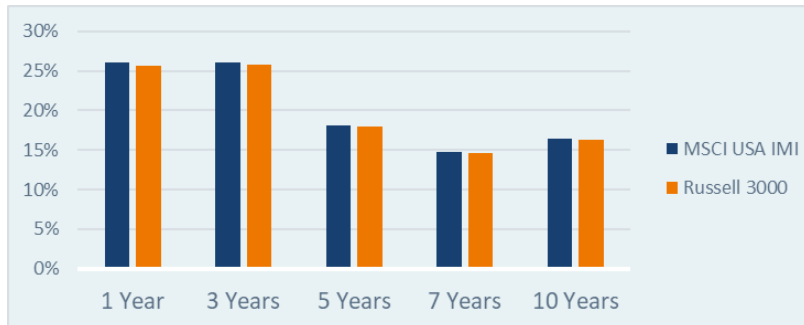
Domestic equity composite

The Russell 3000 and MSCI USA IMI benchmarks provide similar characteristics and performance comparisons and are largely interchangeable

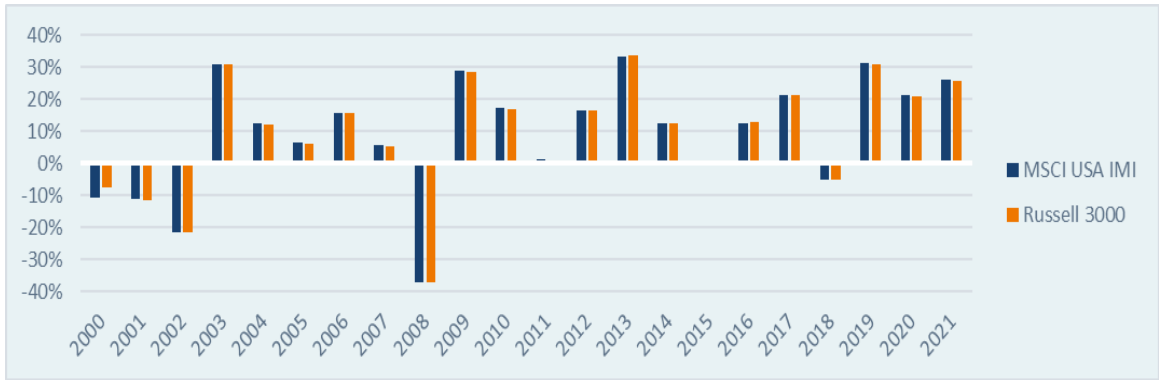
- Russell 3000: The Russell 3000 Index measures the performance of the largest 3,000 US companies representing approximately 97% of the investable US equity market.
- MSCI USA IMI (USD): The MSCI USA Investable Market Index (IMI) is designed to measure the performance of the large, mid and small cap segments of the US market. With 2,575 constituents, the index covers approximately 99% of the free float-adjusted market capitalization in the US.

Sector Weights	Russell 3000	MSCI USA IMI
Information Technology	27.67%	27.17%
Health Care	12.67%	13.09%
Consumer Discretionary	15.29%	12.07%
Financials	11.75%	11.82%
Communication Services	2.76%	8.84%
Industrials	12.90%	8.83%
Consumer Staples	5.14%	5.77%
Energy	3.77%	3.65%
Real Estate	3.53%	3.43%
Materials	1.75%	2.84%
Utilities	2.77%	2.50%

Annualized Performance



Calendar-Year Performance

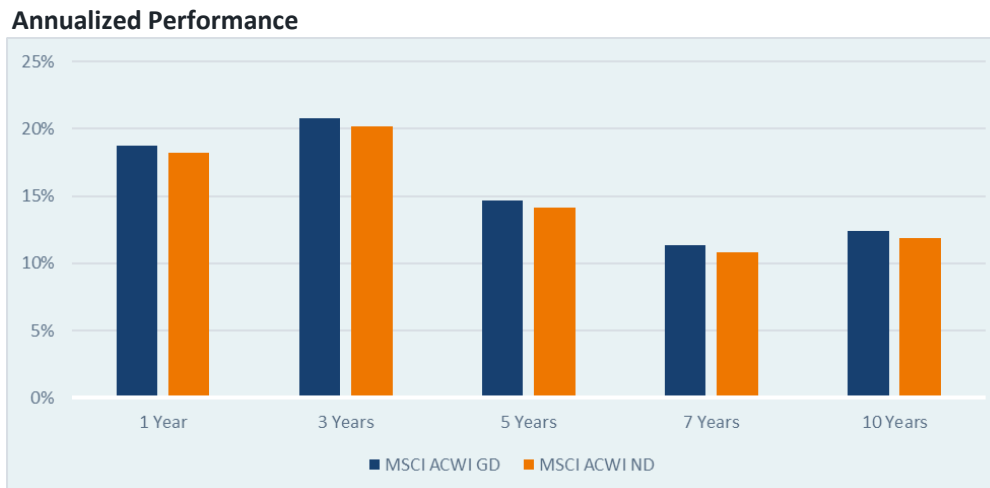


Global equity

The Gross Dividends version of the benchmark was used previously to account for active manager efforts to manage tax implications. With a moves towards passive management, the Net Dividends version is more appropriate for KCERA's international equity allocation.

- The Gross Dividends index reinvests as much as possible of a company's dividend distributions. The reinvested amount is equal to the total dividend amount distributed to investors residing in the country of the dividend-paying company. The Gross total return index does not, however, include any tax credits.
- The Net Dividends index reinvests dividends after the deduction of withholding taxes, using a tax rate applicable to non-resident institutional investors who do not benefit from double taxation treaties.

The ND index shows slightly lower returns over time and is an easier benchmark to beat.



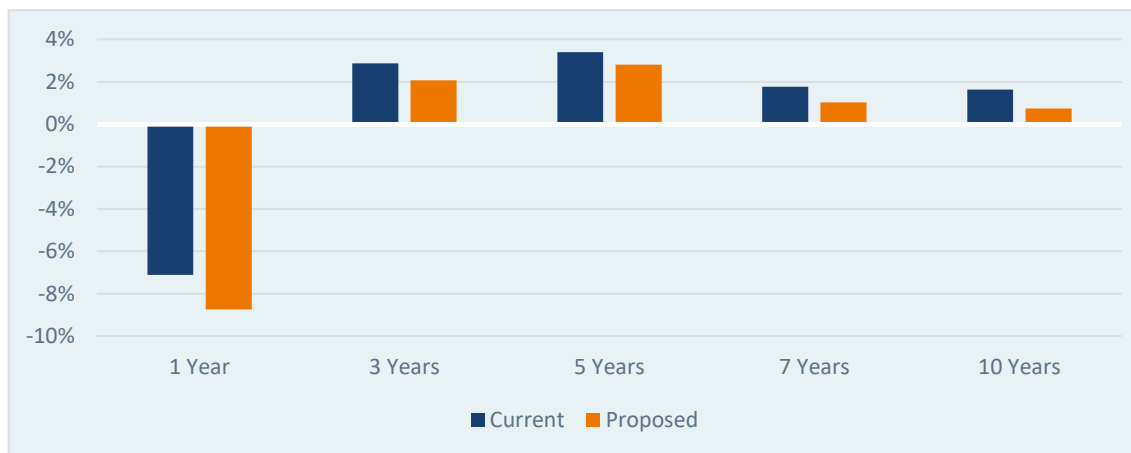
Emerging market debt

KCERA's current EMD benchmark is a 50/50 mix of JP Morgan's hard and local currency indexes. The local currency portion is the narrowest version of the benchmark, and we believe a broader, more diverse version better reflects the opportunity set.

- The current version reflects markets that are directly investable and accessible to foreign investors. The index is capitalization weighted, based on outstanding debt.
- The proposed version includes additional countries (i.e., Indonesia and Thailand) that are accessible to most of the international investor base. It also increases diversification by applying a 10% allocation cap to the maximum weight for any country in the index.

The proposed benchmark is JP Morgan's most widely used local currency EM index

Annualized Blended Benchmark Performance



Recommendations and next steps

Recommendation - CEP

- Revise Capital Efficiency Program beta target sources from 100% equity to:
 - 25% equity (S&P 500 futures)
 - 55% rates (Treasury futures)
 - 20% commodities (Commodities futures)
- Adjust CE Program collateral pool such that reserve collateral is reduced from 55% to 30%

Recommendations - SAA

- Increase allocation to Capital Efficiency and the Alpha Pool to 8%
- Adjust policy allocation ranges to allow staff additional management flexibility

Recommendation - benchmarks

— Change policy benchmarks as follows:

- Domestic Equity Composite from Russell 3000 to MSCI USA IMI for reporting purposes
- Global Equity Composite from MSCI ACWI IMI GD (Gross of Dividend withholding tax) to MSCI ACWI IMI ND (net of dividend withholding tax) for performance reporting purposes
- EM Debt from from 50 JPM EMBI Global Div/ 50 JPM GBI EM to 50 JPM EMBI Global Div/50 JPM GBI EM Global Div for performance reporting purposes and also in the investment policy

Potential next steps

- Obtain Board approval
- Implement asset allocation and CE Program changes
- Prepare revised Investment Policy Statement for review