



INVESTMENT COMMITTEE MEETING CALENDAR SHEET
November 12, 2025

To: Retirement Board

From: Alison Romano, CEO & CIO

Anna Langs, CFA, FRM, Managing Director

Date: November 12, 2025

Agenda Item: Challenges of Benchmarking Private Assets and Evaluating Actionable Risk

Recommendation:

Discussion Only

Executive Summary:

This report examines the challenges of benchmarking, managing, and evaluating risks of alternative asset classes. The presentation reviews different approaches to benchmarking private assets and ways to manage and measure risks such as Total Tracking Error, Actionable Tracking Error as well as interpretations and decomposition of Tracking Error.

Background:

The Retirement Board is responsible for setting SFERS' Strategic Asset Allocation ("SAA"), i.e. the Policy Portfolio, including target allocations and benchmarks for each asset class. On a quarterly basis, Wilshire reports the performance of the Total Plan as well as the excess return which is the relative performance of the Plan vs. the SAA. Over the past 5 years, large dispersion between public and private market returns resulted in increased magnitude of excess returns of SFERS' Total Plan vs. its Policy benchmark.

The benchmark selection is important as it reflects the risk/return objective for each asset class and the Total Plan. SFERS' Policy Portfolio has a large allocation to alternative asset classes such as Private Equity, Real Assets, Private Credit, and Absolute Return. While investments in alternative asset classes are expected to deliver superior risk-adjusted returns as compared to public markets, managing and monitoring these portfolios requires a sophisticated and nuanced approach.

Excess returns don't tell the whole story as benchmarking challenges have contributed to the dispersion between Policy and realized portfolio returns. Another important measure of active risk is Tracking Error defined as volatility (i.e., standard deviation) of excess returns.

Wilshire and Staff collaborated on introducing investment guardrails for Actionable Tracking Error as a way to manage and measure actionable deviations from the SAA over which Staff has control.

In previous Investment Committee meetings, Staff and Wilshire reviewed the enhancements to portfolio construction and investment guidelines and introduced Portable Alpha framework. The Portable Alpha implementation enables Staff to separate the management of Beta (i.e., benchmark index) investments and Alpha (i.e., excess return over the benchmark) and to understand the drivers of that Alpha.

Staff collaborated with Wilshire to implement improved risk analytics, and updated investment guidelines, policies, and procedures to incorporate Portable Alpha investments. A higher degree of focus on Actionable Tracking Error can translate into better ways to find alpha including porting techniques and using strategic leverage.

Attachment:

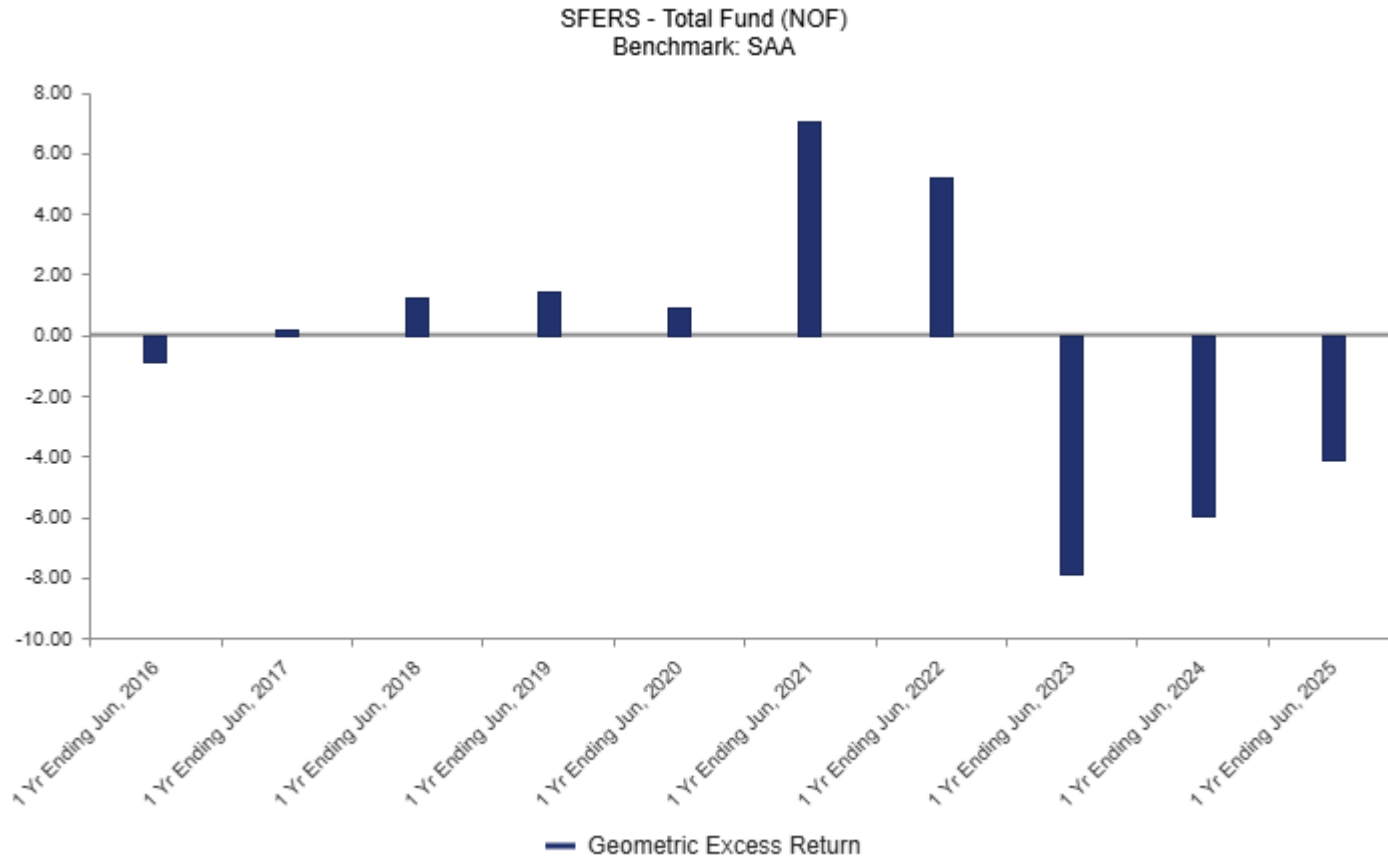
“Challenges of Benchmarking Private Assets and Evaluating Actionable Risk” by Wilshire Associates

Wilshire

Challenges of Benchmarking Private Assets and Evaluating Actionable Risk

November 2025

Policy in Practice: Why Benchmarks Matter



* Monthly data; Net of Investment Management Fees

- Chart highlights the fiscal year excess returns of SFERS relative to Policy
- Coming out of pandemic there have been large increases to excess performance (both to the upside and downside)
- Large dispersion between Public and Private returns is the primary driver
- Purpose of the discussion today is to talk about:
 1. What is driving these large swings?
 - Benchmarking (Primarily)
 2. Is there a better way to measure and manage?
 - Actionable Tracking Error
 - Alpha / Beta Separation
 - Risk Management / Asset Allocation

Benchmarking Private Assets

Benchmark Purpose

- Serves as a clear and objective means of evaluating performance
- Benchmarks provide a realistic starting point, such as a passive portfolio or a peer universe estimate
- The purpose of benchmarking can be summarized as follows:

Performance Attribution

Decomposition of sources of return, such as asset allocation, manager selection, active vs. passive management, manager skill, etc.

Insight on Risk/Returns

Insight into level and types of risk being taken to generate return and the volatility of return over time

Manager Selection/Evaluation

Measure against which manager performance can be evaluated to assist in retention / termination decisions

Target Benchmark Characteristics

| | |
|--|---|
| Unambiguous | Benchmark components and construction methodology are clearly identifiable. |
| Investable | It is possible to replicate and simply hold the benchmark. |
| Measurable | The benchmark's return is readily calculable on an on-going basis. |
| Appropriate | The benchmark is consistent with the composite's objective or manager's investment style. |
| Reflective of current investment options | The manager is knowledgeable of the securities or factor exposures within the benchmark. |
| Pre-specified | The benchmark is agreed upon prior to the start of the monitoring period. |

Source: CFA Institute

General Issues with Alternative & Illiquid Asset Benchmarks

| | |
|--|---|
| Unambiguous | Private Market benchmarks tend to be ambiguous by nature. |
| Investable | Private Market assets tend to have no passive alternatives. |
| Measurable | Private Market assets are measured relatively infrequently. |
| Appropriate | Private Markets assets are not universally defined. |
| Reflective of current investment options | Unlike traditional asset classes, Private Market assets do not have a predefined definition of the opportunity set. |
| Pre-specified | A benchmark can be pre-specified; however, there are different views on how to benchmark Private Markets. |

Common Benchmark Options: Private Equity

Public Index (+ Premium)

- **Description:** The investor benchmarks the private equity fund against a public equity index, with or without a premium.
- **Considerations:** Misalignment between benchmark and private equity assets, especially following a change in market environment due to a tendency for private markets to lag public markets.

Private Equity Universe Index

- **Description:** Several providers offer private equity indexes and include various fund types such as buyout, growth equity, and venture capital.
- **Considerations:** Most are U.S. focused introducing potential currency and regional differences, often lags in data reporting, the indices typically rely on self reporting, potential misalignment from different weights in vintage years, and potential misalignment regarding fund types.

Public Market Equivalent

- **Description:** A collection of performance measures developed to evaluate private equity funds, while seeking to overcome the limitations of common performance measures such as the internal rate of return and multiple on invested capital.
- **Considerations:** Different methodologies to evaluate

Common Benchmark Option 1: Public Index + Premium

The most common method used to benchmark private equity assets.

- Examples of public market indexes used by investors include Russell 2000 Growth, S&P 500, MSCI World, Wilshire 5000, Russell 3000, and MSCI ACWI ex-US.
- Investors can choose to use public markets indexes as-is or may opt to adjust the benchmark by lagging it or adding a premium to it.
- The appropriate public market index to use depends on the regional composition and the fund type (i.e., buyout, growth equity, venture capital)

| SFERS' Private Equity Policy | |
|------------------------------|---|
| 11/1/1984 - 12/31/2002: | S&P 500 + 6% |
| 1/1/2003 – 12/31/2017: | S&P 500 + 5% |
| 1/1/2018 – 12/31/2022: | 75% Russell 3000 / 25% MSCI ACWI ex US Net +3% |
| 1/1/2023 - Present: | 75% Russell 3000 / 25% MSCI ACWI ex-US IMI Net + 3% |

Main Considerations

Pros:

- Available on a timely basis
- Reflects objective of private investment (Growth exposure)

Cons:

- Misalignment between benchmark and underlying assets
- Not investible
- Market volatility can lead to periods of exaggerated over/underperformance
- What is right premium?

Common Benchmark Option 2: Universe Index Providers

Typical Benchmark Construction

- Private Equity Indexes are constructed by aggregating quarterly performance from various Private Equity funds, typically focused on a particular fund type (i.e., buyouts), or a combination thereof.
- Market leading benchmark providers have robust processes in place to verify the accuracy of the returns, seek to eliminate selection bias, and tend to cover an extensive data set to provide depth and breadth of coverage for the fund type(s) included in the index.
- SFERS staff is currently using some of these options as part of ongoing monitoring and annual reviews

Main Considerations

Pros:

- Reflects the broad opportunity set

Cons:

- May not reflect the type of maturity of the program being evaluated
- Often reporting lags
- Potential misalignment regarding region, underlying fund type, vintage year, etc.
- Not all funds open to investors
- Survivorship bias

Private Equity Universe Index Examples

There are many Private Equity indexes available to investors, including, but not limited to the following:

- **Private Equity Quarterly Index (PREQIN)**
 - **Offering:** Preqin PE Quarterly Index
 - **Regional Focus:** Global
 - **Strategy Breakdown:** Broad range of funds – buyouts, venture capital, etc.
 - **Funds Included:** 6,300+
- **Cambridge Associates**
 - **Offering:** Cambridge Associates US Private Equity Index (Ex-US options also available)
 - **Regional Focus:** US-focused
 - **Strategy Breakdown:** Buyout, growth, and venture capital
 - **Funds Included:** 9,900+ funds, across 2,400 fund managers
- **FTSE (formerly Refinitiv)**
 - **Offering:** FTSE Private Equity Buyout Index
 - **Regional Focus:** US-focused
 - **Strategy Breakdown:** Equity buyout through both liquid and publicly traded assets
 - **Funds Included:** 8,000+
- **MSCI (formerly Burgiss)**
 - **Offering:** 70 PE indexes available
 - **Regional Focus:** Varies by benchmark but global and regional solutions available
 - **Strategy Breakdown:** Broad range of funds – buyouts, venture capital, distressed, etc.
 - **Funds Included:** 7,500+ across the various offerings
- **State Street**
 - **Offering:** State Street Private Equity Index (SSPEI)
 - **Regional Focus:** Global
 - **Strategy Breakdown:** Mix of buyout, venture capital, private debt, and energy/natural resources
 - **Funds Included:** 3,800

Common Benchmark Option 3: Public Market Equivalents

Typical Benchmark Construction

- What it is: A way to compare a private investment's cash flows to a public index as if the money had been invested in that index at the same times.
- Goal: Answer a simple question—"Did our private investment beat just buying the market?"
- Use actual cash flows: Take every capital call (cash out) and distribution (cash in) from the private fund.
- Mirror in a public index: Pretend each call bought the index that day and each distribution sold the index that day.
- SFERS staff is currently using some of these options as part of ongoing monitoring and annual reviews

Main Considerations

Pros:

- Simple question, clear answer: "Did we beat just buying the market?"
- Complements IRR/TVPI: Adds a market benchmark context those metrics lack

Cons:

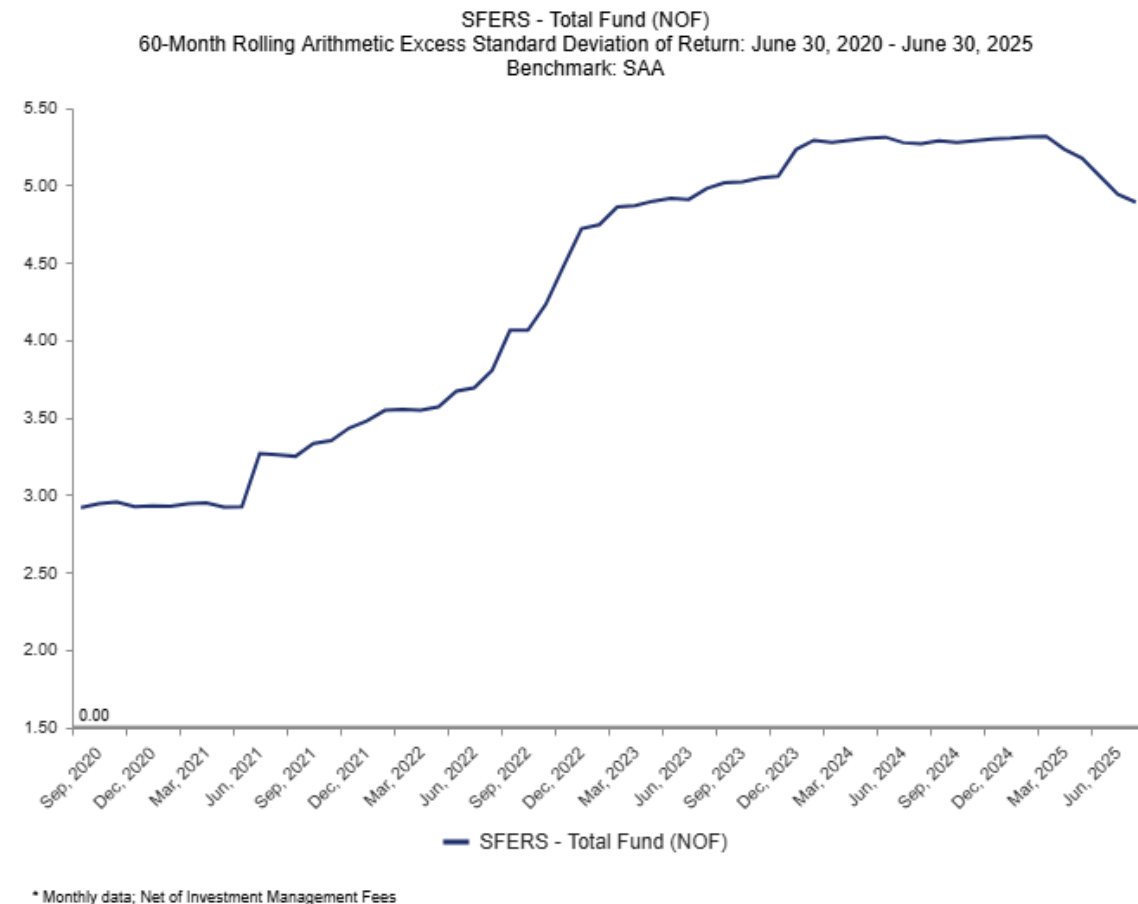
- Not for time-weighted analysis and cannot be combined for Total Fund policy index use
- Data demands: Requires complete, accurate cash-flow history; missing items undermine the math

Actionable Tracking Error

- October 2024

What is Tracking Error and why does it matter?

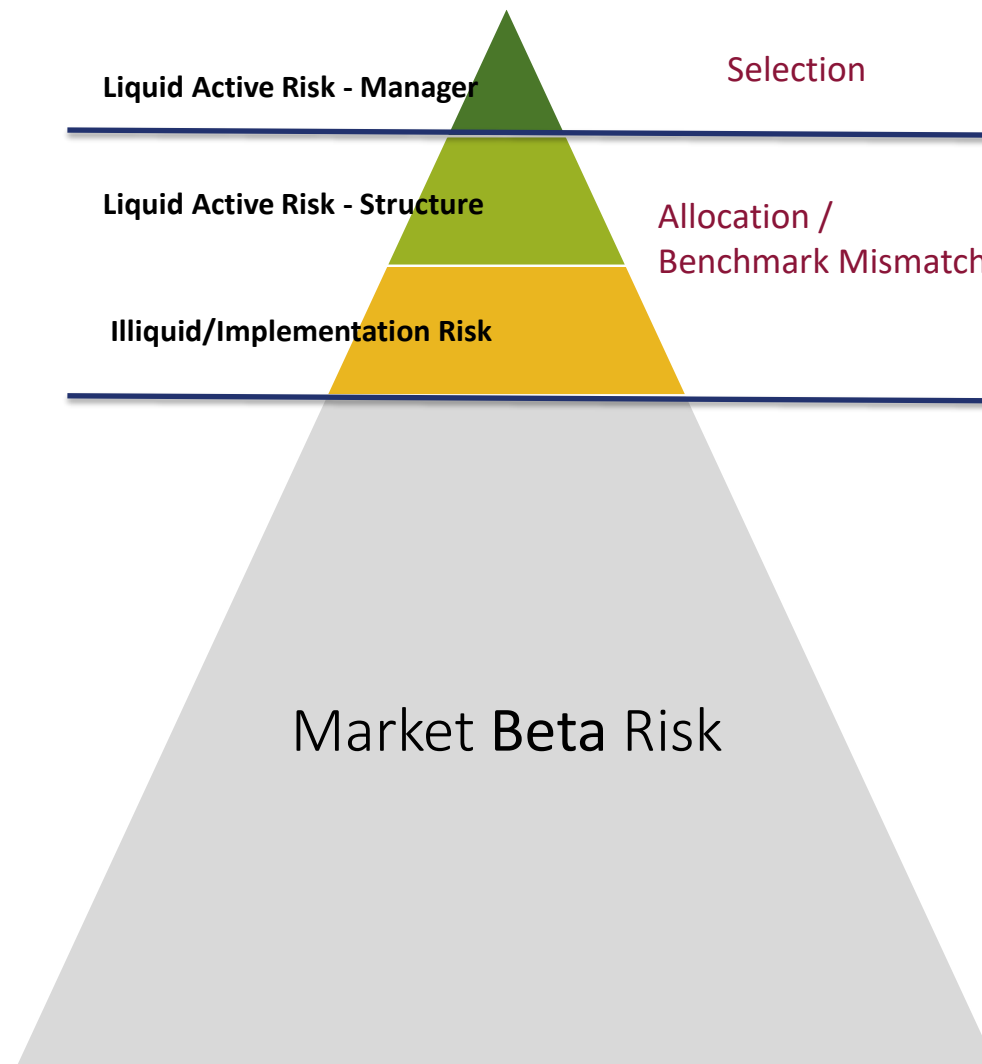
- Tracking error measures the realized or expected volatility (i.e., standard deviation) of the Total Fund’s excess returns relative to benchmark
 - Policy benchmark = The Board’s risk tolerance in action using benchmarks
 - Total fund returns = Implementation of that policy
 - Tracking error = Precision of implementation
- Tracking error assists investors in measuring their actual experience vs expected experience
- Why does the actual experience deviate from expectations?
 - Can’t invest passively in all asset classes
 - Rebalancing is costly and sometimes not possible
 - Increased market volatility
 - Active management
- A plan should only accept tracking error if they:
 - Expect to get compensated for that risk by generating additional return
 - Want to access the underlying beta (i.e., private markets) that is hard to replicate



Interpreting Active Risk: Sources of Tracking Error

Active manager risk is not the only source of tracking error for asset owners.

- **Total Fund TE** – aggregate active risk of all investments versus the strategic policy but can and should be split up amongst the various stakeholders
- **Allocation Deviation** – active risk from differences in actual weights vs policy weights
- **Benchmark Mismatch** – active risk from differences in style in the individual composites versus composite benchmarks (by staff)
- **Manager Risk** – active risk from asset managers (irrespective of style biases versus their benchmark or truly idiosyncratic risk)



Managing Public Markets Active Risk

- **Allocation**

- Deviation from the target allocation
- Portfolio characteristic tilts vs. composite benchmark

- **Selection**

- Active positioning by asset managers



- ✓ Rebalance if unintentional, if intentional, monitor and analyze alpha generation effectiveness
- ✓ Eliminate if unintentional, if intentional, monitor and analyze alpha generation effectiveness
- ✓ Allocate and analyze active risk contribution by manager and determine rebalancing ranges

Challenges Associated with Private Markets Active Risk

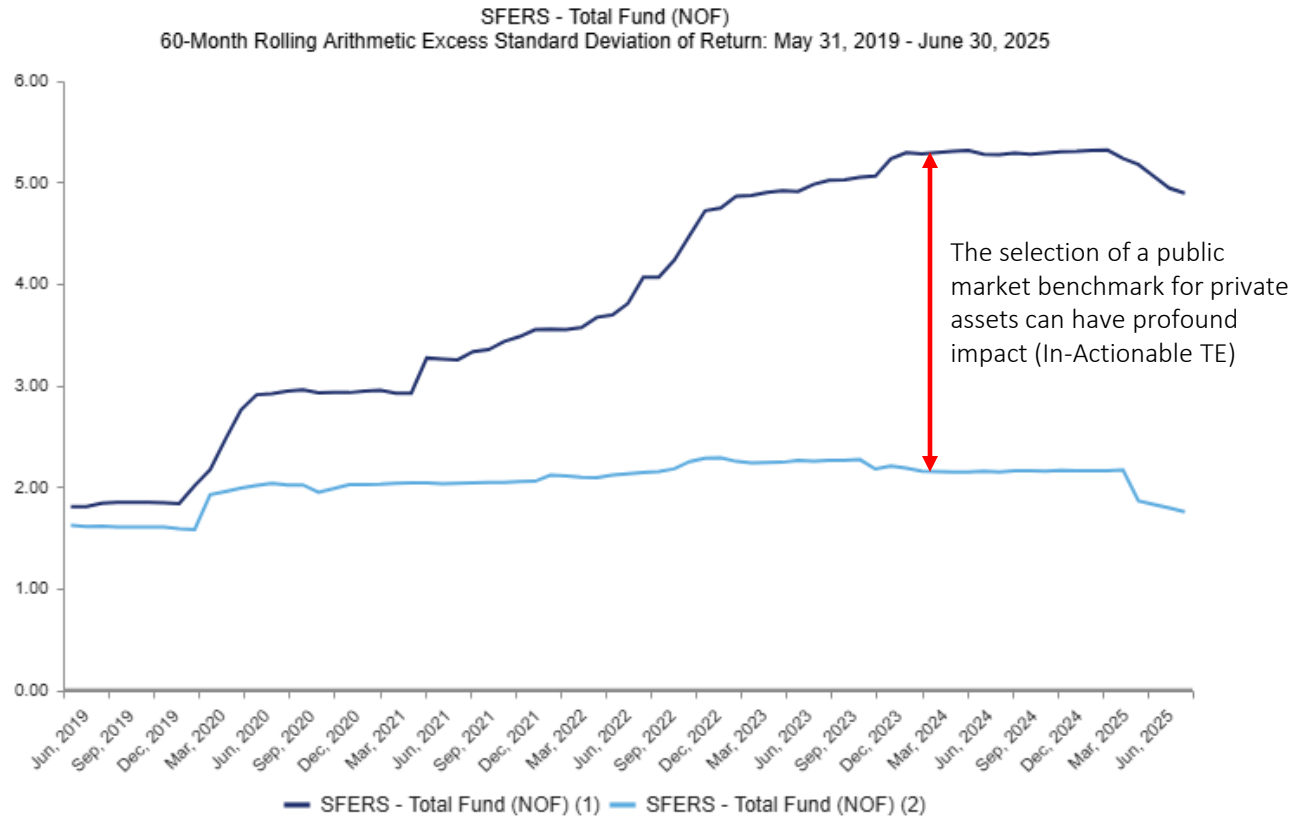
- Private investment performance measured against public market benchmark
- Private markets investments performance reported on a lagged basis
- Cannot readily rebalance or manage cash flow



- ✘ Benchmark mismatch cannot be eliminated (no pre-determined, investable, passive benchmark)
- ✘ Can use lagged public market benchmark but does not allow any action to be taken to manage active risk in a timely manner)
- ✘ Cannot actively rebalance (cash flow is not in staff control after commitment)

Private markets investments will exhibit a large tracking error and the sources of tracking error is confounded between actual investment risk and measurement mismatch

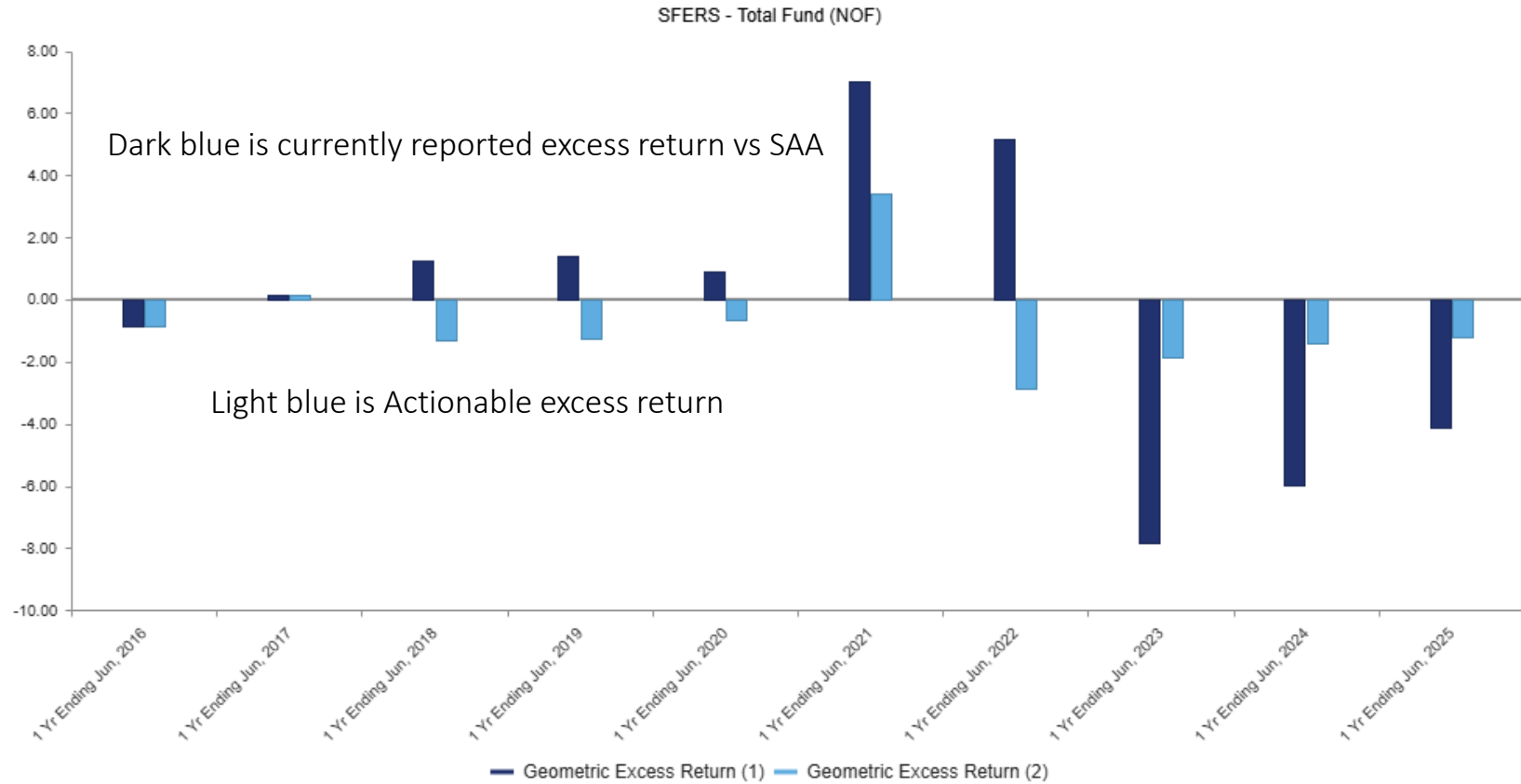
Actionable vs In-Actionable Tracking Error (Rolling 5 years realized)



* Monthly data; Net of Investment Management Fees
Benchmarks Used: (1) SAA, (2) Actionable SAA

- Dark blue line is SFERS actual realized rolling (5-Year) tracking error:
- Recent increases primarily driven by public market benchmarks used for private assets
- Staff can't invest passively in Private Markets to capture the Public Equity + Premium return
- We can adjust the policy benchmark to account for that issue, and you can see that in **light blue** (Actionable TE)
- The light blue line measures TE that staff has more direct control over

Comparison of SFERS Excess Return Using Different Policy Measurements



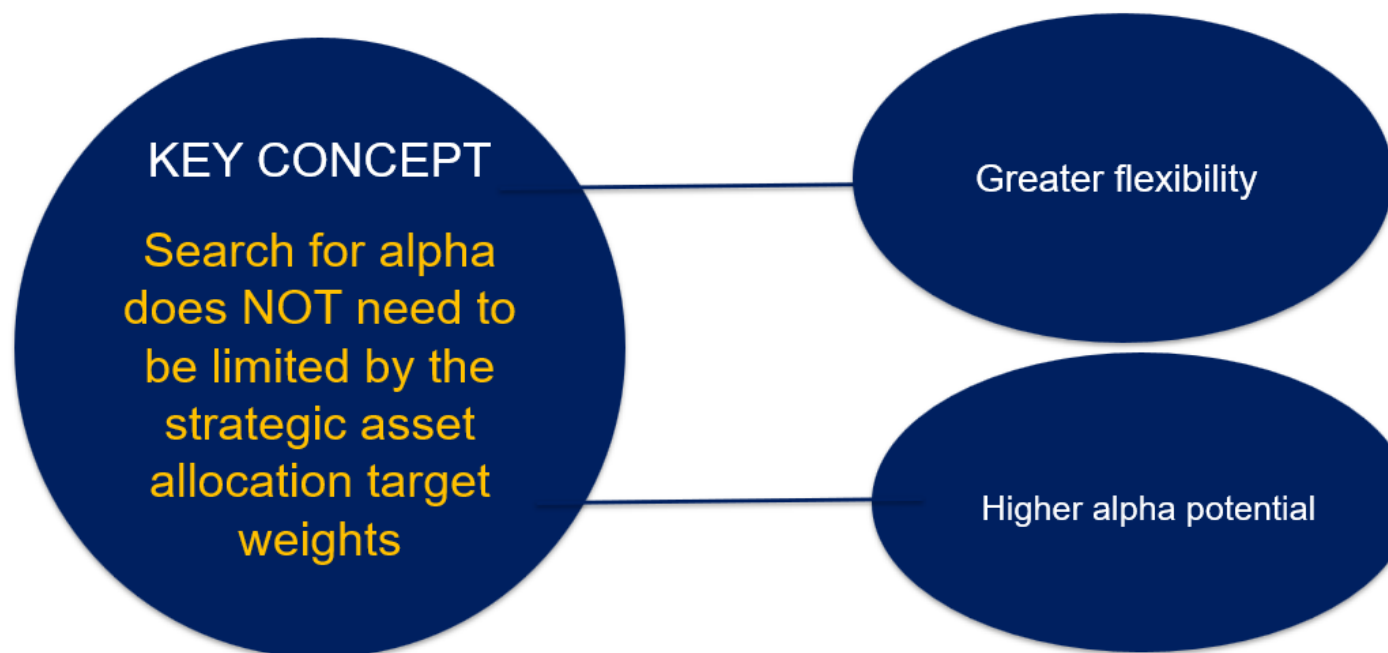
* Monthly data; Net of Investment Management Fees
 Benchmarks Used: (1) SAA, (2) Actionable SAA

- The result of using actionable TE should be smaller relative swings both to upside and downside
- This should help focus the investor on management-controlled decisions

From Actionable Tracking Error to Portable Alpha

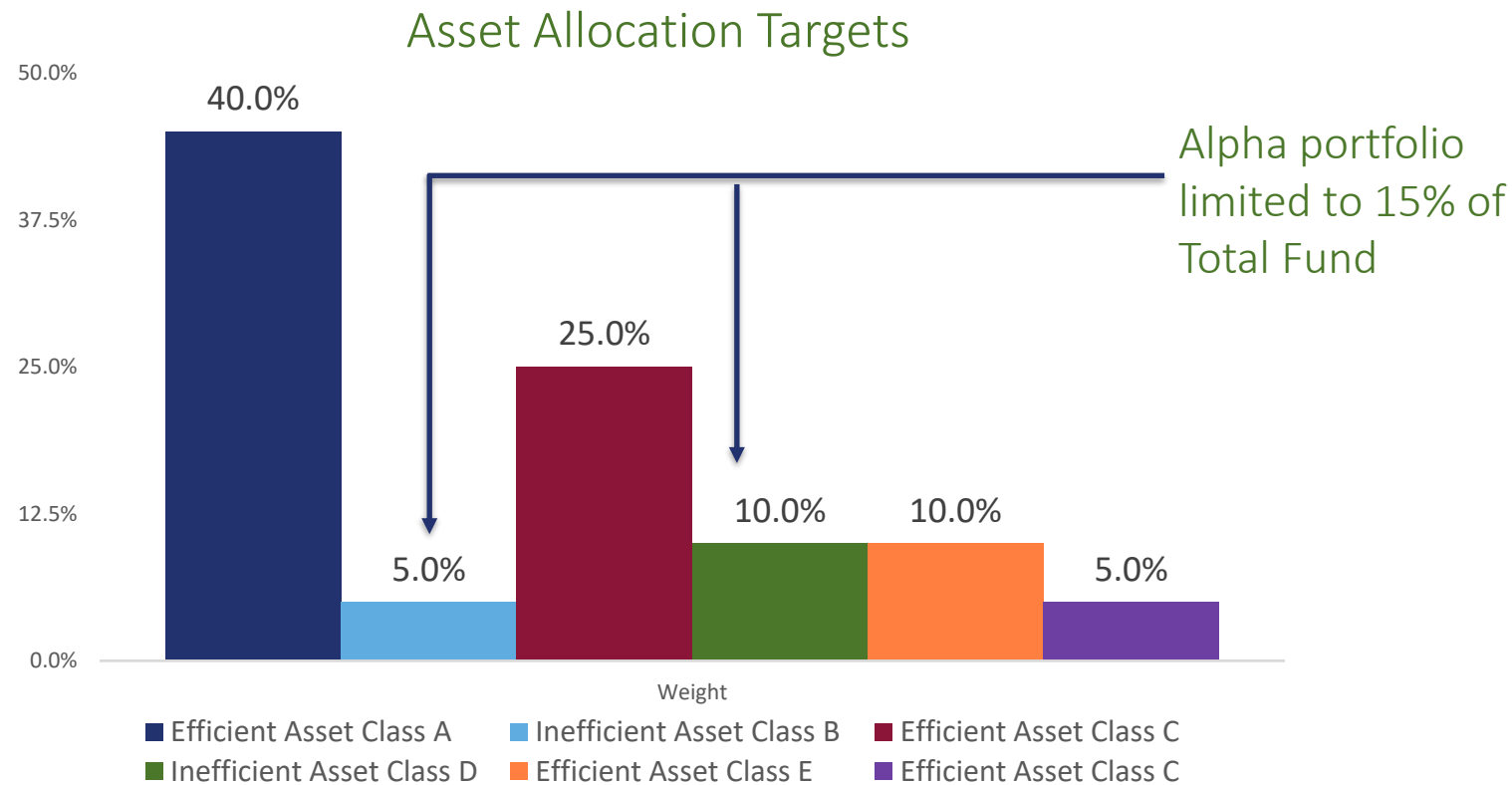
- Actionable tracking error essentially shines a light on active risk that Staff can control
- Supports the concept of allowing investment teams the ability to look for alpha across the investment universe
- Allows staff to measure tactical decisions including leverage
- This is known as Alpha / Beta Separation

Total Fund Alpha – Beta Separation



Alpha constrained by Beta

- Less efficient asset classes have higher expected information ratios than efficient asset classes – spend active risk where there is more potential for reward
- Active exposures are inherently limited by target Beta allocation



Illustrative Example – Not SFERS Asset Allocation

Total Fund Alpha – Beta Separation

Step 1

- Establish governance (Leverage, Portable Alpha, Risk Guardrails)
- Ensure Staff has tools to measure risk
- Provide periodic reporting to board

Step 2

- Define optimal Alpha
- Build high quality alpha stream subject to active risk constraints
- Staff has been working on this within public markets already

Step 3

- Implementation through adjustment of beta exposures to align with strategic asset allocation
- Strategic leverage allows for more flexible implementation options

Strategic Beta Allocation

Summary

- Most asset owners are dealing with higher tracking error coming out of the pandemic and 2022 drawdown / recovery
- Excess returns don't tell the whole story – benchmarking challenges have contributed to the return experience
- Benchmarking Private Markets requires a mosaic approach and context around some of the challenges
- Tracking error is multi-faceted and should be taken when you expect to be compensated
- Actionable Tracking Error is one way to measure risk over which Staff has control
- Higher degree of focus on actionable tracking error can translate to better ways to find alpha including porting
- Strategic leverage can be used implement alpha

Appendix

Benchmarking Alternative & Illiquid Assets

Benchmarking is an essential part of investing, yet many challenges exist within benchmarking non-traditional assets.

- Unlike traditional assets, non-traditional assets are difficult to define and go by many names: Private Markets, Alternatives, and Illiquids.
- Investors must consider many factors when benchmarking non-traditional asset classes, including, but not limited to time horizon, illiquidity, leverage, and reporting lags.
- This presentation addresses the various challenges investors face when benchmarking non-traditional assets and provides best practices for investors to consider.

Non-Traditional Asset Examples

- Private Equity
- Real Estate
- Private Credit
- Hedge Funds
- Infrastructure

General Benchmark Considerations

There are several items investors should consider for both traditional and non-traditional assets:

- **Time Horizon**
 - Examine results over various time horizons for a more holistic understanding of performance.
 - Calculate rolling returns to smooth out short-term volatility and show performance across a market cycle.
- **Risk Factors**
 - Evaluate risk-adjusted performance using metrics such as Sharpe ratio, Sortino ratio, etc.
- **Impact of Fees**
 - Compare both net and gross returns relative to the benchmark to account for the impact of fees.
- **Benchmark Construction**
 - Understand how the benchmark is constructed and if there are any notable limitations / assumptions.
- **Review Benchmarks**
 - Regularly review the benchmark and make updates, as applicable, to maintain relevance and appropriateness.

Alternative Benchmark Considerations

Non-traditional assets present unique challenges due to the lack of regular market prices, varying liquidity, and complex risk profiles. Investors must consider many factors when selecting a benchmark:

- **Reporting**
 - Understand the implications of any reporting lags.
 - Acknowledge the impact of market environment when using public market equivalent benchmarks.
- **Additional Risk Factors**
 - Account for the illiquidity premium and / or the use of leverage within the underlying assets.
 - Understand the liquidity of the underlying assets and any mismatch between those and the benchmark.
 - Ensure that the benchmark accounts for sensitivities to periods of stress.
- **Time Horizon**
 - Confirm that the benchmark reflects the appropriate time frame and aligns with the anticipated holding period.
 - Reassess the appropriateness of the benchmark over time as market standards can evolve.

The Impact of the Investment Environment

Alternative benchmarks offer an imperfect proxy, which can be pronounced in different investment environments.

- Performance can be significantly impacted when private assets are benchmarked against public assets.
 - Private markets often lag public markets, be it on the upside or downside.
 - Private markets benefit from this mismatch when public markets are falling, but the reverse is also true with private markets having a higher hurdle in strong equity markets.

Source: CFA Institute

The Denominator Effect

Another issue investors face when holding Private Equity within their portfolio is the so-called denominator effect, whereby private asset allocations exceed the percentage threshold established in an allocation policy.

The effect comes into play after extraordinary performance, such as in 2021, where Private Equity valuations significantly outpace public equities and bonds, leading investors to be over-allocated to Private Equity.

Custom Benchmarks Considerations

Pros

- Customization allows investors to create a solution that seeks to address the unique composition of the client's portfolio.
- Opting for benchmarking a portfolio against itself may also be an option investors take, which removes benchmark impact on attribution and reporting.

Cons

- Custom benchmarks make peer comparison more complicated.
- Custom benchmarks rely on subjectivity within the creation of the benchmark
- Customization is often complex.

Custom Benchmarks Overview

Given the complexities associated with benchmarking Private Equity assets, clients may elect to create a custom benchmark to assess the performance of their Private Equity portfolios.

- Examples of custom benchmarks are limitless; however, a few are shown below:
 - Lagged: MSCI World (1 Quarter Lagged)
 - Lagged + Premium: Wilshire 5000 (1 Quarter Lagged) + 3%
 - Different Weights + Premium: Russell 3000 (75%) + MSCI ACWI ex-US (25%) + 3%
 - Different Weights + Lagged: S&P 500 (2.5%) + S&P 500 (1 Quarter Lagged, 97.5%)
 - Composite Performance: Benchmarking the portfolio against itself.

Public Market Equivalent (PME) Examples

| PME Methodology | Description | Main Pros | Main Cons |
|--|--|---|--|
| “Buy and Hold” | <ul style="list-style-type: none"> • Completely match contributions of underlying fund • Interim distributions are ignored • Sell all units at end of period to generate NAV | <ul style="list-style-type: none"> • Simple calculation • Never fails (i.e., avoids “negative NAV”) | Does not account for any interim distributions. PME IRR can be materially impacted over long periods of time. |
| Long-Nickels | <ul style="list-style-type: none"> • Completely match contributions <u>and distributions</u> of underlying fund • Calculate remaining NAV | <ul style="list-style-type: none"> • Accounts for both contributions and distributions in PME calculation | Breaks down in certain instances where private equity fund significantly outperforms (e.g., “negative NAV”) |
| PME+ (WPM recommended approach) | <ul style="list-style-type: none"> • Completely match contributions • Scale distributions of underlying fund so that the terminal benchmark NAV is equal to the underlying fund’s NAV. | <ul style="list-style-type: none"> • Contributions matched perfectly • Distributions accounted for but scaled to avoid breakdown • Never fails | Methodology scales distributions by a factor instead of completely matching the distributions of the underlying fund |
| Kaplan-Schoar | <ul style="list-style-type: none"> • Completely match contributions <u>and distributions</u> of underlying fund • Calculate remaining NAV | <ul style="list-style-type: none"> • Simple calculation • Never fails (i.e., avoids “negative NAV”) | Output is not an IRR benchmark and difficult to measure alpha. Less common methodology that will need some investor education. |

Note: WPM stands for Wilshire Private Markets

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