



RETIREMENT BOARD MEETING CALENDAR SHEET
November 12, 2025

To: Retirement Board
Through: Alison Romano, CEO & CIO
From: Anna Langs, CFA, FRM Managing Director Kevin Cao, CFA Assistant Portfolio Manager
Date: November 12, 2025
Agenda Item: Risk Review for SFERS Total Plan

Recommendation:

Discussion Only

Background:

SFERS Investment Staff presents its annual update of Risk Management and affirms that key risk metrics are within expectations.

SFERS has a robust Risk Management framework which includes Strategic Asset Allocation ("SAA") and Liquidity Management, along with the measurement and management of key risk exposures for SFERS as a whole and for each asset class. The Retirement Board approves the SAA, which encompasses the risk/return objectives for the Total Plan, and also approves asset class guidelines with risk guardrails.

Staff worked with Wilshire Associates to incorporate comprehensive modeling using both bottom-up position-based and top-down board market risk estimates for the Total Portfolio and each asset class. Staff incorporated these risk tools to enhance portfolio construction, internal investment guidelines and improve risk management and monitoring.

SFERS Investment Staff also presents an overview of SFERS' use of leverage. Plan-Level Leverage helps with rebalancing, liquidity management, and ability to improve Total Portfolio risk/return profile. The leverage allocation in the SAA provides opportunities to innovate leverage implementation using diversifying and risk mitigating strategies. In collaboration with Board's consultant, Wilshire, Staff introduced Portable Alpha (PA) Framework and Guidelines, updated the Leverage Policy to include PA strategies, and worked with Investment Operations and BNY Mellon on accounting for PA strategies and monitoring PA investment guidelines.

Attachment:

"Total Plan Risk Review" – SFERS Investment Staff presentation

Total Plan Risk Review

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November 12, 2025



SFERS
San Francisco Employees' Retirement System

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1. Risk Overview and Key Takeaways

What is Risk?

Risk is multi-dimensional. Risk management requires a multifaceted approach.

- **Shortfall:** Support distributions and long-term growth
- **Behavioral:** Instill strong governance
- **Drawdown:** Limit portfolio losses
- **Inflation:** Preserve long-term purchasing power
- **Liquidity:** Balance near-term needs, long-term opportunities
- **Active:** Ensure unique exposures
- **Emerging & Long-Term:** Environmental, Social & Governance risks, such as externalities, intangibles and reputation may be linked to various risk lenses



Who Sets Risk Tolerances and Manages Risk?

Board Approves

- Strategic Asset Allocation (SAA)
- Asset Class Guidelines

Staff Implements

- SAA
- Portfolio Construction
- Manager Selection

Staff Monitors

- Volatility Measures and Liquidity
- Exposure Risk – Sectors, Geographies, Factors
- Absolute Risk and Benchmark Relative Risk

SAA and Risk

Risk principles applied when Board approved SAA in 2024:

- ✓ Increase Liquidity
- ✓ Reduce Downside Risk
- ✓ Reduce Growth Exposure
- ✓ Minimize risk of reduction in funded status and increase in contributions (related to return volatility)

Quantitative Risk Measures Reviewed in SAA

Risk	Measure	Concept
<i>Liquidity</i>	Market Level Liquidity Score	Percent of fund in liquid assets that can be sold
	Stressed Liquidity Score	Similar to above, taking into account market impact and dislocation
<i>Downside Risk</i>	Conditional Drawdown Risk (CDAR)	Average loss of worst 10% of projected losses
<i>Growth Exposure</i>	Wilshire Growth Factor Exposure	Sensitivity of portfolio to economic growth
<i>Return Volatility (Absolute Risk)</i>	Standard Deviation of Return	~68% of the time the 1-year return is expected to be within 1 standard deviation of returns

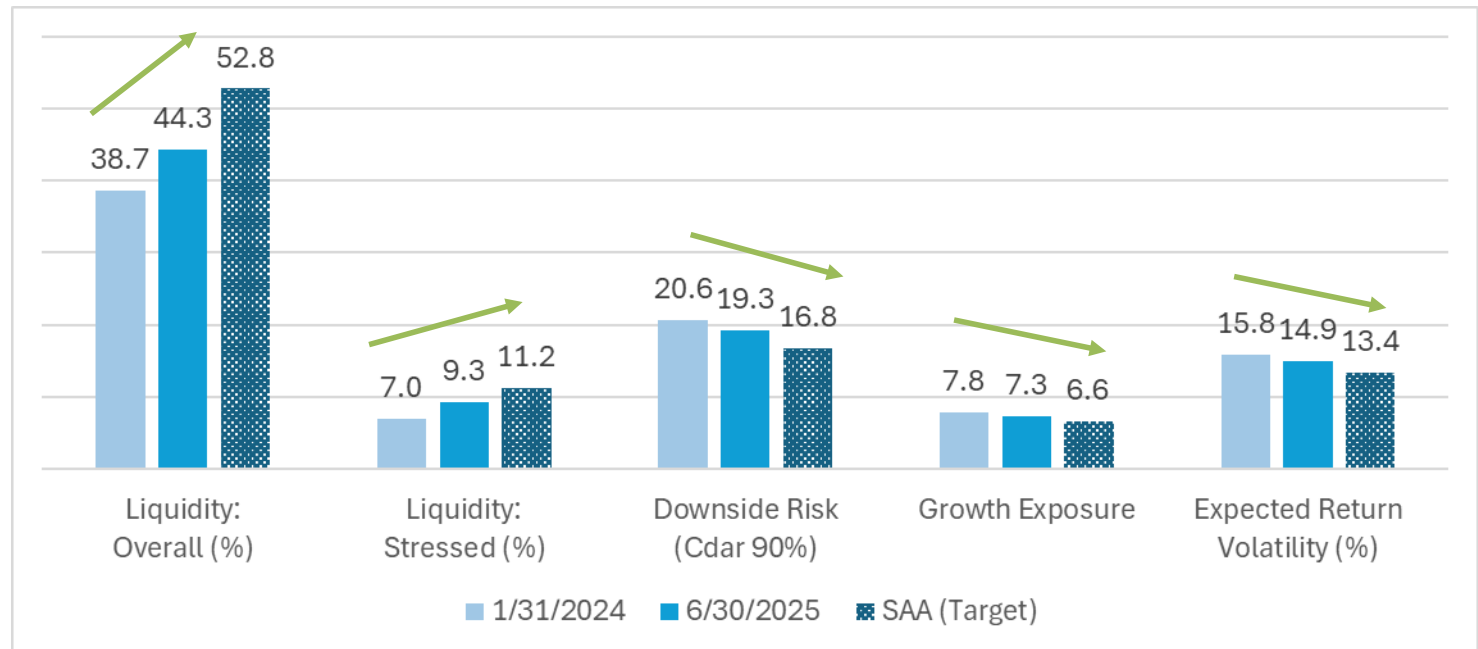
Total Fund: Expected Risk and Return Profile

SFERS has been moving the Total Fund risk profile to align with the SAA

Return

	1/31/2024	6/30/2025	SAA
Expected 10-Year Return (%)	6.9	6.8	6.7
Expected 30-Year Return(%)	8.2	7.9	7.6

Risk



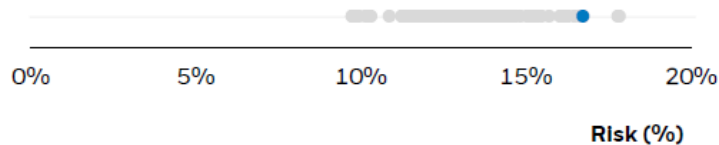
Source: Wilshire's Capital Market forecasts for nominal geometric expected returns for each asset class. Capital market assumptions are as of 6/30/2025. Current allocation is as of 6/30/2025.

SFERS in Context: Expected Risk and Return

SFERS has higher expected Total Fund risk than most peer plans, driven primarily by higher private markets exposure¹

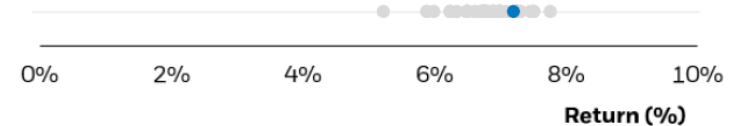
Total Risk

Total Risk – Expected Ann. Return Volatility

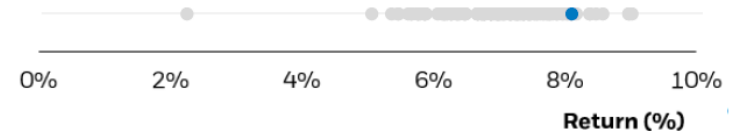


Returns (10yr Annualized) vs. Assumed Return

Assumed Ann. Discount Rate



Realized 10-yr Ann. Return

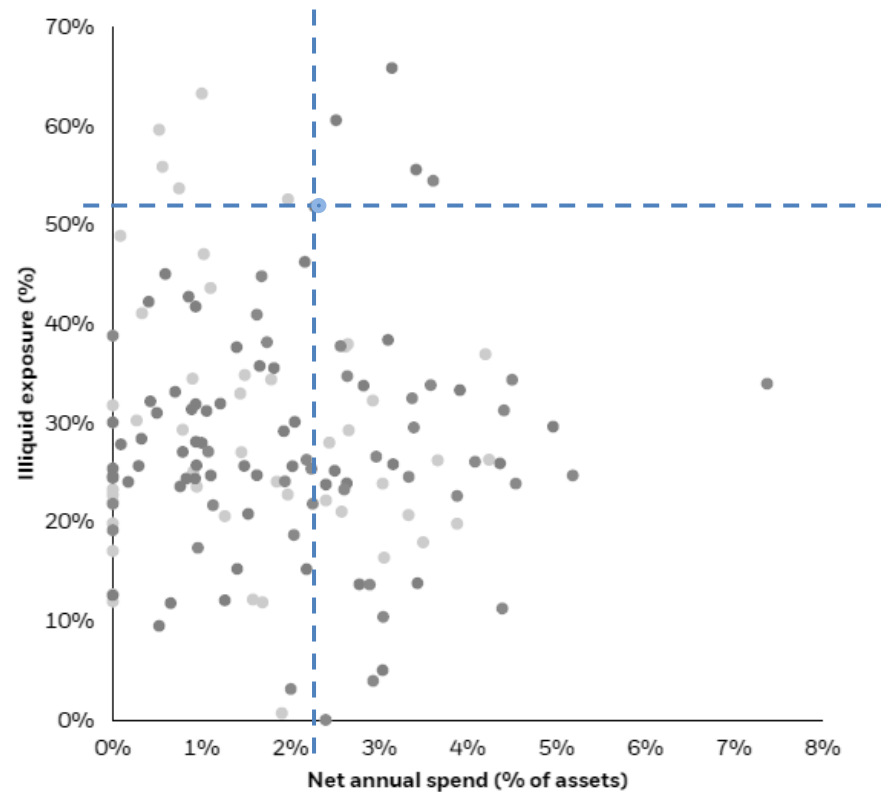


Legend: ● All Plans ● SFERS

¹Based on BlackRock's Public Pension Plan Coverage Universe of 145 plans with total assets of \$5.4 trillion and an average fund size of \$37.3bn
Source: BlackRock as of May 2025 based on BlackRock's CMA. Neither diversification nor asset allocation can guarantee a profit or prevent loss. Actual and hypothetical results are not a guarantee of future results and may be higher or lower than shown. Expected returns are shown net of fees and expenses; realized returns are stated as reported. The results shown are for illustrative discussion purposes only and no representation is being made that any account, product or strategy will achieve results shown. The hypothetical results are based on criteria applied retroactively with the benefit of hindsight and with knowledge of factors that may positively affect performance and that cannot account for risk factors that may affect actual performance. Interpretation of any results should take into consideration inherent limitations and risks of the model and assumptions used.

SFERS in Context: Liquidity

SFERS' higher private market exposure results in greater illiquidity relative to spend

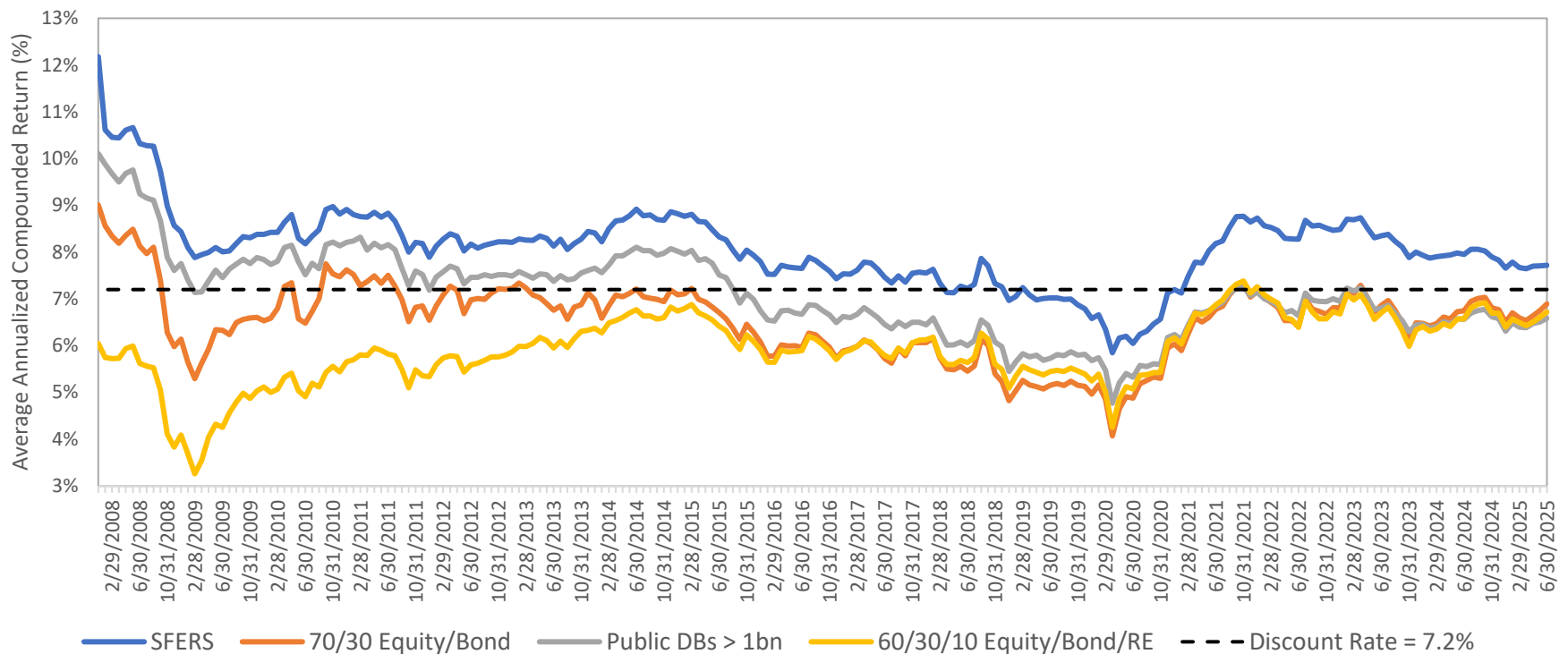


Source: BlackRock, PPD, P&I as of May 2025. Plan data sourced from fiscal year end 2024. Net annual spend is calculating by netting contributions and benefit payments. A positive net annual spend indicates a negative net contribution/benefit payment position; plans with a positive net position are shown at 0% net annual spend. Allocation metrics (average/range) and cohorting only includes plans that allocate to the asset class and may differ from metrics that include all plans. Neither asset allocation nor diversification can guarantee profit or prevent loss.

SFERS in Context: Realized Rolling 20-year Returns

SFERS delivered strong historical returns, with 20-year rolling returns consistently higher than 70/30 and 60/30/10 portfolios and peer universe

20-year rolling returns can be below 7.2% discount rate over multiple years



Notes: SFERS data sourced from NEPC, Wilshire, and BNY Mellon. 70/30 Equity/Bond returns sourced from Evestment – represents 70% MSCI ACWI Net Dividends (prior to 1999 uses Gross Dividends) + 30% Bloomberg Barclays US Aggregate Index. 60/30/10 includes 10% MSCI US REIT Net Index returns. Public DBs > 1bn sourced from NEPC and Wilshire and represents the Investment Metrics Public DB > \$1 Billion Net universe. Data Period: January 1, 1988 through June 30, 2025. Private Equity, Real Assets, and Private Credit performance as of 3/31/2025.



What Other Measures/Sources of Risk Does SFERS Evaluate?

Consistent with policy/guidelines, SFERS Staff monitors a wide breadth of risk statistics

	Measure	Concept
Volatility of Excess Returns	Tracking Error	How much portfolio returns vary from benchmark returns
Volatility of Excess Returns	Stressed Tracking Error	Estimation of portfolio return divergence from benchmark returns in stressed conditions
Factor Exposure	Factor contribution to Tracking Error	Contribution of exposure to common factors (e.g. growth) driving volatility of excess returns
Geographic Exposure	Geographic contribution to Tracking Error	Contribution of geographic exposure driving volatility of excess returns
Idiosyncratic Risk	Tracking error from non-standard factors (“active management”)	Contribution of unique risks driving volatility of excess returns (manager selection)
Leverage	Total Plan Notional relative to NAV	When economic or market exposure of investment exceeds the total capital deployed

SFERS Annual Risk Review: Key Takeaways

SFERS has a robust and evolving risk management framework

- In 2025, Staff worked with Wilshire to on-board comprehensive risk modeling for Total Portfolio and each Asset Class
 - Staff is leveraging these risk tools to enhance portfolio construction, internal investment guidelines and risk monitoring framework
- Asset allocation is a key driver of total fund return and risk
 - Total fund risk as measured by volatility remains within expectations
 - High exposure to growth assets helps drive returns, but introduces significant volatility and tail risks
 - In 2025, Staff rebalanced towards new Strategic Asset Allocation with lower allocation to Growth assets
- Diversification of alternative assets has help dampen risk relative to a standard 70/30 portfolio
- Portfolio positioning decisions within and across asset classes also directly impact risk
 - In 2025, SFERS increased its allocation to US Treasuries, Credit, and Cash
 - SFERS has maintained strategic tilt to Health Care sectors, removed IT and decreased China overweights
- Stress tests imply potential for significant drawdown if the equity market had a substantial downturn scenario. However, the total fund is less sensitive to negative equity moves, fixed income moves and interest rate hikes than a standard 70/30 portfolio

Total Plan Risk Metrics Within Expectations/Guardrails

Risk Metric	Value	Within Guardrails
1. Total Risk - Expected Annualized Volatility Decreased due to Staff's risk reduction and lower market risk	10.3%	✓
2. Drawdown Risk: CVaR90 - Average of Worst 10% of Exp. Ann. Returns Decreased, remains elevated	14.3%	✓
3. Tracking Error: Expected Volatility of Excess Returns vs Policy Decreased due to lower Equity allocation	64 bps	✓
4. Stress Tracking Error: Exp. Volatility of Excess Returns in Dislocation Decreased with reduced Equity allocation	86 bps	✓
5. Asset Allocation Overweight Private Equity + Underweight Public Equity	+5% Growth Assets	✓
6. Leverage: Net and Gross Notional Not fully utilized, plans for innovative deployment	0 Net 21 bps Gross	✓
7. Liquidity: Percent of Portfolio in Liquid Assets Improved w/ larger allocations to Treasuries, Credit, and Cash	Base Case 44% Stressed 9%	✓

Source Wilshire Associates, data as of 06/30/2025

2. Asset Allocation and Performance

Asset Allocation and Performance: Key Takeaways

- The Total Fund historical volatility is driven mostly by Growth assets (Public and Private Equity)
- Increased liquidity and reduced Growth exposure in line with the new SAA
- SFERS has evolved its asset allocation to diversify its non-growth assets
 - The considerable increase in asset diversification over the last 5-7 years has led to lower realized risk vs. Policy benchmark
- The historical risk and return profile of each asset class is consistent with expectations; growth assets have delivered higher returns with higher risk and capital preservation assets have delivered lower returns with lower risk
- Asset allocation deviations from the Policy benchmark contributed to performance while manager selection detracted

Total Plan Realized Risk and Return

Annualized Returns and Realized Volatility

Lower Realized Volatility and elevated Tracking Error due to large allocation to alternatives

Realized Return, Volatility, and Tracking Error	5 Year (%)	7 Year (%)
Portfolio Return	9.6	8.3
Interim Policy Return	11.4	9.2
SAA Return	11.1	9.0
Portfolio Volatility	6.6	6.9
Interim Policy Volatility	9.5	9.9
SAA Volatility	9.7	9.9
Tracking Error vs Interim Policy	4.7	4.7
Tracking Error vs SAA	4.9	4.7

Source: BNY Mellon.

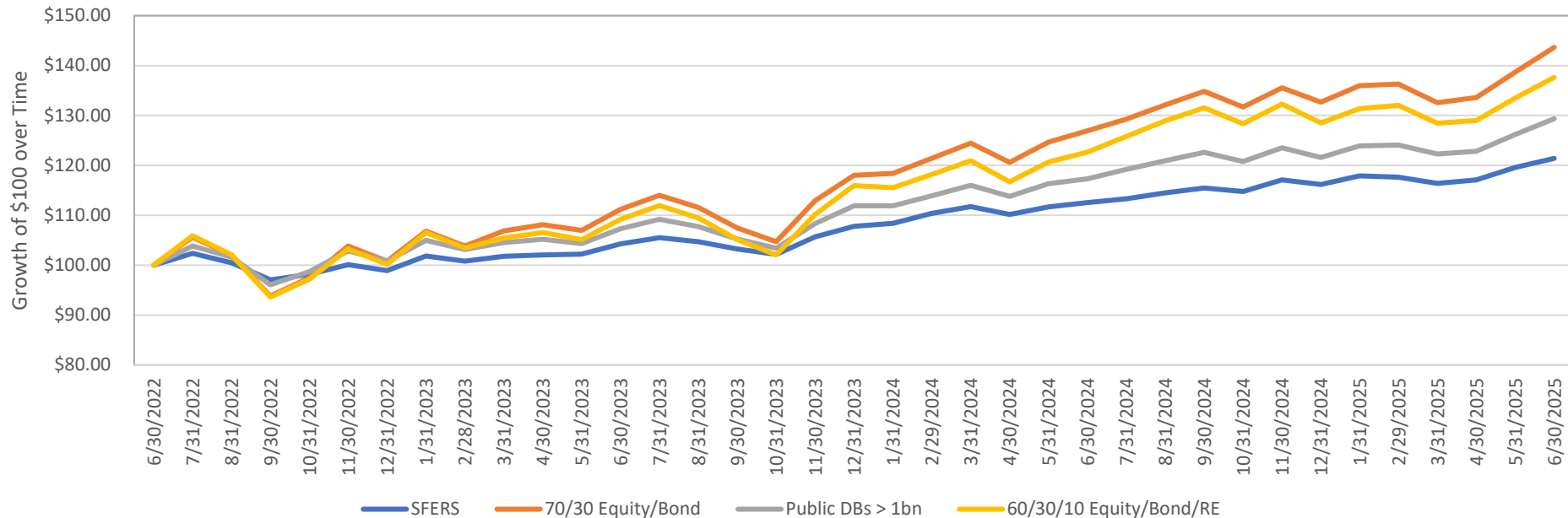
Note: Volatility represents realized annual standard deviation. Return attribution based on Brinson Attribution method. Select effect is measured against asset class policy returns.

SFERS Performance and Risk Analysis | 3 Year (July 2022 to June 2025)

Compounded Cumulative Returns

3-Year returns are muted due to underperformance of PE and RA, superior risk-adjusted return:

- Underperforming 70/30 and 60/30/10 portfolios with less realized volatility and lower tail risk*



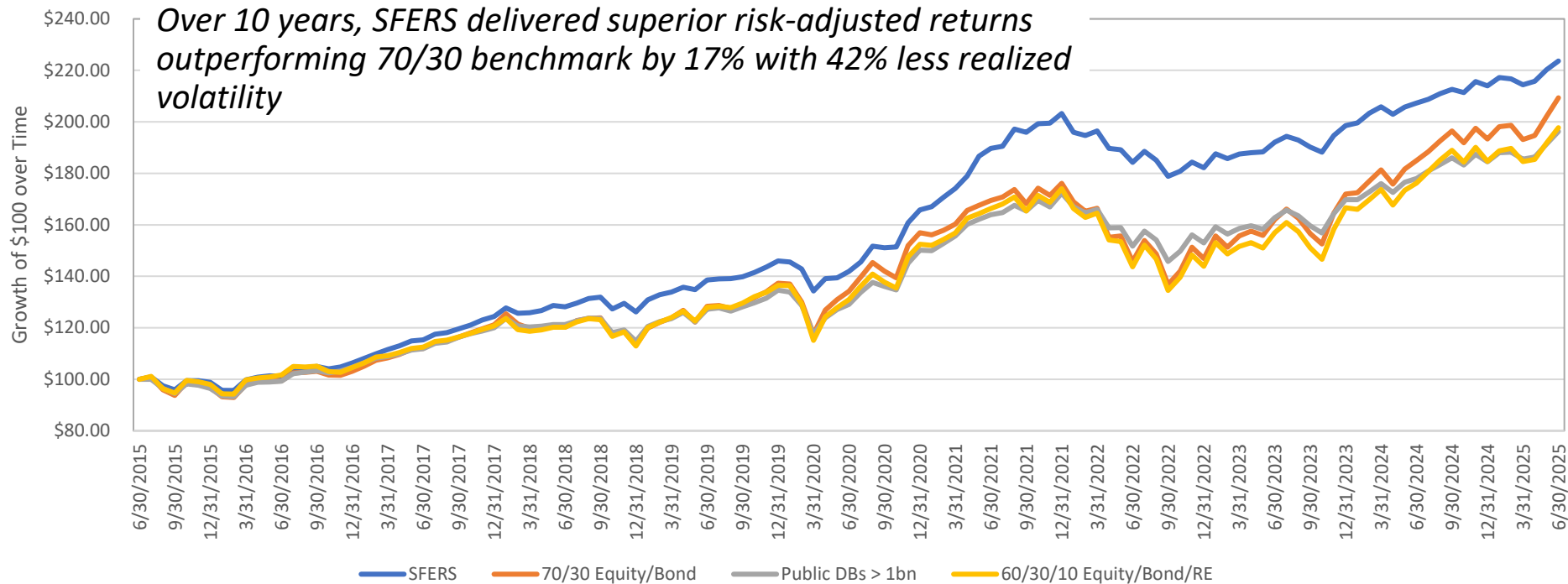
	Total Return	Ann. Return	Ann. Volatility	Sharpe Ratio	Downside Deviation	Sortino Ratio	Skewness	Correlation	Worst Return	Worst Return Month	% of Positive Months	Monthly VaR (99%)
SFERS	21.4%	6.7%	5.2%	1.24	2.9%	2.29	-0.44	1.00	-3.4%	Sep 2022	66.7%	3.5%
70/30 Equity/Bond	42.3%	12.5%	12.2%	0.97	7.0%	1.79	-0.34	0.98	-8.1%	Sep 2022	66.7%	8.2%
60/30/10 Equity/Bond/RE	37.6%	11.2%	12.5%	0.85	7.4%	1.55	-0.32	0.97	-8.3%	Sep 2022	63.9%	8.4%
Public DBs > 1bn	29.4%	9.0%	8.0%	1.07	4.6%	1.95	-0.42	0.98	-5.4%	Sep 2022	66.7%	5.4%

Notes: SFERS data sourced from NEPC, Wilshire, Caissa, and BNY Mellon. 70/30 Equity/Bond returns sourced from Evestment – represents 70% MSCI ACWI Net Dividends (prior to 1999 uses Gross Dividends) + 30% Bloomberg Barclays US Aggregate Index. 60/30/10 Equity/Bond/RE returns sourced from Caissa – represents 60% MSCI ACWI Net Dividends (prior to 1999 uses Gross Dividends) + 30% Bloomberg Barclays US Aggregate Index + 10% MSCI US REIT Net Index. Public DBs > 1bn sourced from NEPC and Wilshire and represents the Investment Metrics Public DB > \$1 Billion Net universe. Data Period: July 1, 2022 through June 30, 2025. Private Equity, Real Assets, and Private Credit performance as of 3/31/2025.



SFERS Performance and Risk Analysis | 10 Year (July 2015 to June 2025)

Compounded Cumulative Returns



	Total Return	Ann. Return	Ann. Volatility	Sharpe Ratio	Downside Deviation	Sortino Ratio	Skewness	Correlation	Worst Return	Worst Return Month	% of Positive Months	Monthly VaR (99%)
SFERS	124.8%	8.4%	6.5%	1.25	3.8%	2.19	-0.48	1.00	-6.1%	Mar 2020	71.7%	4.4%
70/30 Equity/Bond	107.8%	7.6%	11.2%	0.65	7.2%	1.10	-0.35	0.92	-9.6%	Mar 2020	67.5%	7.5%
60/30/10 Equity/Bond/RE	97.7%	7.1%	11.3%	0.60	7.4%	1.00	-0.45	0.91	-11.0%	Mar 2020	65.0%	7.6%
Public DBs > 1bn	96.3%	7.0%	8.4%	0.80	5.4%	1.33	-0.53	0.94	-8.7%	Mar 2020	66.7%	5.7%

Notes: SFERS data sourced from NEPC, Wilshire, Caissa, and BNY Mellon. 70/30 Equity/Bond returns sourced from Evestment – represents 70% MSCI ACWI Net Dividends (prior to 1999 uses Gross Dividends) + 30% Bloomberg Barclays US Aggregate Index. 60/30/10 Equity/Bond/RE returns sourced from Caissa – represents 60% MSCI ACWI Net Dividends (prior to 1999 uses Gross Dividends) + 30% Bloomberg Barclays US Aggregate Index + 10% MSCI US REIT Net Index. Public DBs > 1bn sourced from NEPC and Wilshire and represents the Investment Metrics Public DB > \$1 Billion Net universe. Data Period: July 1, 2015 through June 30, 2025.

Private Equity, Real Assets, and Private Credit performance as of 3/31/2025.



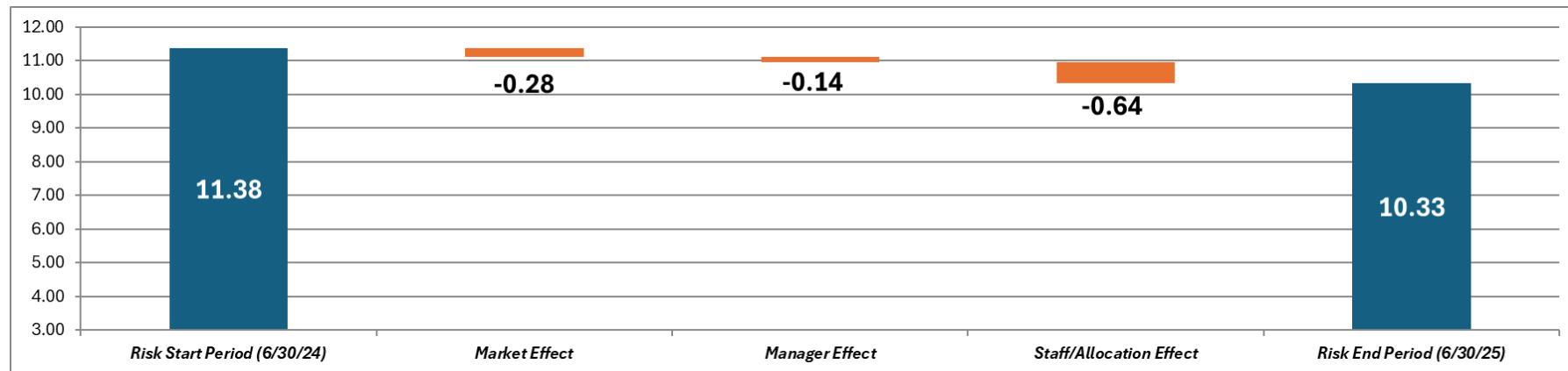
3. Total Portfolio:

Absolute and Active Risks

Total Portfolio Risk Modeling: Key Takeaways

- Staff worked with Wilshire to on-board comprehensive modeling for position-based risk estimates for Total Portfolio and each Asset Class
- Staff is leveraging these risk tools to enhance portfolio construction, internal investment guidelines and risk monitoring framework
- Current ex-ante portfolio volatility and tail risks are higher than Policy
- Introduced new Active Risk Guardrails for Rebalancing Decisions:
 - Total Portfolio TE < 100 bps
 - Stress Total Portfolio TE < 150 bps
- Fundamental Factors (i.e. Small-cap) tilts are contributing the most to active risk / tracking error
- Risk estimates are trending lower as COVID market dislocation receives lower weight in risk modeling

Total Portfolio Risk Changes Analysis



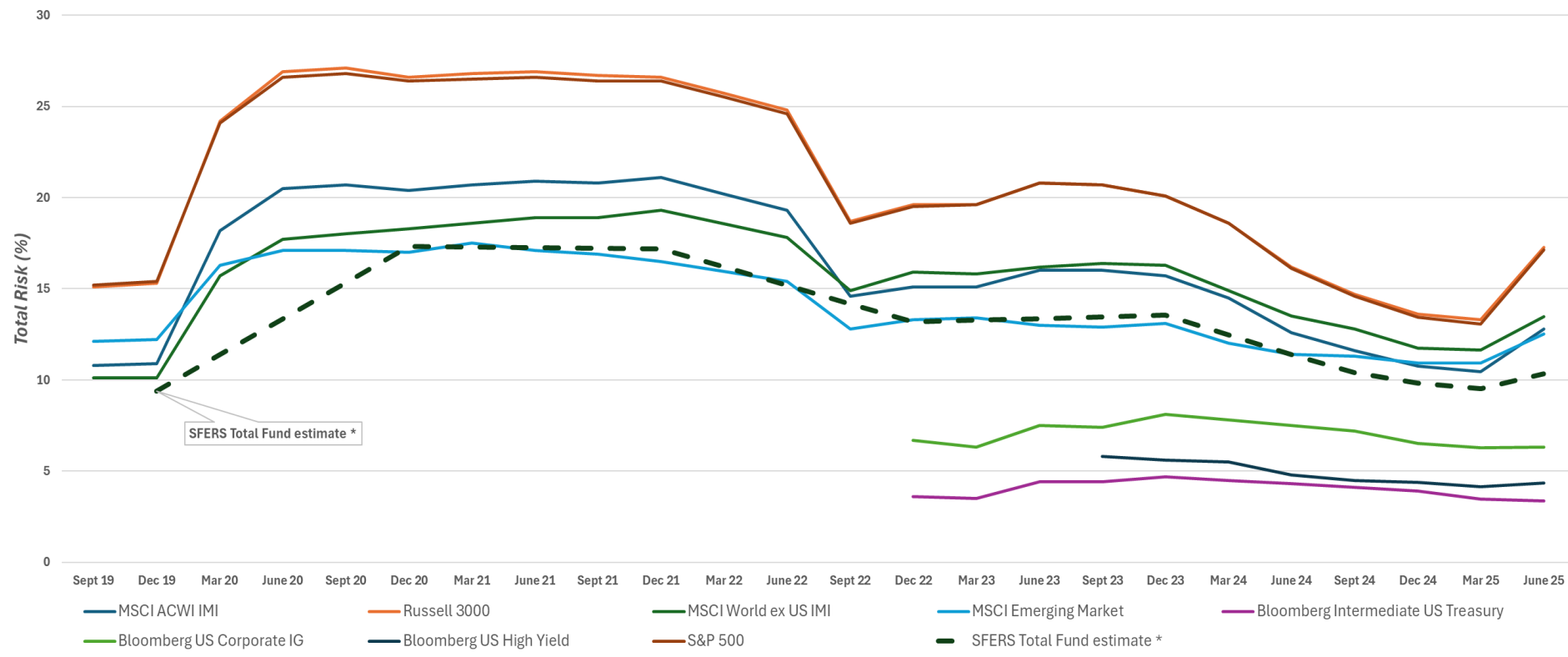
- **Total Portfolio Risk* decreased from 11.38% to 10.33% over FY2025**
 - Market effects reduced Total Plan Risk by 28 bps. Market effects are attributed to changes in market volatility, excluding changes in manager positioning and staff decisions from the beginning to end of the analysis time period.
 - Manager effects reduced Total Plan Risk by 14 bps. Manager effects are calculated by isolating effects coming from changes in individual manager portfolio holdings.
 - Staff/Allocation effects reduced Total Plan Risk by 64bps. Allocation effects come from Staff decisions regarding manager lineup, rebalancing and SAA implementation.

Note: Total Portfolio Risk is estimated as annualized ex-ante volatility using SFERS' holdings and Wilshire's Risk Model
Source: Wilshire Advisors. Data as of 06/30/2025

Calibrating Wilshire's Risk Model

Current market risk estimates are lower than a year ago and increasing starting April 2025

Total Risk of Market Indices Over Time



Source: BNY Mellon.

Note: Volatility represents realized annual standard deviation.

Total Portfolio Active Risk Guidelines

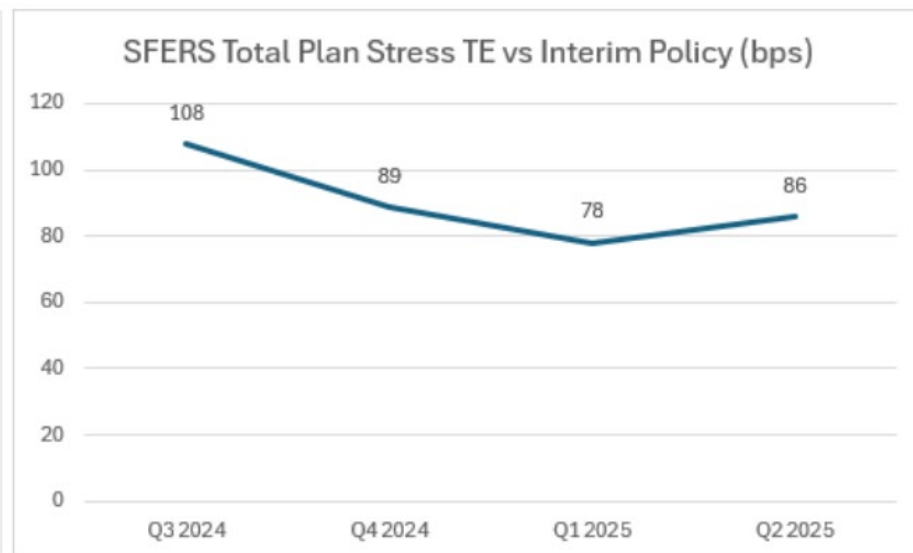
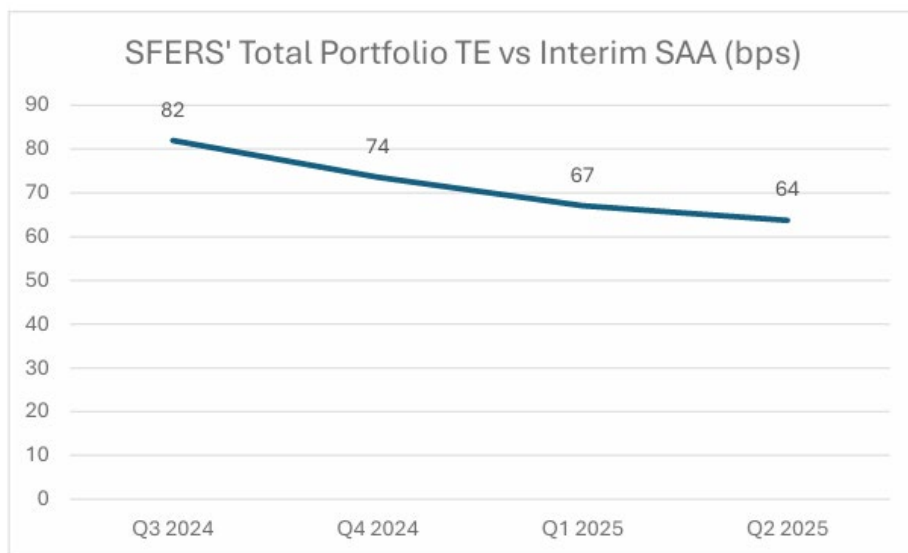
In 2025 Staff introduced two complementary risk guardrails to manage Total Portfolio Active Risk :

1. Total Portfolio Tracking Error < 100 basis points – 64 basis points as of 6/30/2025

Total Portfolio TE estimate is calculated using Wilshire's current 10-year Capital Market Assumptions.

2. Stress Total Portfolio Tracking Error < 150 basis points – 86 basis points as of 6/30/2025

Stress Total Portfolio TE estimate is calculated using 90th-percentile volatility estimates for each asset class and GFC stress correlation between asset classes.



4. Use of Leverage

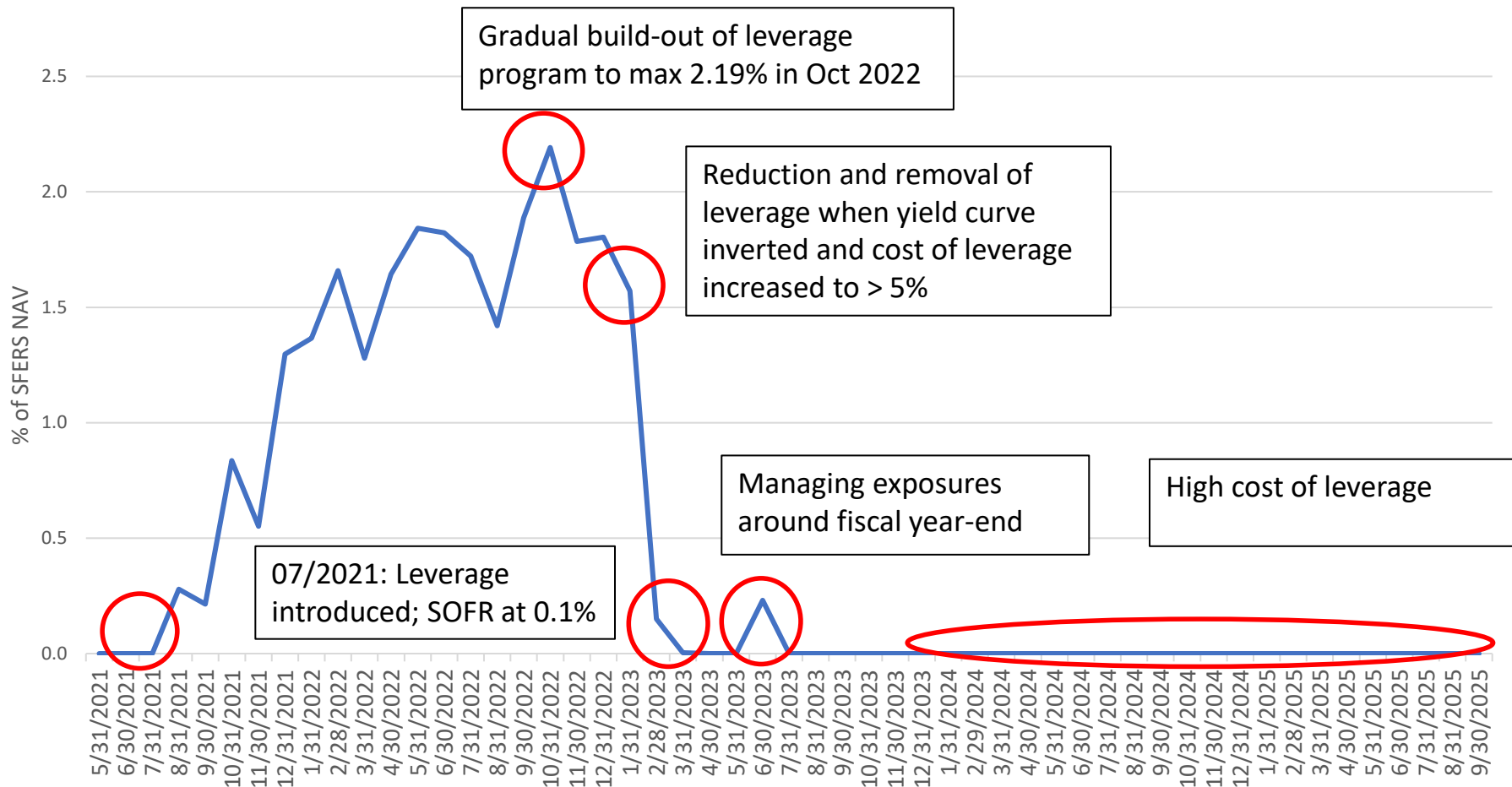
Overview of SFERS' Use of Leverage

- Retirement Board approved strategic target allocation to Total Plan Leverage of 3% with 0% to 5% allowable range in November 2020
- Since inception in July 2021, average leverage has been 0.4% with maximum of 2.2% in October 2022. ITD levered and unlevered returns are approximately the same at 4.2% annualized
- The cost of leverage as proxied by Secured Overnight Financing Rate (SOFR) increased from 0.1% in July 2021 to 5.3% in September 2023, currently at 4.2%
- Staff removed leverage in July 2023 due to the high cost of leverage, cost relative to low expected returns, and limited implementation options
- Staff introduced Portable Alpha Framework to innovate leverage implementation using diversifying and risk mitigating strategies starting June 2025. As of June 30, 2025 Gross Leverage is 21 basis points (\$80 million) and net leverage is zero
- Use of leverage helps rebalancing, liquidity management, and ability to improve Total Portfolio risk/return profile

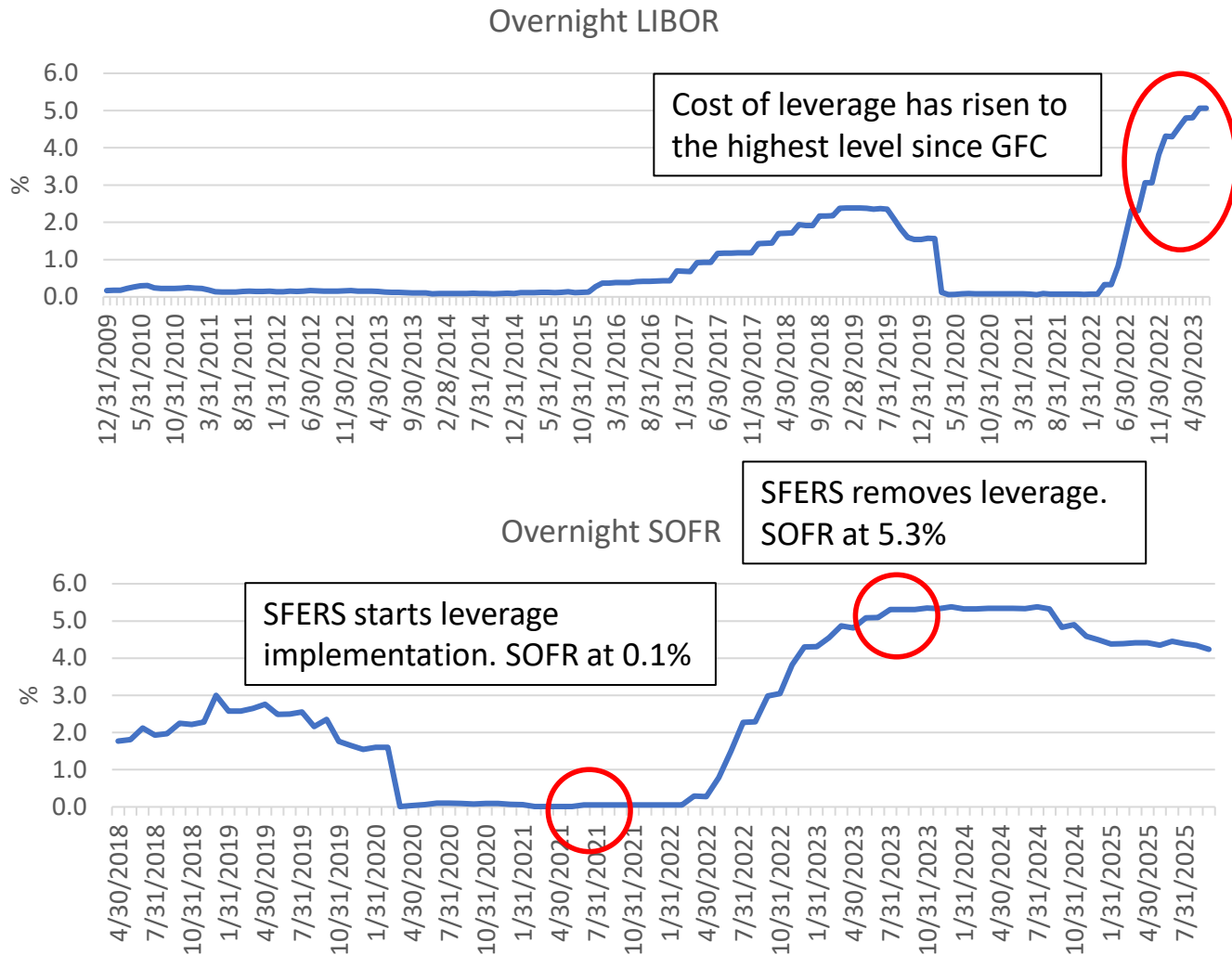
Leverage Implementation

- Historically, leverage was used to manage exposures to publicly traded asset classes. It helps with rebalancing flexibility of Public Equity and US Treasury allocations and liquidity management around large cashflows.
- Additionally, SFERS marginally increased leverage using its credit facility with BNY Mellon on three occasions for short (less than two weeks) time periods to manage large cashflows and redemption schedules.
- Staff started implementing leverage via Portable Alpha (PA) strategies. PA strategies use leverage efficiently and are designed to provide diversification and risk mitigation with objective to improve Total Portfolio risk/return profile
- In collaboration with Board's consultant, Wilshire, Staff introduced Portable Alpha (PA) Framework and Guidelines, updated Leverage Policy to include PA strategies, and worked with Investment Operations and BNY Mellon on accounting for PA strategies and monitoring PA investment guidelines.

SFERS Historical Net Leverage



Historical Cost of Leverage



Source: Bloomberg. LIBOR, London Interbank Offered Rate, was a benchmark rate at which major global banks lent to one another in the international interbank market. LIBOR represented borrowing cost between banks. LIBOR was phased out on June 30, 2023 and replaced with the Secured Overnight Financing Rate (SOFR).



Portable Alpha

BETA

Market Benchmark

- Compensation for exposure to asset class
- Systematic risk from the benchmark used to model SAA
- Primary driver of portfolio performance
- Relatively inexpensive to gain exposure
- Efficient to implement



ALPHA

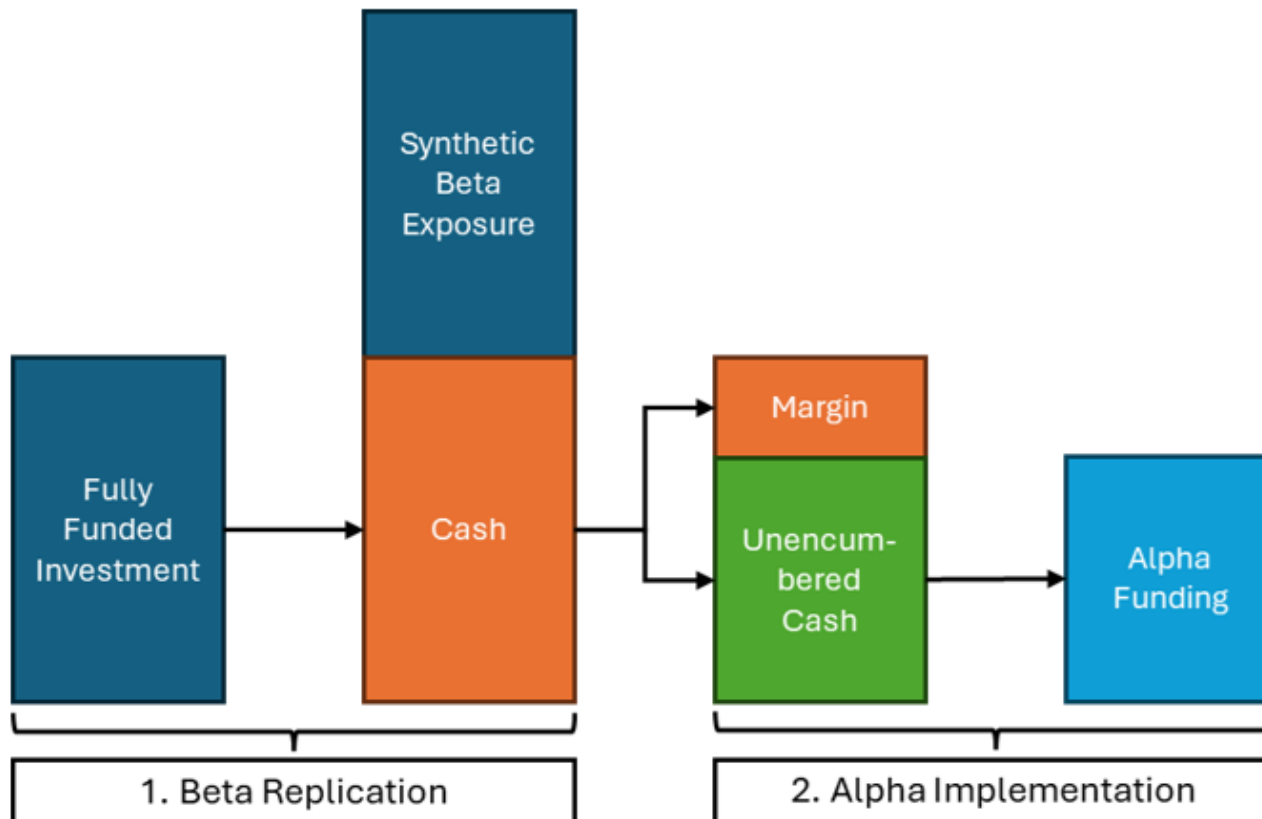
Excess Return

- Deviations from underlying benchmarks
- Requires skill to extract additional return
- Can be diversifying and risk mitigating to asset class and Total Portfolio
- More expensive to gain exposure



Portable Alpha Structure

- Beta replication through derivatives frees up capital/Cash and introduces leverage
- Alpha funded from Cash is allocated to investment opportunities that diversify and mitigate risk for Total Portfolio



Note: Stylized example for illustrative purpose only.



Portable Alpha Implementation

- Starting June 2025 Staff introduced Gross Leverage through a Portable Alpha Strategy with Parametric
- Staff worked with Wilshire and Mercer to establish Portable Alpha guidelines for a risk-controlled Enhanced Treasuries mandate
- Updated Leverage Policy to account for Portable Alpha strategies
 - Beta replication and Alpha exposure are included in leverage calculations
 - Net leverage accounts for Cash balances
- Investment Operations and BNY Mellon added daily monitoring of the new investment guidelines

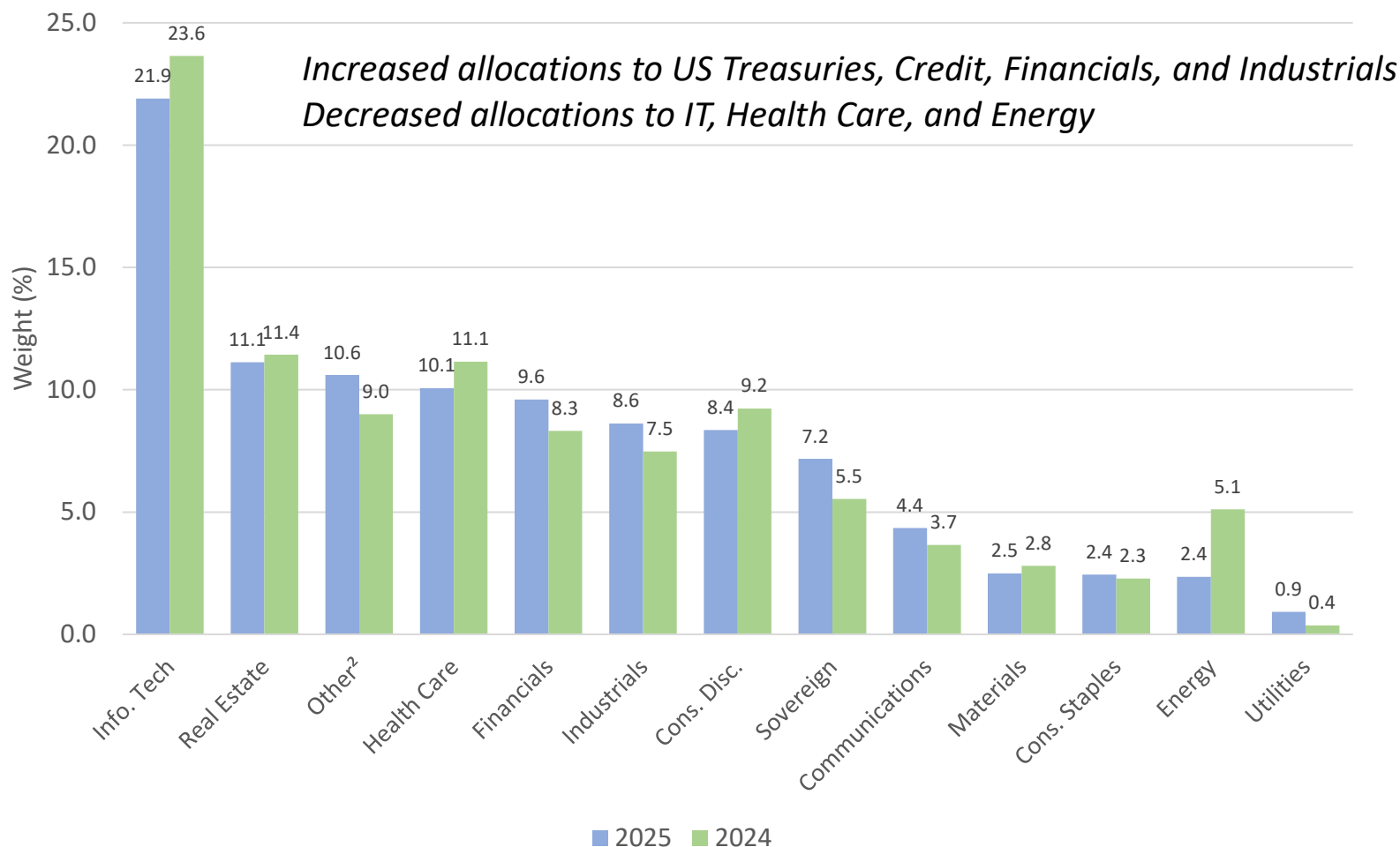
5. Exposure Analysis

Exposure Analysis: Key Takeaways

- In 2025 SFERS increased allocation to US Treasuries, Public Credit, and Cash
- SFERS has maintained strategic tilt to Health Care, reduced IT overweight, and decreased China overweight
 - IT overweight benefited Private Equity portfolio producing strong absolute and relative returns. Public Equity Tech managers underperformed
 - Healthcare overweight benefited Public Equity both absolute and relative returns. Healthcare Private Equity portfolio produced strong absolute return while underperforming Cambridge Healthcare Benchmark
 - Public Equity China managers delivered strong relative performance but underperformed the Policy benchmark. Private Equity's China overweight detracted from both absolute and relative performance
- SFERS also continues to be active in its approach to Public Equity investing
 - The Public Equity asset class volatility has increased in-line with the market
 - Risk relative to the benchmark and active share had been increasing over the last five years through 2022, but have moderated in the past two years
 - Active risk has decreased by ~30% as measured by active share and ex-ante tracking error due to recent market recovery and Staff's rebalancing

Exposure by Sector: Current vs 2024

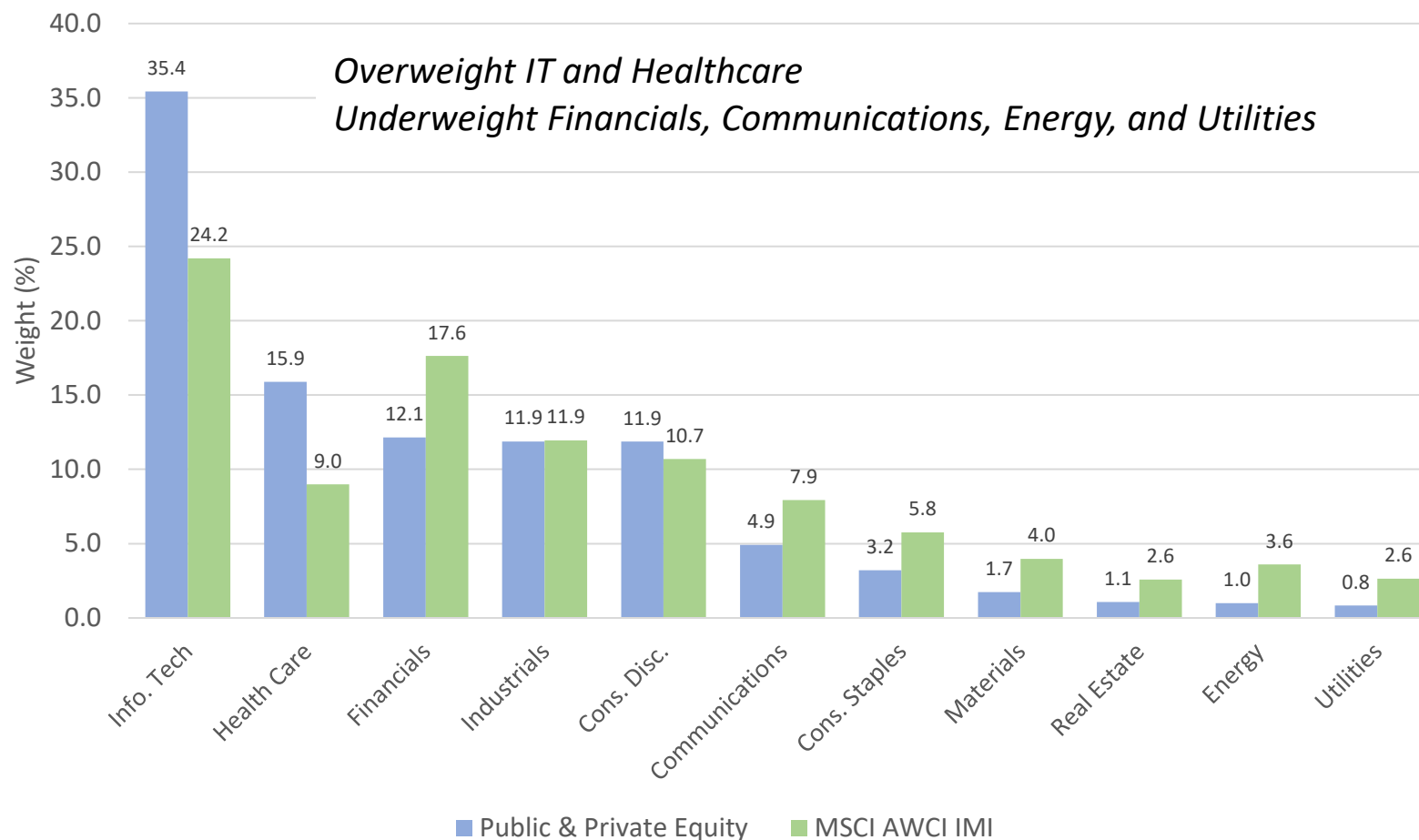
SFERS Total Fund



Notes: Total Plan exposures as of June 30, 2025 except for private market asset class exposures which are as of March 31, 2025. Shown as a % of net exposure. Sector exposures exclude cash and FX. ²Other consists of ABS, CMBS, Municipal bonds, investment grade bonds, structured credit and commodities.

Exposure by Sector:

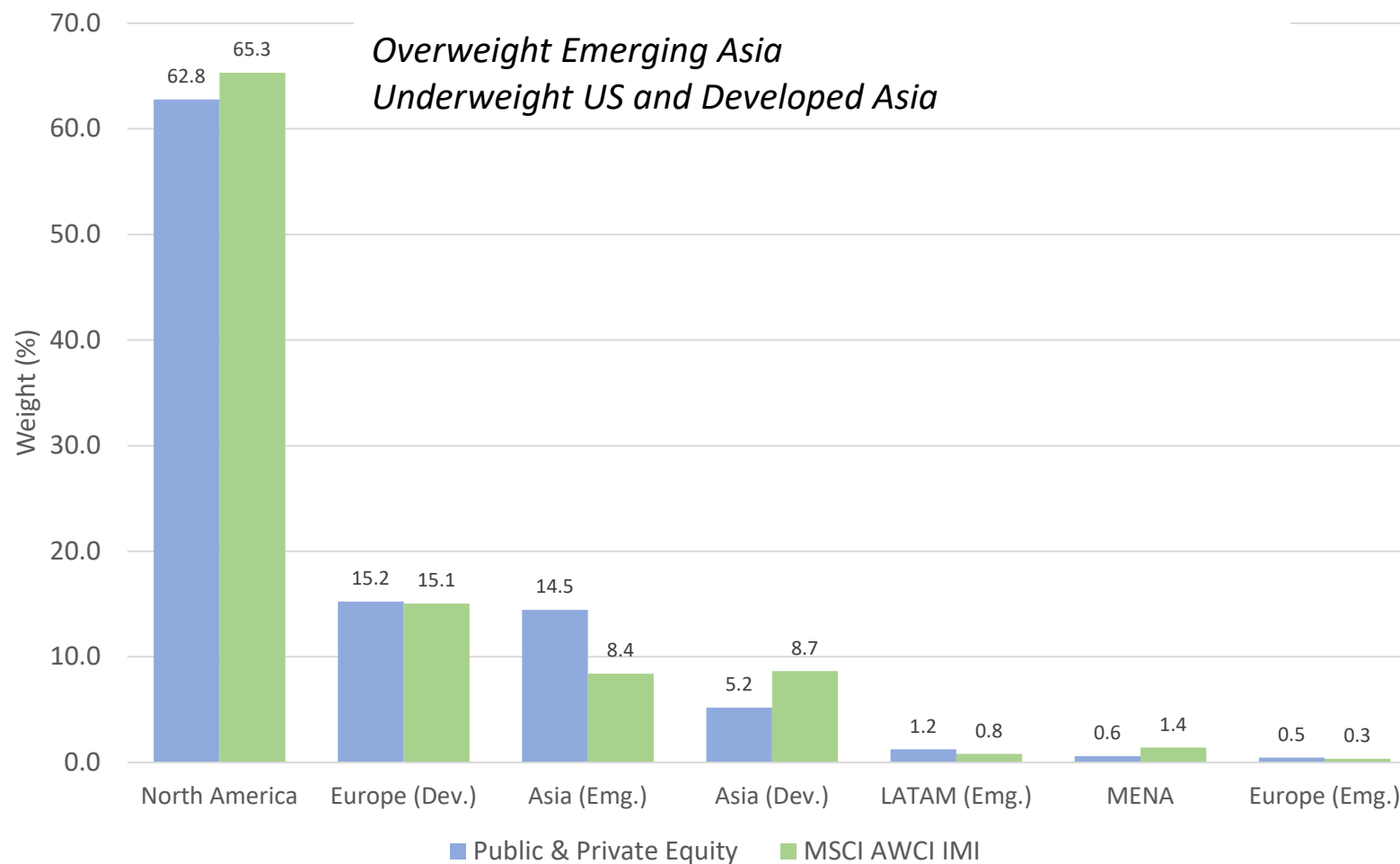
Public & Private Equity vs MSCI ACWI IMI



Notes: Exposures as of June 30, 2025 except for private market asset class exposures which are as of March 31, 2025. Shown as a % of net exposure. Sector exposures exclude cash, FX, and undefined sectors.

Exposure by Region:

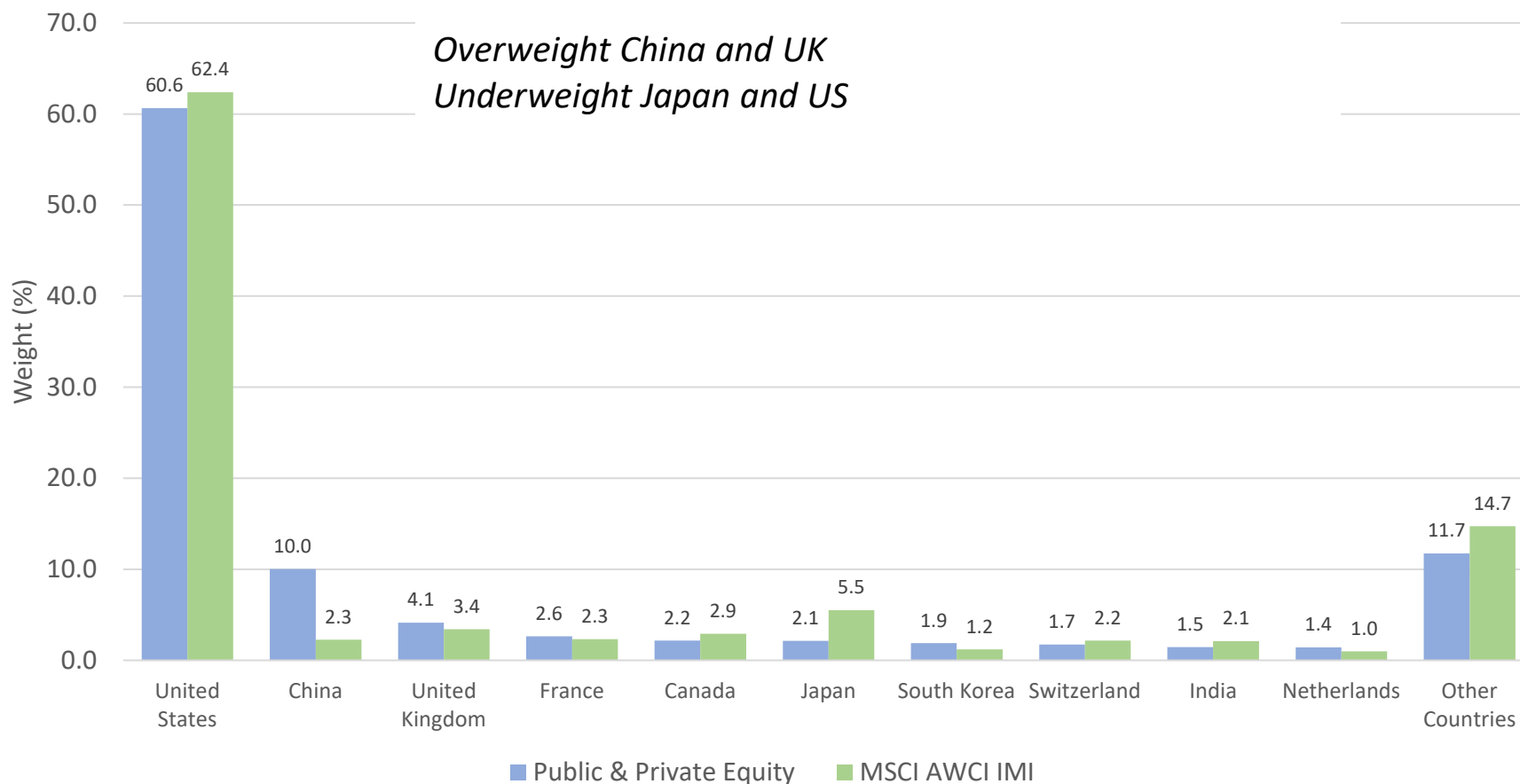
Public & Private Equity vs MSCI ACWI IMI



Notes: Exposures as of June 30, 2025. Weights are re-weighted to a base of 100%. Undefined exposures are excluded. MENA Developed and MENA Emerging exposures are combined.

Exposure by Country:

Public & Private Equity vs MSCI ACWI IMI

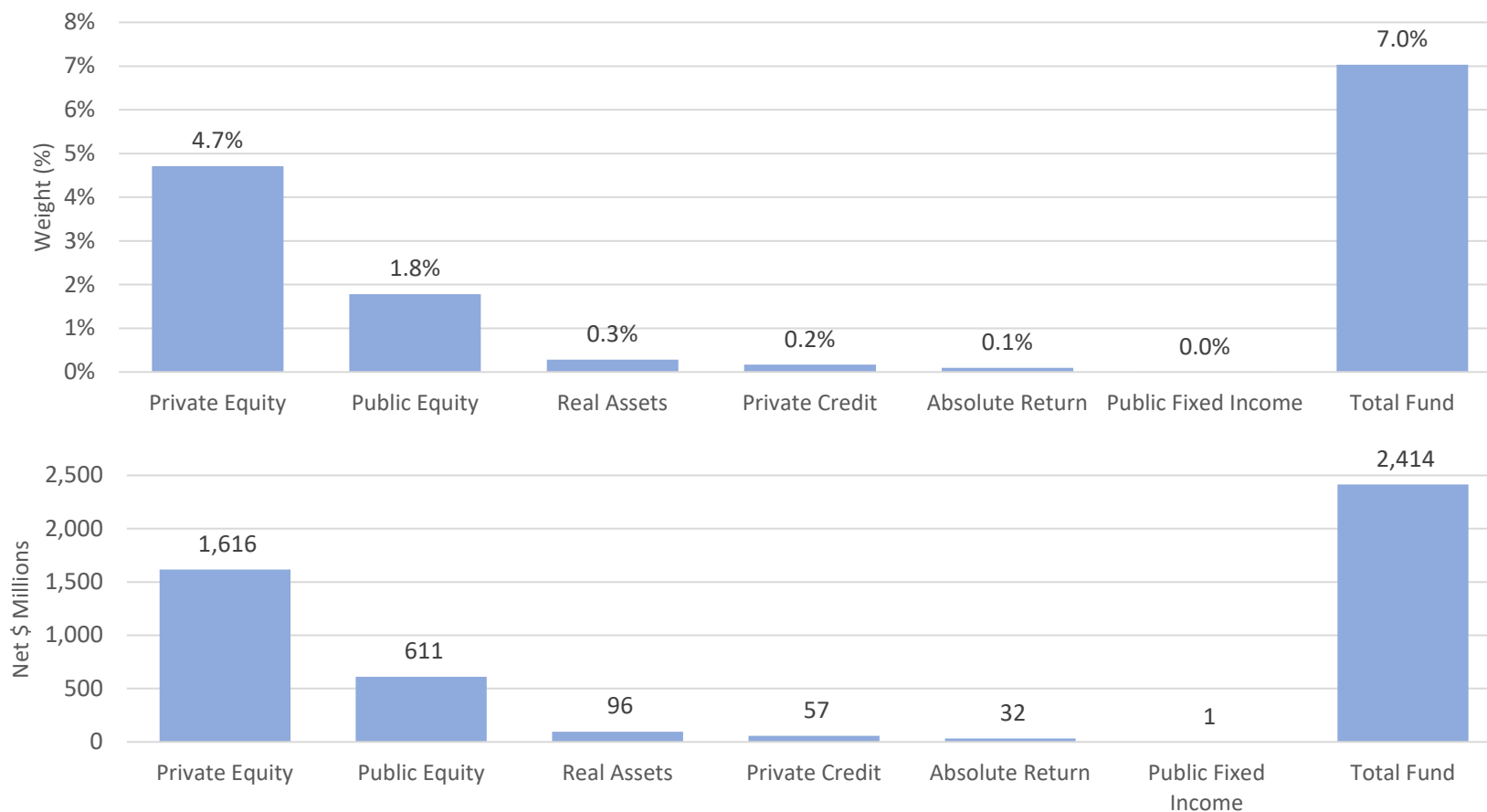


Notes: Exposures as of June 30, 2025 except for private market asset class exposures which are as of March 31, 2025. Shown as a % of net exposure. North America undefined, General and Undefined exposures bucketed as United States. Europe undefined exposure split evenly between UK, France and Germany. Asia Developed undefined exposure split evenly between South Korea and Hong Kong after adjusting for known country exposures. Asia Emerging undefined exposure split 2/3 to China and 1/3 to India. Middle East undefined exposure bucketed as Saudi Arabia.



Country Exposure: China

SFERS Total Fund and By Asset Class



Notes: Sourced from Aksia and Caissa. Total Plan exposures as of June 30, 2025 except for private market asset class exposures which are as of March 31, 2025. Undefined Asia exposure for Private Equity were then adjusted for known China exposure based off best available information from certain managers and the rest assumed to be other countries.

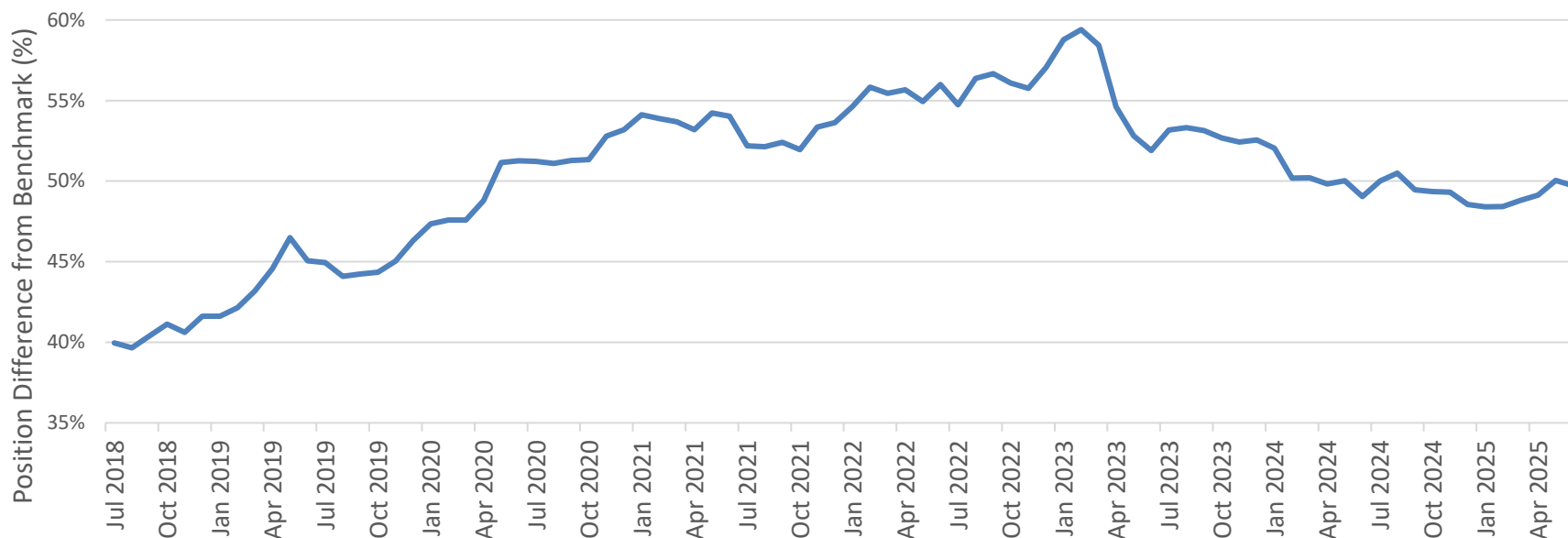


Active Exposure: Public Equity

Historical Active Share

- “Active Share” measures how portfolio is different from the benchmark quantifying the degree of active management. Active Share measures the fraction of portfolio’s position weights that differs from the benchmark index, MSCI ACWI IMI in the analysis below
- Active Share for SFERS Public Equity Portfolio increased from 39% to 50% over the past 7 years, i.e. more than half of Public Equity portfolio is different from MSCI ACWI IMI benchmark now vs. 40% 7 years ago

Historical Active Share vs. MSCI ACWI for SFERS Public Equity Portfolio
July 2018 - June 2025

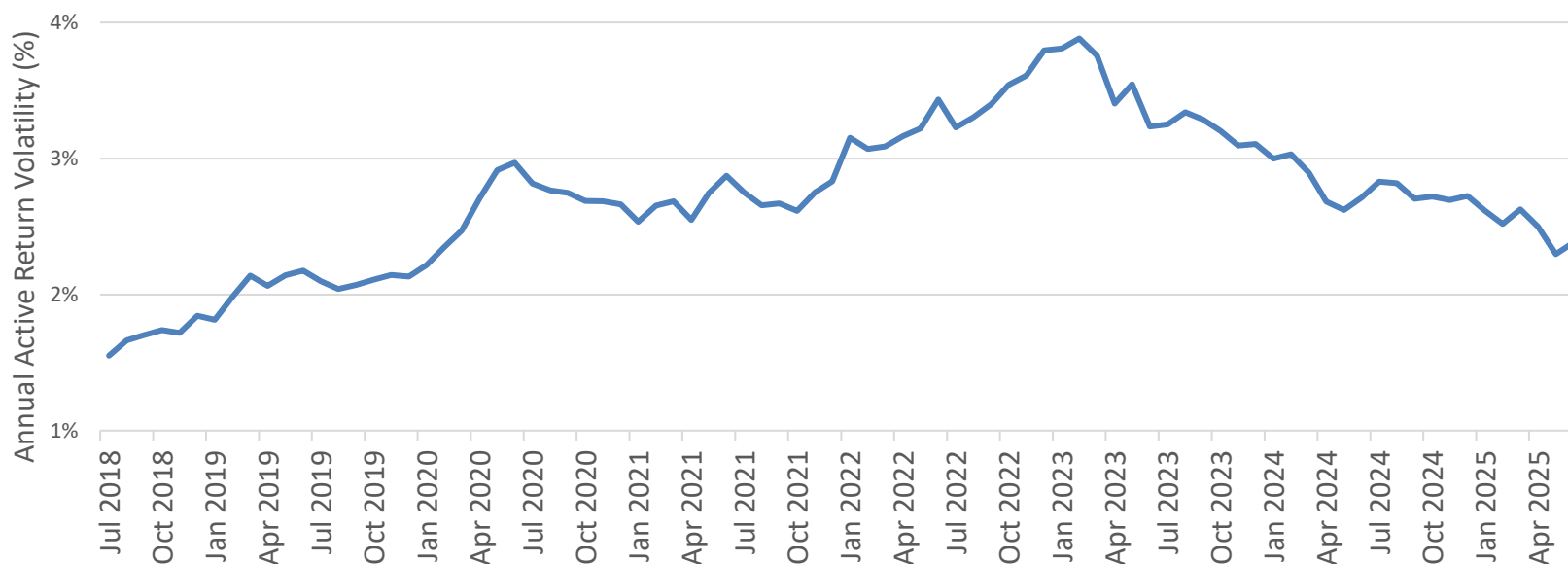


Relative Risk: Public Equity

Historical Ex-Ante Tracking Error vs. MSCI ACWI IMI

- SFERS Public Equity portfolio active risk increased from 155bps in 2018 to 238bps in 2025
- Ex-Ante tracking error measures portfolio's annual volatility away from its benchmark
- Expect to be compensated for additional active risk though manager selection and thematic tilts

Historical Ex-Ante Tracking Error vs. MSCI ACWI for SFERS Public Equity Portfolio
July 2018 - June 2025



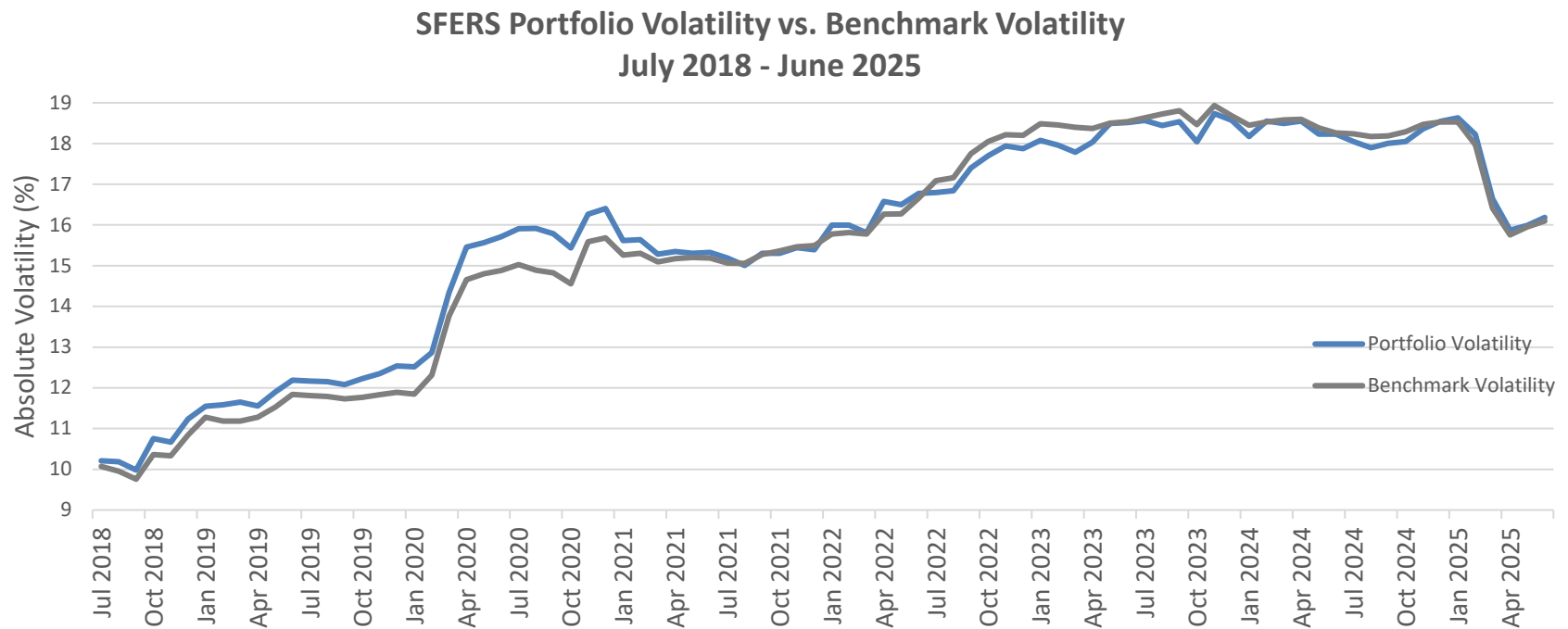
Source: StyleAnalytics.

Note: Ex-ante tracking error is calculated using trailing 5-year stock level covariance matrix against MSCI ACWI IMI Index.

Absolute Risk: Public Equity

Portfolio Ex-Ante Volatility vs Benchmark Ex-Ante Volatility

- SFERS Public Equity's portfolio ex-ante volatility increased in tandem with the benchmark volatility from 10% to 16%
- The tracking error increased over time because of portfolio decisions and the market (benchmark) has become riskier



Source: StyleAnalytics.

Note: Ex-ante volatility is calculated using trailing 5-year stock level covariance matrix. Benchmark is MSCI ACWI IMI Index.

Public Equity Risk Metrics Within Guardrails

Risk Metric	Portfolio	Target	Range	In Compliance
1. Tracking Error: Decreased w/ reductions to IT, China, and HC	2.4%	3%	1%-5%	✓
2. Beta: Range bound	1.0	1.0	0.8-1.2	✓
3. Ann. Ex-Ante Volatility as % of BM Volatility: Range bound	100.6%	100%	80%-120%	✓
4. Sector Risk Decomp of TE: no significant change	9.2%	-	0%-50%	✓
5. Country Risk Decomp of TE: decreased	10.8%	-	0%-50%	✓
6. Style Risk Decomp of TE: elevated	35.1%	-	0%-50%	✓
7. Idiosyncratic Risk % of TE: increased	47.1%		>30%	✓
8. Liquidity (of % in >12 months Tier): improved	13.0%	-	0%-20%	✓
9. Net Long Exposure: range bound	99.0%	-	75%-100%	✓
10. Gross Long Exposure: no significant change	113.0%		75%-150%	✓

Notes: Data as of 06/30/2025

Fixed Income Risk Metrics Within Guardrails

Risk Metric	Portfolio	Benchmark	Difference	Allowable Range	In Compliance
1. Treasuries Duration: match	3.6 yrs	3.6 yrs	0 yrs	+/- 0.5 yrs	✓
2. Treasuries Avg Credit Quality: match	AA+	AA+	0 Notches	Same	✓
3. Treasury Liquidity (of % < 1 month Tier): Fully Liquid	100.0%	100.0%	0.0%	0.0%	✓
4. Treasuries Allocation	5.0%	7.0%	-2.0%	+/- 3%	✓
5. Public Credit Spread Duration: Lower than Benchmark	4.1 yrs	4.9 yrs	-0.8 yrs	+/- 3 yrs	✓
6. Public Credit Avg Credit Quality: Higher than Benchmark	BBB-	BB+	1 Notch	+/- 3 Notches	✓
7. Public Credit Liquidity (of % in >12 months Tier)	0.3%	0.0%	0.3%	< 5%	✓
8. Public Credit Tracking Error	1.2%	-	-	0.5%-3%	✓
9. Public Credit Allocation	5.0%	8.0%	-3.0%	+/- 4%	✓
10. Cash Allocation	1.4%	1.0%	0.4%	0-5%	✓

Notes: Data as of 06/30/2025, Interim Policy Benchmark Allocations as of 06/30/2025

6. Stress Test and Scenario Analysis

Stress Testing: Key Takeaways

- Diversification helps mitigate risk in modeled stress scenarios
- Estimated losses in stress scenarios are lower than historically realized due to portfolio diversification
- Factor stress tests indicate:
 - Greater sensitivity to equity and credit market dislocations and EM currency devaluation
 - Lesser sensitivity to Energy and Interest Rates shocks
- GFC-like scenario can result in -30% loss and is estimated as once in ~30 years event
- While the overweights to IT and Biotech are expected to generate greater return over the long term, these also expose the fund to higher potential losses in the case of a short-term Tech or Biotech market shock

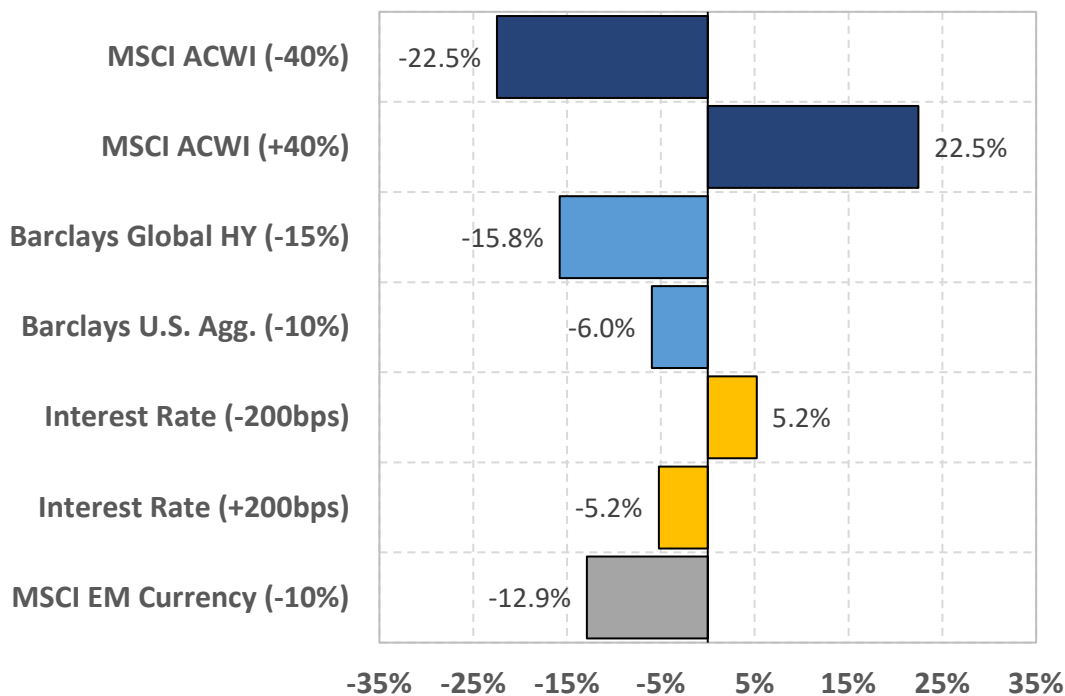
SFERS Stress Test

Single Market Factor Stress Test Summary

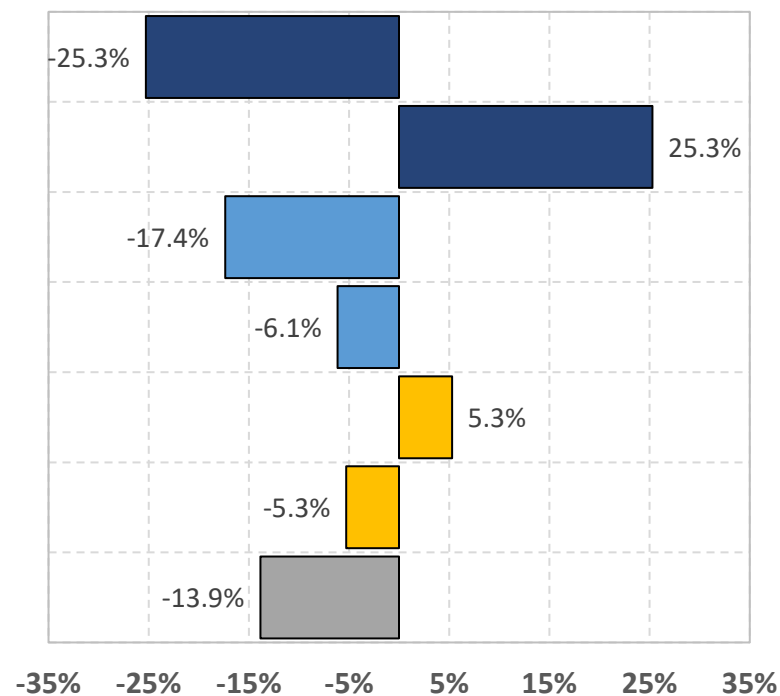
SFERS estimated loss in -40% equity market drawdown is 22.5%, less than 25.3% estimate loss for 70/30 portfolio

Lesser sensitivity to Credit, Interest Rates, and Currency dislocations vs the 70/30 portfolio

Stress Events - Total Plan % P&L



Stress Events - Equity/Bond 70/30 % P&L



Source: Caissa.

Notes: Total Plan exposures as of June 30, 2025, except for private market asset class exposures which are as of March 31, 2025. Each Stress Test shocks a single market factor and deducts the impact on all other assets using correlation matrix calculated based on weekly price movements from July 1st, 2021 till June 30th, 2024. Adjustment factors of 0.6x for Private Equity, 0.55x for Real Assets and 0.75x for Private Credit are applied. 70 Equity/30 Bond Benchmark is defined as 70% Global Equity (MSCI ACWI IMI) and 30% Fixed Income (61.5% Bloomberg Barclays Intermediate Treasuries + 38.5% Bloomberg Barclays U.S. Aggregate).



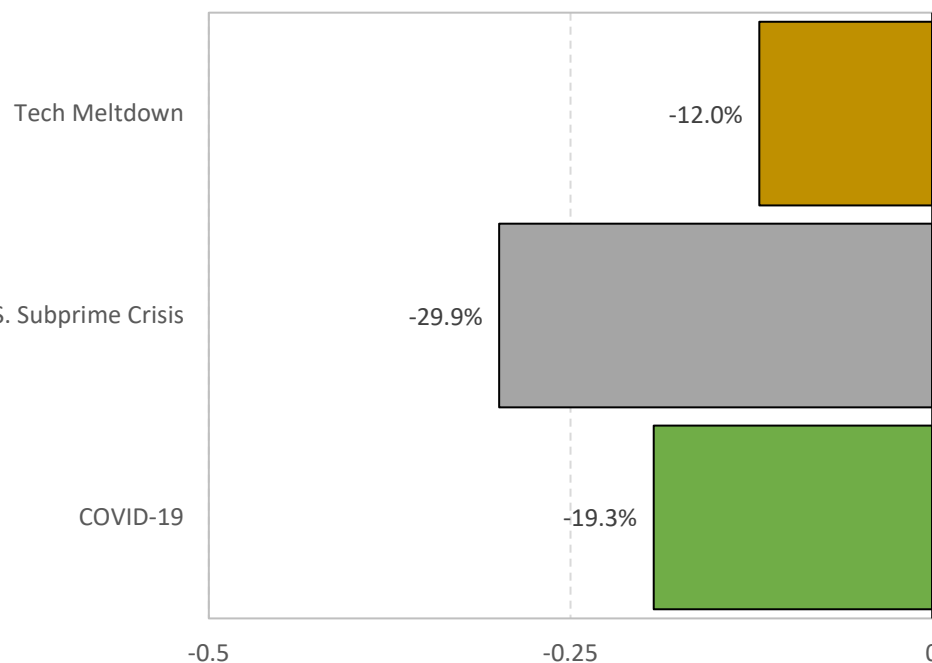
SFERS Scenario Analysis

Historical Stress Test Summary

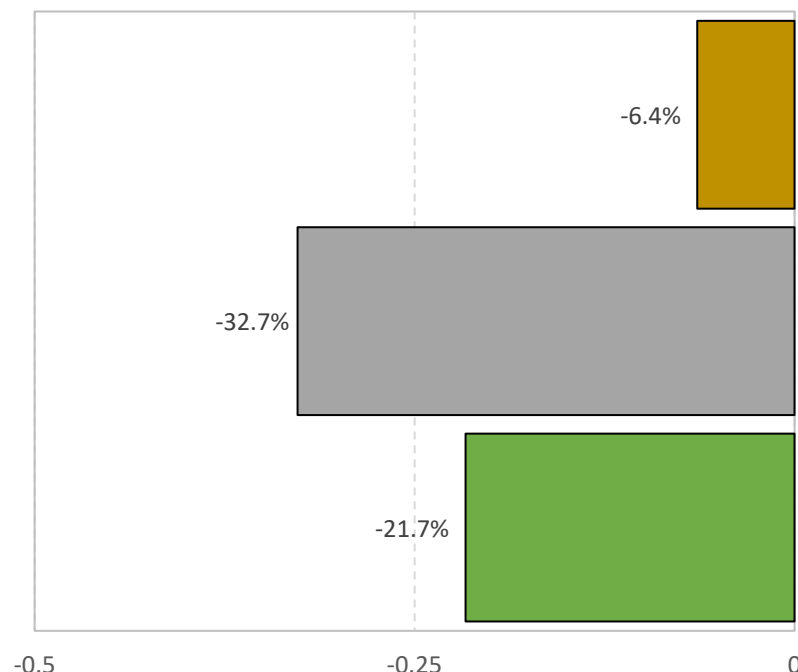
GFC-like scenario can result in -30% loss

Estimated losses in Tech Meltdown scenarios are higher than the 70/30 benchmark due to SFERS growth tilt

Stress Events - Total Plan % P&L



Stress Events - Equity/Bond 70/30 % P&L



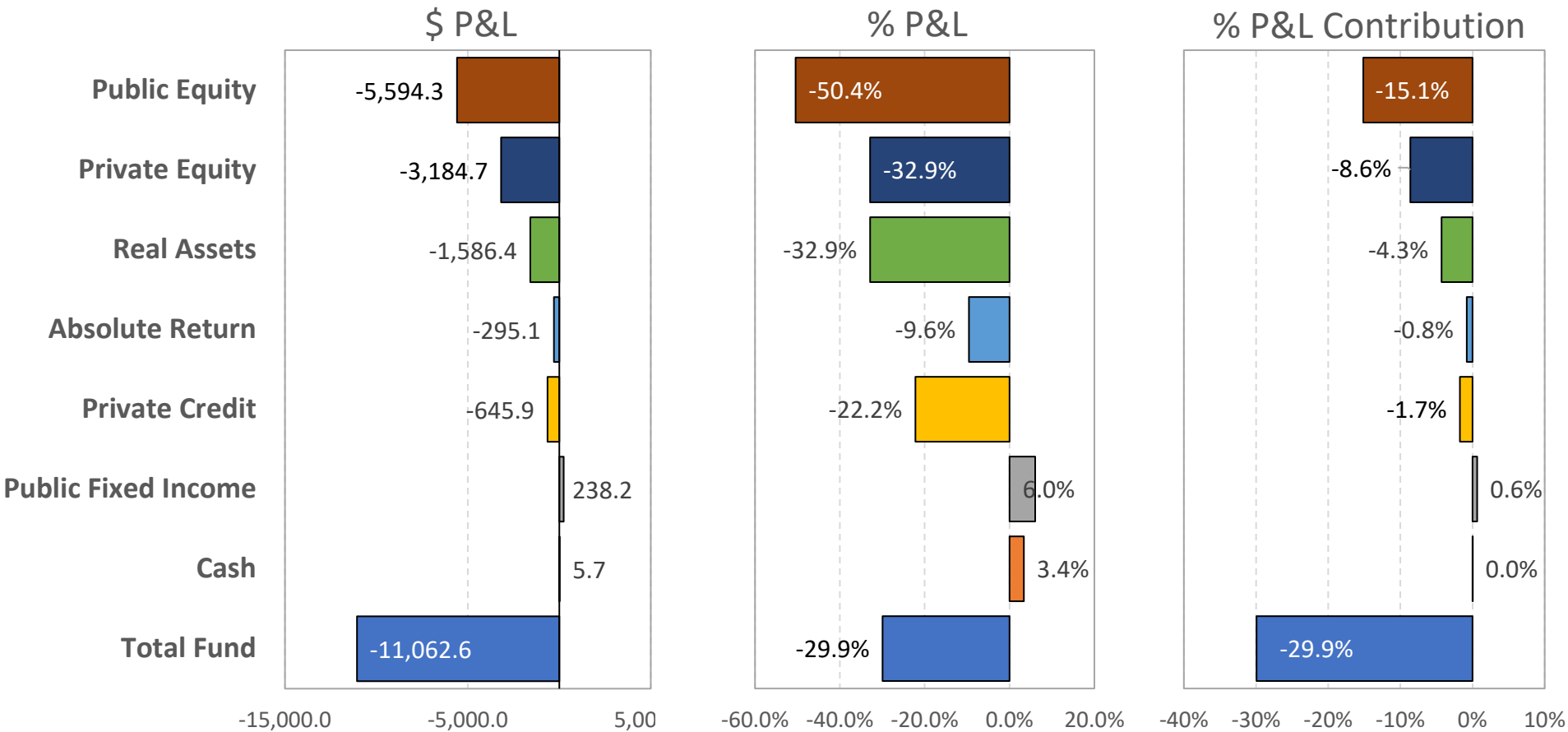
Source: Caissa. Uses adjustment factors of 0.6x for Private Equity, 0.55x for Real Assets and 0.75x for Private Credit.

Notes: Total Plan exposures as of June 30, 2025 except for private market asset class exposures which are as of March 31, 2025. Tech Meltdown dates are March 10, 2000 through October 9, 2002. US Subprime Crisis dates are October 8, 2007 through March 9, 2009. COVID-19 dates are February 12, 2020 through March 23, 2020. 70 Equity/30 Bond Benchmark is defined as 70% Global Equity (MSCI ACWI IMI) and 30% Fixed Income (61.5% Bloomberg Barclays Intermediate Treasuries + 38.5% Bloomberg Barclays U.S. Aggregate).



Historical Stress Test

U.S. Subprime Crisis '07-'09 Scenario



Source: Caissa. Uses adjustment factors of 0.6x for Private Equity, 0.55x for Real Assets and 0.75x for Private Credit.

Notes: Total Plan exposures as of June 30, 2025, except for private market asset class exposures which are as of March 31, 2025.

U.S. Subprime Crisis 07-09 scenario is based on asset price movements from 10/08/2007 to 03/09/2009.

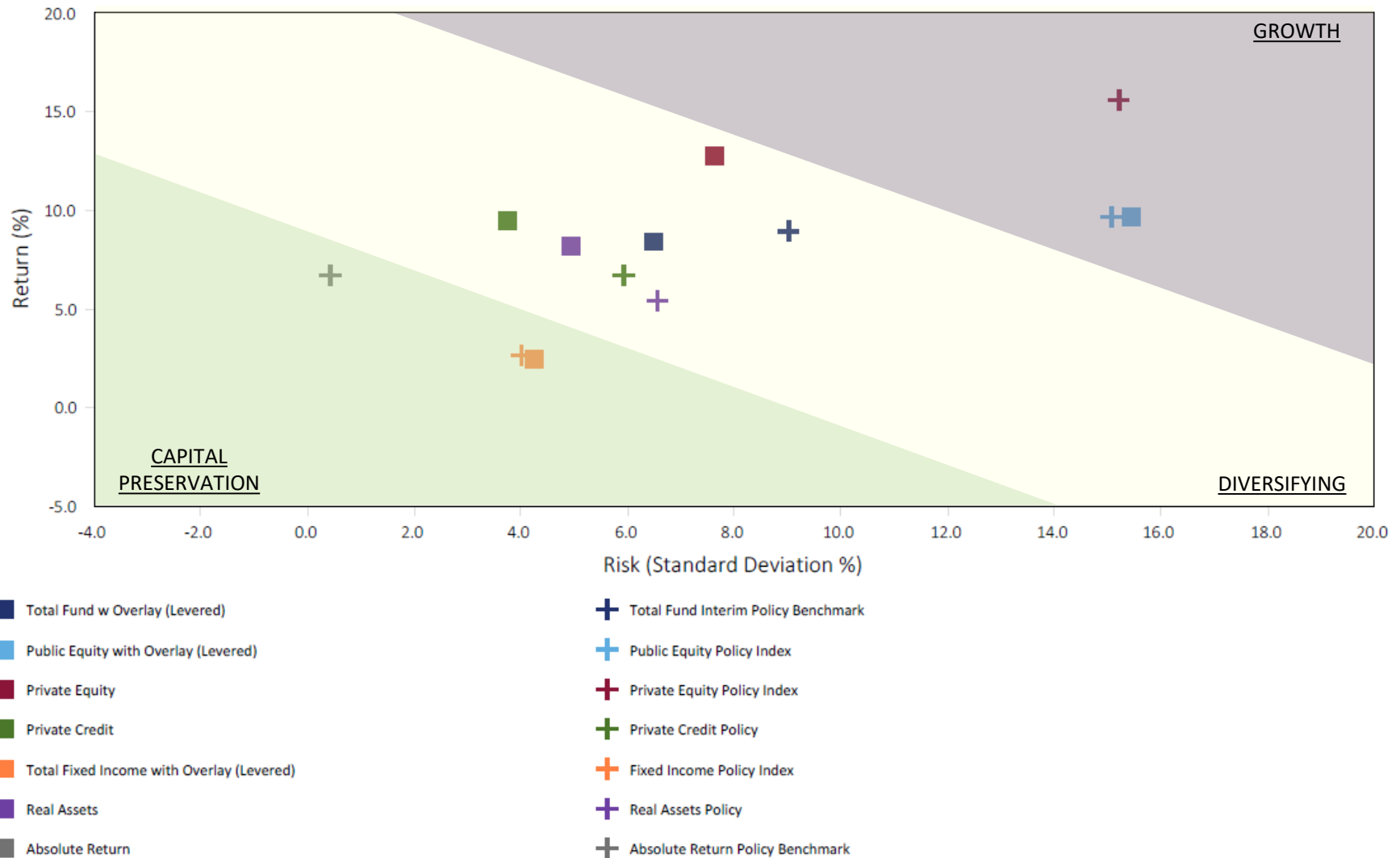


7. Appendix:

Performance Analysis

SFERS Performance and Risk by Asset Class

Risk / Return Trailing 10-year Returns



Notes: SFERS data sourced from Wilshire, BNY Mellon.



8. Appendix:

Quantitative Analytics Glossary

APPENDIX: Wilshire Ex-Ante Risk Methodology

- Covariance Matrix Horizon – 2 years equal weighted, no decay factor
- [SFERS' Portfolio Modeling Summary](#)
- Public Equity, Public Credit, Treasuries and Cash: Holdings based using information from custodian and managers
- Private Equity: Custom modeling for every company and creating an equity using Country/Sector/NAV
 - Fundamental exposures are proxied based on Wilshire model in accordance with Country/Sector of that company
- Private Credit: Proxied using policy benchmark mix of 50/50 HY and Bank Loans index
 - Portfolio weights are mapped using SFERS actual weights to the same HY and Bank Loans Index
- Real Assets: Proxied using following mix of indices which line up with risk and correlation used in ALS:
 - 50% Wilshire US REIT Index, 20% Bloomberg Global HY, 20% Dow Jones Infrastructure, 10% S&P Energy Index
 - Portfolio weights are mapped using SFERS actual weights to those same indices
- Absolute Return – Custom modeling using 2 years of realized performance introduced as new factors into the model and regressed vs existing Wilshire factors

APPENDIX: Quantitative Analytics Glossary

Total Return

Total time-weighted rate of return earned during the defined time period.

$$\text{Total Return}_t = (1 + \text{Return}_t) \times (1 + \text{Total Return}_{t-1}) - 1$$

Annualized Return

Average annual compounded rate of return earned during the defined time period.

$$\text{Annualized Return} = (1 + \text{Total Return})^{12/N} - 1$$

N = Number of months in the defined time period

APPENDIX: Quantitative Analytics Glossary

Annualized Volatility

Annualized standard deviation (volatility) of monthly returns. Volatility measures the dispersion of return around the average return.

$$\text{Monthly Volatility} = \sqrt{\frac{1}{N-1} \sum_{t=1}^N (\text{Return}_t - \text{Average Monthly Return})^2}$$

$$\text{Annualized Volatility} = \text{Monthly Volatility} \times \sqrt{12}$$

N = Number of months in the defined time period

Sharpe Ratio

Return in excess of the risk-free rate per unit of risk.

$$\text{Sharpe Ratio} = \frac{\text{Average Monthly Return} - \text{Period Risk Free Rate}}{\text{Monthly Volatility}} \times \sqrt{12}$$



APPENDIX: Quantitative Analytics Glossary

Annualized Downside Deviation

Volatility of returns below a specified minimum acceptable return (MAR).

$$\text{Downside Deviation} = \sqrt{\frac{1}{N} \sum_{r_t < \text{MAR}}^N (r_t - \text{MAR})^2 \times \sqrt{12}}$$

N = Number of months in the defined time period

MAR = Minimum Acceptable Return

Sortino Ratio

An alternative to the Sharpe Ratio, the Sortino Ratio measures the compound average return in excess of the minimum acceptable return (MAR) per unit of downside deviation below the MAR.

$$\text{Sortino Ratio} = \frac{\text{Compound Average Monthly Return} - \text{MAR}}{\text{Monthly Downside Deviation}} \times \sqrt{12}$$

MAR = Minimum Acceptable Return

N = Number of months in the defined time period

APPENDIX: Quantitative Analytics Glossary

Annualized Gain Deviation

Volatility of returns at or above 0%.

$$\text{Gain Deviation} = \sqrt{\frac{1}{N-1} \sum_{\text{Return}_t \geq 0}^N (\text{Gain Return}_t - \text{Mean Gain Return})^2 \times \sqrt{12}}$$

N = Number of months in the defined time period where return is greater than or equal to 0%

$\text{Gain Return}_t = \text{Return}_t$ if $\text{Return}_t \geq 0$ and 0 if $\text{Return}_t < 0$

Mean Gain Return = Sum of Gain Return_t for defined time period divided by N

Annualized Semi Deviation

Volatility of returns below the average return.

$$\text{Semi Deviation} = \sqrt{\frac{1}{N-1} \sum_{\text{Return}_t < \text{Average Return}}^N (\text{Semi Return}_t - \text{Average Return})^2 \times \sqrt{12}}$$

N = Number of months in the defined time period where return is less than the Average Return for the period

$\text{Semi Return}_t = \text{Return}_t$ if $\text{Return}_t < \text{Average Return}$ and Average Return if $\text{Return}_t \geq \text{Average Return}$

Average Return = Mean return for all return observations in the defined time period



APPENDIX: Quantitative Analytics Glossary

Annualized Loss Deviation

Volatility of returns below 0%.

$$\text{Loss Deviation} = \sqrt{\frac{1}{N-1} \sum_{\text{Return}_t < 0}^N (\text{Loss Return}_t - \text{Mean Loss Return})^2 \times \sqrt{12}}$$

N = Number of months in the defined time period where return is less than 0%

$\text{Loss Return}_t = \text{Return}_t$ if $\text{Return}_t < 0$ and 0 if $\text{Return}_t \geq 0$

$\text{Mean Loss Return} = \text{Sum of Loss Return}_t \text{ for defined time period divided by } N$

Correlation

Indicates the extent two return series fluctuate together. Positive correlation indicates the extent to which the two return series increase or decrease in parallel. Negative correlation indicates the extent to which one return series moves in the opposite direction as the other return series.

$$\text{Correlation}_{x,y} = \frac{\sum_{t=1}^N (\text{Return}_{x,t} - \text{Average Return}_x)(\text{Return}_{y,t} - \text{Average Return}_y)}{(N-1) \times \text{Monthly Volatility}_x \times \text{Monthly Volatility}_y}$$

N = Number of months in the defined time period

x = One of the two return series

y = The other one of the two return series

APPENDIX: Quantitative Analytics Glossary

Worst Return

Lowest periodic return within an entity's return series associated with the defined time period.

Worst Return Date

Date of the lowest periodic return within an entity's return series associated with the defined time period.

% of Positive Months

Percent of periodic returns within an entity's return series that are greater than zero within the defined time period.

VaR

Value at Risk expressed in %.

$VaR = Z \text{ Score} \times \text{Standard Deviation of Returns}$

$Z \text{ Score} = Z \text{ Score at the specified confidence level}$

<u>Confidence Level</u>	<u>Z Score</u>
90%	1.28155
95%	1.64485
99%	2.32635

