



City of Milwaukee  
Employees' Retirement System

Bernard J. Allen  
Executive Director

David M. Silber, CFA, CAIA  
Chief Investment Officer

Melody Johnson  
Deputy Director

February 4, 2022

Mr. Jim Owczarski  
City Clerk  
Room 205, City Hall

Dear Mr. Owczarski:

Please be advised that an Investment Committee Meeting of the Annuity and Pension Board has been scheduled for **Thursday, February 10, 2022 at 8:45 a.m.** This meeting will be conducted via teleconference.

*Special Notice: Instructions for the public on how to observe the meeting will be available on the ERS's website ([www.cmers.com](http://www.cmers.com)) prior to the meeting.*

The agenda is as follows:

- I. Hedge Fund of Funds Manager Interviews.
  - a. Goldman Sachs Asset Management AIMS Aptitude.
  - b. Blackstone Alternative Asset Management.
  - c. Grosvenor Capital Management.


Please be advised that the Investment Committee may vote to convene in closed session on the following item (II.) as provided in Section 19.85(1)(e), Wisconsin State Statutes, to deliberate or negotiate the purchasing of public properties, the investing of public funds, or conducting other specified public business, whenever competitive or bargaining reasons require a closed session. The Investment Committee may then vote to reconvene in open session following the closed session.

- II. Selection of Hedge Fund of Funds Manager.
- III. Informational.
  - a. 4<sup>th</sup> Quarter 2021 Performance Report.
  - b. Value Add Analysis.

Sincerely,

Bernard J. Allen  
Executive Director

BJA:jmw



February 10, 2022

**The Employees' Retirement  
System of the City of Milwaukee  
2022 Hedge Fund of Fund Search**

**CITY OF MILWAUKEE EMPLOYEES' RETIREMENT SYSTEM  
HEDGE FUND-OF-FUND SEARCH  
FEBRUARY 10, 2022**

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## Memorandum

**To:** Employees' Retirement System of the City of Milwaukee Investment Committee  
**From:** Joe McGuane, Senior Vice President, Hedge Fund Research  
**Date:** February 10, 2022  
**Subject:** Hedge Fund of Funds Search

### Introduction

At the July 28, 2021 meeting, the CMERS' Investment Committee directed Callan to conduct a search for a hedge fund of funds (FOF) manager to complement UBS, CMERS' existing Absolute Return Hedge Fund Manager. Callan evaluated 71 funds representing 41 firms who provided sufficient data for such evaluation and were considered potentially qualified. We are recommending the following three firms for further consideration (in alpha order):

Blackstone Alternative Asset Management  
Goldman Sachs / Aptitude Investment Management  
Grosvenor Capital Management

### Candidate Overview

In addition to the detailed profiles of each manager provided, this memorandum provides some broad observations that serve to characterize the unique attributes of these managers. Each candidate has distinct, differentiating characteristics or qualities. These differences do not necessarily mean one is better than another. That is, one firm's unique attributes may be appealing to some investors, but not to others.

Each manager has an investment philosophy that governs the degree to which it pursues certain strategies or managers in its discretionary portfolios. For example, Blackstone is more comfortable pursuing strategies offering more of an illiquidity premium where daily liquidity and transparency is less critical. The longer-term investment horizon for these strategies to be successful is important for evaluation. In between these opposing philosophies, the discretionary portfolios of Aptitude and Grosvenor tend to reflect a broader mix of both liquid and illiquid strategies. Table 1 below categorizes the liquidity profiles of the FOFs' underlying strategies. Please note these labels are fluid and subject to change, depending on a given firm's perception of risk-reward trade-offs amid ongoing opportunities.

**Table 1 - Underlying Strategy and Illiquidity Risk**

More Liquid Strategies	Less Liquid Strategies	Broad Mix of Strategies
	Blackstone	Aptitude
		Grosvenor

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Second, a FoF's investment philosophy is often expressed in terms of underlying manager size preferences. Some FoFs prefer to focus on larger-tier managers, given their often well-established infrastructure, greater economies of scale, and longer track records; while other FoFs prefer to focus on smaller-tier managers who are arguably more nimble in the market or more capacity constrained to generate better excess returns. These preferred managers also tend to be more single strategy focused, where best in class capabilities can be more readily targeted. Recognizing that the merits of fund size may differ depending upon the given strategy, other FoFs will hire manager of all sizes.

Table II below categorizes the candidates in terms of biases in the underlying fund sizes based on each FoF's stated preferences, if any, and Callan's assessment of each FoF's holdings of underlying managers. Certain trading market environments are more conducive to larger firms while other market conditions favor the smaller manager. Consequently, for a well-balanced portfolio structure, exposure to both spectrums of fund size bias is worth considering.

**Table II - Underlying Fund Size Preference**

<b>Smaller, Single-Strategy Funds Emphasized</b>	<b>Larger, Multi-Strategy Funds Emphasized</b>	<b>Broad Mix of Fund Sizes and Types</b>
	Aptitude	
	Blackstone	
	Grosvenor	

### **Recommendation**

Each of the three FoF candidates presented can provide CMERS with a customized, well-diversified solution that complements UBS, the existing Absolute Return Manager. Also, it is important that the hired firm demonstrate the flexibility and resources to adapt to the variety of unknown paths ahead facing the hedge fund industry.

Given CMERS' emphasis on capital preservation, lower volatility, and broad diversification, Callan recommends that CMERS interview Blackstone, Goldman Sachs/Aptitude and Grosvenor, candidates that best represent the preferred combination of skills and core competencies that match CMERS' needs and preferences.



**CITY OF MILWAUKEE EMPLOYES' RETIREMENT SYSTEM**  
**Hedge Fund-of-Funds Manager Search**  
**August 2021**

**Investment Manager Candidate Profile**

<b>Manager Orientation:</b>	<p>CMERS is searching for a firm to manage a fund of funds in the absolute return style of investing. It is anticipated that the manager will have expertise in managing a diversified program focusing on traditional absolute return oriented strategies. The focus of the program should be “absolute return” with limited “directional” exposure. The return and risk expectations are below those for “long/short” funds of funds and “core diversified” funds of funds. Specifically, the expected targeted return should approximate T-bills plus 4% and total expected volatility as measured by standard deviation of returns should be similar to fixed income. The total portfolio must be sufficiently diversified to minimize exposure to traditional capital markets and to limit concentration with individual partnerships or investment strategies.</p> <p>All else equal, we will favor managers with higher levels of transparency, lower fees, and a lengthy and established positive history of working with similar organizations.</p>
<b>Manager Type:</b>	<p>CMERS is open to a separately managed portfolio comprised of limited partnership interests, a “Fund of One” or “Fund of Funds” approaches.</p>
<b>Amount to be Allocated:</b>	<p>CMERS is targeting an initial allocation of approximately \$170 million invested in a fund of funds vehicle. This constitutes approximately 3% of total fund assets.</p>
<b>Managed Assets:</b>	<p>A minimum of \$5 billion in assets managed in similar style mandates is preferred; however, on a select basis, CMERS will consider managers with less.</p>
<b>Size of Professional Staff:</b>	<p>Investment staff should be of sufficient depth and breadth to perform ongoing duties of the firm, with particular emphasis on due diligence.</p>
<b>Years Experience Managing</b>	<p>At least two key decision-makers ideally will have worked</p>

<b>Investments:</b>	together in their current organizational setting for at least three years. If key decision makers do not satisfy these experience criteria, the firm must be able to convincingly demonstrate a strong continuing commitment to this product and currently have other professionals on staff who were major contributors to the performance record being used for evaluation.
<b>Geographic Location:</b>	Must be able to meet CMERS' client servicing requirements
<b>Involvement with Other Businesses:</b>	Prefer no financial relationships with underlying hedge fund managers beyond those of a limited partner. Exceptions will be considered on a case by case basis.
<b>Hedge Fund Analysis Orientation:</b>	Quantitative tools may be used to narrow the universe of Managers, but a qualitative process of due diligence and risk management must be emphasized.
<b>Risk Level:</b>	Risk will be evaluated by considering the standard deviation and downside risk of returns relative to peers. As a measure of capital market exposure, correlation with the equity (e.g. S&P 500) and fixed income (e.g. Bloomberg Aggregate Index) markets will also be evaluated.
<b>In-House Research Capability:</b>	In-House research capability is critical although limited outsourcing of due diligence is acceptable.
<b>Historical Performance Criteria:</b>	<p>In order to identify potential candidates we require that firms exhibit competitive historic performance. We will score historical return performance based on the following:</p> <ul style="list-style-type: none"> <li>• Rolling period returns compared to a specific absolute return level (e.g., T-bills + 4%, or another specific investment objective) as well as the peer group of fund-of-fund managers with a similar mandate.</li> <li>• Rolling period Sharpe Ratio compared to the peer group of fund-of-fund managers with a similar mandate.</li> <li>• Performance relative to appropriate Hedge Fund of Fund indexes over rolling periods.</li> </ul> <p>We are striving to identify those firms who exhibit strong absolute returns but who also exhibit solid risk-adjusted performance and low correlation to traditional capital markets.</p>
<b>Qualities Specifically Sought:</b>	<ul style="list-style-type: none"> <li>- Ideally, the candidates will have meaningful institutional fund experience, particularly with public funds. They will avoid significant strategy or manager concentration and will tend to utilize a readily understandable, fundamentally oriented investment approach. They will be stable organizations where key investment professionals have significant ownership and/or performance driven incentives.</li> <li>- Candidates should provide diversification in philosophy and approach when compared with CMERS's existing managers.</li> </ul>



	<ul style="list-style-type: none"> <li>- Candidates should provide strong transparency to underlying funds and their investments as appropriate.</li> </ul>
<b>Qualities to be Avoided</b>	<ul style="list-style-type: none"> <li>- Manager should avoid any market or financial leverage at the fund-of-fund level, except for cash flow management purposes (i.e., matching redemptions with pending contributions);</li> <li>- Manager should avoid extreme manager concentration;</li> <li>- Manager should avoid extreme strategy concentration.</li> </ul>
<b>Experience of Investment Professionals:</b>	At least two key investment professionals should each have five years experience involving the management of fund-of-fund portfolios.
<b>Financial Well-Being of Firm:</b>	Firm must be a viable and on-going business.
<b>Client Communication:</b>	Good client servicing capabilities with the ability to communicate with non-investment oriented board members.
<b>Fees:</b>	Fees must be competitive with industry norms.
<b>Client Submitted Firms:</b>	None

## Ranking Hedge-Funds-of-Funds

### How Callan Ranks Hedge-Fund-of-Funds

Callan's process for ranking hedge fund-of-funds for client recommendations is primarily based upon a combination of performance and organization/product-related data supplied by the investment managers. The purpose of this paper is to describe this process of evaluating and distilling a myriad of competing information to generate a useful ranking, while highlighting important caveats to consider in this quantitative approach.

#### Rating Performance

Callan's performance-ranking process is designed to rate highly those hedge fund-of-funds that achieve the best risk-adjusted returns with the least amount of market exposure, depending upon the mandate. In other words, all things being equal, preferable funds will typically demonstrate better-than-average returns, with lower-than-average volatility and lower-than-average correlations to equity or fixed-income markets, when compared to other peers pursuing similar investment styles<sup>1</sup>. In this ranking process, the objective is to enable both funds with lower risk-return patterns and funds with higher risk-return patterns to rank equally well, with the investor's risk tolerance to differentiate a preference among the two.

#### Factors Considered

To rank a fund's performance, we specifically evaluate six sets of variables vis-à-vis the peer group of candidates being considered:

- Rolling Return (net of fee);
- Rolling Standard Deviation and Downside Risk;
- Rolling Sharpe Ratio;
- % of Excess Returns over Cash Benchmark;
- Rolling Correlations with Stock Market and Bond Market
- Rolling Serial Correlations.

The first variable is simply a measure of annualized return ranking, while the second one focuses strictly on measured risk in both absolute volatility as well as volatility of returns below a threshold return (e.g., T-Bills + 4%). Not surprisingly, those funds ranking well in one measure, whether risk or return, typically rank poorly in the other, particularly over full market cycles. As with any investment opportunity, higher returns among hedge funds typically involve higher volatility of returns.

<sup>1</sup> E.g., Absolute Return, Long-Short Equity, or Core Diversified style

Individually, the next two variables are forms of risk-adjusted performance where the first measure, Sharpe Ratio, balances excess returns over the risk-free rate against total volatility, while the second looks at the fund's historic probability of beating the investor's given investment objective vs. peers. Those funds that more consistently underperform the return target will be penalized in the latter ranking even though the associated Sharpe Ratio may be best-in-class supported by an extraordinarily low historical risk. In other words, strong risk-adjusted performance is preferable, particularly when it is achieving the desired return target.

The next performance factor considers the degree of a fund's co-movement with basic market exposures. All things being equal, high correlations with capital markets (e.g., S&P 500, Bloomberg Aggregate) are less desirable than low correlations across a hedge fund program. While correlations do not necessarily indicate causality, they do highlight performance patterns that do not fit with a typical hedge fund program's objective of reducing a fund sponsor's overall volatility in the total fund that includes equity and fixed-income exposure elsewhere. For example, unless viewed as an equity substitute, the investor's hedge fund program typically seeks to minimize chronic equity exposures that, per se, could be achieved more cheaply with indexed assets or traditional active management at a much lower cost. Consequently, all things being equal, this process ranks those funds higher with consistently lower-than-average correlations to these markets among their peers.

The last performance factor is serial, or auto, correlation, which measures the degree to which a fund's current return is related to a prior month's return. This assessment helps to highlight when a fund's reported returns contains an element of smoothing that reflects a lagged valuation process or a market valuation that does not fluctuate as much as other daily traded securities. Investments, like private equity, private real estate, bank loans and other illiquid credits exhibit such auto correlation because daily, weekly or even monthly pricing is not readily available. Reported returns from such investments tend to understate the degree of volatility and correlation with other assets. Consequently, all things being equal, a higher measure of auto-correlation is less attractive than a lower one.

Each of the calculations for these factor ranks is made using rolling periods of 12 or more months over the last 10 years or since inception, if less than 10 years. One concern using a performance period with a relatively short history is that funds ranking well can be potentially just lucky or unlucky, particularly with unusual strategy allocations versus those of peers. For example, those funds launched in the first quarter of 2009 with significant distressed allocations will rank well, particularly if that

allocation is reduced before the next credit crisis. However, with more statistical observations, the fund with a longer history that ranks well is more likely achieving above-average performance by skillfully selecting better managers and allocating strategy risk. As a manager completes a reasonably full market cycle (e.g., 3 to 5 years), the statistical observations within this ranking process become more meaningful.

#### **Summing up the Performance Factor Ranks**

By design, an equal-weighted composite of the risk and return-related factor ranks represents a balanced measure of risk-adjusted returns. However, weights of these underlying factors can be adjusted to reflect an investor bias preferring more return or less risk. Individual factor rankings can be adjusted further to reward those with consistently, albeit modestly, above average performance vis-à-vis those who performed well on average but with higher highs offset by lower lows. That is, in this case, the preferable manager is one with lower “tracking error” versus the peer group. The composite score’s weighting of ranks between correlations with stock and bond markets will depend on client needs and objectives.

The performance ranking process yields reasonable results separating laggards from leaders. However, like any quantitative model, this model requires a qualitative overlay when interpreting results. While laggards ebb and flow over time, persistence of some laggards appears to be explained by factors unrelated to underlying manager selection and strategy allocations. For example, higher-than-average fees and expenses. With return expectations of T-bills + 5%, funds charging notably higher fees and expenses were more likely to rank poorly in this inefficient market of managers soliciting investors. If that manager offers a significant discount to a prospective investor, on the margin, the performance rank will be appropriately affected.

However, other factors can inappropriately affect a fund-of-fund manager’s ranking. A manager providing a composite of separate accounts will likely exhibit lower volatility of returns while preserving its average performance, as disparate accounts are combined in an uninvestable “fund of fund of funds”. Therefore, a large representative account within that manager’s composite would be preferable for the ranking process, all things being equal, to illustrate what an individual investor, not a group of investors, might experience.

Notwithstanding these quantitative deviations, the order of rank provides a priority of discussion, where qualifying remarks about quality of the organizations and their track records, among other factors, drive the next step in the selection process.

#### Rating Product and Organization

Callan's product ranking process focuses on five sets of variables that, all things being equal, make a product (and the organization managing it) more or less attractive versus peers. These five sets of factors represent or characterize:

- Experience (e.g., length of firm history, fund history, size of team, ratio of funds invested by investment team size)
- Assets under Management (e.g., absolute asset levels, recent growth of assets)
- Risk Management (e.g., largest underlying fund allocations, average underlying fund allocation)
- Liquidity (e.g., redemption terms, notice period terms, lock-up periods)
- Fees & Expenses (e.g., fees at various return levels, operating expenses charged to the fund)

The data defining these factors are based on survey information supplied periodically by the fund-of-fund managers to Callan. For each individual factor, the manager is ranked. For example, independent of all other factors, a manager with a long record of experience will rank higher than average. Similarly, a manager with lower than average fees, based on an array of prospective returns achieved, will rank better-than-average. Alternatively, a manager with significant underlying fund concentration risk (e.g., underlying fund allocations greater than 10%, or an average underlying fund allocation greater than 5%) will rank poorly versus those with less concentration risk.

#### Summing up the Product Factor Ranks

When aggregated in a custom-weighted composite rank, the resulting aggregate rank provides a priority of consideration. However, a higher ranking does not necessarily indicate a better candidate to hire. Many factors cannot be easily ranked. For example, other overriding considerations may be:

- Key personnel departures, such as a CIO or persistent analyst turnover, indicating organization distractions and loss of intellectual capital;
- Quality and integrity of key personnel, beyond simple measures like years of experience and team size;
- Quality of references provided by investors, consultants, and hedge fund managers who has worked with a given fund-of-fund;

## Rankings Hedge Fund-of-Funds

### How Callan Ranks Hedge Fund-of-Funds

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- Quality of the fund-of-fund organization structures, delineating distinctly separate responsibilities and managing potential conflicts, helping to align the manager's interest with those of its investor clients (e.g., separate accountability for risk management vs. investment research);
- Quality of vested interests supporting the performance of a particular fund or account, further aligning the manager's goals with those of its investors (e.g., degree of management participation in the fund's downside performance; degree of potential conflicts with other competing business or fund interests).

#### Summing up the Big Picture

Callan's aggregated composite of organization/product and performance factor ranks, unless otherwise specified by the client, is a simple average of the two. Effectively, this aggregate rank attempts to balance the attractiveness of a fund's performance patterns with the measurable features of the firm and its fund.

Overall, Callan's ranking process provides the investor and its consultants with an order of consideration that then needs to be validated by supporting observations or discounted by conflicting ones that cannot be quantified. While a top ranking does not necessarily determine a recommendation, a bottom ranking requires more extenuating factors to justify further consideration in the next step of the selection process.

Product Profiles (Alphabetical)	1	3	4	8	Range of Characteristics for All Candidates Considered			
Organization Name	Blackstone Group (The)	Goldman Sachs/Aptitude	Grosvenor Capital Management, L.P.	UBS Asset Management	Average	Median	Lowest	Highest
Year of Firm Inception	1985	1988	1971	1995	1985	1987	1971	1995
Employee Owned (%)	50.0%	0.0%	78.0%	6.0%	34%	28%	0%	78%
# of Employee Owners	20	0	30	0	13	10	0	30
Year of SEC Registration	1996	1989	1997	1989	1993	1993	1989	1997
Names of Key Employees (Yr in Industry;Yr at Firm)								
CIO/PM	Joe Dowling (1994;2020)	Mike Brandmeyer (1995;1995)	David Richter (1988;1994)	Bruce Amlicke (1986;2010)				
Research Head/PM	Min Htoo (1998;2017)	Jeffrey Klein (1990;2004)	Brad Meyers (1997;2003)	Jeff Colodny (1985;1985)				
CRO	Steve Sullens (1991;2001)	Rohit Kumar (2006;2010)	David Geifman (1989;2011)	Yoshi Nobumoto (1992;2010)				
ODD Head	Brian Gavin (1991;2002)	Ryan Boucher (1998;1998)	Andrew Lettinga (2008;2008)	Nicole Tortarolo (2004;2006)				
Key Employees' Avg Years in Industry	27	23	25	28	26	26	23	28
Key Employees' Avg Years with Firm	10	18	16	17	15	17	10	18
Size of Investment Team (Excl. ODD)	84	28	62	42	54	52	28	84
Size of ODD Team	10	5	17	12	11	11	5	17
Total Firm \$AUM (millions, as of 12/31/20*)	\$77,209	\$3,828	\$26,553	\$38,399	\$36,497	\$32,476	\$3,828	\$77,209
Total Firm \$AUM (millions, as of 12/31/19)	\$78,611	\$2,493	\$26,354	\$37,400	\$36,215	\$31,877	\$2,493	\$78,611
Total Firm \$AUM (millions, as of 12/31/18)	\$74,430	\$1,356	\$27,712	\$38,500	\$35,500	\$33,106	\$1,356	\$74,430
% Firm AUM Growth (2018-2020)	4%	182%	-4%	0%	45.4%	1.7%	-4.2%	182.3%
General Partner \$AUM (millions)	\$1,596.6	\$5.0	\$398.1	\$119.0	\$529.7	\$258.6	\$5.0	\$1,596.6
Total # of Manager Investments	191	40	127	240	150	159	40	240
Ratio of Hedge Funds/Team Member	2.0	1.2	1.6	4.4	2.32	1.82	1.2	4.44
Proposed (or Representative) Fund Name	Blackstone Partners Offshore Fund Ltd.	GSAM Aptitude Partners Ltd	Grosvenor Institutional Partners, L.P.	UBS A&Q Neutral Alpha Strategies Limited				
Inception Date (Representative Fund)	7/1/96	1/1/05	1/1/00	6/30/00	7/1/00	3/31/00	7/1/96	1/1/05
Fund \$AUM (millions, as of 12/31/20*)	\$11,925.9	\$338.0	\$3,832.5	\$1,189.3	\$4,321	\$2,511	\$338	\$11,926
Fund \$AUM (millions, as of 12/31/19)	\$12,674.2	\$139.0	\$3,921.8	\$1,215.4	\$4,488	\$2,569	\$139	\$12,674
Fund \$AUM (millions, as of 12/31/18)	\$11,455.0	\$86.0	\$4,538.4	\$1,975.0	\$4,514	\$3,257	\$86	\$11,455
% Fund AUM Growth (2018-2020)	4%	293%	-16%	-40%	60%	-6%	-40%	293%
Top 3 Clients % of Fund \$aum	13%	30%	25%	30%	24%	28%	13%	30%
Current Strategic Allocations as of*:	12/31/2020	12/31/2020	12/31/2020	12/31/2020	12/31/2020	12/31/2020	12/31/2020	12/31/2020
% Relative Value - Cvt Arb/Cap Str Arb	0%	0%	0%	7%	2%	0%	0%	7%
% Relative Value - Market Neutral Eq, Stat Arb	13%	11%	7%	15%	11%	12%	7%	15%
% Relative Value - Credit/Fixed Income Arb	0%	0%	0%	11%	3%	0%	0%	11%
% Relative Value - Multi-Strategy	0%	22%	19%	0%	10%	9%	0%	22%
% Relative Value - Total	13%	33%	25%	33%	26%	29%	13%	33%
% Event-Driven - Merger	0%	0%	0%	7%	2%	0%	0%	7%
% Event-Driven - Distressed	32%	14%	9%	18%	18%	16%	9%	32%
% Event-Driven - Multi-Strat	21%	4%	16%	3%	11%	10%	3%	21%
% Event-Driven - Total	53%	18%	25%	28%	31%	27%	18%	53%
% Long-Short Equity - Long Bias	13%	24%	35%	20%	23%	22%	13%	35%
% Long-Short Equity - Short Bias	0%	0%	0%	0%	0%	0%	0%	0%
% Long-Short Equity - Total	13%	24%	35%	20%	23%	22%	13%	35%
% Divergent - Macro	6%	18%	13%	17%	14%	15%	6%	18%
% Divergent - Commodities/CTA	4%	0%	0%	4%	2%	2%	0%	4%
% Divergent - Total	10%	18%	13%	20%	15%	16%	10%	20%
% Other - Opportunistic/Hedging/Cash	11%	7%	1%	0%	5%	4%	0%	11%
% Total	100%	100%	100%	101%	100%	100%	100%	101%
# of Managers	72	29	25	43	42	36	25	72
Largest Manager Allocation	6.7%	6.0%	13.6%	9.1%	8.8%	7.9%	6.0%	13.6%
Fund Auditor	Deloitte Touche	Deloitte, KPMG	Pricewaterhouse Coopers	Ernst & Young				
Fund Administrator	Citigroup	Maples Finance Limited	Bank of New York Mellon	Other				
Minimum Investment (\$million)	\$5.00	\$1.00	\$5.00	\$0.50	\$2.88	\$3.00	\$0.50	\$5.00
Management Fee (for \$min investment**)	1.25%	1.00%	1.15%	1.00%	1.10%	1.08%	1.00%	1.25%
Incentive Fee % (for \$min investment**)	0.0%	0.0%	0.0%	0.0%	0.00%	0.00%	0.00%	0.00%
Hurdle Rate (for \$min investment**)	0+ 0%	0+ 0%	0+ 0%	0+ 0%				
Operating/Admin Expenses	0.07%	0.26%	0.09%	0.07%	0.12%	0.08%	0.07%	0.26%
Redemption Period	Semi-Annually	1.5 Years	Quarterly	Quarterly				
Notice Period	Quarterly	Quarterly	Quarterly	60 Days				
Lock-Up Period	Other	None	None	None				
Meets Minimum Criteria?	Yes	Yes	Yes	Yes				

\* Or latest date for which data is available or estimated

# Returns for Periods ended December 31, 2021

## Group: CMERS 2021 FoF Candidates-ABS

	Last Quarter	Last Year	Last 2 Years	Last 3 Years	Last 5 Years	Last 10 Years	Last 15 Years
Blackstone Partners Offsh	0.16%	6.95%	6.19%	6.53%	5.60%	5.80%	4.90%
Grosvenor Inst Ptn	0.41%	7.84%	12.44%	10.30%	7.05%	6.40%	4.47%
Aptitude Hedge Fund	-0.79%	5.35%	9.60%	9.59%	8.04%	7.98%	6.57%
UBS Ntrl Alpha Str Cl SN	1.61%	5.48%	8.09%	7.71%	5.17%	5.16%	4.67%
Candidate Peer Group							
Median	0.28%	7.39%	8.76%	8.41%	6.17%	5.76%	4.67%
Member Count	10	10	10	10	10	10	9
S&P:500	11.03%	28.71%	23.44%	26.07%	18.47%	16.55%	10.66%
Blmbg:Aggregate	0.01%	-1.54%	2.88%	4.79%	3.57%	2.90%	4.09%
60% Stk/40% Bnd	6.57%	15.86%	15.29%	17.54%	12.62%	11.14%	8.30%
HFRI FOF:Conservative Idx	0.47%	7.38%	6.92%	6.71%	4.64%	4.03%	2.38%
90 Day T-Bill + 4%	0.99%	4.05%	4.36%	4.99%	5.14%	4.63%	4.91%



# Returns for Periods ended December 31, 2021

## Group: CMERS 2021 FoF Candidates-ABS

	2015	2016	2017	2018	2019	2020	2021
Blackstone Partners Offsh	3.39%	2.84%	6.89%	1.63%	7.22%	5.44%	6.95%
Grosvenor Inst Ptn	-0.15%	2.44%	6.25%	-1.38%	6.14%	17.24%	7.84%
Aptitude Hedge Fund	5.78%	2.73%	11.17%	0.59%	9.56%	14.02%	5.35%
UBS Ntrl Alpha Str Cl SN	4.54%	1.61%	2.49%	0.46%	6.95%	10.76%	5.48%
Candidate Peer Group							
Median	2.29%	2.57%	6.04%	0.67%	6.71%	7.70%	7.39%
S&P:500	1.38%	11.96%	21.83%	-4.38%	31.49%	18.40%	28.71%
Blmbg:Aggregate	0.55%	2.65%	3.54%	0.01%	8.72%	7.51%	-1.54%
60% Stk/40% Bnd	1.28%	8.31%	14.21%	-2.35%	22.18%	14.73%	15.86%
HFRI FOF:Conservative Idx	0.37%	1.89%	4.12%	-0.87%	6.30%	6.47%	7.38%
90 Day T-Bill + 4%	4.05%	4.33%	4.86%	5.87%	6.28%	4.67%	4.05%

## Standard Deviation for Recent Periods ended 12/31/21

### Group: CMERS 2021 FoF Candidates-ABS

	Last Year	Last 2 Years	Last 3 Years	Last 4 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 15 Years
Blackstone Partners Offsh	2.72%	6.73%	5.61%	5.00%	4.52%	4.11%	3.67%	4.29%
Grosvenor Inst Ptn	8.59%	8.53%	7.15%	6.66%	5.97%	5.49%	4.89%	5.47%
Aptitude Hedge Fund	3.50%	5.56%	4.64%	4.71%	4.28%	4.49%	4.26%	5.42%
UBS Ntrl Alpha Str Cl SN	2.77%	4.75%	3.95%	3.77%	3.41%	3.01%	2.69%	3.40%
Candidate Peer Group								
Median	3.51%	6.14%	5.14%	4.86%	4.40%	4.30%	3.96%	4.88%
S&P:500	11.04%	19.52%	17.41%	17.13%	15.39%	14.48%	13.08%	15.34%
Blmbg:Aggregate	2.84%	3.33%	3.40%	3.35%	3.06%	3.12%	2.98%	3.23%
60% Stk/40% Bnd	6.92%	12.05%	10.63%	10.42%	9.35%	8.76%	7.91%	9.32%
HFRI FOF:Conservative Idx	2.71%	6.40%	5.32%	4.87%	4.37%	3.92%	3.48%	4.34%

## Downside Risk vs. 90 Day T-Bill + 4% for Recent Periods ended 12/31/21

### Group: CMERS 2021 FoF Candidates-ABS

	Last Year	Last 2 Years	Last 3 Years	Last 4 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 15 Years
Blackstone Partners Offsh	0.91%	5.77%	4.76%	4.28%	3.85%	3.48%	2.99%	3.64%
Grosvenor Inst Ptn	6.19%	6.04%	5.08%	4.85%	4.35%	4.12%	3.55%	4.49%
Aptitude Hedge Fund	1.61%	3.84%	3.17%	3.31%	2.98%	3.21%	2.86%	4.28%
UBS Ntrl Alpha Str Cl SN	1.88%	3.74%	3.10%	3.03%	2.76%	2.42%	2.09%	2.92%
Candidate Peer Group								
Median	1.75%	4.94%	4.11%	3.84%	3.47%	3.34%	2.92%	3.97%
S&P:500	5.26%	12.20%	10.80%	11.41%	10.20%	9.45%	8.40%	10.92%
Blmbg:Aggregate	2.99%	2.50%	2.22%	2.45%	2.27%	2.40%	2.34%	2.35%
60% Stk/40% Bnd	3.73%	7.60%	6.56%	6.94%	6.21%	5.74%	5.11%	6.68%
HFRI FOF:Conservative Idx	1.27%	5.40%	4.47%	4.18%	3.76%	3.41%	2.97%	4.05%
90 Day T-Bill + 4%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

# Sharpe Ratio for Recent Periods ended 12/31/21

## Group: CMERS 2021 FoF Candidates-ABS

### Risk Free Rate: 3 Month T-Bill

	Last Year	Last 2 Years	Last 3 Years	Last 4 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 15 Years
Blackstone Partners Offsh	2.54	0.87	0.99	0.81	0.99	0.98	1.41	0.93
Grosvenor Inst Ptn	0.91	1.42	1.30	0.91	0.99	0.81	1.18	0.65
Aptitude Hedge Fund	1.52	1.66	1.85	1.28	1.61	1.35	1.73	1.04
UBS Ntrl Alpha Str Cl SN	1.96	1.63	1.70	1.23	1.18	1.23	1.69	1.11
Candidate Peer Group								
Median	2.25	1.52	1.30	1.07	1.09	1.10	1.44	0.77
S&P:500	2.59	1.18	1.44	0.96	1.13	0.97	1.22	0.64
Blmbg:Aggregate	-0.56	0.76	1.12	0.70	0.79	0.68	0.76	0.98
60% Stk/40% Bnd	2.28	1.24	1.56	1.06	1.23	1.08	1.33	0.79
HFRI FOF:Conservative Idx	2.71	1.03	1.08	0.73	0.80	0.70	0.98	0.34

Alpha vs Average CMERS 2021 FoF Candidates-ABS Group  
for Periods ended 12/31/21

Group: CMERS 2021 FoF Candidates-ABS

Risk Free Rate: 3 Month T-Bill

	Last Year	Last 2 Years	Last 3 Years	Last 4 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 15 Years
Blackstone Partners Offsh	1.53	0.05	0.65	0.92	1.08	1.03	1.01	0.92
Grosvenor Inst Ptn	-6.82	6.01	4.13	2.57	2.21	1.12	1.04	0.01
Aptitude Hedge Fund	-1.86	4.52	4.56	3.24	3.86	3.14	3.04	1.99
UBS Ntrl Alpha Str Cl SN	0.87	3.76	3.36	2.35	1.62	1.66	1.74	1.49
Candidate Peer Group								
Median	1.20	3.41	2.68	2.30	1.76	1.39	1.39	0.55
S&P:500	22.13	11.07	14.17	9.52	9.66	7.27	5.97	3.26
Blmbg:Aggregate	0.23	1.96	3.44	2.16	2.19	2.07	2.18	3.13
60% Stk/40% Bnd	12.89	7.34	9.76	6.52	6.62	5.16	4.44	3.21
HFRI FOF:Conservative Idx	1.85	0.99	1.02	0.48	0.23	-0.11	-0.53	-1.58

## Correlation vs S&P:500 for Recent Periods ended 12/31/21

### Group: CMERS 2021 FoF Candidates-ABS

	Last Year	Last 2 Years	Last 3 Years	Last 4 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 15 Years
Blackstone Partners Offsh	0.16	0.73	0.73	0.72	0.71	0.69	0.68	0.67
Grosvenor Inst Ptn	0.33	0.66	0.66	0.69	0.69	0.69	0.70	0.67
Aptitude Hedge Fund	0.20	0.72	0.72	0.75	0.74	0.71	0.70	0.70
UBS Ntrl Alpha Str Cl SN	0.09	0.65	0.62	0.61	0.60	0.54	0.52	0.55
Candidate Peer Group								
Median	0.18	0.69	0.67	0.67	0.66	0.61	0.61	0.61
S&P:500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Blmbg:Aggregate	0.18	0.20	0.07	0.04	0.03	-0.02	-0.02	0.02
60% Stk/40% Bnd	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
HFRI FOF:Conservative Idx	0.32	0.75	0.74	0.74	0.73	0.72	0.71	0.68

## Beta vs S&P:500 for Recent Periods ended 12/31/21

### Group: CMERS 2021 FoF Candidates-ABS

	Last Year	Last 2 Years	Last 3 Years	Last 4 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 15 Years
Blackstone Partners Offsh	0.04	0.26	0.24	0.22	0.21	0.20	0.20	0.19
Grosvenor Inst Ptn	0.25	0.29	0.28	0.27	0.27	0.26	0.27	0.24
Aptitude Hedge Fund	0.06	0.21	0.20	0.21	0.21	0.22	0.23	0.25
<i>UBS Ntrl Alpha Str Cl SN</i>	<i>0.02</i>	<i>0.16</i>	<i>0.15</i>	<i>0.14</i>	<i>0.14</i>	<i>0.12</i>	<i>0.11</i>	<i>0.13</i>
Candidate Peer Group								
Median	0.05	0.24	0.22	0.21	0.21	0.21	0.21	0.20
S&P:500	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Blmbg:Aggregate	0.05	0.04	0.02	0.01	0.01	0.00	0.00	0.01
60% Stk/40% Bnd	0.62	0.62	0.61	0.61	0.60	0.60	0.60	0.60
HFRI FOF:Conservative Idx	0.08	0.25	0.23	0.22	0.21	0.20	0.19	0.20

## Correlation vs Blmbg:Aggregate for Recent Periods ended 12/31/21

### Group: CMERS 2021 FoF Candidates-ABS

	Last Year	Last 2 Years	Last 3 Years	Last 4 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 15 Years
Blackstone Partners Offsh	-0.20	0.17	0.13	0.09	0.09	0.00	0.00	-0.01
Grosvenor Inst Ptn	-0.03	0.12	0.02	0.01	0.00	-0.06	-0.07	-0.07
Aptitude Hedge Fund	-0.21	0.22	0.14	0.07	0.08	-0.03	0.01	-0.02
UBS Ntrl Alpha Str Cl SN	-0.02	0.29	0.21	0.13	0.14	0.08	0.11	0.12
Candidate Peer Group								
Median	-0.19	0.16	0.10	0.08	0.08	-0.01	0.01	-0.02
S&P:500	0.18	0.20	0.07	0.04	0.03	-0.02	-0.02	0.02
Blmbg:Aggregate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60% Stk/40% Bnd	0.34	0.30	0.19	0.17	0.16	0.12	0.13	0.16
HFRI FOF:Conservative Idx	-0.52	0.11	0.05	0.05	0.06	-0.01	-0.01	-0.03



# Correlation vs CMERS 2021 FoF Candidates-ABS for Periods ended 12/31/21

## Group: CMERS 2021 FoF Candidates-ABS

	Last Year	Last 2 Years	Last 3 Years	Last 4 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 15 Years
Blackstone Partners Offsh	0.85	0.98	0.98	0.98	0.97	0.96	0.96	0.96
Grosvenor Inst Ptn	0.77	0.79	0.79	0.81	0.80	0.82	0.83	0.90
Aptitude Hedge Fund	0.91	0.93	0.93	0.89	0.89	0.85	0.85	0.91
<i>UBS Ntrl Alpha Str Cl SN</i>	<i>0.72</i>	<i>0.91</i>	<i>0.91</i>	<i>0.90</i>	<i>0.89</i>	<i>0.87</i>	<i>0.86</i>	<i>0.88</i>
Candidate Peer Group								
Median	0.80	0.91	0.90	0.89	0.89	0.86	0.85	0.88
S&P:500	0.23	0.71	0.69	0.68	0.68	0.67	0.66	0.64
Blmbg:Aggregate	-0.29	0.16	0.10	0.07	0.08	0.02	0.01	0.00
60% Stk/40% Bnd	0.18	0.71	0.69	0.68	0.68	0.67	0.66	0.63
HFRI FOF:Conservative Idx	0.87	0.98	0.98	0.98	0.98	0.98	0.98	0.98

# Auto Correlation (k=1) for Recent Periods ended 12/31/21

## Group: CMERS 2021 FoF Candidates-ABS

	Last Year	Last 2 Years	Last 3 Years	Last 4 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 15 Years
Blackstone Partners Offsh	-0.40	0.00	-0.01	-0.01	-0.01	-0.01	0.00	0.22
Grosvenor Inst Ptn	-0.44	-0.22	-0.18	-0.11	-0.10	-0.02	0.00	0.23
Aptitude Hedge Fund	-0.31	-0.12	-0.11	-0.04	-0.02	0.07	0.08	0.36
UBS Ntrl Alpha Str Cl SN	-0.30	-0.28	-0.26	-0.13	-0.12	-0.08	-0.06	0.20
Candidate Peer Group								
Median	-0.36	-0.11	-0.08	-0.03	-0.02	0.00	0.04	0.26
S&P:500	-0.56	-0.04	-0.10	-0.13	-0.13	-0.13	-0.14	0.07
Blmbg:Aggregate	0.43	0.19	0.02	0.08	0.06	0.07	0.04	0.07
60% Stk/40% Bnd	-0.52	-0.09	-0.13	-0.14	-0.14	-0.13	-0.14	0.05
HFRI FOF:Conservative Idx	0.02	0.15	0.15	0.16	0.15	0.18	0.18	0.38
90 Day T-Bill + 4%	0.09	0.48	0.81	0.84	0.84	0.87	0.89	0.87

## Aptitude Investment Management LP

401 Union Street 37th Floor  
Seattle, WA 98101

### History

Aptitude (formerly Federal Way) was established in 2012 by Salim Shariff after a spin-out from Weyerhaeuser Asset Management. His prior experience also includes Morgan Stanley Alternative Investment Partners (MSAIP) under Jack Coates, where Shariff and most of the team was recruited. In December 2018, GSAM acquired Aptitude Investment Management, which joined the firm's Alternative Investments & Manager Selection (AIMS) platform and rebranded as "AIMS Aptitude." Shariff retired at the 2021, leaving his co-founder, Jeff Klein, with primary roles on the investment committee and day to day management of the portfolio. Aptitude leadership reports directly to AIMS co-heads Mike Brandmeyer and Raanan Agus and have added depth of resources supported by the AIMS platform.

### Structure

Founded: 2012  
Parent: Goldman Sachs  
Registered Investment Advisor: Yes  
"Broker Dealer" Affiliate: No  
Hedge Fund Affiliate: No

**Contact:** Michael Hillman  
840 South 333rd Street Suite 201  
Federal Way, WA 98003  
Phone: (253) 236-0227  
Fax: (253) 236-3534  
Email: michael.hillman@gs.com

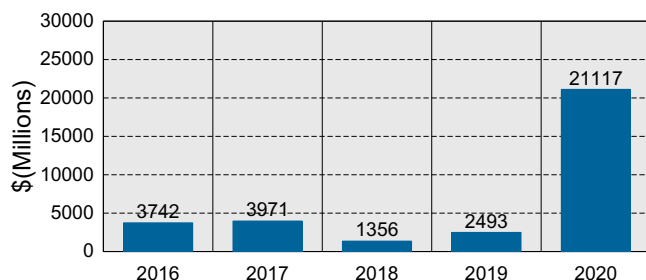
### Key Professionals (Hedge fund-related)

	Joined Firm	Investment Experience
Raanan Agus Co-CIO	1993	1993
Mike Brandmeyer Co-CIO	1995	1995
Jack Springate Portfolio Manager	2007	2004
Steve Bossi Portfolio Manager	2009	1982
Jeff Klein Portfolio Manager	2012	1993
Salim Shariff Portfolio Manager	2012	1981

### Employee Structure

Central Research Analyst	6
Client Services/Marketing	56
Hedge Fund Analyst	12
Risk Management	42
Executive Management	2
Operations	39
Portfolio Manager	9
<b>Total</b>	<b>166</b>

### Total Asset Growth



### Investment Professional Turnover

	# Emp	Last Yr Gained	Last Yr Lost
Hedge Fund Analyst	6	0	0
Operational Due Diligence	6	0	0
Portfolio Manager	3	0	0
Risk Management	5	0	0

### Total Asset Structure as of December 31, 2020

Type of Mandate	#Acct	\$(mm)	% Tot	Client Type	#Acct	\$(mm)	% Tot
Total	0	21,117	100%	Total	0	21,117	100%
Total	0	21,117	100%	Total	0	21,117	100%

## AIMS BIOS

**Raanan Agus** is global co-head and co-chief investment officer of Alternative Investments & Manager Selection (AIMS) within Goldman Sachs Asset Management. AIMS invests in leading private equity, hedge fund, real estate, ESG, credit and public market managers, investing as a limited partner, secondary-market investor, seed-capital provider, co-investor or management company partner. Prior to his current role, Raanan served as head of Direct Alternatives for Goldman Sachs Asset Management and global co-head of Goldman Sachs Investment Partners, a position he held since the group's inception in 2007. Prior to that, he was co-head of the Goldman Sachs Principal Strategies Group beginning in 2003 and later became sole head of the group until 2007. Raanan joined Goldman Sachs in 1993 as an associate in Equities Arbitrage. He was named managing director in 1999 and partner in 2000. Raanan earned an AB, summa cum laude, phi beta kappa, from Princeton University in 1989 and a JD/MBA, Stone scholar, beta gamma sigma, specializing in Finance from Columbia University in 1993.

**Marc Boheim** is a managing director in the Alternative Investments & Manager Selection (AIMS) Group based in London and leads the group's private equity activities in Europe. He is also co-chief operating officer of the Private Equity team, global head of the AIMS Private Equity Co-Investment platform and co-chair of the AIMS Private Equity Co-Investment Committee, as well as a member of the AIMS Cabinet, the AIMS Public Co-Investment Strategies Investment Committee and the AIMS General Partner Strategies Investment Committee. Previously, Marc worked in the Advisory Group in the Investment Banking Division in New York and London, where he focused primarily on investment banking transactions in Germany and Austria. He first joined Goldman Sachs as an analyst in 1992 and rejoined as an associate in 1997. Marc was named managing director in 2005. Marc earned a BS from Cornell University and an MBA from the University of Chicago Booth Graduate School of Business.

**Steve Bossi** is a managing director in the Alternative Investments & Manager Selection (AIMS) Group, based in New York. He is also a member of the AIMS Portfolio Construction and Strategy Investment Committee. Prior to joining Goldman Sachs as a managing director in 2009, he served as global head and chief investment officer of the Deutsche Bank Asset Management Fund of Hedge Funds Business, chairman of the DB Fund of Funds Investment Committee, and president of DB Investment Managers. He was previously deputy to the chief investment officer and head of research for fundamental and trading strategies. Prior to joining Deutsche Bank Asset Management, he worked with the Private Finance Group at Aetna Life & Casualty before joining a family office as chief investment officer. He received a BS from The University of Connecticut and an MBA from The University of Chicago Booth School of Business.

**Ryan Boucher** is a managing director in the Alternative Investments & Manager Selection (AIMS) Group, based in New York. He is head of AIMS Operational Diligence and is co-chair of the AIMS Management Assessment & Controls Committee. Previously, Ryan was the chief financial officer of AIMS Private Equity activities, a business in which he held several roles from 2000 to 2010. Prior to that, he worked on the Risk and Performance Analytics Team in the Goldman Sachs Investment Management Division from 1998 to 2000. Ryan joined Goldman Sachs in 1998 as an analyst. He earned a BS in Finance, with a minor in Economics, summa cum laude, from Fordham University in 1998.

**Michael Brandmeyer** is co-chief investment officer of the Alternative Investments & Manager Selection (AIMS) Group, overseeing the AIMS investment committees across alternative investment strategies, including private equity primaries, secondaries, co-investments, and management-company stakes. Previously, Mike co-led the AIMS private equity investing activities, including the secondaries investment program through the GS Vintage Funds. Before joining the AIMS Group, he was a portfolio manager in the Goldman Sachs Fixed Income Group focusing on high yield and emerging market debt. Mike joined Goldman Sachs in 1995 in the Investment Management Division, and was named managing director in 2004 and partner in 2012. He is a member of the Advisory Board of the Columbia School of International and Public Affairs. He received a BA in International Affairs from The University of California, Davis, an MBA from Columbia Business School, and an MIA from The Columbia School of International and Public Affairs. He is a CFA charter holder.

**Sean Brennan** is a managing director in the Alternative Investments & Manager Selection (AIMS) Group, based in New York. He is a member of the AIMS Real Estate Investment Committee. Sean joined Goldman Sachs in 2010 as an associate and was named managing director in 2017. Prior to joining the firm, he worked in General Electric's Business Development Group. Sean earned a BA in Economics from Georgetown University, an MBA from the Wharton School at the University of Pennsylvania and a JD from the University of Pennsylvania.

**Betsy Gorton** is a managing director in the Alternative Investments & Manager Selection (AIMS) Group, based in New York. She is a member of the AIMS Portfolio Construction and Strategy Investment Committee. Previously, she worked in Goldman Sachs Equity Research covering gaming, lodging, and leisure and before that she worked in a group covering real estate. Prior to joining Goldman Sachs, she worked in Equity Research at Robinson Humphrey from 1998-2000. She received a BA in Art History and International Relations from Emory University and an MBA from The Darden School of Business at The University of Virginia.

**Robert Hamilton Kelly** is a managing director in the Alternative Investments & Manager Selection (AIMS) Group based in New York. He is a member of the AIMS Group GP Strategies Investment Committee and a portfolio manager responsible for the Petershill strategies. Robert joined Goldman Sachs as an associate in 2009 in the AIMS Group in the Investment Management Division. He was named managing director in 2017. Prior to joining the firm, Robert worked at Gleacher & Co./Gleacher Shacklock in Investment Banking and in Special Situations. Robert earned a BA (Hons) and an MA from the University of Oxford.

**Harold Hope** is global head of secondary investing, including the Vintage Funds, in the Alternative Investments and Manager Selection (AIMS) Group. He is also chair of the AIMS Vintage Funds Investment Committee and a member of the AIMS Real Estate Strategies Committee and the AIMS Petershill Funds Investment Committee. Harold joined Goldman Sachs in 1999 as an associate in Leveraged Finance and Corporate Finance within the Investment Banking Division and moved to the AIMS private equity business in 2001. He was named managing director in 2006 and partner in 2016. Prior to joining the firm, Harold worked as a financial analyst at the investment banking boutique Bowles Hollowell Conner & Co. Harold earned a BA in Economics and Political Science from the University of North Carolina at Chapel Hill and a JD from Harvard Law School, where he was an editor on the Harvard Law Review.

**Taylor Jordan** is a managing director in the Alternative Investments & Manager Selection (AIMS) Group, based in San Francisco. He leads the AIMS Imprint investment vertical. Taylor joined Goldman Sachs in 2015 as a managing director. Prior to joining the firm, Taylor co-founded Imprint Capital, an impact investment advisory firm, in 2007. In his capacity as chief investment officer, he designed Imprint's investment program and chaired its Investment Committee. Before that, he served as director of Investments at RSF Social Finance, a San Francisco based social finance organization. At RSF, he oversaw capital markets and designed and managed a multi asset class impact investment program. Prior to impact investing, he served as the executive director of a nonprofit membership organization and co-founded a multi-media technology company. Taylor serves on the board of the Cricket Island Foundation. He earned a BA in Economics from Colorado College.

**Amy Jupe** is a managing director in the Alternative Investments & Manager Selection (AIMS) Group, where she is global co-head of the AIMS Private Equity Primaries team, responsible for manager selection and portfolio construction for private equity manager investments. She is also co-chair of the AIMS Private Equity Primaries Investment Committee. Previously, Amy led investments in public markets alternative strategies within the AIMS Group. She joined Goldman Sachs in 2004 as an analyst in the Global Investment Strategies Group, focusing on asset allocation and other strategic investment issues for institutional clients, and was named managing director in 2019. Amy earned a BA in Economics, with honors, from Durham University in 2004. She is a CFA charterholder.

**Jeffrey Klein** is a managing director in the Alternative Investments & Manager Selection (AIMS) Group, based in Vancouver. He serves as a Portfolio Manager for AIMS Aptitude strategies as well as Hedge Fund Opportunities. He is a founder of AIMS Aptitude. He is responsible for the selection and monitoring of hedge fund portfolios. He previously served in a similar role at Weyerhaeuser Asset Management LLC, conducting the selection and monitoring of managers and providing advice and recommendations on asset allocation and investment architecture. Prior to Weyerhaeuser, Jeff worked at Watson Wyatt Investment Consulting in Canada and at Southern Life. He holds a B.Bus.Sci. with honours from the University of Cape Town in South Africa and is a Fellow of both the Institute of Actuaries, London, and the Canadian Institute of Actuaries.

**Mikhail Krel** is a vice president in the Alternative Investment & Manager Selection (AIMS) Group, based in New York. He leads the AIMS Engineering vertical with Eric Ryckman.

**Michael Miele** is co-head of the Private Equity Group within the Alternative Investments & Manager Selection (AIMS) Group. He is a member of the AIMS Private Equity Investment Committee. Michael joined Goldman Sachs in 1992 in Corporate Finance after having been an analyst in the Leveraged Buyout Group in New York and in Corporate Finance in Sydney from 1987 to 1990. From 1993 to 1996, he was with the Principal Investment Area before moving to the Private Equity Group. Michael was named managing director in 1999 and partner in 2004. Michael earned an MBA from the Harvard Business School in 1992 and a BA from Swarthmore College in 1987.

**Steven Qu** is a vice president in the Alternative Investment & Manager Selection (AIMS) Group, based in New York. He leads the AIMS Risk Management vertical.

**Ali Raissi** is global co-head of the Petershill strategy in the Alternative Investments & Manager Selection (AIMS) Group. He is co-chair of the AIMS GP Strategies Investment Committee, directing investing in leading private-market and public-market managers as a management company investor (through the Petershill General Partner Stakes Funds) and in newly established private-market managers (through the Petershill Private Equity Seed Fund). Ali is a managing director ally of the Lesbian, Gay, Bisexual and Transgender Network. Ali first joined Goldman Sachs in 1999 as an analyst in the Financial Institutions Group in the Investment Banking Division and rejoined the firm in Goldman Sachs Asset Management as portfolio manager for the first Petershill fund in 2007. Ali was named managing director in 2011. Prior to rejoining the firm, Ali was an advisory principal at Perella Weinberg Partners, where he focused on mergers and acquisitions and financial institutions. Ali earned a BA in Economics and a general honors degree from the University of Pennsylvania, where he was a Benjamin Franklin Scholar.

**Eric Ryckman** is global head of Strats for the Alternative Investment & Manager Selection Group (AIMS). Previously, he led the Institutional Sales Strats team from 2014 to 2015, and prior to that, he worked as a strategist in Private Wealth Management from 2010 to 2014. Eric joined Goldman Sachs in 2010 as an associate and was named managing director in 2019. Prior to joining the firm, Eric worked as a Harry Bateman Research Instructor in Mathematics at the California Institute of Technology. Eric earned a BS in Mathematics and Statistics from the University of Michigan in 2002. He also earned a MA in Mathematics in 2003, and a PhD in Mathematics in 2007, both from the University of California Los Angeles (UCLA).

**Christian von Schimmelman** is a senior portfolio manager in the Alternative Investments and Manager Selection (AIMS) Group, focusing on GP stake, secondary and credit opportunities. He serves on the AIMS Credit Strategies Investment Committee, AIMS GP Strategies Investment Committee and AIMS Private Equity Group Investment Committee. Prior to joining AIMS in 2008, Christian was a senior member of the Principal Investment team on the bank loan desk for four years. Prior to that, he was a member of the Financial Institutions Group in the Investment Banking Division from 1999 to 2004. Christian joined Goldman Sachs in 1999 as an associate and was named managing director in 2009. Earlier in his career, Christian worked at McKinsey & Company in the Financial Services Practice and at Salomon Brothers Inc. in the Investment Banking Division. Christian earned a BS in Economics from the Wharton School of the University of Pennsylvania and an MBA from the University of Chicago Booth School of Business.

**Jack Springate** is a managing director in the Alternative Investments & Manager Selection (AIMS) Group, based in New York. He is also a member of the AIMS Portfolio Construction and Strategy Investment Committee and serves as a Portfolio Manager for the Princeton Fund and Hedge Fund Opportunities, as well as other hedge fund mandates. He is also a member of the Public Markets Investment Team. Prior to joining Goldman Sachs in 2007, he worked in the Advisory Team in HSBC's Alternative FundInvest Group in Geneva, Switzerland. Prior to this, he began his career on a graduate program in the Corporate, Investment Banking and Markets Division of HSBC in London. He serves on the Board of Play Rugby USA, a non-profit youth development organization. He received an MA in Social and Political Sciences from Fitzwilliam College, Cambridge University. He is a CFA charterholder.

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## Aptitude Investment Management LP

### Aptitude Hedge Fund Composite - Unlevered

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#### Investment Philosophy:

AIMS Aptitude believes in active management and alternative investment strategies because of the opportunities they offer in supplementing market-premia returns with skill-based returns. However, is not easy to identify these opportunities and thus a selection premium can be obtained as a reward for effective due diligence, strong relationships and good judgment. It is possible to identify high quality investment skill that can contribute meaningfully to the delivery of strong risk-adjusted portfolio returns over a long time horizon. At the portfolio level, sophisticated portfolio construction is critical to maximizing the combined risk-adjusted return potential of these return drivers. An effective portfolio construction approach achieves this most directly through appropriate diversification by combining and sizing manager-level return drivers. A secondary consideration for portfolio construction is in exploring tactical adjustments to portfolio positioning over time. Successful identification of manager skill comprises three core focus areas of assessment: (i) A governance structure that successfully aligns the organization and its people around appropriate investment performance objectives, (ii) An investment approach that leads to sustainable outperformance in achieving these goals, and (iii) The quality of operational and legal infrastructure to support these objectives.

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#### Research Process:

AIMS Aptitude believe that a robust and consistent manager selection process, constantly refined and informed by the prevailing environment, is essential to both finding top quartile managers as well as avoiding weak performers. There are common characteristics desired in managers before searching for, or evaluation of, any potential manager for our clients' portfolios. Broadly speaking, AIMS Aptitude seeks compelling evidence that identifies a highly skilled team and a thoughtful investment strategy with a well-managed business which offer the potential to provide persistent performance. To find such managers, the investment process incorporates a series of distinct steps, reflecting a process that has developed within our team for over dozens of years, across thousands of manager evaluations, and throughout market environments of both relative calm and significant volatility. Importantly, the investment process is continually evolving, always informed by performance feedback and self-reflective hypothesis testing.

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#### Manager Selection:

AIMS Aptitude looks for common characteristics in managers for our clients' portfolios. Broadly speaking, compelling evidence that identifies a highly skilled team and a thoughtful investment strategy with a well-managed business will offer the potential to provide persistent performance. The investment due diligence process is executed by a dedicated Manager Coverage Team and culminates in an in-depth investment memo presented to the Investment Committee ("IC") for a final decision. The IC is the governing body for the rating and diligence of hedge funds, and is comprised of senior members of the AIMS Investment Team. A Manager Diligence team compiles a list of potential strategies, and once a group of managers has been identified for evaluation, the team performs the initial stage of return and holding analytics, and conducts preliminary conference calls with the first round of prospective managers. Prior to the first meeting with a manager, the Manager Diligence Team compiles and reviews the prospective managers' portfolio, conducts investment discussions and performs strategy level research utilizing the firm's internally developed proprietary quantitative tools. In addition, the team reviews all relevant manager documentation in advance of the meeting. This provides the team with the appropriate background and leads to a more targeted and efficient initial meeting. Following the initial meeting, the Manager Diligence Team completes a meeting note in the proprietary database, Fluent, which creates an institutional record of each manager interaction. Managers under consideration are discussed with the broad investment team to help crystalize our views. Gaining the broader team perspective is extremely valuable in identifying and validating concerns and in determining next steps. The Portfolio Managers will start to engage with the Manager Diligence Team, as well as the underlying fund during this stage of diligence. Upon completion of the investment diligence process, the Manager Diligence Team compiles its findings into an Investment Committee Memo ("IC Memo") which is presented and discussed during the Investment Committee meeting. The Investment Committee is responsible for analyzing the factors presented in the IC Memo (see "Factor Framework" below) to determine a rating for each fund during the Investment Committee meetings. Once an investment team has decided that it is likely they would like to invest in a particular manager, the legal and operational diligence heads are engaged to do their independent diligence. Their focus is on the organizational structure, the culture, people, processes and controls. This diligence will be shared with the investment team. These legal and operational diligence individuals also partake in the Aptitude PM Meeting, as a key differentiator of the Aptitude investment process.



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## Aptitude Investment Management LP

### Aptitude Hedge Fund Composite - Unlevered

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#### **Risk Management:**

Portfolio construction is critical in two primary areas: (i) Achieving diversification (ii) Sizing positions to maximize returns. In addition, a secondary consideration in meeting portfolio objectives is in exploring tactical adjustments to portfolio positioning to mitigate risks or capitalize on market opportunities. i. Economies and capital markets are more complex than can be easily understood and modelled through the framework of a singular risk model. The best source of aggregated risk control is appropriate levels of diversification. AIMS Aptitude's approach to diversification is multi-dimensional, constituting a varied set of fundamentally differentiated return streams comprising a combination of active strategies through a diverse set of managers across asset classes, capital structures, geographies and trading styles. However, while diversification gives the ability to spread risk and reduce the adverse impact of any individual loss, it is not a cure-all. Careful diversification with the preference to create a focused portfolio of assets and risks that are known and understood extremely well by the firm will also mitigate risk. ii. Investments with skill-based active managers should be sized based on a range of risk considerations, including relative conviction levels, which in-turn are generally an evolutionary outcome of the ongoing diligence process. iii. An awareness of the macro environment and expertise in analyzing tactical opportunities (which could range from asset class to individual security in scope) can provide opportunities to modestly enhance returns at the portfolio level over time. The AIMS Portfolio Construction and Strategy Investment Committee (PCSIC) is the oversight and governance body approving all portfolio construction decisions. The PCSIC comprises senior members of the investment, risk, portfolio construction, and client portfolio solutions teams and is also supported by our dedicated.

# Aptitude Investment Management LP

## Aptitude Hedge Fund Composite - Unlevered

### As of December 31, 2020

#### Product Highlights:

**Investment Style:** Hedge Fund-of-Funds

**Return Target:**

**Volatility Target:**

**Inception Date:**

**Type of Vehicle:**

**Investment Process:**

Portfolio Characteristics	Year End
Number of Managers	25
Largest Manager Allocation (%)	7.3

#### Current Allocation

Market Neutral Equity	7.3%
Fixed Income Arbitrage	2.1%
Multi-Strategy Relative Value	23.9%
Relative Value Other	0.5%
Distressed	3.5%
Special Situations	3.0%
Multi-Strategy Event Driven	12.0%
Global Long-Short Equity	17.2%
U. S. Long-Short Equity	6.9%
Non-U.S. Long-Short Equity	14.0%
Managed Futures	9.5%
<b>Total</b>	<b>99.9%</b>

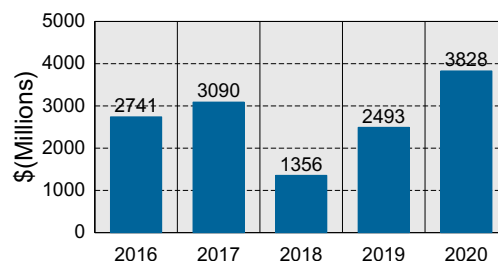
#### Vehicle Terms

<b>Investment Minimum (\$mil)</b>	\$1.00 mm
<b>Subscription Period:</b>	Monthly
<b>Redemption Period:</b>	Quarterly
<b>Notice Period:</b>	
<b>Lock-up Period:</b>	None
<b>Initial Payout:</b>	8%
<b>Final Payout:</b>	8%
<b>Gate Provisions:</b>	No
Up to 1/12th of the investor's total investment can be redeemed in any quarter.	

#### Total Asset Structure

Client Type	# Acct	\$(mm)	%Tot
Total	0	3,828	100%
Total	0	3,828	100%

#### Total Asset Growth



#### Fees & Expenses

##### Flat Sample Fees

Account	Mgmt (%)
Size \$(mm)	
Balance	1.00

##### Performance Sample Fees

Account	Mgmt (%)	Perf (%)
Size \$(mm)		

##### Additional Fees/Consideration

#### Other Considerations

Open to U.S. Taxable: Yes  
 Open to U.S. Tax-Exempt: Yes  
 UBIT incurred: Yes  
 Open to ERISA Tax-Exempt: Yes  
 Subject to 25% Limit: Yes

## Aptitude Hedge Fund Period Ended December 31, 2021

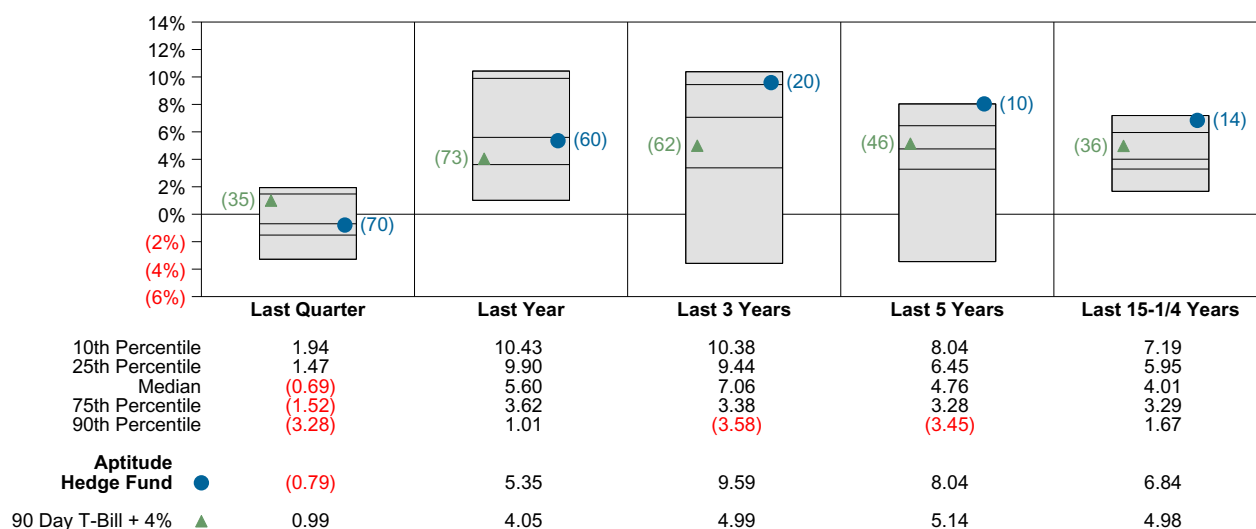
### Investment Philosophy

AIMS Aptitude believes in active management and alternative investment strategies because of the opportunities they offer in supplementing market-premia returns with skill-based returns. However, it is not easy to identify these opportunities and thus a selection premium can be obtained as a reward for effective due diligence, strong relationships and good judgment. It is possible to identify high quality investment skill that can contribute meaningfully to the delivery of strong risk-adjusted portfolio returns over a long time horizon. At the portfolio level, sophisticated portfolio construction is critical to maximizing the combined risk-adjusted return potential of these return drivers. An effective portfolio construction approach achieves this most directly through appropriate diversification by combining and sizing manager-level return drivers. A secondary consideration for portfolio construction is in exploring tactical adjustments to portfolio positioning over time. Successful identification of manager skill comprises three core focus areas of assessment: (i) A governance structure that successfully aligns the organization and its people around appropriate investment performance objectives, (ii) An investment approach that leads to sustainable outperformance in achieving these goals, and (iii) The quality of operational and legal infrastructure to support these objectives.

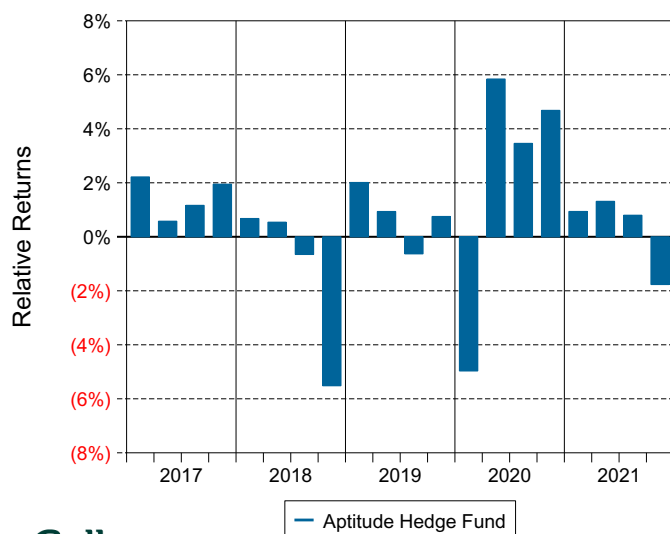
### Quarterly Summary and Highlights

- Aptitude Hedge Fund's portfolio posted a (0.79)% return for the quarter placing it in the 70 percentile of the Callan Absolute Rtn Hedge Fund of Funds group for the quarter and in the 60 percentile for the last year.
- Aptitude Hedge Fund's portfolio underperformed the 90 Day T-Bill + 4% by 1.78% for the quarter and outperformed the 90 Day T-Bill + 4% for the year by 1.31%.

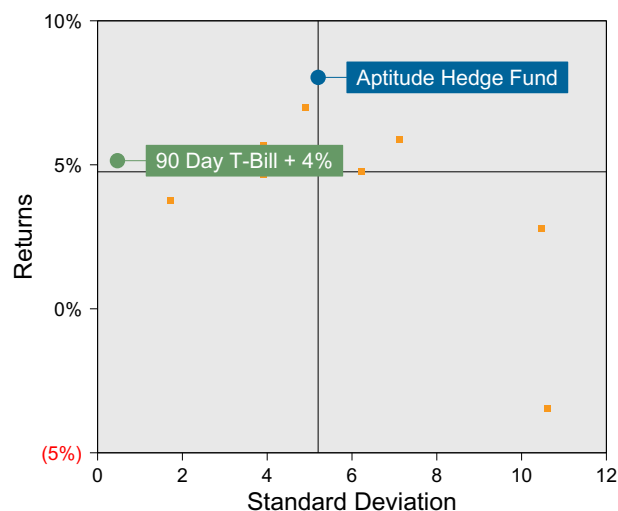
### Performance vs Callan Absolute Rtn Hedge Fund of Funds



### Relative Return vs 90 Day T-Bill + 4%



### Callan Absolute Rtn Hedge Fund of Funds Annualized Five Year Risk vs Return

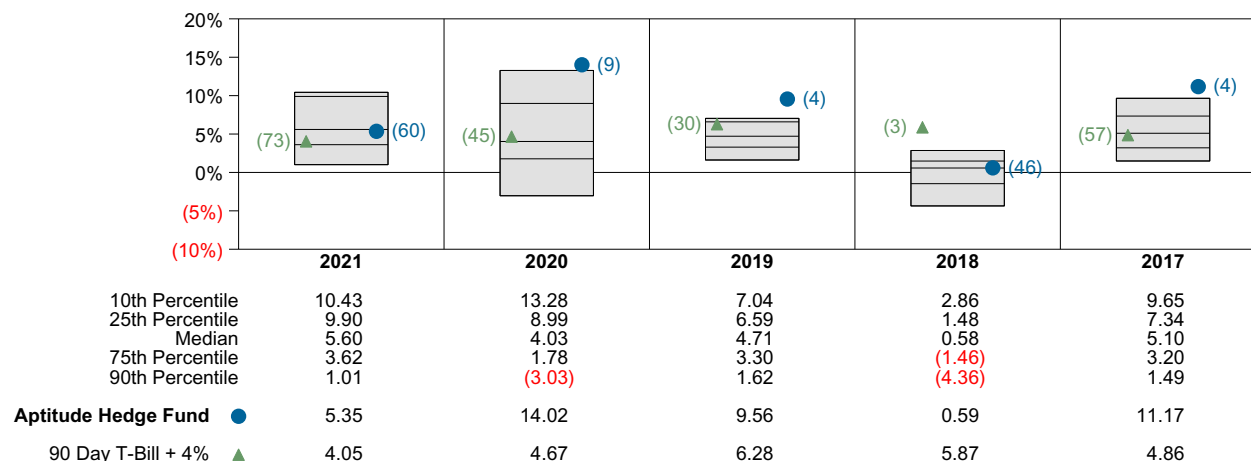


## Aptitude Hedge Fund Return Analysis Summary

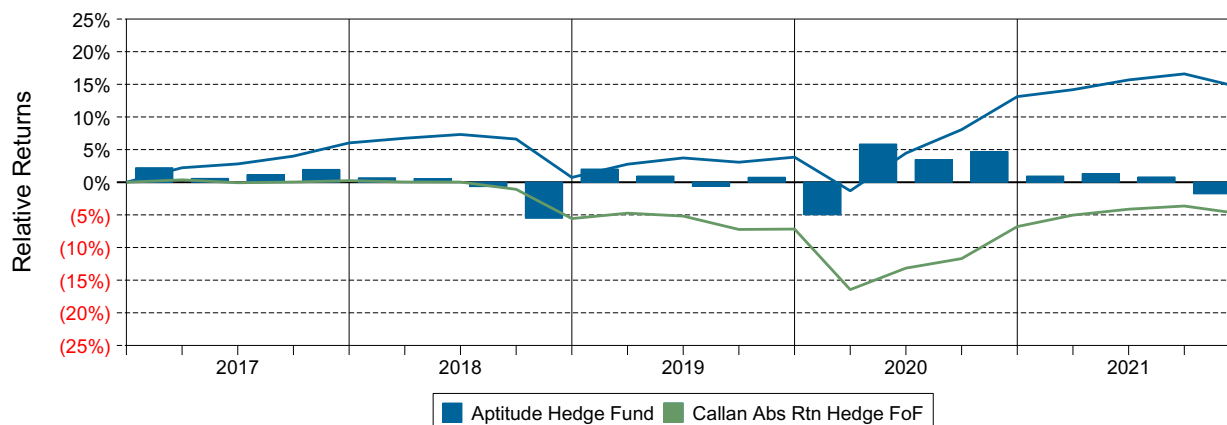
### Return Analysis

The graphs below analyze the manager's return on both a risk-adjusted and unadjusted basis. The first chart illustrates the manager's ranking over different periods versus the appropriate style group. The second chart shows the historical quarterly and cumulative manager returns versus the appropriate market benchmark. The last two charts illustrate the manager's ranking relative to their style using various risk-adjusted return measures.

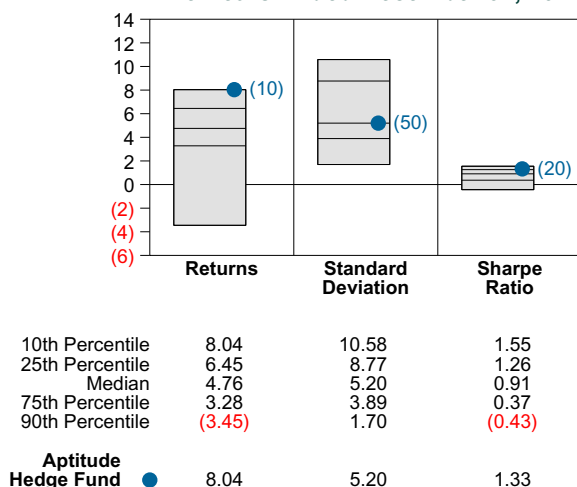
### Performance vs Callan Absolute Rtn Hedge Fund of Funds



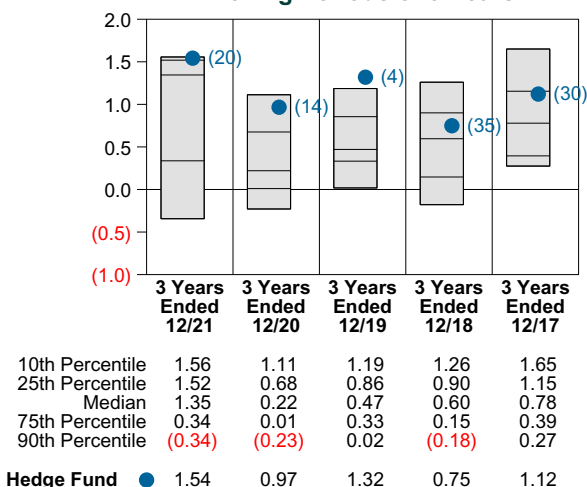
### Cumulative and Quarterly Relative Return vs 90 Day T-Bill + 4%



### Risk Adjusted Return Measures Rankings Against Callan Absolute Rtn Hedge Fund of Funds Five Years Ended December 31, 2021



### Sharpe Ratio Rankings Against Callan Absolute Rtn Hedge Fund of Funds Rolling Periods of 3 Years

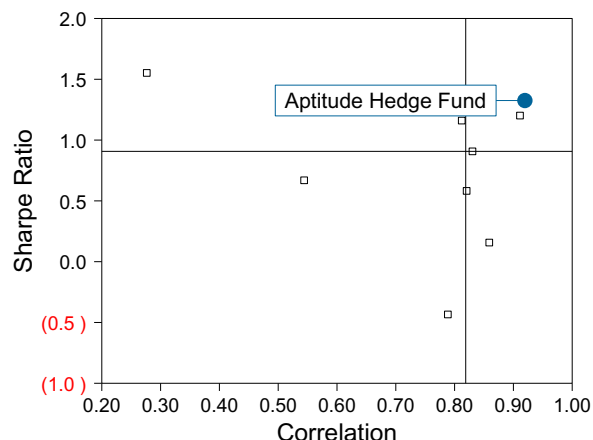
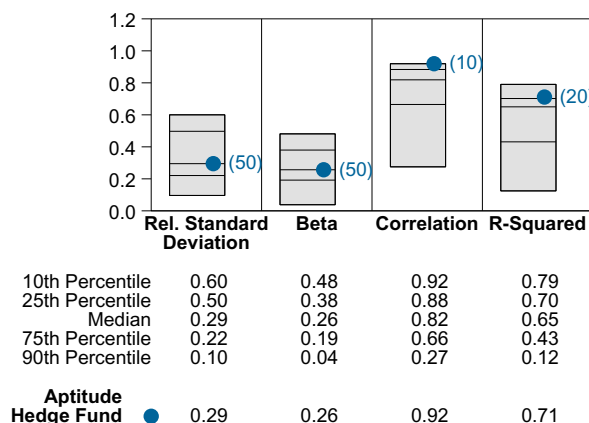


## Aptitude Hedge Fund Risk Analysis Summary

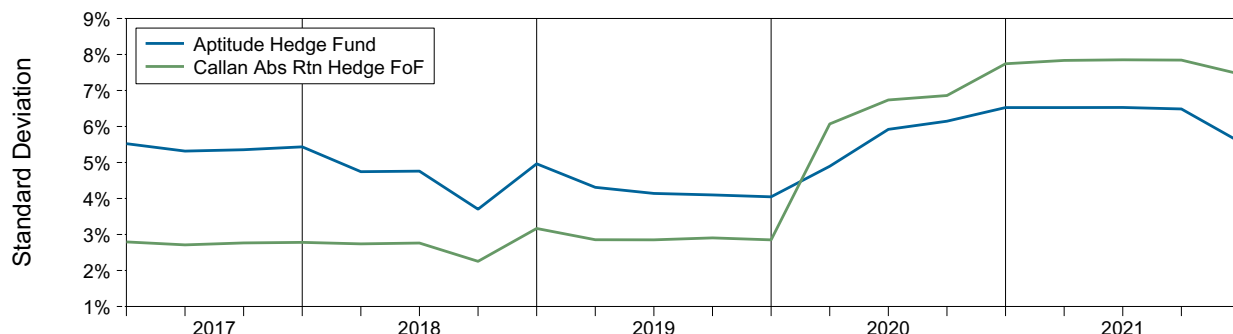
### Risk Analysis

The charts below analyze the risk or variation of a manager's return pattern as well as its correlation to the appropriate market index returns; and hence potential diversification benefits. The first chart ranks several manager risk and correlation statistics relative to an appropriate peer group. The second chart displays the Sharpe Ratio versus correlation tradeoff of the manager and the members of the peer group. The line chart in the center illustrates the changes in risk levels through multiple rolling time periods. The bottom two charts address relative return, downside risk and their tradeoff (Sortino Ratio) for the manager and the peer group.

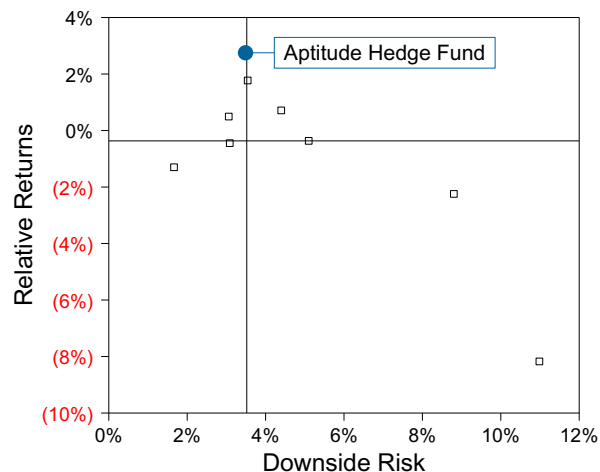
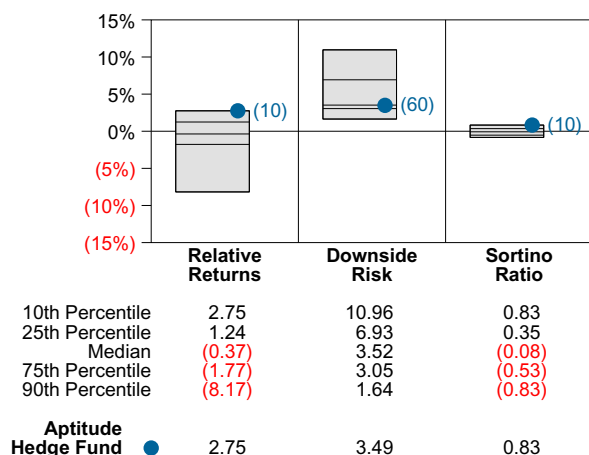
### Risk Statistics vs S&P 500 Index Rankings Against Callan Absolute Rtn Hedge Fund of Funds Five Years Ended December 31, 2021



### Rolling 12 Quarter Standard Deviation



### Downside Risk Statistics Rankings vs 90 Day T-Bill + 4% Rankings Against Callan Absolute Rtn Hedge Fund of Funds Five Years Ended December 31, 2021



## Blackstone Alternative Asset Management

345 Park Avenue 28th Floor  
New York, NY 10154-0004

### History

Blackstone Alternative Asset Management L.P. (BAAM), the marketable alternative investments division of Blackstone, was founded in 1990 to manage the internal assets of the firm by creating a diversified portfolio of hedge fund investments to offset the equity exposure of the firm's other businesses. In June, 2007, The Blackstone Group (TBG) listed approximately 23.6% of its holding company on the NYSE under the symbol "BX". TBG is majority-owned (51%) by the founders or their estates and its employees. Approximately 95% of BAAM's assets under management come from institutional investors.

### Structure

Founded: 1990  
Parent: The Blackstone Group  
Registered Investment Advisor: Yes  
"Broker Dealer" Affiliate: No  
Hedge Fund Affiliate: GSO Capital Partners

### Contact:

Eric Perlyn  
345 Park Avenue 28th Floor  
New York, NY 10154-0004  
Phone: (212) 583-5957  
Fax: (646) 253-7672  
Email: perlyn@blackstone.com

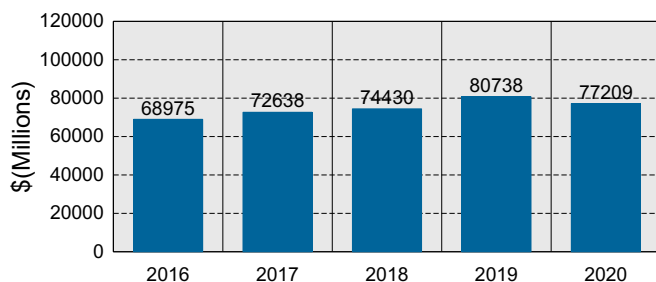
### Key Professionals (Hedge fund-related)

	Joined Firm	Investment Experience
Joe Dowling Global Head of BAAM	2021	1999
David Ben-Ur CIO of BAAM Principal Solutions	2022	1995
Stephen Sullens SMD, Head of Portfolio Management	2001	1991
Bob Jordan Deputy CIO, Spec Sits	2011	1994
Ian Morris Head of Allocation Strategy	2010	1993
Brian Gavin SMD, COO	2002	1991

### Employee Structure

Hedge Fund Analyst	70
Risk Management	15
Operations	73
Other	27
Portfolio Manager	7
<b>Total</b>	<b>192</b>

### Total Asset Growth



### Investment Professional Turnover

	# Emp	Last Yr Gained	Last Yr Lost
Hedge Fund Analyst	70	0	0
Operational Due Diligence	10	0	0
Portfolio Manager	7	0	0
Risk Management	9	0	0

### Total Asset Structure as of December 31, 2020

Type of Mandate	#Acct	\$(mm)	% Tot	Client Type	#Acct	\$(mm)	% Tot
Total	650	77,209	100%	Corporate	61	5,596	7%
Total	650	77,209	100%	Public (Government)	177	30,105	39%
				Foundation/Endowment	87	4,345	6%
				Health Care	15	2,943	4%
				Insurance	37	4,241	5%
				High Net Worth	207	2,846	4%
				Sovereign Wealth Funds	21	18,936	25%
				Other	45	8,197	11%
				<b>Total</b>	<b>650</b>	<b>77,209</b>	<b>100%</b>

## Blackstone Alternative Asset Management Blackstone Partners Offshore

### Investment Philosophy:

BAAM's Partners OS fund targets attractive risk-adjusted returns through investments in a well-diversified group of managers that employ a variety of unique investment strategies including Interest Rate-Driven, Credit-Driven, Commodities, Event-Driven, Equity, Managed Futures, and Global Macro. Partners OS targets low volatility and low correlation to traditional asset classes.

### Research Process:

As a hedge fund solutions provider, BAAM's research function is that of manager due diligence. BAAM does not have an independent research department, but its research capabilities are conducted in-house. As a part of BAAM's investment research process, BAAM meets with hundreds of managers each year. Peer groups are created, ranked, and re-ranked on both quantitative and qualitative criteria on an ongoing basis. This assists BAAM in sourcing new managers for review, prioritizing workflow, identifying trends in investment strategies, and monitoring existing managers.

### Asset Allocation:

Portfolio construction begins with the establishment of an investment strategy, objectives, and restrictions including return objectives, volatility constraints, sector and strategy allocation limits, liquidity needs, and regulatory issues. A top-down asset allocation/sector view is then formed using short- and medium-term sector return and risk expectations, guided by weekly investment opportunity and monthly Allocation Strategy meetings, along with open dialogue across the organization. Next, a bottom-up approach is used for sourcing and selecting managers that, when assembled, reflect the team's top-down view. Following an exhaustive identification and due diligence process, BAAM will continually review and make periodic adjustments to the portfolio based on underlying manager performance and changes in market conditions and opportunities.

### Manager Selection:

Prior to investing in a new manager, the Investment Team is required to complete an Investment Summary Package ("ISP") for each newly funded manager. The ISP is a comprehensive summary of the due diligence procedures performed by the Portfolio Management (PM), Business & Financial Evaluation (BFE), Risk Management (RM), and Legal & Product Structuring (LPS) Teams and includes a certification by each team that the manager meets BAAM's standards. The Investment Team prepares a synopsis and recommendation for each Prospect manager to the Investment Committee, who determines whether a Prospect has met (or is expected to meet) all of BAAM's due diligence criteria. Should a Prospect manager be rejected at any stage, it may continue to be monitored. Next, BAAM's Executive Committee must formally approve prospective managers, either approve or reject the recommendations of the Investment Committee relating to the funding of and redemption from underlying hedge funds. While the manager approval process is consensus driven, any BAAM Team involved in the due diligence process (PM, RM, BFE, and LPS) may veto an investment decision.

### Risk Management:

Risk is examined at the individual manager level and on an aggregate portfolio level. Risk reports, which break out exposure levels across all asset classes, are filled out quarterly by the underlying managers. Managers also report the percentage of their portfolio that is considered illiquid and the top ten long and short positions. Each of these reports is analyzed against data gathered during the prior three quarters. Inconsistencies with the understanding of the manager are questioned and trends are noted. These reports are entered into the proprietary system which aggregates portfolio exposures for further analysis. Each manager must complete an extensive due diligence questionnaire prior to funding, updated annually. At least once a year the Portfolio Management team performs an on-site front-office review, and the Business/Financial Evaluation team performs an on-site back-office review for every funded manager.

### Manager Termination Discipline:

The following are criteria that BAAM during consideration of termination: 1.) Manager's positions and trading activity are not consistent with their stated guidelines. 2.) Assets under management outgrow the underlying manager's ability to attain return objectives, or overly strains their infrastructure. 3.) A manager significantly reduces their time or capital commitment to the investment strategy. 4.) Changes in key management personnel. 5.) BAAM is uneasy about the managers' specific investment decisions

## Blackstone Alternative Asset Management Blackstone Partners Offshore As of December 31, 2020

### Product Highlights:

**Investment Style:** Broadly Diversified

**Return Target:**

**Volatility Target:**

**Inception Date:** 199607

**Type of Vehicle:** 3c7

**Investment Process:**

### Current Allocation

Fixed Income Arbitrage	12.8%
Relative Value Other	10.6%
Distressed	1.9%
Long/Short Credit	30.6%
Multi-Strategy Event Driven	21.0%
Long Short Equity	12.9%
Global Macro	6.3%
Managed Futures	4.0%
<b>Total</b>	<b>100.0%</b>

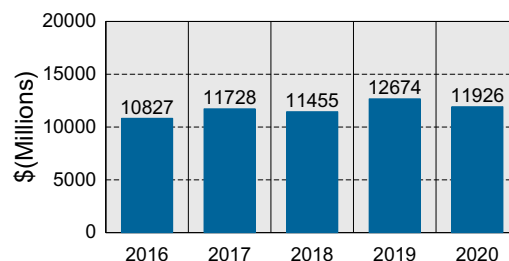
### Vehicle Terms

<b>Investment Minimum (\$mil)</b>	\$5.00 mm
<b>Subscription Period:</b>	Monthly
<b>Redemption Period:</b>	Semi-annually
<b>Notice Period:</b>	90 days
<b>Lock-up Period:</b>	None
<b>Initial Payout:</b>	95%
<b>Final Payout:</b>	5%
<b>Gate Provisions:</b>	

### Total Asset Structure

Client Type	# Acct	\$(mm)	%Tot
Total	194	11,926	100%
Total	194	11,926	100%

### Total Asset Growth



### Fees & Expenses

#### Flat Sample Fees

Account Size \$(mm)	Mgmt (%)
First \$99	1.25
Next \$100	1.10
Balance	0.95

#### Performance Sample Fees

Account Size \$(mm)	Mgmt (%)	Perf (%)
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#### Additional Fees/Consideration

**Administrative/Operating Expenses:** 0.07%

### Other Considerations

**Open to U.S. Taxable:** No

**Open to U.S. Tax-Exempt:** Yes

**UBIT incurred:** No

**Open to ERISA Tax-Exempt:** No



## Blackstone Partners Offshore Period Ended December 31, 2021

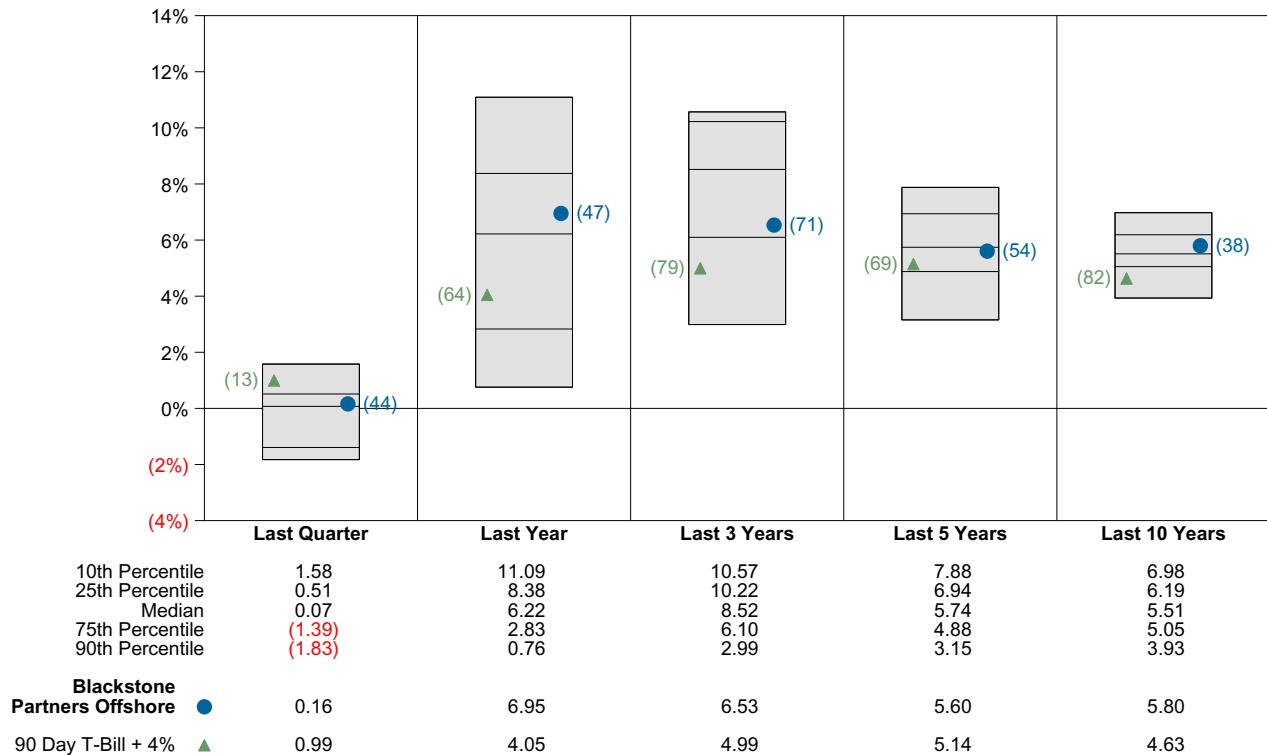
### Investment Philosophy

BAAM's Partners OS fund targets attractive risk-adjusted returns through investments in a well-diversified group of managers that employ a variety of unique investment strategies including Interest Rate-Driven, Credit-Driven, Commodities, Event-Driven, Equity, Managed Futures, and Global Macro. Partners OS targets low volatility and low correlation to traditional asset classes.

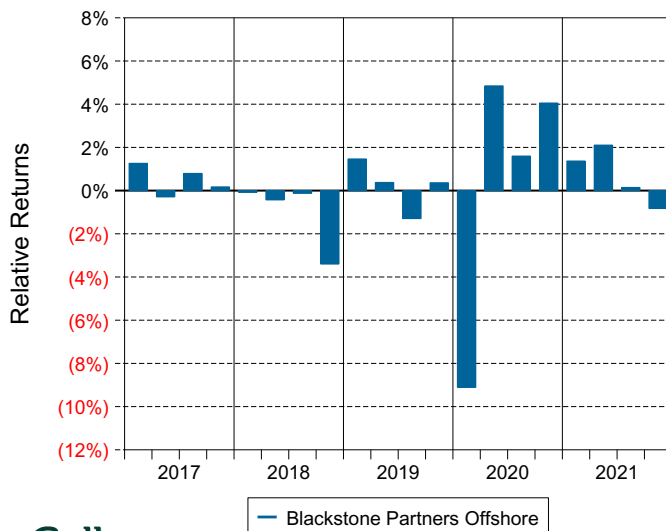
### Quarterly Summary and Highlights

- Blackstone Partners Offshore's portfolio posted a 0.16% return for the quarter placing it in the 44 percentile of the Callan Core Diversified Fund of Funds group for the quarter and in the 47 percentile for the last year.
- Blackstone Partners Offshore's portfolio underperformed the 90 Day T-Bill + 4% by 0.83% for the quarter and outperformed the 90 Day T-Bill + 4% for the year by 2.90%.

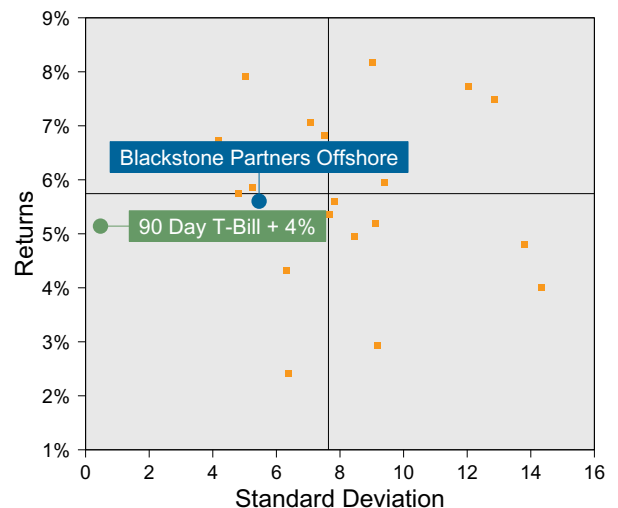
### Performance vs Callan Core Diversified Fund of Funds



### Relative Return vs 90 Day T-Bill + 4%



### Callan Core Diversified Fund of Funds Annualized Five Year Risk vs Return

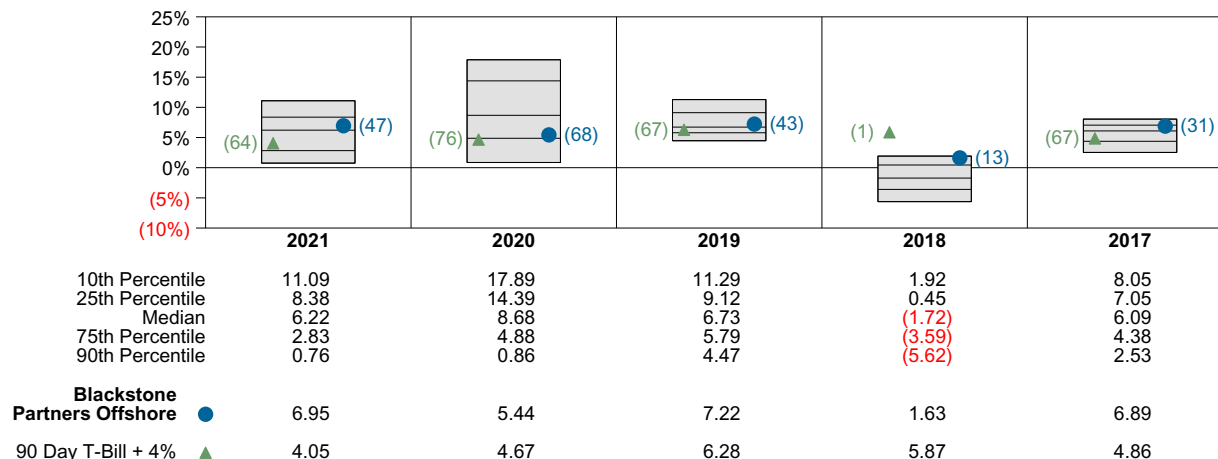


## Blackstone Partners Offshore Return Analysis Summary

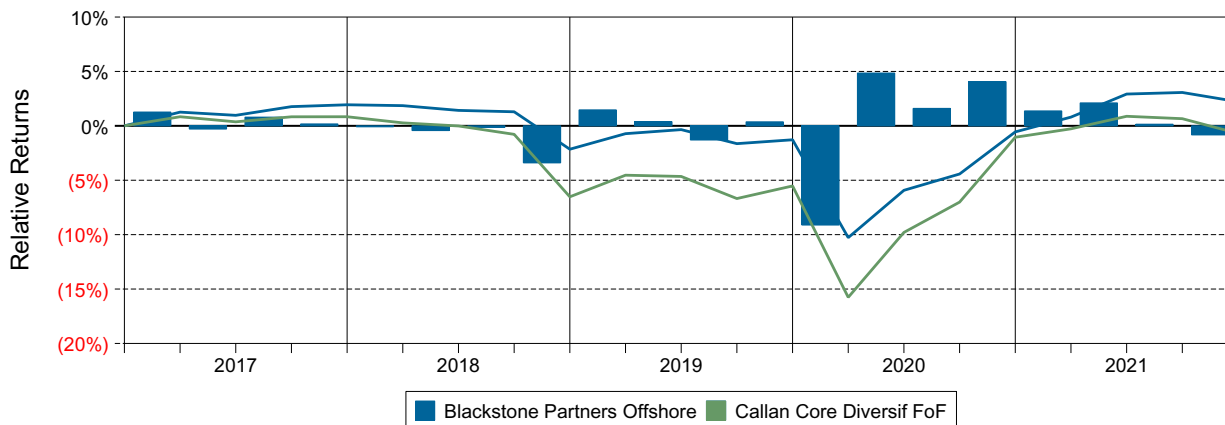
### Return Analysis

The graphs below analyze the manager's return on both a risk-adjusted and unadjusted basis. The first chart illustrates the manager's ranking over different periods versus the appropriate style group. The second chart shows the historical quarterly and cumulative manager returns versus the appropriate market benchmark. The last two charts illustrate the manager's ranking relative to their style using various risk-adjusted return measures.

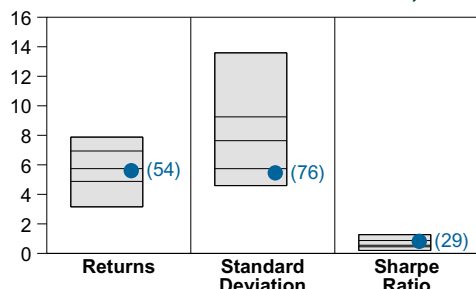
### Performance vs Callan Core Diversified Fund of Funds



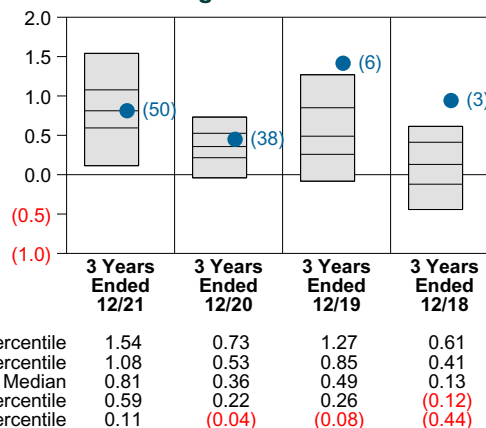
### Cumulative and Quarterly Relative Return vs 90 Day T-Bill + 4%



### Risk Adjusted Return Measures Rankings Against Callan Core Diversified Fund of Funds Five Years Ended December 31, 2021



### Sharpe Ratio Rankings Against Callan Core Diversified Fund of Funds Rolling Periods of 3 Years

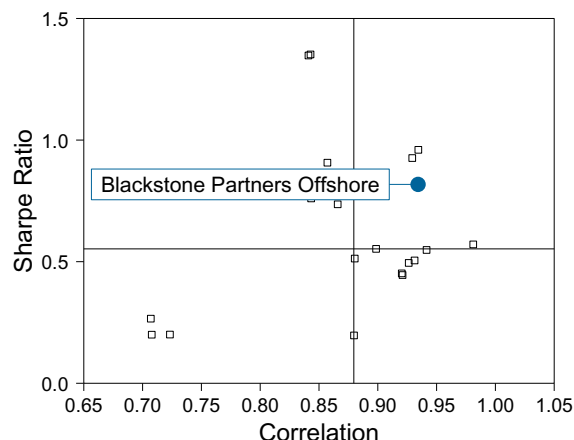
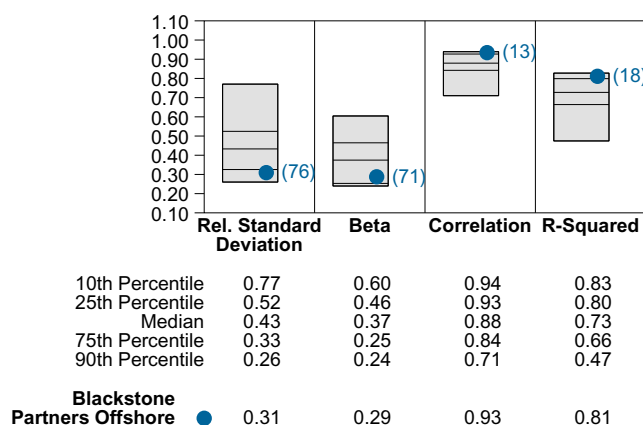


# Blackstone Partners Offshore Risk Analysis Summary

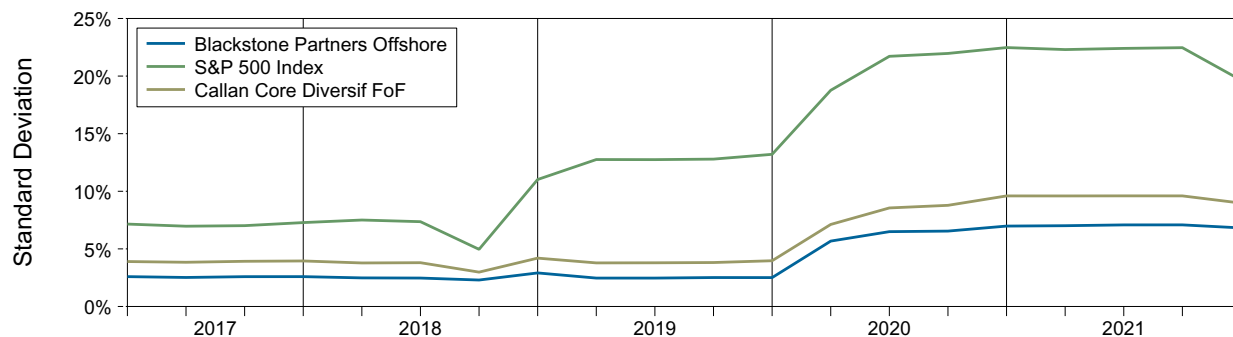
## Risk Analysis

The charts below analyze the risk or variation of a manager's return pattern as well as its correlation to the appropriate market index returns; and hence potential diversification benefits. The first chart ranks several manager risk and correlation statistics relative to an appropriate peer group. The second chart displays the Sharpe Ratio versus correlation tradeoff of the manager and the members of the peer group. The line chart in the center illustrates the changes in risk levels through multiple rolling time periods. The bottom two charts address relative return, downside risk and their tradeoff (Sortino Ratio) for the manager and the peer group.

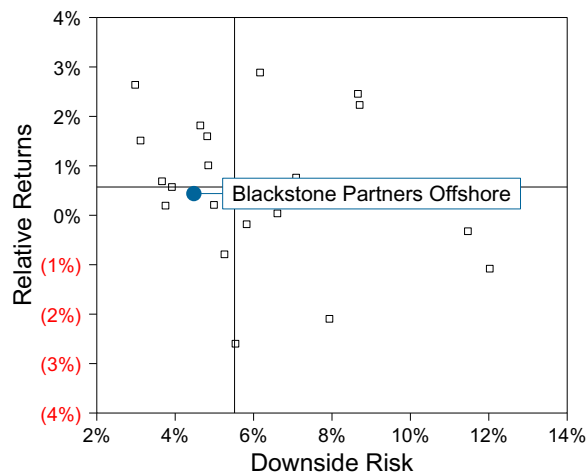
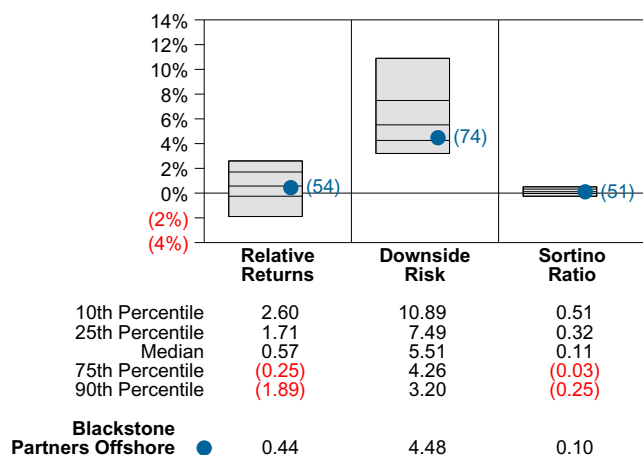
## Risk Statistics vs S&P 500 Index Rankings Against Callan Core Diversified Fund of Funds Five Years Ended December 31, 2021



## Rolling 12 Quarter Standard Deviation



## Downside Risk Statistics Rankings vs 90 Day T-Bill + 4% Rankings Against Callan Core Diversified Fund of Funds Five Years Ended December 31, 2021



## Grosvenor Capital Management, L.P. 900 North Michigan Avenue Suite 1100 Chicago, IL 60611

### History

Grosvenor Capital Management, L.P. ("Grosvenor") provides alternative investment solutions that include commingled funds, customized funds and direct investment advisory services on behalf of its clients. Grosvenor launched its first multi-manager hedge fund portfolio in 1971, its first hedge fund advisory relationship was established in 1994, and has been building and managing customized (single-investor) hedge fund portfolios on behalf of institutional clients since 1996. The firm is headquartered in Chicago and has expanded its global presence through branch offices in New York and Los Angeles and affiliate offices in Europe and Asia. GCM Grosvenor became a publicly traded company on November 18, 2020 with 78% of the equity held by management.

### Structure

Founded: 1971  
Registered Investment Advisor: Yes  
"Broker Dealer" Affiliate: Grosvenor Securities LLC  
Hedge Fund Affiliate: No

**Contact:** Stephen Brewster  
900 North Michigan Avenue Suite 1100  
Chicago, IL 60611  
Phone: (312) 506-6525  
Fax: (312) 506-6888  
Email: sbrewster@gcmlp.com

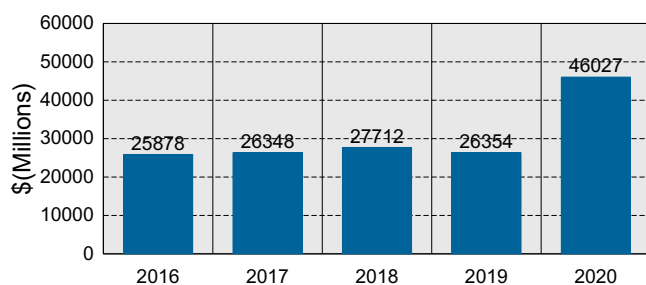
### Key Professionals (Hedge fund-related)

	Joined Firm	Investment Experience
Michael Sacks CEO, Managing Director	1990	1988
Paul Meister COO, Managing Director	1991	1991
Jonathan Levin President	2011	2004
David Richter Managing Director	1994	1988

### Employee Structure

Central Research Analyst	15
Hedge Fund Analyst	37
Risk Management	8
Operations	411
Portfolio Manager	17
<b>Total</b>	<b>488</b>

### Total Asset Growth



### Investment Professional Turnover

	# Emp	Last Yr Gained	Last Yr Lost
Hedge Fund Analyst	37	0	0
Operational Due Diligence	15	0	0
Portfolio Manager	17	0	0
Risk Management	8	0	0

### Total Asset Structure as of December 31, 2020

Type of Mandate	#Acct	\$(mm)	% Tot	Client Type	#Acct	\$(mm)	% Tot
Total	0	46,027	100%	Total	0	46,027	100%
Total	0	46,027	100%	Total	0	46,027	100%

# Significant Scale and Global Presence

## Governance

Office of the Chairman				
Michael Sacks, Chairman and CEO	Paul Meister, Vice Chairman	Jonathan Levin, President	Pamela Bentley, CFO	Sandee Hurse, CHRO
Francis Idehen, COO	Eric Levin, CTO	Burke Montgomery, General Counsel	Frederick Pollock, CIO	Stacie Selinger, Head of Investor Relations

**166**  
Investments

Research &  
Portfolio  
Management  
**137**  
professionals

Operational  
Due Diligence  
**15**  
professionals

Risk  
Management  
**7**  
professionals

Labor Impact  
Strategies  
**8**  
professionals

**489**  
Employees



### MAIN OFFICES

Additional investment professionals and non-investment professionals are in other regional offices.

**314**  
Operations

Client Group  
**43**  
professionals

Marketing  
**19**  
professionals

Strategy  
**5**  
professionals

Finance  
**123**  
professionals

Legal/Compliance  
**16**  
professionals

Technology  
**41**  
professionals

Human Resources  
**15**  
professionals

Administration  
**52**  
professionals

Data as of April 1, 2021. Individuals with dual responsibilities are counted only once. The Operational Due Diligence team includes one member who will be fully transitioned to the team as of May 1, 2021.

## Select Biographies

### **Jonathan R. Levin, President, Office of the Chairman**

Mr. Levin is the firm's President and is responsible for day-to-day management of the business. Mr. Levin is Chair of the Global Investment Council and a member of the Private Equity, Real Estate and Infrastructure Investment Committee, the Labor Impact Fund Investment Committee, and the Strategic Investments Investment Committee. Prior to joining GCM Grosvenor, Mr. Levin was the Treasurer and Head of Investor Relations at Kohlberg Kravis Roberts & Co., where he was responsible for managing KKR's balance sheet investments, engaging with public investors and industry analysts, and leading strategic projects. Prior to his role as Treasurer and Head of Investor Relations, Mr. Levin worked in KKR's private equity business and focused on investments in the financial services industry. Mr. Levin began his career as an Analyst in the private equity group of Bear Stearns. He holds an A.B. in Economics from Harvard College. Mr. Levin is a member of the Board of Directors of the Ann & Robert H. Lurie Children's Hospital of Chicago.

### **Bradley H. Meyers, Managing Director, Absolute Return Strategies Investment Committee Member, Head of Absolute Return Strategies Portfolio Management**

Mr. Meyers is a member of the Absolute Return Strategies Investment Committee, Head of Absolute Return Strategies Portfolio Management and serves on the Global Investment Council. Mr. Meyers is also a member of the Absolute Return Strategies Seeding and Strategic Investments Investment Committees. Mr. Meyers oversees the portfolio management process and approves portfolio allocations prior to implementation. Prior to assuming his role as Head of Absolute Return Strategies Portfolio Management, Mr. Meyers was a Vice President on the Absolute Return Strategies Research Team with a focus on credit and arbitrage strategies. Prior to joining GCM Grosvenor, he was a Financial Analyst with Merrill Lynch in the Mergers & Acquisitions Group. Prior to Merrill Lynch, he worked as an Associate for PricewaterhouseCoopers, LLP. Mr. Meyers received his Bachelor of Science in Accountancy from the University of Illinois at Urbana-Champaign and his Master of Business Administration from the University of Chicago Booth School of Business.

### **Wai Yee Cheng, CFA, Executive Director, Absolute Return Strategies**

Ms. Cheng serves as a Portfolio Manager for a number of multi-strategy portfolios and for other specialized strategies and custom mandates, including the emerging manager program. Ms. Cheng leads activities related to the construction, implementation and monitoring of portfolios. Prior to joining GCM Grosvenor, Ms. Cheng was a Senior Portfolio Manager for Texas Treasury Safekeeping Trust Company. In this role, she managed the Alternative Fixed Income and Private Debt strategies for the trust company's endowment. Previously, Ms. Cheng was an Associate Director in the Portfolio Management Department at Pacific Alternative Asset Management Company. She began her career working as an Analyst in foreign exchange sales and trading at Goldman Sachs in Hong Kong. She received her Bachelor of Arts in Economics from the University of Chicago and her Master of Business Administration from the Tuck School of Business at Dartmouth College. Ms. Cheng holds the Chartered Financial Analyst® designation.

### **Bill Morgan, CAIA, Managing Director, Client Group**

Mr. Morgan leads the firm's consultant relations efforts working alongside Client Group professionals to deepen the firm's connectivity with the global consultant community. Prior to joining GCM Grosvenor, Mr. Morgan was a Managing Director at Mesirow Advanced Strategies providing U.S. and global consultant and client relationship management. Previously, he held senior roles focusing on business development, consultant relations, and investments at UBS and Morgan Stanley across traditional and alternative strategies, multi-asset class solutions, and advisory services. Mr. Morgan received his Bachelor of Science in Industrial Engineering *with honors* from University of Wisconsin and his Master of Business Administration from Kellogg Graduate School of Management at Northwestern University. He holds the Chartered Alternative Investment Analyst® designation.

### **Amy Wierenga, Managing Director, Chief Risk Officer, ARS Investment Committee, PERI Investment Committee**

Ms. Wierenga is the firm's Chief Risk Officer and is responsible for global risk strategy and oversight. She is a member of the Absolute Return Strategies Investment Committee and the Private Equity, Real Estate and Infrastructure Investment Committee. Prior to joining GCM Grosvenor, Ms. Wierenga spent 12 years at BlueMountain Capital Management. At BlueMountain, Ms. Wierenga was a Partner and served as Chief Risk Officer overseeing Risk and Portfolio Construction. She also led BlueMountain's Treasury and Operations functions during her tenure. Previously, Ms. Wierenga was with Merrill Lynch in the Global Rates and FX trading division and the Federal Reserve Bank where she was a commissioned Bank Examiner and Market and Liquidity Risk Specialist. Ms. Wierenga received her Bachelor of Science in Economics and Bachelor of Arts in Music *cum laude* from Butler University and her Master of Business Administration in Analytic Finance, Econometrics & Statistics from the University of Chicago Booth School of Business. She chairs the Endowment and Investment Committee as a

member of the Board of Trustees of Butler University, is a member of the Board of Advisors for Rutgers RTWS, and was recognized by the Hedge Fund Journal as one of the 50 Leading Women in Hedge Funds in 2018.

**Thomas Rowland, CFA, CAIA, Managing Director, Absolute Return Strategies**

Mr. Rowland is a strategy head for credit strategies. Prior to joining GCM Grosvenor, he worked at Citadel Investment Group as a Credit Analyst on the Distressed Credit Team and as an Associate in Portfolio Finance, where he was primarily responsible for the funding of Citadel's credit strategies. Mr. Rowland received his Bachelor of Arts *cum laude* in Economics and a certificate in Finance from Princeton University. Mr. Rowland holds the Chartered Financial Analyst® and Chartered Alternative Investment Analyst® designations and is a member of the CFA Institute and the CAIA Association.

**Pamela Bentley, Managing Director, Chief Financial Officer, Office of the Chairman**

Pamela Bentley is the firm's Chief Financial Officer and is a member of the firm's Operations Committee. She is responsible for managing the financial functions of the firm including overseeing activities related to corporate and fund accounting, treasury and cash management, financial planning and reporting, tax, and operational due diligence while also playing a vital role in the firm's strategic initiatives. Prior to joining GCM Grosvenor, Ms. Bentley spent 15 years with The Carlyle Group, a publicly traded global investment firm, where her most recent role was Chief Accounting Officer and Managing Director. Previously, she was a Vice President of Finance and Investor Relations at Transaction Network Services, Inc. and a Senior Manager at Arthur Andersen LLP. Ms. Bentley received her Bachelor of Business Administration from the University of Michigan's Ross School of Business. She is a Certified Public Accountant and a member of the American Institute of Certified Public Accountants. Ms. Bentley is a member of and Chair-elect of the Board of Directors of Junior Achievement of Greater Washington.

**Marc Iyer, CFA, Managing Director, Private Equity Investments**

Mr. Iyer focuses on fund investments in illiquid credit and special situations. His experience spans corporate distressed securities, NPL portfolios, structured finance, direct lending and asset based opportunities. He is responsible for sourcing, structuring and underwriting investments, in addition to his client relationship and portfolio management responsibilities. Prior to joining GCM Grosvenor, Mr. Iyer was an Investment Banking Associate in the Financial Institutions Group at Merrill Lynch, where he worked on a number of capital raising and M&A transactions. Mr. Iyer received his Master of Business Administration from the Wharton School of the University of Pennsylvania, majoring in Finance and Accounting. He has an undergraduate degree in Engineering and holds the Chartered Financial Analyst® designation.

**Steve McMillan, Managing Director, ARS Research**

Steve joined the ARS-Research team as a Managing Director on April 6 in the London office. Prior to joining to GCM, Steve was CEO at BlueMountain Europe and Head of Fund Management at BlueMountain Capital Management. He received a Bachelor of Science degree from Essex University, School of Mathematics.



## Grosvenor Capital Management, L.P. Grosvenor Institutional Partners, L.P.

### Investment Philosophy:

Grosvenor Institutional Partners, L.P., is a globally diversified, multi-strategy, multi-manager portfolio that allocates its assets to entities managed by hedge fund managers that specialize in a wide range of alternative investment strategies. Its investment objectives are: (1) to generate a superior absolute and risk-adjusted rate of return, with low performance volatility and low correlation with global equity and fixed income markets, over a full market cycle; and (2) to preserve capital during challenging market environments.

### Research Process:

Grosvenor's Research Team is responsible for seeking to identify the highest quality managers globally. The team is organized into designated strategy/regional teams, each led by a Strategy Head that specialize in equities, credit, relative value, global macro, commodities, emerging managers, direct opportunities, special opportunities, Asia and Europe. The process for identifying, evaluating and approving hedge funds has four key phases: (1) identification and initial screening; (2) initial investment due diligence; (3) full due diligence - investment, risk management and operational; and (4) approval by the Investment and Operations Committees.

### Asset Allocation:

Grosvenor assigns a Portfolio Management Team to each portfolio, whose responsibility includes proposing the initial portfolio, monitoring, and proposing changes to the portfolio. David Richter and Bradley Meyers, both members of the Investment Committee, review and approve all initial and subsequent portfolio allocations proposed by each Portfolio Management Team. In proposing allocations for a portfolio, the Portfolio Management Team employs a combination of "top-down" and "bottom-up" inputs. "Top down" inputs are established by the Investment Committee with input from professionals across the Investment Team. "Bottom up" inputs reflect the Portfolio Management Team's judgment in selecting and proposing the allocation of capital to approved funds in a manner that the Portfolio Management Team determines to be appropriate in light of the portfolio's investment guidelines.

### Manager Selection:

After initial due diligence is performed, further evaluations are conducted by three distinct teams: investment due diligence (Research Team), risk management due diligence (Risk Management Team), and operational due diligence (Operational Due Diligence Team). The Research and Risk Management Teams present their conclusions to the Investment Committee and, separately, the Operational Due Diligence Team presents its conclusions to the Operations Committee. Both committees must independently approve a hedge fund for investment before GCMLP will allocate capital to the underlying fund and place it on its approved list. Michael Sacks can veto any affirmative decision, but not override a rejection or termination made by the Investment Committee or Operations Committee.

### Risk Management:

Grosvenor has an independent, dedicated Risk Management Team in its Investment Department responsible for managing and monitoring market risks. The team functions alongside the Research and Portfolio Management Teams and is primarily responsible for: (1) Conducting independent risk management due diligence and monitoring; (2) Performing risk management analytics on strategies, funds and portfolios; (3) Performing risk aggregation of clients' hedge fund programs and broader investment portfolios; (4) Collaborating with the Information Technology Development Team to develop proprietary risk management tools. Issues identified by the Risk Management Team are raised to the appropriate investment professionals (e.g., Investment Committee, Strategy Heads and Portfolio Managers). Any concerns that are not addressed to the satisfaction of the Head of Risk Management are elevated to the Office of the Chairman.

### Manager Termination Discipline:

Grosvenor monitors from an investment, risk management and operational perspective. Areas of concern may cause Grosvenor to place an investment manager or fund on a Watch List and/or perform enhanced monitoring and due diligence. Grosvenor monitors for any developments that indicate heightened investment or operational risk. Such signs may include: (1) under/over performance; (2) strategy drift; (3) moving beyond scope of expertise; (4) key personnel moves; (5) significant changes in asset base; (6) withdrawal of personal investment; (7) manager inaction; (8) revisions of reporting results; (9) ethical or legal issues; (10) lack of disclosure; (11) changes to reporting deadlines; (12) excessive/uncharacteristic concentrations. None of these developments, in and of themselves, are necessarily grounds for immediate termination, but any one of them will typically lead to a detailed and intensive due diligence review, and possibly: (1) a potential change in the Investment Committee's conviction level; (2) change in risk categorization; (3) inclusion on an Investment or Operational Due Diligence Watch List; or (4) termination.



**Grosvenor Capital Management, L.P.  
Grosvenor Institutional Partners, L.P.  
As of December 31, 2020**

**Product Highlights:**

**Investment Style:** Broadly Diversified

**Return Target:** 3 Month T-Bill+5.0%

**Volatility Target:**

**Inception Date:** 200101

**Type of Vehicle:** 3c7

**Investment Process:**

25% Strategic Allocation

75% Manager Selection

**Portfolio Characteristics**

	Year End
Number of Managers	25
Largest Manager Allocation (%)	10.9
Median Manager Size (\$M)	3,408
Wtd Avg Manager Size (\$M)	8,284
Wtd Avg Liquidity (Months)	5
Portfolio Leverage	4.0
Wtd Avg Mgr Leverage	4.2

**Current Allocation**

Market Neutral Equity	7.0%
Multi-Strategy Relative Value	18.7%
Relative Value Other	1.8%
Long/Short Credit	10.1%
Multi-Strategy Event Driven	15.3%
Long Short Equity	35.6%
Global Macro	11.5%
<b>Total</b>	<b>100.0%</b>

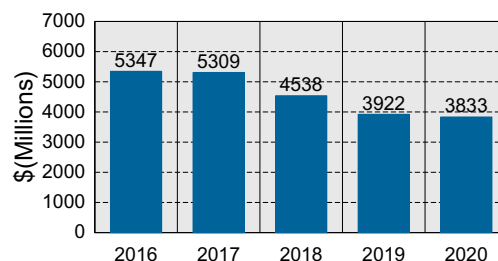
**Vehicle Terms**

Investment Minimum (\$mil)	\$5.00 mm
Subscription Period:	Monthly
Redemption Period:	Quarterly
Notice Period:	60 days
Lock-up Period:	
Initial Payout:	95%
Final Payout:	5%
Gate Provisions:	

**Total Asset Structure**

Client Type	# Acct	\$(mm)	%Tot
Total	155	3,833	100%
Total	155	3,833	100%

**Total Asset Growth**



**Fees & Expenses**

**Flat Sample Fees**

Account Size \$(mm)	Mgmt (%)
First \$25	1.15
Next \$25	1.00
Next \$50	0.80
Balance	0.60

**Performance Sample Fees**

Account Size \$(mm)	Mgmt (%)	Perf (%)
------------------------	----------	----------

**Additional Fees/Consideration**

Administrative/Operating Expenses: 0.09%

**Other Considerations**

Open to U.S. Taxable: No  
Open to U.S. Tax-Exempt: Yes  
UBIT incurred: No  
Open to ERISA Tax-Exempt: Yes  
Subject to 25% Limit: No

## Grosvenor Institutional Partners, LP Period Ended December 31, 2021

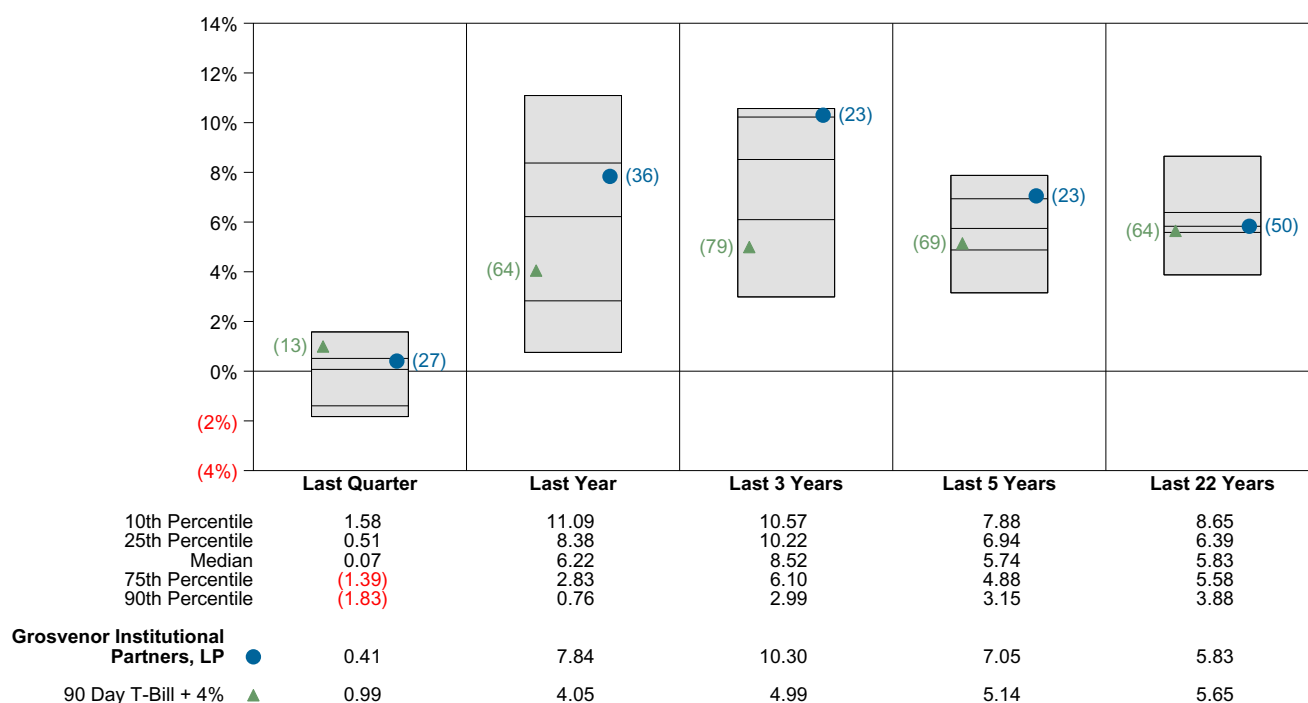
### Investment Philosophy

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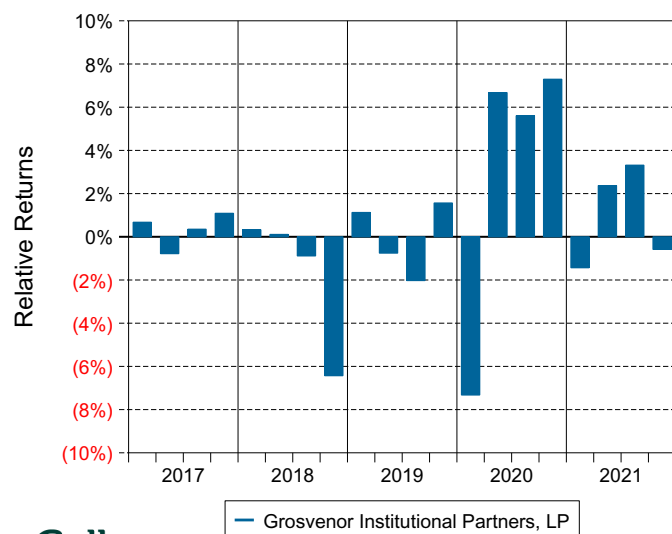
### Quarterly Summary and Highlights

- Grosvenor Institutional Partners, LP's portfolio posted a 0.41% return for the quarter placing it in the 27 percentile of the Callan Core Diversified Fund of Funds group for the quarter and in the 36 percentile for the last year.
- Grosvenor Institutional Partners, LP's portfolio underperformed the 90 Day T-Bill + 4% by 0.59% for the quarter and outperformed the 90 Day T-Bill + 4% for the year by 3.79%.

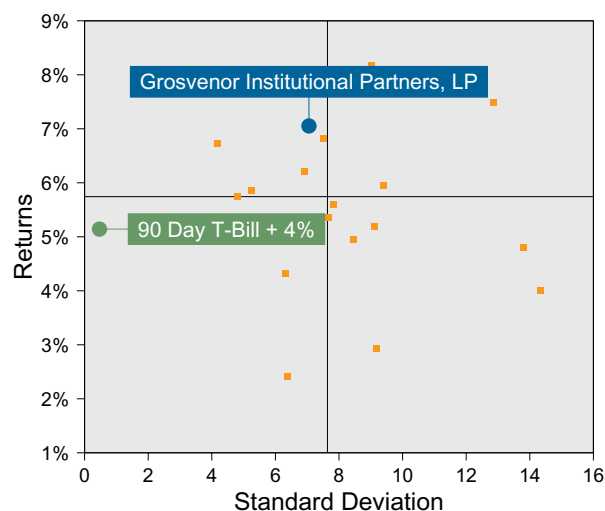
### Performance vs Callan Core Diversified Fund of Funds



### Relative Return vs 90 Day T-Bill + 4%



### Callan Core Diversified Fund of Funds Annualized Five Year Risk vs Return

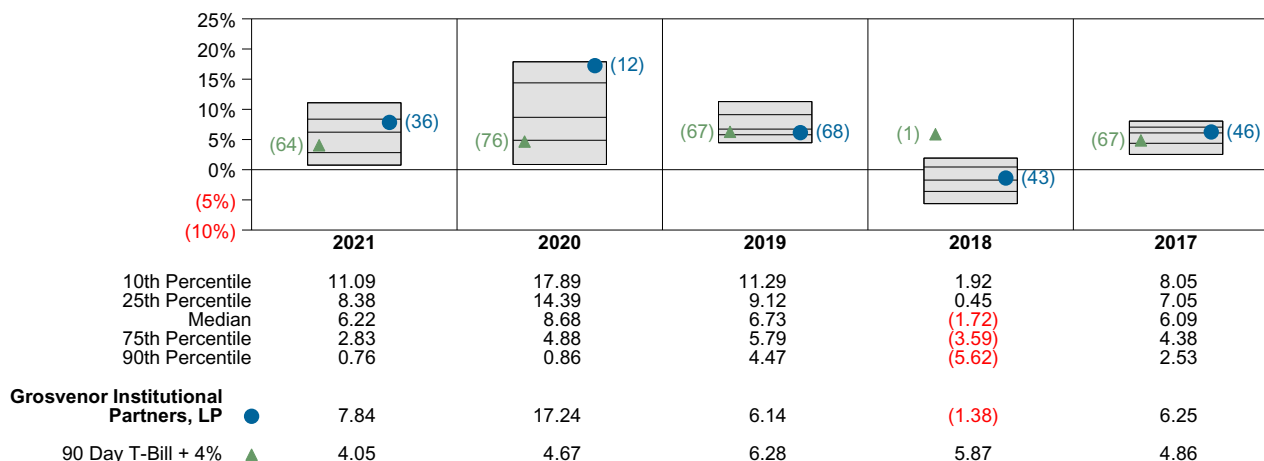


# Grosvenor Institutional Partners, LP Return Analysis Summary

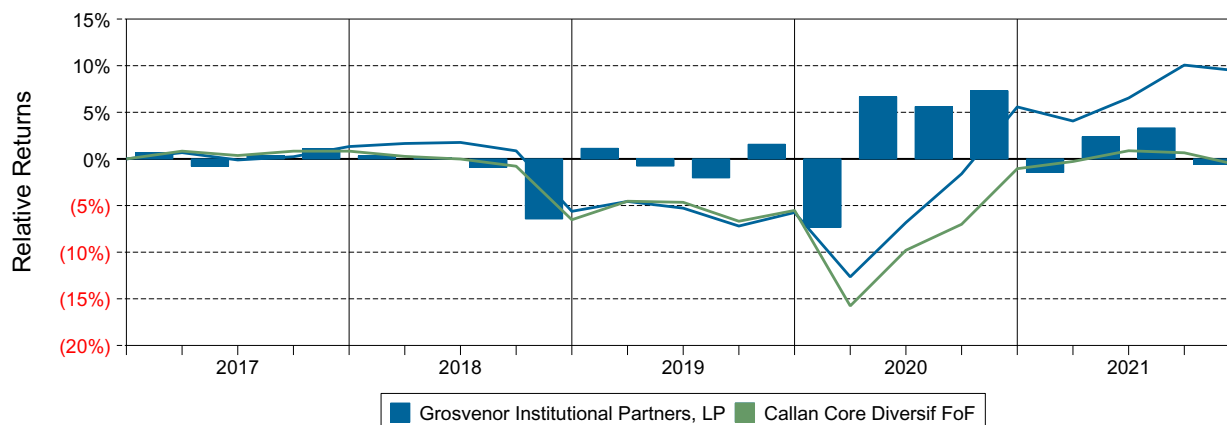
## Return Analysis

The graphs below analyze the manager's return on both a risk-adjusted and unadjusted basis. The first chart illustrates the manager's ranking over different periods versus the appropriate style group. The second chart shows the historical quarterly and cumulative manager returns versus the appropriate market benchmark. The last two charts illustrate the manager's ranking relative to their style using various risk-adjusted return measures.

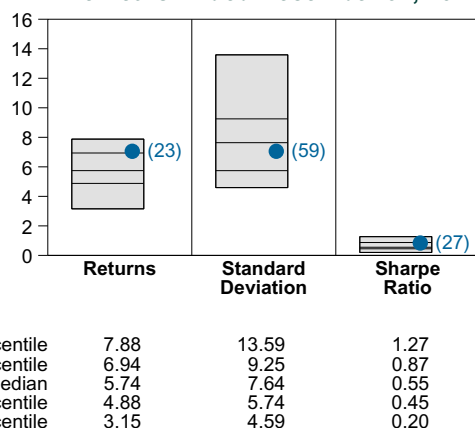
## Performance vs Callan Core Diversified Fund of Funds



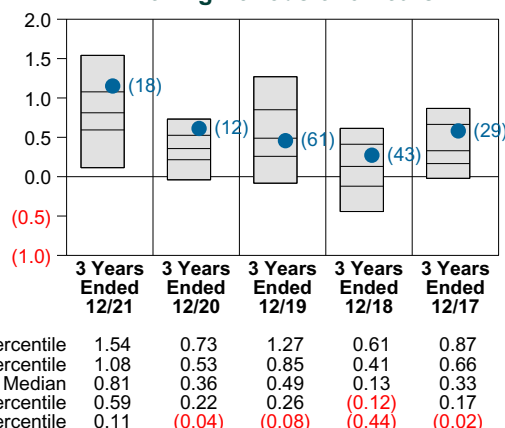
## Cumulative and Quarterly Relative Return vs 90 Day T-Bill + 4%



## Risk Adjusted Return Measures Rankings Against Callan Core Diversified Fund of Funds Five Years Ended December 31, 2021



## Sharpe Ratio Rankings Against Callan Core Diversified Fund of Funds Rolling Periods of 3 Years

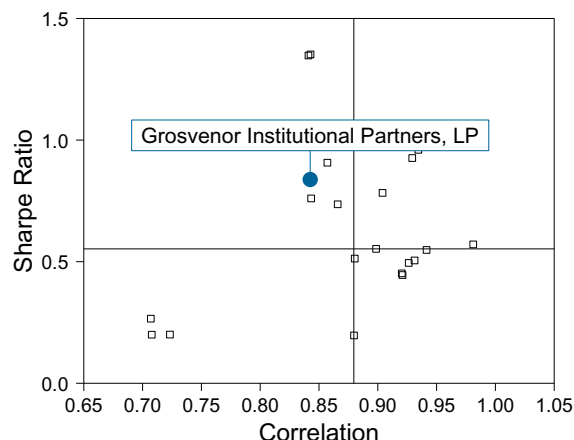
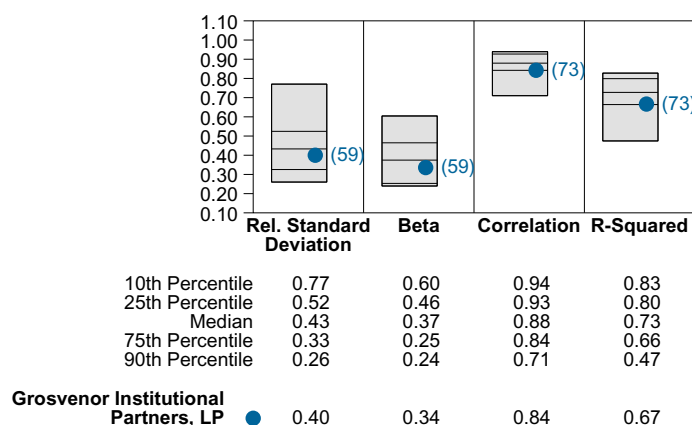


# Grosvenor Institutional Partners, LP Risk Analysis Summary

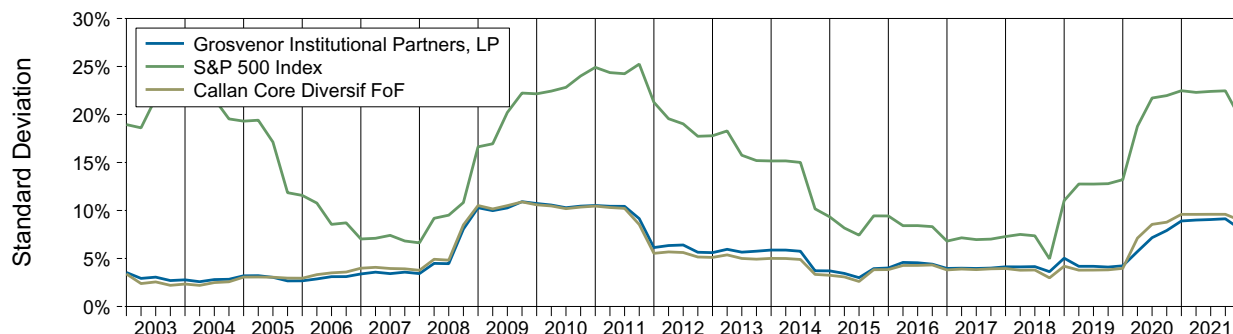
## Risk Analysis

The charts below analyze the risk or variation of a manager's return pattern as well as its correlation to the appropriate market index returns; and hence potential diversification benefits. The first chart ranks several manager risk and correlation statistics relative to an appropriate peer group. The second chart displays the Sharpe Ratio versus correlation tradeoff of the manager and the members of the peer group. The line chart in the center illustrates the changes in risk levels through multiple rolling time periods. The bottom two charts address relative return, downside risk and their tradeoff (Sortino Ratio) for the manager and the peer group.

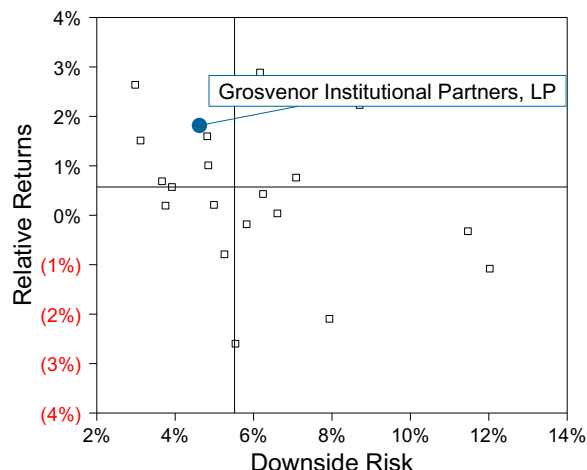
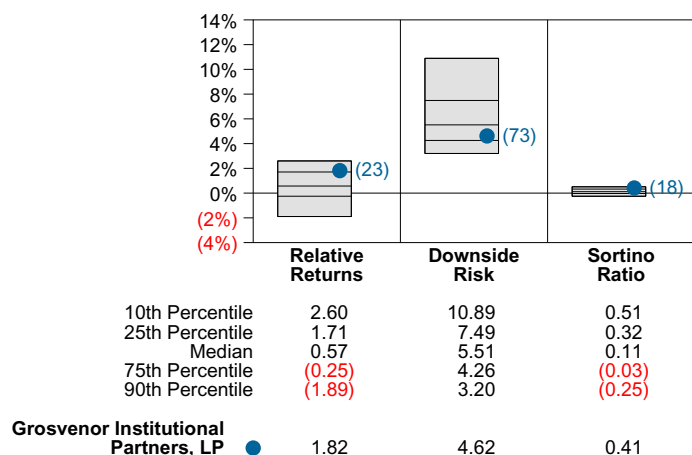
## Risk Statistics vs S&P 500 Index Rankings Against Callan Core Diversified Fund of Funds Five Years Ended December 31, 2021



## Rolling 12 Quarter Standard Deviation



## Downside Risk Statistics Rankings vs 90 Day T-Bill + 4% Rankings Against Callan Core Diversified Fund of Funds Five Years Ended December 31, 2021



## UBS Asset Management

677 Washington Boulevard  
Stamford, CT 06901

### History

UBS Hedge Fund Solutions LLC ("HFS") is a limited liability company that is a wholly owned subsidiary of UBS Americas Holding LLC. HFS was originally founded in 1994, known then as Alternative Investment Strategies ("AIS"), which specialized in hedge fund commingled and customized account solutions and launched its flagship product, now known as A&Q Neutral Alpha Strategies. In 2004, the firm went through its first of two rebranding initiatives when it integrated O'Connor's Multi-Manager business. In 2013, UBS separated O'Connor and A&Q Hedge Fund Solutions (formerly AIS) and in 2015, changed the name to what it is now known as today, HFS. Today, business is conducted through primary offices in Chicago and Stamford with additional offices in London, Zurich, and Hong Kong.

### Structure

Founded: 1994  
Parent: UBS AG  
Registered Investment Advisor: Yes  
"Broker Dealer" Affiliate: UBS Securities, LLC  
Hedge Fund Affiliate: UBS O'Connor

**Contact:** Carla Dougiello  
677 Washington Boulevard  
Stamford, CT 06901  
Phone: (203) 719-4313  
Fax: (203) 719-1399  
Email: carla.dougiello@ubs.com

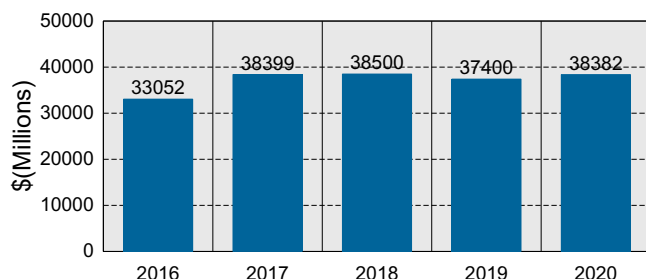
### Key Professionals (Hedge fund-related)

	Joined Firm	Investment Experience
Jeff Colodny Senior Investment Officer	2004	1987
Nicole Tortarolo Head of Operational Due Diligence & Investment Structuring	2006	2004
Bruce Amlicke Head of HFS; CIO	2010	1986
Chris Bae	2016	1998

### Employee Structure

Central Research Analyst	27
Hedge Fund Analyst	12
Risk Management	5
Operations	12
Portfolio Manager	10
<b>Total</b>	<b>66</b>

### Total Asset Growth



### Investment Professional Turnover

	# Emp	Last Yr Gained	Last Yr Lost
Hedge Fund Analyst	27	5	2
Operational Due Diligence	12	0	1
Portfolio Manager	10	0	0
Risk Management	8	0	0

### Total Asset Structure as of December 31, 2020

Type of Mandate	#Acct	\$(mm)	% Tot	Client Type	#Acct	\$(mm)	% Tot
Total	0	38,382	100%	Total	0	38,382	100%
Total	0	38,382	100%	Total	0	38,382	100%

# MMS investment team

## MMS Management and Advisory Board

### Bruce Amlicke, CIO of MMS

Chris Bae, Macro & Portfolio Specialists

Yoshi Nobumoto, Investment Risk & Quantitative Research

Joe Sciortino, Credit / Income Investments

Nicole Tortarolo, Investment Structuring & Operational Due Diligence

Jeff Colodny, Portfolio Management

Adolfo Oliete, Asia-Pacific Investments

Glenn Shapiro, Direct Investments & Special Situations

Gina Toth, Senior Investment Officer

### Bill Ferri, Head of Americas and Head of MMS

Rip Matos, Senior Investment Officer

Edoardo Rulli, Head of Investment Research

Ned Sienko, Equity Investments

Portfolio Management & Risk		Investment Research			Investment Structuring & Operational Due Diligence	
Portfolio Management		Equity	Credit / Income	Trading	Investment Structuring	
Risk Management		Relative Value	Multi-Asset	Special Situations		
Portfolio Specialists		Regional Teams (Generalists)			Operational Due Diligence	
Quant and Data						
Data and Transparency			Quant Research			

#### Notes

Data as of September 2020.

# Key personnel biographies

## Hedge Fund Solutions (HFS)



**William (Bill) Ferri** is **Head of UBS Asset Management Americas**, a role he has held since March 2017, responsible for developing and implementing the strategy for the region, as well as ensuring engagement with clients, regulators, industry bodies and key stakeholders. Bill also is Head of UBS Asset Management's Multi-Manager and Hedge Fund Solutions business, one of the world's largest hedge fund investors and leading active fund management and advisory franchise. He is a long-standing member of the UBS Asset Management Executive Committee and a member of the UBS Group Americas Executive Committee. Bill was a founding member of the O'Connor hedge fund and Asset Management's fund-of-funds business in 2000, and was global Head of these businesses for many years. Prior to this, Bill held a number of roles across UBS in key business and legal functions. Bill joined UBS predecessor organization Paine Webber in 1995 after practicing corporate law at Seward & Kissel. Bill has over 28 years of investment industry experience and holds a BS from Cornell University and a JD from University of North Carolina.



**Bruce Amlicke** is the **Chief Investment Officer (CIO)** of UBS Multi-Manager Solutions, is responsible for managing investments of third party active investment funds across hedge funds, traditional assets, liquid alternatives and private credit. In his CIO role, he leads the global investment team and oversees all aspects of portfolio management, asset allocation and manager selection. Before rejoining UBS in 2010, he was a Senior Managing Director of the Blackstone Group where he spent five years as the CIO of Blackstone Alternative Asset Management. Prior to that, Bruce was CIO of the UBS O'Connor Multi-Manager program from 2003-2004, which was the predecessor business to UBS Multi-Manager Solutions. He originally joined O'Connor Multi-Manager in 1998. Bruce's investment career began in 1986 with O'Connor & Associates (later bought by Swiss Bank Corporation) where he was a trader and portfolio manager of the Foreign Currency Options team.



**Chris Bae** is the **Head of FICC / Trading Investments** for UBS Hedge Fund Solutions (HFS). Chris is primarily responsible for leading the HFS Research Team across Global Macro, Commodities, CTA, Statistical Arbitrage and Fixed Income Relative Value strategies. Before joining UBS in 2016, he was a Global Macro Portfolio Manager at BlueCrest Capital Management (2016). Prior to that, Chris held roles at Bank of America Merrill Lynch, which included Global Head of FX Trading, Global Head of Fixed Income Electronic Trading and Global Head of Currency Options Trading (2009-2015). Before that, Chris worked at Goldman Sachs in Currency Options and Equity Derivatives Trading. He has held board seats at both the New York Federal Reserve Foreign Exchange Committee and the Bank of England Joint Standing Committee. Chris has over 21 years of investment industry experience and holds a BS from Massachusetts Institute of Technology (M.I.T.).





**Jeff Colodny** is the **Head of Portfolio Management** for UBS Hedge Fund Solutions (HFS). Jeff is primarily responsible for portfolio management and contributes to manager research. Prior to assuming his current role in 2004, he was a Senior Trader on the UBS Proprietary Equities Trading Desk specializing in convertible bond arbitrage (2002-2004). Before that, Jeff was a Senior Trader on the UBS convertible desk (1996-2002). Previously, he traded US Euro and Asian convertible bonds with the then Swiss Bank Corporation in London, where he was instrumental in deploying the O'Connor risk management system on the London convertible desk (1993-1995). Jeff was also a Trader on the O'Connor convertible trading team in Chicago (1990-1993). He began his career as an equity option Trader with O'Connor & Associates on the Pacific Coast Stock Exchange in San Francisco, where he was also Chairman of the Options Listing Committee (1985-1990). Jeff has over 34 years of investment industry experience and holds a BA from Bowdoin College.



**Euripides (Rip) Matos** is a **Senior Investment Officer** and a member of the UBS Multi-Manager Solutions (MMS) Management and Advisory Board. Rip is primarily responsible for manager research. Prior to joining UBS in 2007, he worked in Principal Investment Management at JP Morgan Chase & Co., where he was a Vice President focusing on the management of a significant proprietary multi-manager hedge fund of funds, with generalist strategy research responsibilities. He also served as a member of the Portfolio Operating Committee, responsible for manager selection and asset allocation. Before that, Rip was an Associate Portfolio Manager and Senior Research Analyst at Tremont Advisers in 1996, covering event-driven, relative value, credit, and multi-strategy areas. Rip has 23 years of investment industry experience and holds a BA from Fordham University and an MBA from Baruch College.



**Yoshi Nobumoto** is **Head of Investment Risk** and a member of the UBS Multi-Manager Solutions (MMS) Management and Advisory Board. Yoshi is primarily responsible for leading the investment risk functions of MMS including monitoring investment risk guidelines, risk identification via tools such as scenario and factor analysis at the platform, product, strategy and fund level while working closely with the portfolio team. Before assuming his current role, Yoshi was a Senior Investment Officer focusing on fixed-income relative value and mortgage strategy research. Prior to joining U33BS in 2010, Yoshi was a principal / portfolio manager at Tequesta Capital Advisors, later serving as the Chief Operating Officer / Chief Risk Officer (1999-2008). He began his tenure there as a global relative value Portfolio Manager. Before that, he worked for Ill Advisors, a global fixed income hedge fund, as a fixed income trader (1995-1998). Yoshi began his career in investments with Ocwen Financial Corporation as a senior financial analyst. Yoshi has 27 years of investment industry experience and holds a BS from the University of Pennsylvania. He holds a CFA and a Professional Risk Manager (PRM) designation from PRMIA.



**Adolfo Oliete** is **Head of Asia-Pacific Investments** for UBS Hedge Fund Solutions (HFS). Adolfo is primarily responsible for spearheading investment research in the region. He is a member of the UBS Asset Management APAC Committee and the Management Committee. Adolfo leads research on markets, hedge fund investment due diligence and co-investments in Asia. He has a senior management role in Asia and represents the region in portfolio management meetings. Adolfo joined UBS Asset Management's A&Q investment team in London in 2012. Prior to joining UBS in 2012, he spent one year as a hedge fund consultant at Casteel Capital (2011-2012). Before that, Adolfo worked at Highbridge Capital Management in New York and London where he was a Senior Vice President (1997-2009). During the last six years at Highbridge, he traded European convertible bonds and helped manage the European Convertible bond arbitrage portfolio. Adolfo has over 22 years of investment industry experience and holds a BBA from the University of Massachusetts, at Amherst.





**Edoardo Rulli** is the **Head of European Investments** for UBS Hedge Fund Solutions (HFS). Edoardo is primarily responsible for spearheading investment research in the region. Before re-joining UBS in 2016, he was Head of Research at Falcon Money Management where he joined as partner (2009-2016). Before that, he was a Director at UBS A&Q, the predecessor unit of HFS, in London (2008-2009). Previously, Edoardo was a senior analyst at Tremont Capital Management in London, a multi-billion fund of funds (2004-2008). He started his career in 2001 at Rasini & C, UK based hedge fund advisory firm, as an analyst researching European and Asian hedge funds (2001-2004). Edoardo has over 19 years of investment industry experience and holds a BS from Bocconi University in Milan, Italy.



**Joseph (Joe) Sciortino** is the **Head of Credit Investments** for UBS Hedge Fund Solutions (HFS). Joe is primarily responsible for manager research in structured products and private credit and is involved in corporate credit strategies. He is a member of the portfolio management team and is actively involved in a variety of client-facing functions. Prior to joining UBS in 2006, Joe was a Senior Investment Analyst at Lake Partners, Inc., a multi-billion dollar consultant specializing in alternative investments, where he was responsible for manager research, portfolio management and directing the junior research analysts (2000-2006). Joe has over 20 years of investment industry experience and holds a BS from Rensselaer Polytechnic Institute.



**Glenn Shapiro** is the **Head of Special Situations and Fundamental Strategies** for UBS Hedge Fund Solutions (HFS). Glenn is primarily responsible for managing concentrated opportunistic investments for our products as well as the fundamental strategies in the HFS allocation business. Prior to joining UBS in 2015, he founded Gage Reinsurance Limited, a Bermuda-based reinsurance company (2014-2015). Previously, he co-founded and managed Parameter Capital Management, a long/short equity-focused hedge fund affiliated and backed by SAC Capital Advisors (2010-2013). Before PCM, Glenn was a partner and portfolio manager at Balyasny Asset Management, a multi-strategy long/short hedge fund (2007-2010). Prior to that, he was an analyst at Sigma Capital Management, a subsidiary of SAC (2001-2007). Glenn began his career in the investment banking division of Lehman Brothers in 1994. He has 25 years of investment industry experience including investment banking and direct investment roles. Glenn holds a BA from Washington University in St. Louis and an MBA from the J.L. Kellogg School of Management at Northwestern University.



**Ned Sienko** is the **Head of Equity Investments** for UBS Hedge Fund Solutions (HFS). Ned is primarily responsible for manager research as well as portfolio management of certain client portfolios. Previously, he was responsible for the oversight of the Portfolio Management and Due Diligence team of the Alternative Investment Group within UBS Wealth Management Americas, serving as a Portfolio Manager since July 1995, and as the Head of the Alternative Investment Group's portfolio management group since 1998. Prior to joining UBS in 1995, Ned worked at Kidder, Peabody & Co., Inc. where his responsibilities included finance, product origination and due diligence (1984-1994). Ned has over 35 years of investment industry experience and holds a BS from Fairfield University and an MBA from New York University.



**Nicole Tortarolo** is the **Head of Investment Structuring** for UBS Hedge Fund Solutions (HFS). Nicole is responsible for the investment due diligence and client advocacy processes that focus on operations, alignment of terms and investment governance of third party managers across traditional and hedge fund capabilities. She is also primarily responsible for structuring dedicated co-investments, managed accounts and other customized structures with hedge fund and private credit managers. Nicole joined UBS in 2006 as in-house Legal Counsel where she was responsible for formation and structuring of hedge funds, hedge fund of funds, and private equity funds of funds (2006-2011). Prior to joining UBS in 2006, Nicole was an Associate at the New York law firm, Schulte Roth & Zabel, where she advised various investment advisers as part of the firm's Investment Management practice (2003-2006). Nicole has over 15 years of investment industry experience and holds a BA from the University of Washington and a JD from Tulane Law School.



**Gina Toth** is a **Senior Investment Officer** within the Multi-Manager Solutions team, focusing on fixed income and multi-asset investment strategies. She is part of the team responsible for manager due diligence and selection, portfolio construction, risk management, investment oversight, and performance of multi-asset strategies. These investment strategies include both internal and external capabilities. Gina joined UBS Asset Management in March 2013. Previously, she worked at AllianceBernstein as a Senior Portfolio Manager in New York and Sydney, specializing in multi-asset portfolios, asset allocation and custom solutions for the institutional, high-net worth and retail channels, encompassing both traditional and non-traditional asset classes. She also spent 14 years in New York and London as a fixed income portfolio manager for US and global portfolios. Gina has over 25 years of investment industry experience and holds a BA from the University of Michigan and an MBA from Johnson Graduate School of Management.

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## UBS Asset Management A&Q Neutral Alpha Strategies Limited

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### Investment Philosophy:

UBS Neutral Alpha Strategies Limited is a broad based neutral fund of funds that seeks to achieve risk-adjusted capital appreciation over the long term while maintaining zero to low correlation to traditional asset classes and low volatility over an economic market cycle (3-5 years). The fund primarily invests in a diverse set of alternative investment funds employing a range of hedged strategies, including Credit/Income, conservative Equity Hedged, Multi-Strategy, Relative Value, and Trading.

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### Research Process:

UBS Hedge Fund Solutions uses a proprietary system, OCTANE, to track manager information and streamline research. OCTANE is a web-based engine containing detailed historical quantitative and qualitative information on over 35,000 hedge funds and alternative investment vehicles, and assists with efficient organization of the hedge fund universe, information sharing, portfolio construction, asset allocation, fund investing and fund monitoring. The Investment Team constantly receives communications from new or prospective hedge funds. OCTANE tracks both registered and prospective hedge funds that the Investment Team encounters, allowing them to track funds of interest that may not be quite ready to include in the investment process.

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### Asset Allocation:

Overall asset allocation is determined by the investment mandate and the Investment Team's outlook. The weights of each strategy depend on the Investment Team's perception of the relative attractiveness and fit within the context of the portfolio mandate, considering a future outlook. The goal is to manage overall portfolio volatility and correlations in line with the client's mandate and rebalance as necessary. The CIO, Deputy-CIO and Senior Portfolio Managers are responsible for generating portfolio structure recommendations and work closely with the Strategy Teams to develop a comprehensive understanding of the factors that drive strategy returns and risks, and assess the macroeconomic and market factors over the next 3 to 12 months. Strategy and market research provide a framework for comparing the variety of hedge fund strategies based on risk and return.

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### Manager Selection:

Strategy Teams conduct extensive peer analysis, including qualitative and quantitative assessment, aiming to identify differentiating factors of the prospective manager versus their peers. The teams meet on a regular basis to evaluate managers and schedule meetings. Prioritization generally takes into account: outlook for a strategy based on top-down assessment, launch of a new strategy in relation to potentially negotiating favorable terms, capacity, manager pedigree, risk/return potential and track record. Once a fund has been prioritized, further due diligence meetings are required. The following are evaluated: manager's investment strategy and process, alpha generation process, structure of firm and alignment of interests, portfolio management and risk control framework and performance attribution. Lastly, an Investment Opinion report is presented during the monthly Manager Approval and Redemption Committee, which then votes to approve the new fund for inclusion on the platform.

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### Risk Management:

Risk management serves as an integral component of the overall investment process. The Investment Risk Team provides analysis based on data from a variety of sources through an extensive set of quantitative procedures and presents research to the Investment Team to allow for informed investment decisions. Analysis includes a comprehensive set of quantitative and qualitative risk factors, leveraging deep strategy research and manager selection due diligence. From a bottom-up perspective, sub-fund exposures are monitored using Enhanced Monitoring transparency to verify that exposures are within expectations. An independent risk group known as Market Risk Control is responsible for guideline monitoring at the product level. In addition, the Product Control team further verifies that guidelines are adhered to on a pre-trade basis.

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### Manager Termination Discipline:

There are no set criteria for redeeming from a manager. The reason for terminating (or reducing) a manager is based on a change of rating in future expectations in the risk-reward profile of the investment. These factors include changes in the investment strategy, the investment team, the strategy's opportunity set, the level of assets and other intangibles. Historically, personnel changes and changes in risk tolerance have been a couple of the primary reasons for firing managers. These findings are summarized in a risk report. Most importantly, qualitative factors are continually monitored, as these firms are dynamic business units. Investment Team members are in frequent contact with each of the underlying investments in the portfolios. This typically involves phone calls with firms on a monthly basis, in addition to periodic face-to-face meetings.

**UBS Asset Management**  
**UBS Neutral Alpha Ltd. - Class SN**  
**As of December 31, 2020**

**Product Highlights:**

**Investment Style:** Market Neutral

**Return Target:** LIBOR-3 Month

**Volatility Target:**

**Inception Date:** 200006

**Type of Vehicle:** 3c7

**Investment Process:**

20% Strategic Allocation

80% Manager Selection

**Portfolio Characteristics**

	<b>Year End</b>
Number of Managers	26
Largest Manager Allocation (%)	9.2
Annual Percent Turnover	26.0

**Current Allocation**

Market Neutral Equity	9.1%
Fixed Income Arbitrage	12.4%
Relative Value Other	8.1%
Merger Arbitrage	0.7%
Long/Short Credit	17.9%
Multi-Strategy Event Driven	4.1%
Long Short Equity	24.6%
Global Macro	20.1%
Managed Futures	2.5%
Cash, Hedging, and Overlay	0.3%
<b>Total</b>	<b>99.9%</b>

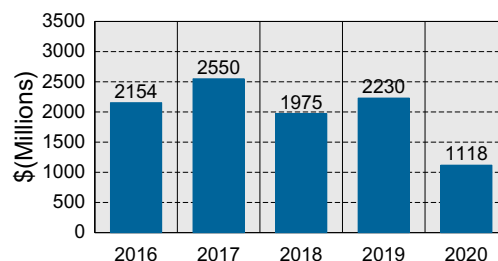
**Vehicle Terms**

Investment Minimum (\$mil)	\$1.00 mm
Subscription Period:	Monthly
Redemption Period:	Quarterly
Notice Period:	60 days
Lock-up Period:	None
Initial Payout:	90%
Final Payout:	10%
Gate Provisions:	

**Total Asset Structure**

<b>Client Type</b>	<b># Acct</b>	<b>\$(mm)</b>	<b>%Tot</b>
Total	0	1,118	100%
Total	0	1,118	100%

**Total Asset Growth**



**Fees & Expenses**

**Flat Sample Fees**

<b>Account Size \$(mm)</b>	<b>Mgmt (%)</b>
Balance	1.00

**Performance Sample Fees**

<b>Account Size \$(mm)</b>	<b>Mgmt (%)</b>	<b>Perf (%)</b>
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**Additional Fees/Consideration**

**Administrative/Operating Expenses:** 0.07%  
**Equity Interest in any Hedge Fund:** Yes  
 UBS O'Connor

**Other Considerations**

**Open to U.S. Taxable:** No  
**Open to U.S. Tax-Exempt:** Yes  
**UBIT incurred:** No  
**Open to ERISA Tax-Exempt:** Yes  
**Subject to 25% Limit:** Yes

1.00% is a preferred fee for Callan clients. Published fee is 1 & 10%, reflected in the performance pages that follow.

## UBS Ntrl Alph Strt CI SN Period Ended December 31, 2021

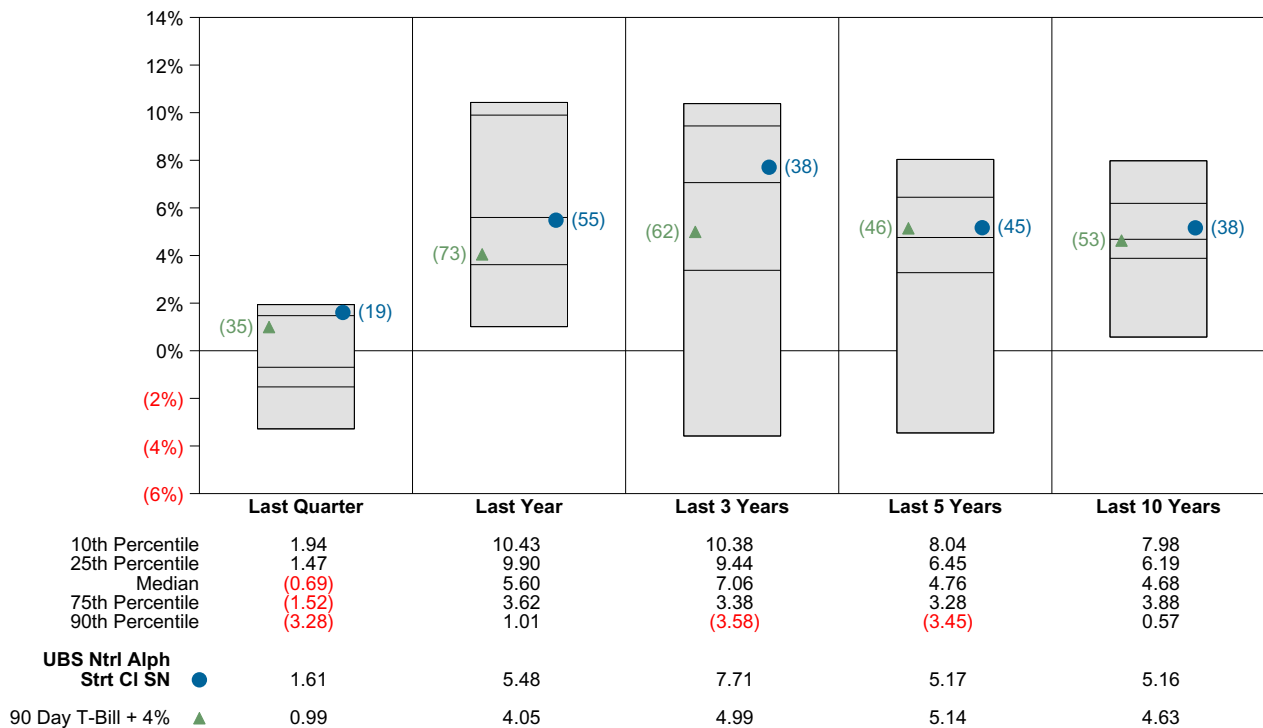
### Investment Philosophy

UBS Neutral Alpha Strategies Limited is a broad based neutral fund of funds that seeks to achieve risk-adjusted capital appreciation over the long term while maintaining zero to low correlation to traditional asset classes and low volatility over an economic market cycle (3-5 years). The fund primarily invests in a diverse set of alternative investment funds employing a range of hedged strategies, including Credit/Income, conservative Equity Hedged, Multi-Strategy, Relative Value, and Trading.

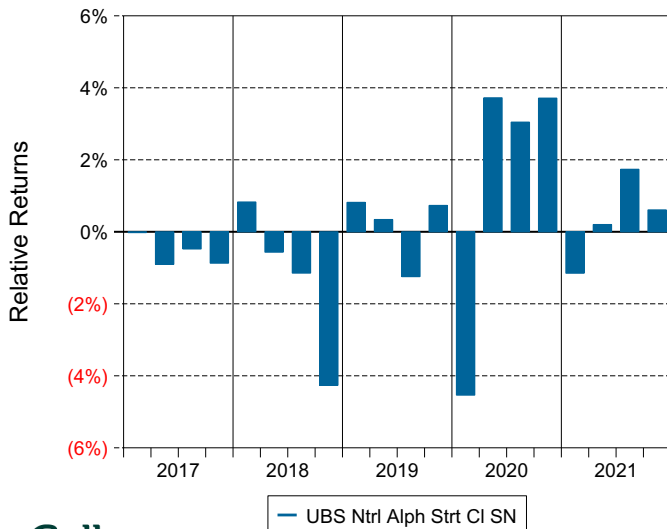
### Quarterly Summary and Highlights

- UBS Ntrl Alph Strt CI SN's portfolio posted a 1.61% return for the quarter placing it in the 19 percentile of the Callan Absolute Rtn Hedge Fund of Funds group for the quarter and in the 55 percentile for the last year.
- UBS Ntrl Alph Strt CI SN's portfolio outperformed the 90 Day T-Bill + 4% by 0.61% for the quarter and outperformed the 90 Day T-Bill + 4% for the year by 1.44%.

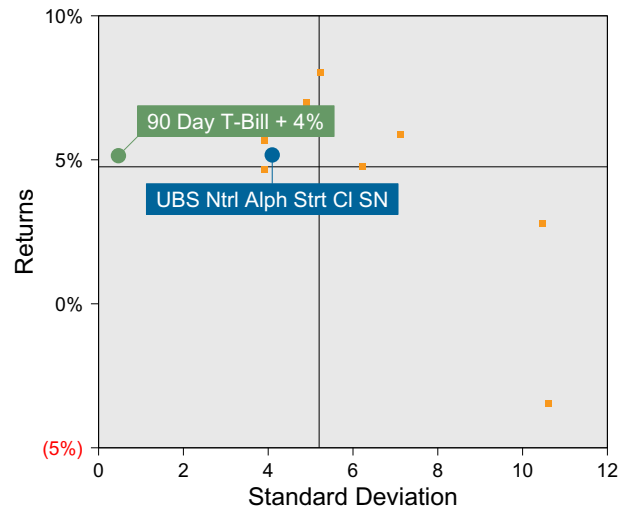
### Performance vs Callan Absolute Rtn Hedge Fund of Funds



### Relative Return vs 90 Day T-Bill + 4%



### Callan Absolute Rtn Hedge Fund of Funds Annualized Five Year Risk vs Return

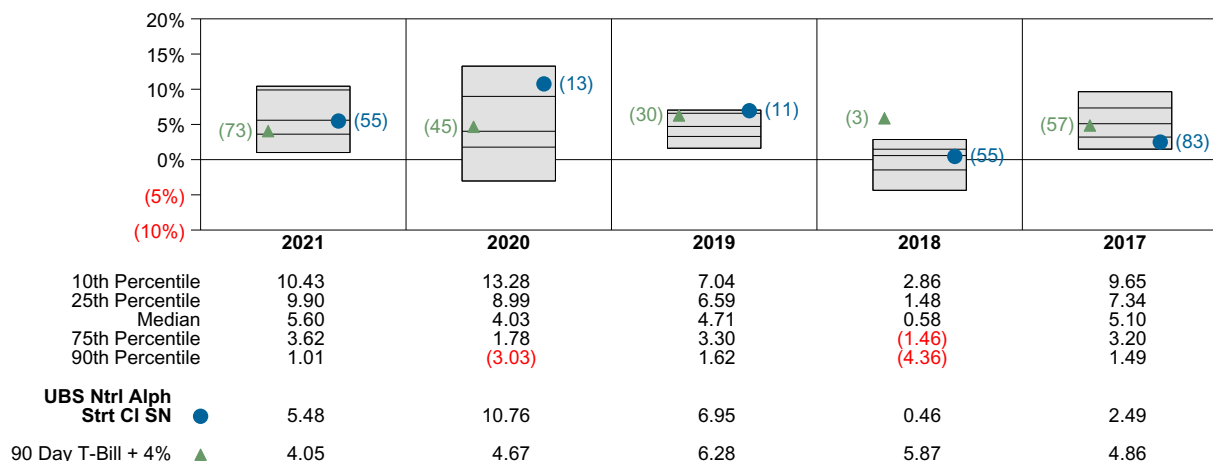


## UBS Ntrl Alph Strt CI SN Return Analysis Summary

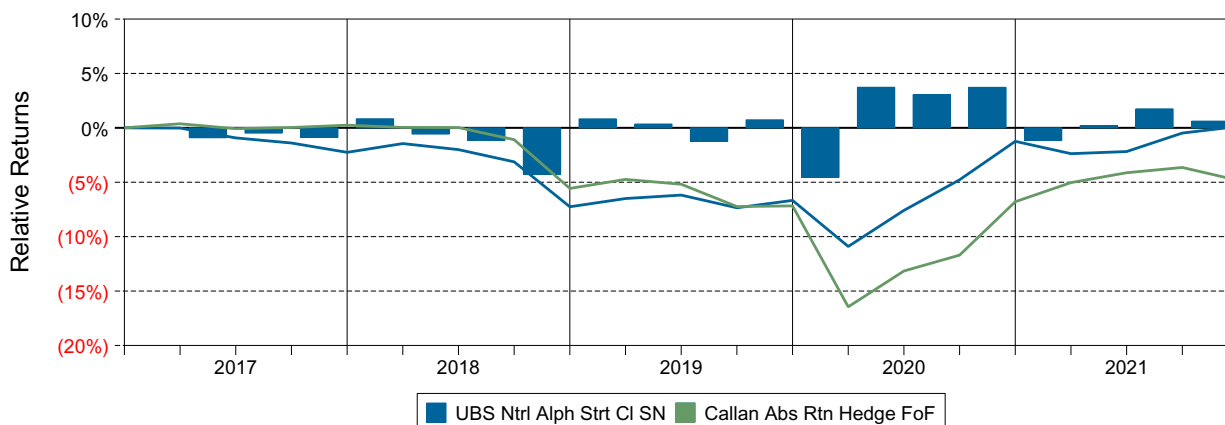
### Return Analysis

The graphs below analyze the manager's return on both a risk-adjusted and unadjusted basis. The first chart illustrates the manager's ranking over different periods versus the appropriate style group. The second chart shows the historical quarterly and cumulative manager returns versus the appropriate market benchmark. The last two charts illustrate the manager's ranking relative to their style using various risk-adjusted return measures.

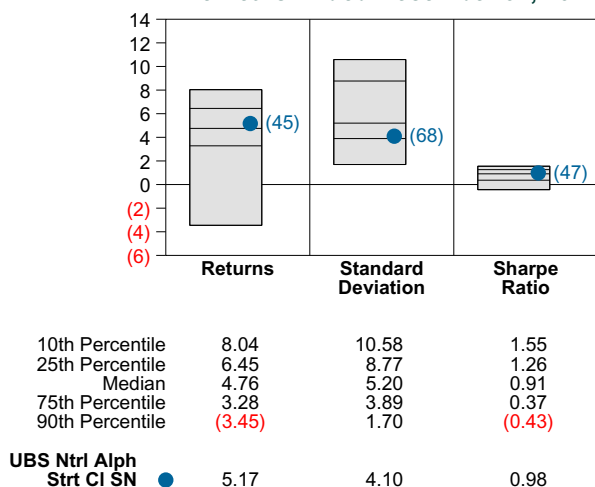
### Performance vs Callan Absolute Rtn Hedge Fund of Funds



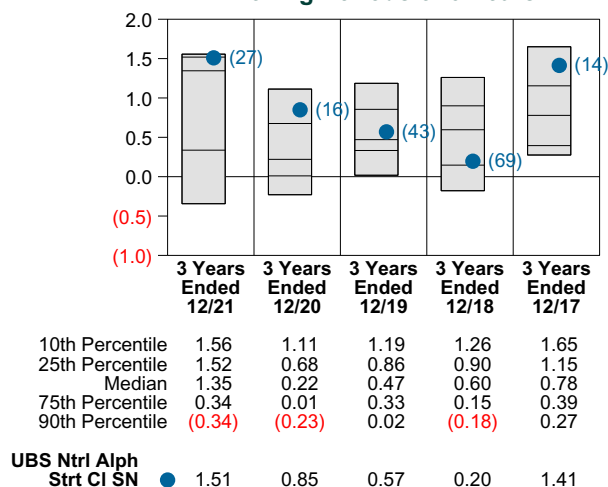
### Cumulative and Quarterly Relative Return vs 90 Day T-Bill + 4%



### Risk Adjusted Return Measures Rankings Against Callan Absolute Rtn Hedge Fund of Funds Five Years Ended December 31, 2021



### Sharpe Ratio Rankings Against Callan Absolute Rtn Hedge Fund of Funds Rolling Periods of 3 Years

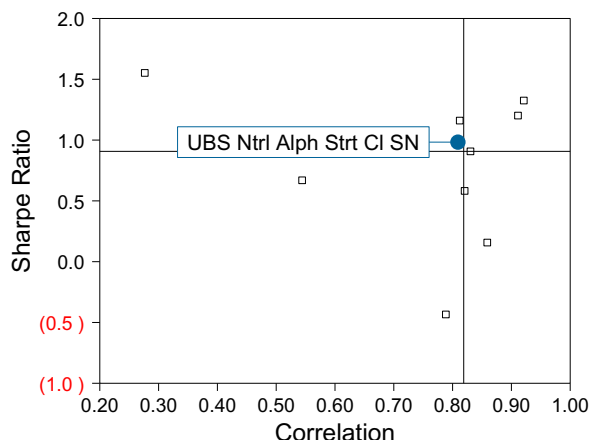
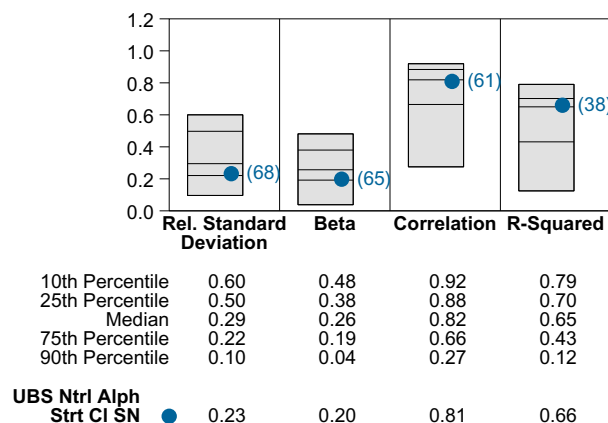


## UBS Ntrl Alph Strt CI SN Risk Analysis Summary

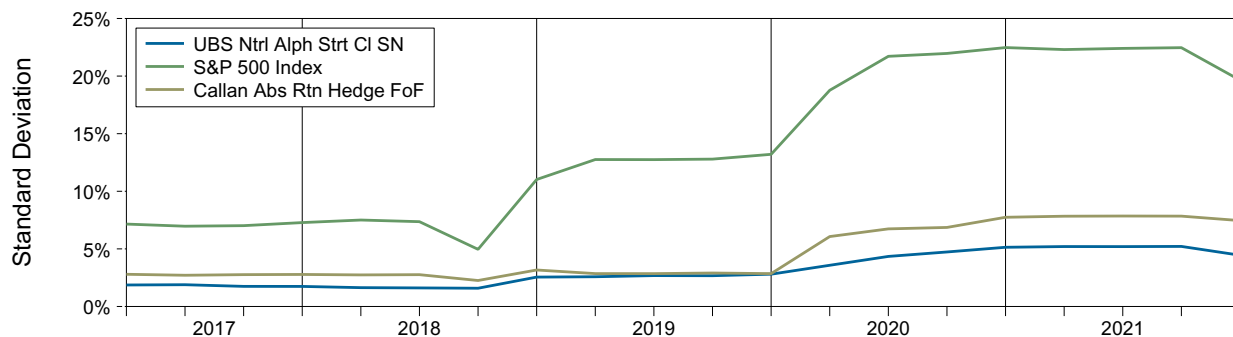
### Risk Analysis

The charts below analyze the risk or variation of a manager's return pattern as well as its correlation to the appropriate market index returns; and hence potential diversification benefits. The first chart ranks several manager risk and correlation statistics relative to an appropriate peer group. The second chart displays the Sharpe Ratio versus correlation tradeoff of the manager and the members of the peer group. The line chart in the center illustrates the changes in risk levels through multiple rolling time periods. The bottom two charts address relative return, downside risk and their tradeoff (Sortino Ratio) for the manager and the peer group.

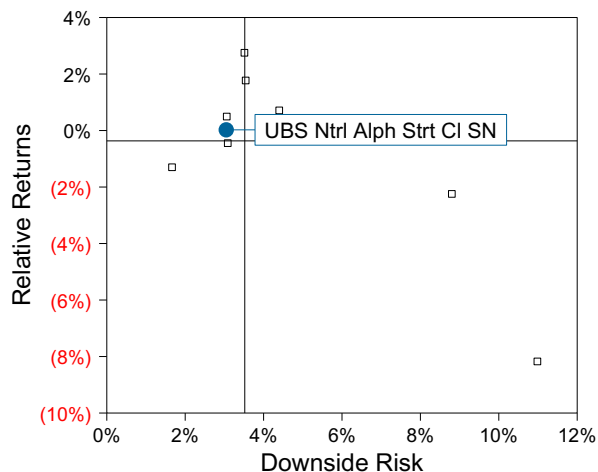
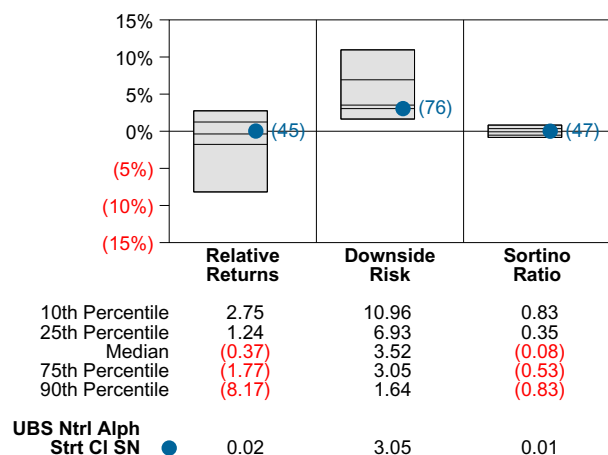
### Risk Statistics vs S&P 500 Index Rankings Against Callan Absolute Rtn Hedge Fund of Funds Five Years Ended December 31, 2021



### Rolling 12 Quarter Standard Deviation



### Downside Risk Statistics Rankings vs 90 Day T-Bill + 4% Rankings Against Callan Absolute Rtn Hedge Fund of Funds Five Years Ended December 31, 2021



# **4th Quarter 2021 Performance Report**

February 10, 2022

Employees' Retirement System



# Presentation Agenda

- Fund Overview
- Public Equity
- Fixed Income
- Absolute Return
- Private Equity
- Recent Performance Update

# Market Environment

Asset Class	Benchmark	Target Weight	Benchmark Return Q4 2021
Public Equity	MSCI ACWI IMI	44%	6.1%
Fixed Income	BBG Barclays US Agg.	23%	0.0%
Real Assets <sup>(1)</sup>	Blended Benchmark	13%	5.7%
Private Equity <sup>(1)</sup>	Russell 3000 + 2%	10%	0.4%
Absolute Return	90-Day T-Bill + 3%	10%	0.8%

	Q4 2021
<b>CMERS Benchmark</b>	<b>3.6%</b>

<sup>(1)</sup>Real Estate and Private Equity benchmark returns are reported on a 1-quarter lag.

# Relative Performance Expectations

		Q4 2021		Q4 2021	Q4 2021
<b>Value Equity Bias</b>	Russell 3000 Value	7.5%	Russell 3000 Growth	10.9%	↓
<b>Small Cap Equity Bias</b>	Russell 2000	2.1%	Russell 1000	9.8%	↓↓
<b>Fixed Income Credit</b>	Loomis Sayles (net)	-0.1%	BBG Barclays US Agg.	0.0%	
<b>Private Equity<sup>(1)</sup></b>	CMERS PE (net)	10.8%	PE Benchmark	0.4%	↑↑

	Q4 2021
<b>CMERS Total Fund (net)</b>	<b>4.9%</b>
<b>CMERS Benchmark</b>	<b>3.6%</b>

<sup>(1)</sup>Private Equity returns are reported on a 1-quarter lag.

# Total Fund Performance

## 10 Year Rolling Returns – 11/1/1997 to 12/31/2021

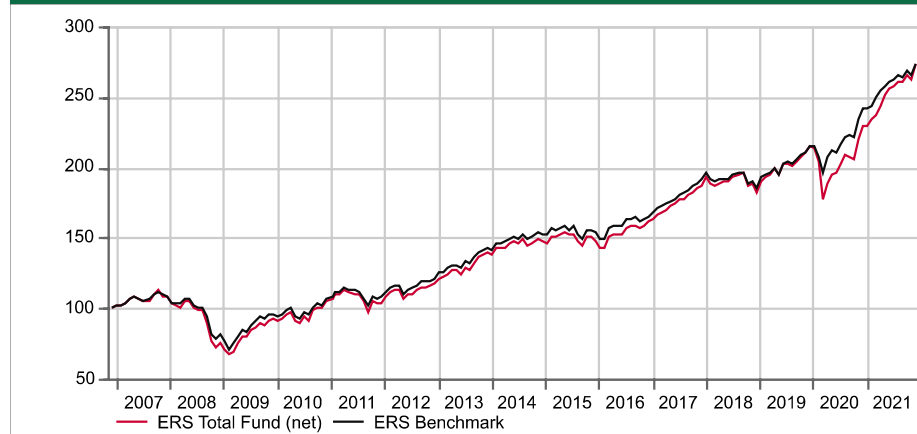


## Trailing Returns

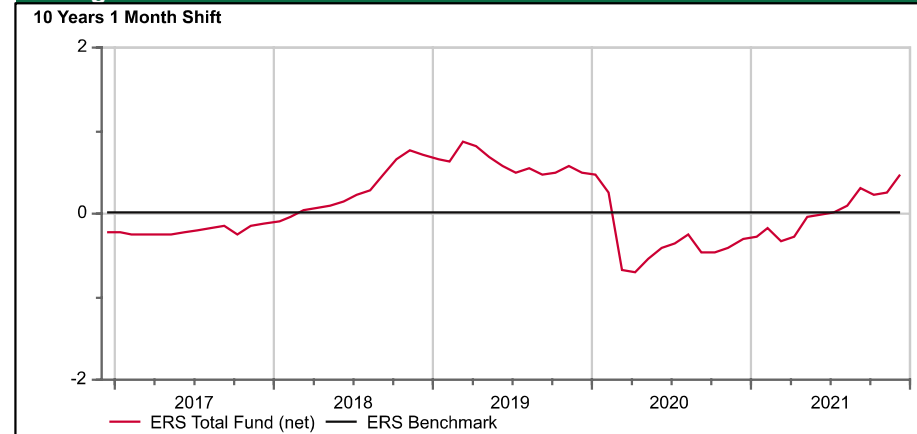
### Annualized Return

	QTR	1 Year	3 Year	5 Year	7 Year	10 Year	15 Year
ERS Total Fund (net)	4.9	18.9	14.5	11.2	9.2	10.2	6.9
ERS Benchmark	3.6	12.8	13.9	10.6	8.7	9.8	6.9

## Investment Growth – 1/1/2007 to 12/31/2021



## Rolling Excess Returns – 1/1/2007 to 12/31/2021



# ERS Fund Attribution – 4<sup>th</sup> Quarter 2021

Asset Class	Benchmark	Average Weight %	Policy Weight %	+/-	Portfolio Return	Benchmark Return	+/-	Attribution Effect(%)			
								Broad Category Group Allocation	Manager Selection	Style Bias	Total Active Return
<b>Public Equity</b>	MSCI ACWI IMI NR USD	<b>44.2</b>	<b>44.0</b>	<b>0.2</b>	<b>5.5</b>	<b>6.1</b>	<b>-0.6</b>	<b>0.0</b>	<b>0.1</b>	<b>-0.4</b>	<b>-0.3</b>
<b>Fixed Income</b>	BbgBarc US Agg Bond TR USD	<b>23.9</b>	<b>23.0</b>	<b>0.9</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>-0.1</b>	<b>0.0</b>	<b>0.0</b>	<b>-0.1</b>
<b>Real Assets<sup>(1)</sup></b>	Real Assets Benchmark	<b>12.6</b>	<b>13.0</b>	<b>-0.4</b>	<b>7.8</b>	<b>5.7</b>	<b>2.1</b>	<b>0.0</b>	<b>0.2</b>	<b>0.0</b>	<b>0.2</b>
<b>Private Equity<sup>(1)</sup></b>	Russell 3000 (Qtr Lag) + 200bps	<b>12.1</b>	<b>10.0</b>	<b>2.1</b>	<b>10.9</b>	<b>0.4</b>	<b>10.5</b>	<b>-0.1</b>	<b>1.3</b>	<b>0.0</b>	<b>1.2</b>
<b>Absolute Return</b>	90 Day T-Bill +3%	<b>7.1</b>	<b>10.0</b>	<b>-2.9</b>	<b>2.6</b>	<b>0.8</b>	<b>1.8</b>	<b>0.1</b>	<b>0.1</b>	<b>0.0</b>	<b>0.2</b>
<b>Total</b>		<b>100.0</b>	<b>100.0</b>	<b>0.0</b>	<b>4.9</b>	<b>3.6</b>	<b>1.3</b>	<b>-0.1</b>	<b>1.7</b>	<b>-0.3</b>	<b>1.3</b>

## Main Drivers of 4<sup>th</sup> Quarter 2021 Relative Performance

## Impact %

### Manager Selection

#### - Private Equity<sup>(1)</sup>

Abbott, Mesirow, PA Capital

1.3%

#### - Real Estate Core Managers<sup>(1)</sup>

ProLogis, Morgan Stanley, JP Morgan

0.2%

### Style Bias

-Public Equity Style Bias (primarily U.S. Small Cap and Value)

-0.4%

<sup>(1)</sup> Private Equity and some Real Estate returns are reported on a 1-quarter lag.

# ERS Fund Attribution – 2021

Asset Class	Benchmark <sup>(2)</sup>	Average Weight %	Policy Weight %	+/-	Portfolio Return	Benchmark Return	+/-	Attribution Effect(%)			
								Broad Category Group Allocation	Manager Selection	Style Bias	Total Active Return
Public Equity	MSCI ACWI IMI NR USD	46.2	43.8	2.2	20.6	18.2	2.4	0.1	1.3	-0.2	1.2
Fixed Income	BbgBarc US Agg Bond TR USD	23.4	23.8	0.4	-0.3	-1.5	1.3	0.1	0.3	0.1	0.4
Real Assets <sup>(1)</sup>	Real Assets Benchmark	11.8	12.5	-1.2	21.7	14.4	7.3	0.0	0.8	0.0	0.8
Private Equity <sup>(1)</sup>	Russell 3000 (Qtr Lag) + 200bps	10.5	10.0	0.5	67.9	33.9	34.0	-0.1	3.1	0.0	3.0
Absolute Return	90 Day T-Bill +3%	8.1	10.0	-1.9	8.3	3.0	5.2	0.2	0.3	0.1	0.6
Total		100.0	100.0	0.0	18.8	12.8	6.0	0.3	5.7	0.0	6.0

## Main Drivers of 2021 Relative Performance

Impact %

### Manager Selection

#### - Private Equity<sup>(1)</sup>

Abbott & Mesirow

2.8%

#### - Public Equity

DFA Mandates, William Blair, Brandes, CastleArk

1.2%

#### - Real Estate Core Managers<sup>(1)</sup>

ProLogis, Morgan Stanley, JP Morgan

0.7%

#### - UBS A&Q

0.3%

#### - Loomis Sayles

0.3%

### Asset Allocation

-Underweight Absolute Return & Overweight Public Equity

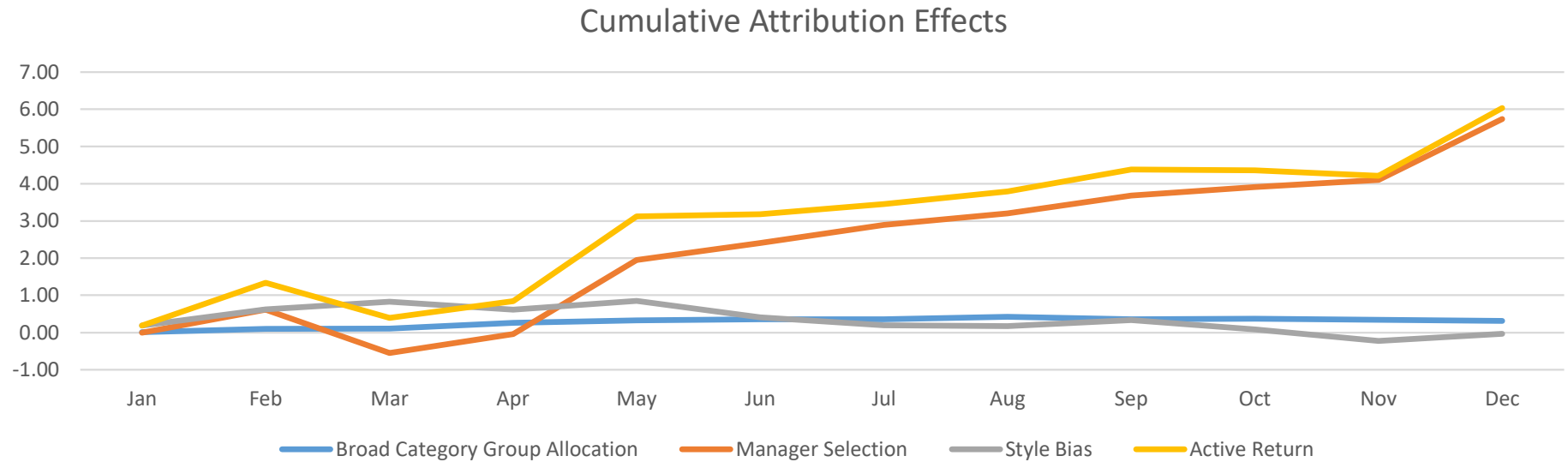
0.3%

<sup>(1)</sup>Private Equity and some Real Estate returns are reported on a 1-quarter lag.

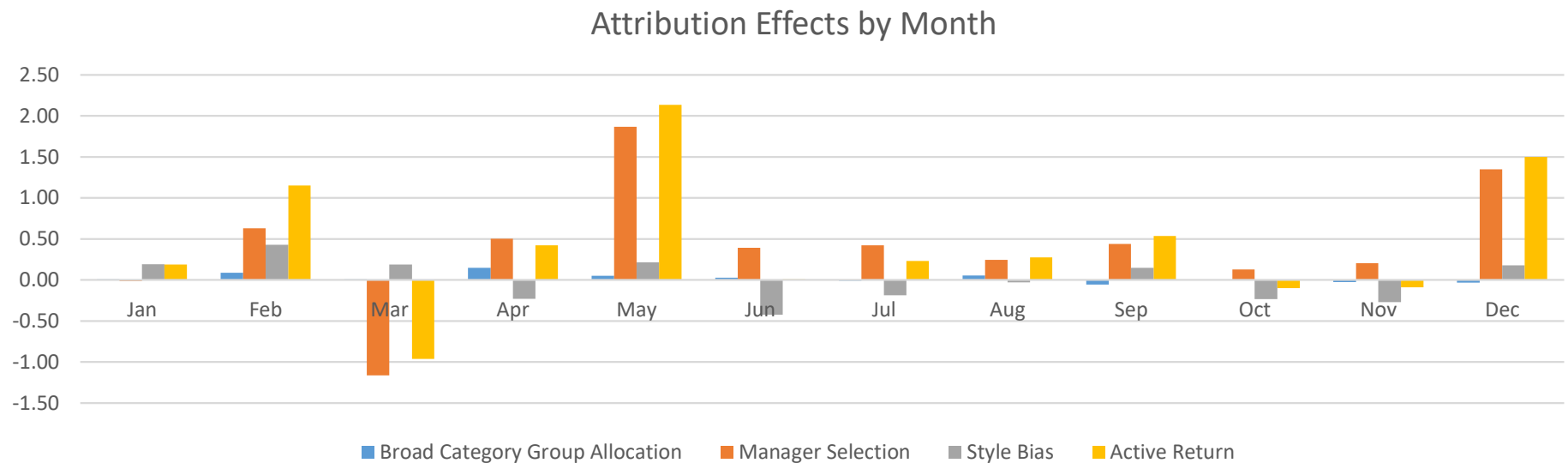
<sup>(2)</sup> Policy Weights changed effective April 1, 2021 to reflect the Strategic Policy targets approved in the December 2020 ALM Study.

# 2021 Attribution

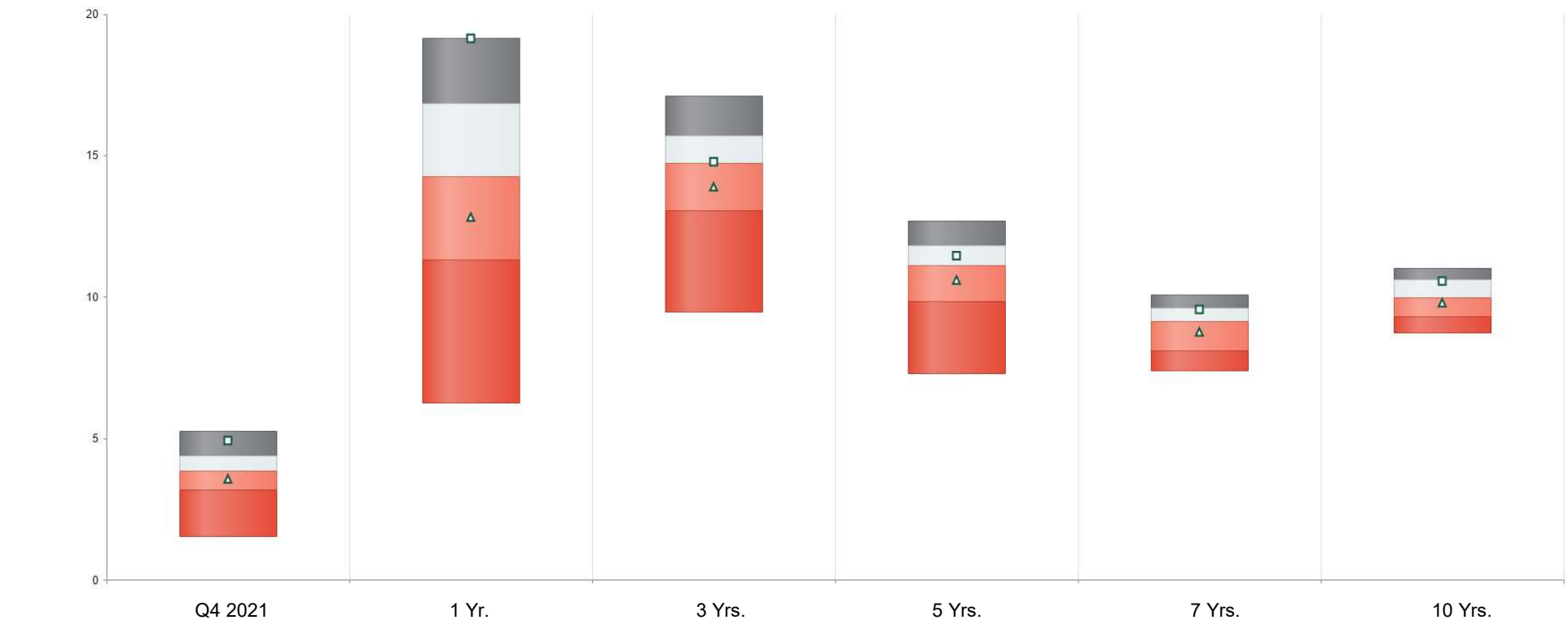
## Cumulative Attribution Effects



## Monthly Attribution Effects



# Total Fund vs Universe

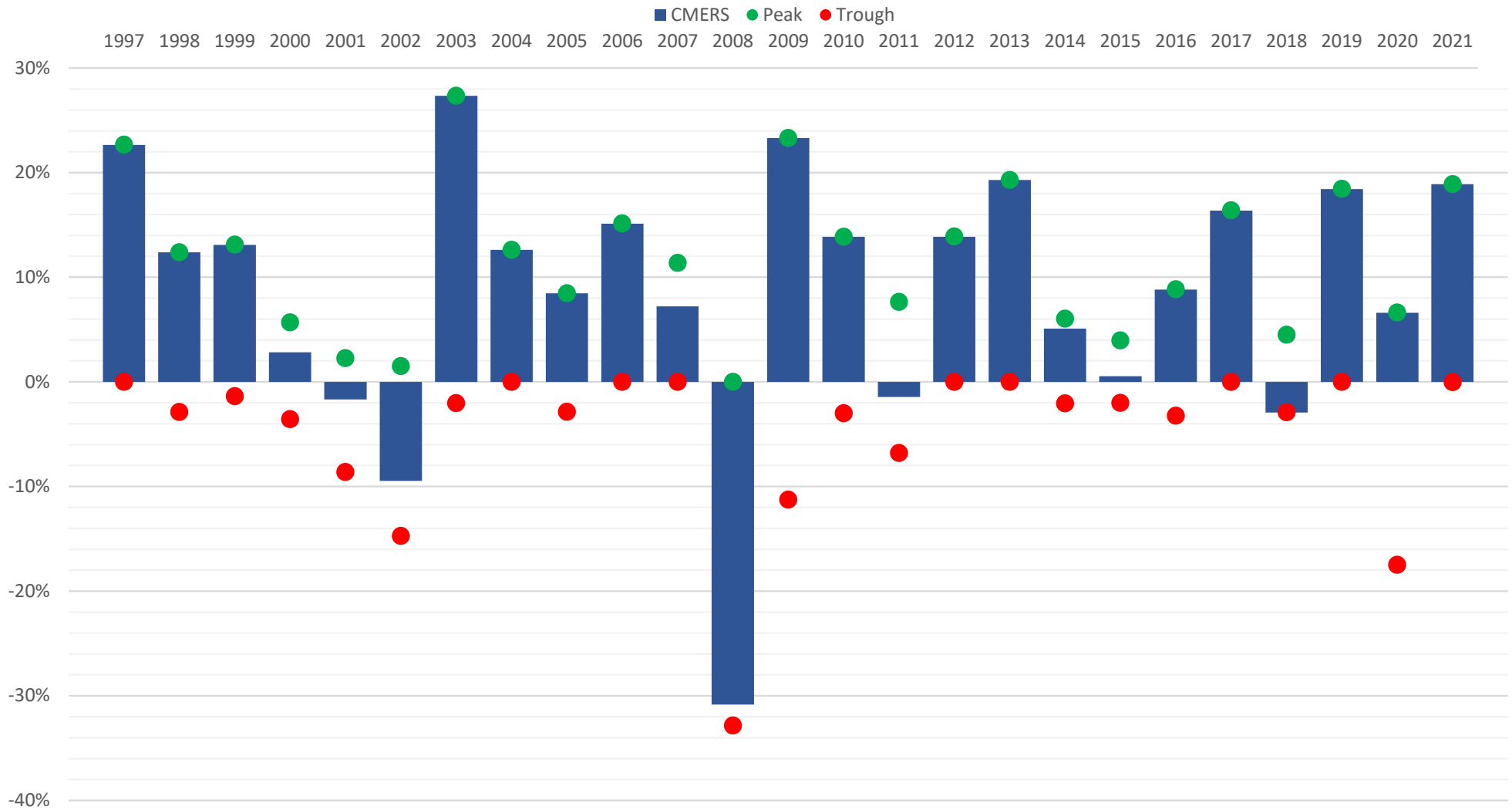


■ Account
 ▲ Index

	Q4 2021	1 Yr.	3 Yrs.	5 Yrs.	7 Yrs.	10 Yrs.
Account Return	4.9	19.1	14.8	11.5	9.5	10.6
Percentile Rank	15	11	48	40	32	27
Index Return	3.6	12.8	13.9	10.6	8.7	9.8
Percentile Rank	66	67	62	54	56	63
1st Quartile	4.4	16.8	15.7	11.8	9.6	10.6
Median	3.8	14.3	14.7	11.1	9.1	10.0
3rd Quartile	3.2	11.3	13.1	9.8	8.1	9.3
Observations	44	45	43	41	31	23



# Annual Returns, Peaks and Troughs



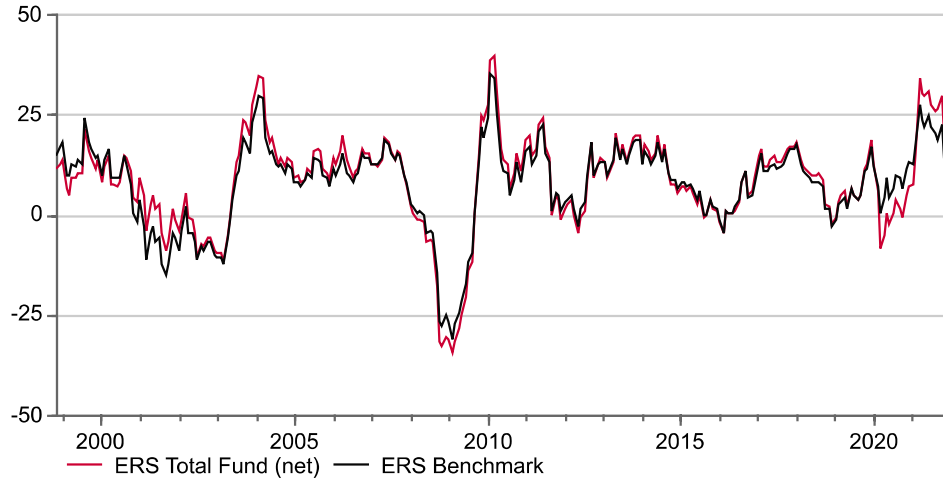
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
CMERS	22.7%	12.4%	13.1%	2.8%	-1.7%	-9.4%	27.3%	12.6%	8.5%	15.1%	7.2%	-30.8%	23.3%	13.9%	-1.4%	13.9%	19.3%	5.1%	0.5%	8.8%	16.4%	-2.9%	18.4%	6.6%	18.9%
Peak	22.7%	12.4%	13.1%	5.7%	2.3%	1.5%	27.3%	12.6%	8.5%	15.1%	11.4%	0.0%	23.3%	13.9%	7.6%	13.9%	19.3%	6.0%	4.0%	8.8%	16.4%	4.5%	18.4%	6.6%	18.9%
Trough	0.0%	-2.9%	-1.4%	-3.6%	-8.6%	-14.7%	-2.0%	0.0%	-2.9%	0.0%	0.0%	-32.9%	-11.3%	-3.0%	-6.8%	0.0%	0.0%	-2.1%	-2.0%	-3.3%	0.0%	-2.9%	0.0%	-17.5%	0.0%

\*Net of Fees

# Total Fund Rolling Returns as of December 31, 2021

## 1 Year Rolling Returns – 12/1/1997 to 12/31/2021

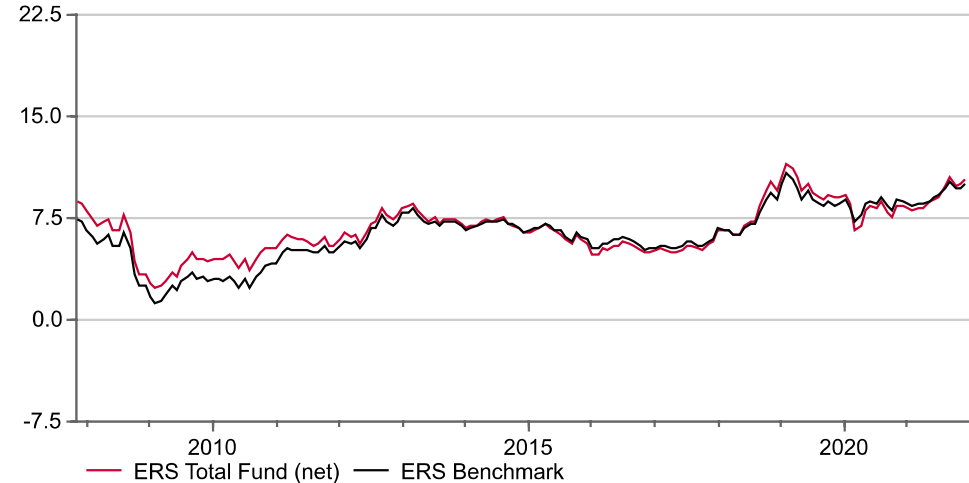
### 1 Year 1 Month Shift



©FactSet Research Systems

## 10 Year Rolling Returns – 12/1/1997 to 12/31/2021

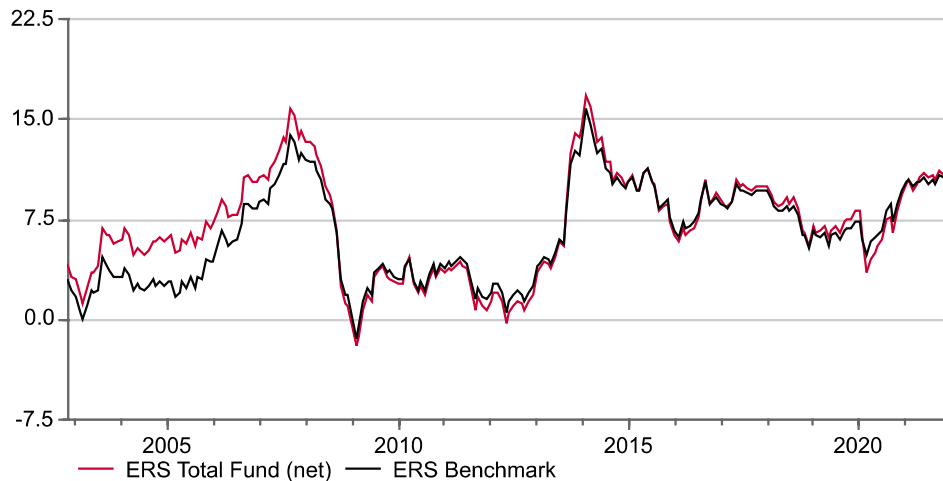
### 10 Years 1 Month Shift



©FactSet Research Systems

## 5 Year Rolling Returns – 12/1/1997 to 12/31/2021

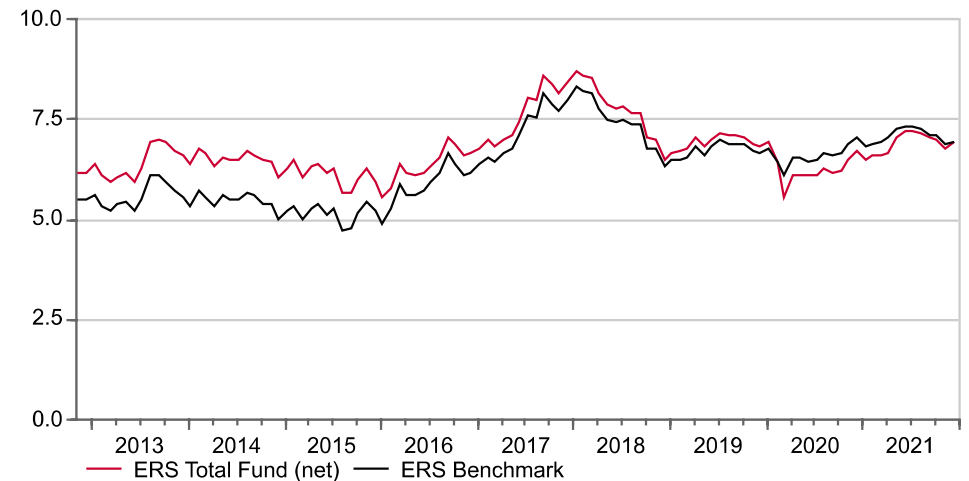
### 5 Years 1 Month Shift



©FactSet Research Systems

## 15 Year Rolling Returns – 12/1/1997 to 12/31/2021

### 15 Years 1 Month Shift

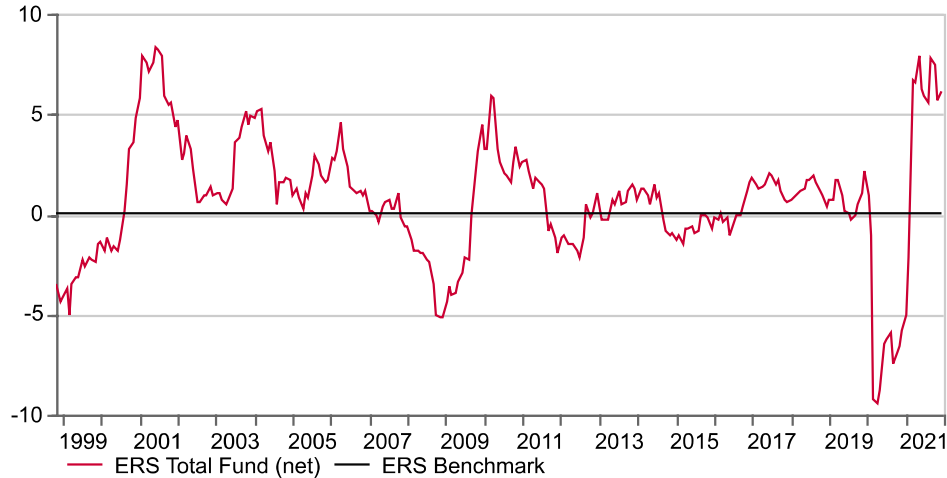


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# Total Fund Rolling Excess Returns as December 31, 2021

## 1 Year Rolling Excess Returns – 12/1/1997 to 12/31/2021

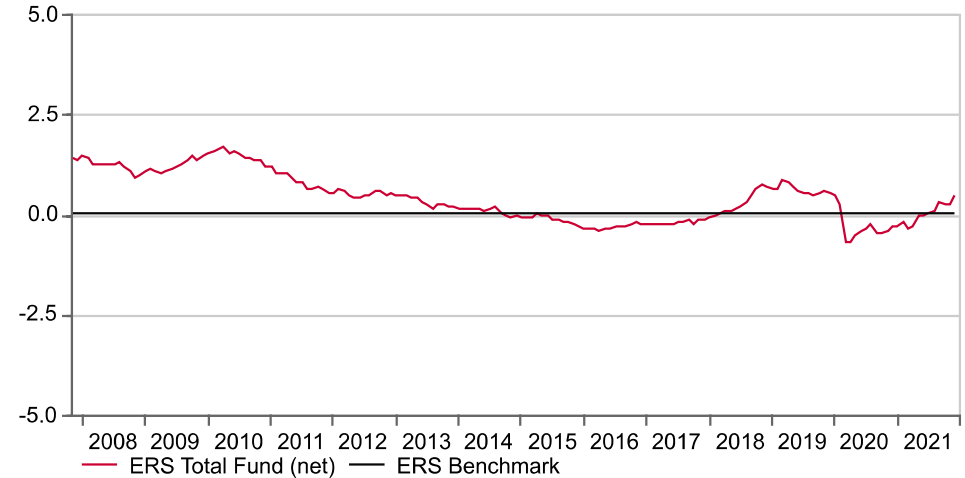
### 1 Year 1 Month Shift



©FactSet Research Systems

## 10 Year Rolling Excess Returns – 12/1/1997 to 12/31/2021

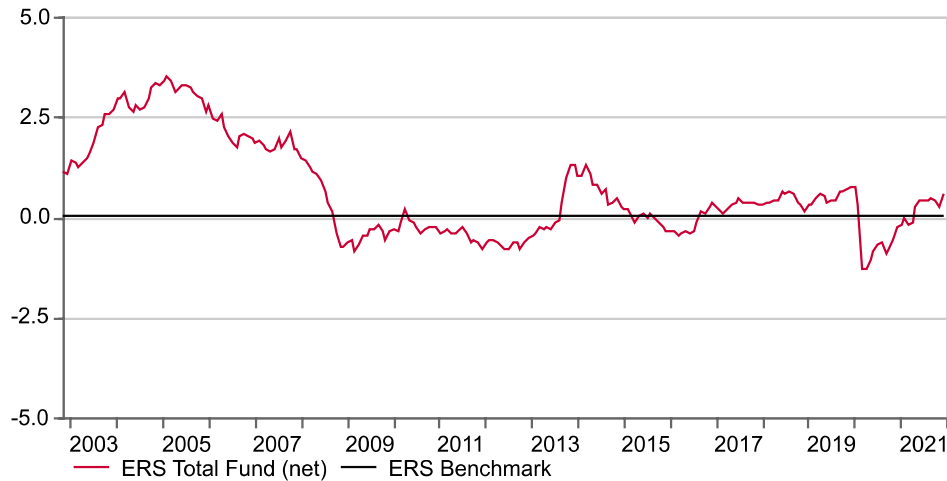
### 10 Years 1 Month Shift



©FactSet Research Systems

## 5 Year Rolling Excess Returns – 12/1/1997 to 12/31/2021

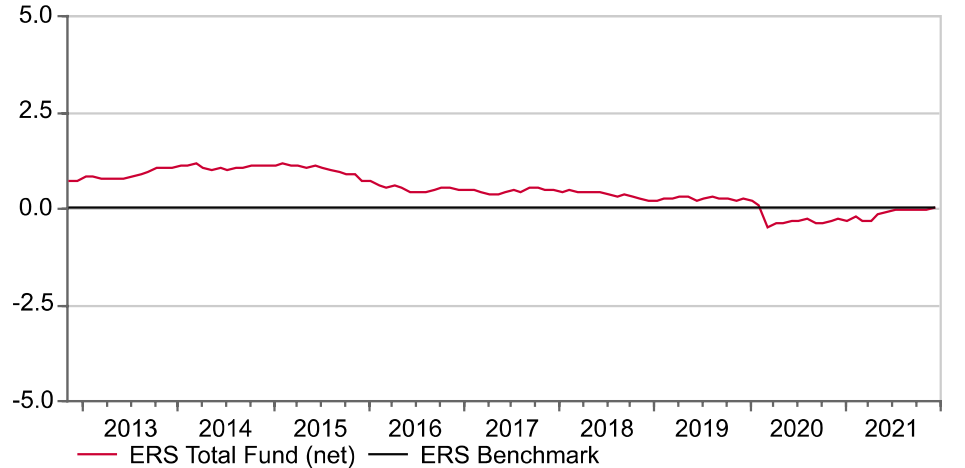
### 5 Years 1 Month Shift



©FactSet Research Systems

## 15 Year Rolling Excess Returns – 12/1/1997 to 12/31/2021

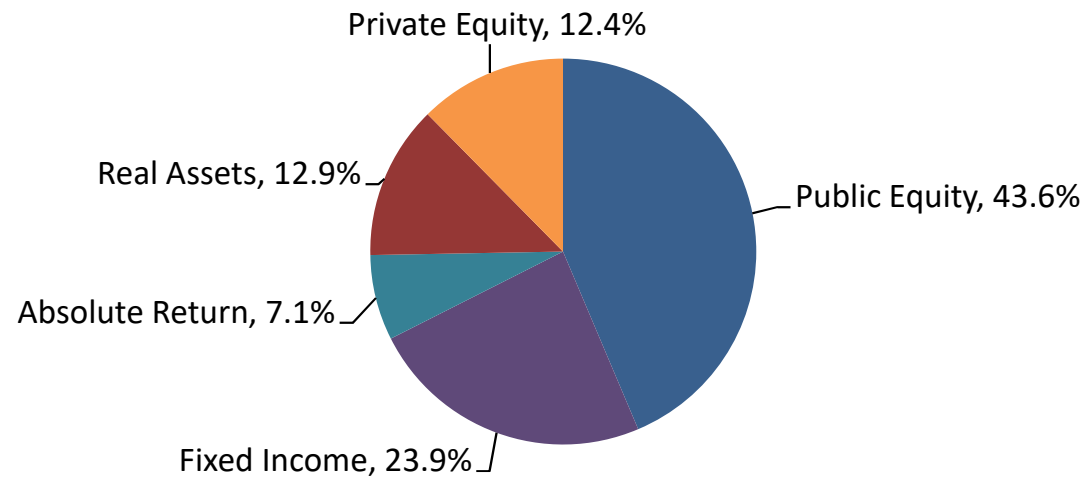
### 15 Years 1 Month Shift



©FactSet Research Systems

# Asset Allocation as of December 31, 2021

## Actual Asset Allocation\*



## Actual Asset Allocation vs. Policy Target



# Fund Value of Assets: 2007 – 2021

(Reflects 12/31 Fund Values)

## Market Value of Fund Assets



Most recent Actuarial valuation projects benefit payments to total \$5.1 billion in next 10 years.

<b>Benefit Payments</b>	\$4.7 billion
<b>Expenses</b>	\$247 million
<b>Contributions</b>	\$1.3 billion
<b>Investment Gain</b>	\$4.7 billion

14 Year Estimates (1/1/2008 - 12/31/2021)

Benefit Payments, Expenses, Contributions, and Investment Gain amounts are calculated using estimates of cash flows into and out of the Fund. These amounts are not audited and may not tie to CMERS Financial Statements.

# 2021 Market Value Change

December 31, 2020 Market Value including City Reserve & PABF Accounts			\$ 5,565,502,643
Monthly Cash Outflows thru	<u>December 31, 2021</u>		
Retiree Payroll Expense		\$ (431,647,056)	
PABF Payroll Expense		\$ (66,222)	
Expenses Paid		\$ (16,160,152)	
GPS Benefit Payments		\$ (13,212,507)	
Sub-Total Monthly Cash Outflows			\$ (461,085,938)
Monthly Cash Inflows thru	<u>December 31, 2021</u>		
Contributions		\$ 117,161,851	
PABF Contribution		\$ 69,238	
Sub-Total Monthly Contributions			\$ 117,231,088
City Reserve Fund Contribution			\$ 8,000,000
Capital Market Gain/(Loss)			<u>\$ 1,030,486,955</u>
Value including City Reserve & PABF Accounts as of	<u>December 31, 2021</u>		<u>\$ 6,260,134,748</u>
Less City Reserve Account <sup>1</sup>			\$ 42,080,935
Less PABF Fund <sup>2</sup>			\$ 2,500
Net Projected ERS Fund Value as of	<u>December 31, 2021</u>		<u><u>\$ 6,218,051,313</u></u>

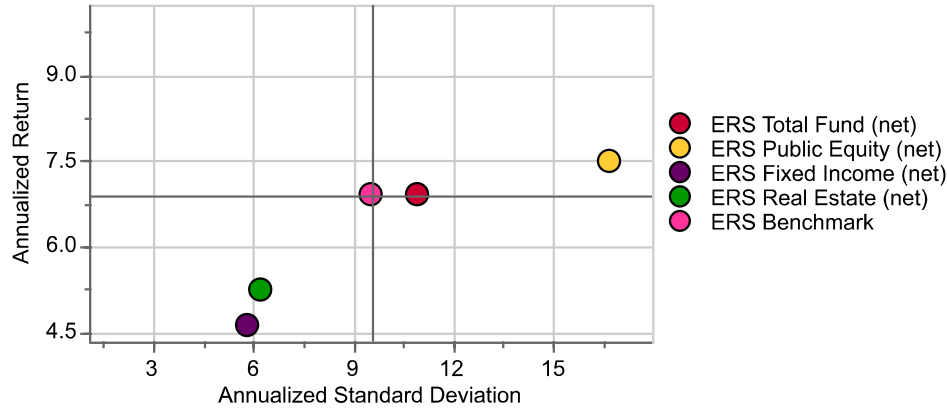
1 The City Reserve Account balance equals the market value currently held in the Baird account.

2 PABF Fund balance equals the market value currently held in the PABF account.

Monthly Cash Outflows, Monthly Cash Inflows, and Capital Market Gain/(Loss) amounts are calculated using estimates of cash flows into and out of the Fund. These amounts are not audited and may not tie to CMERS Financial Statements.

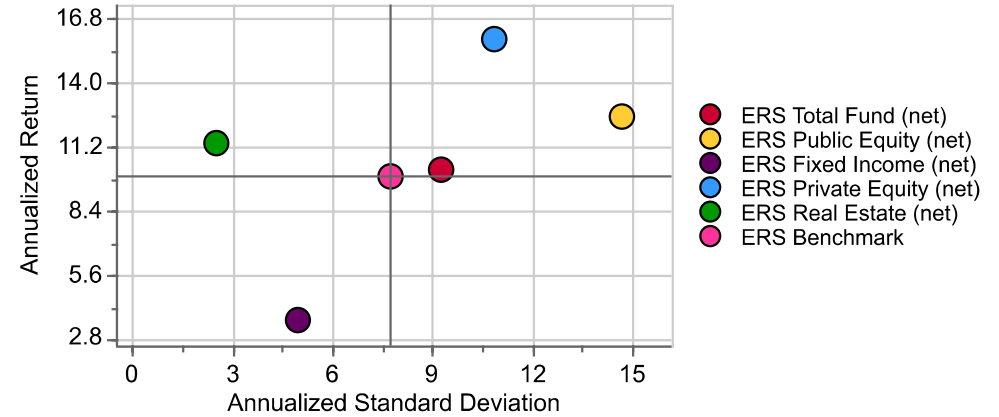
# Total Fund Statistics

## 15 Year Risk-Reward-1/1/2007 to 12/31/2021



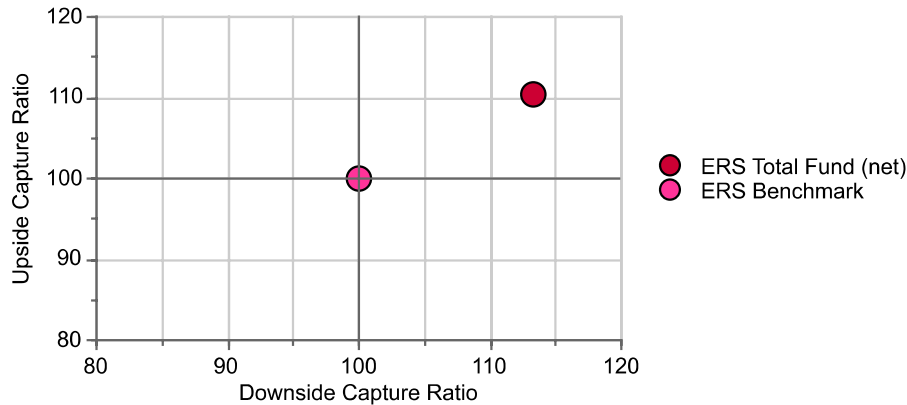
©FactSet Research Systems

## Risk-Reward Since Private Equity Inception – 7/1/2010 to 12/31/2021



©FactSet Research Systems

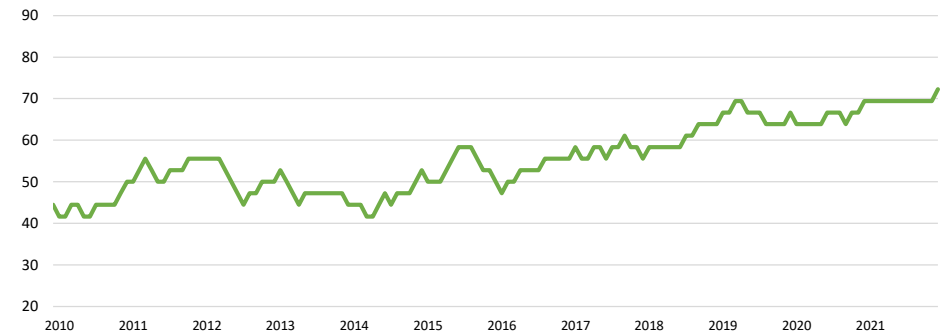
## 15 Year Upside-Downside –1/1/2007 to 12/31/2021



©FactSet Research Systems

## Batting Average

Rolling Window: 3 years  
Time Period: 1/1/2007 to 12/31/2021



## 15 Year Risk –1/1/2007 to 12/31/2021

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Total Fund (net)	6.9	10.9	-0.1	0.6	0.0	2.6	1.1
ERS Benchmark	6.9	9.5	0.0	0.6	--	--	1.0

## Risk – 7/1/2013 to 12/31/2021

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Total Fund (net)	9.7	8.7	-0.1	1.0	0.1	3.0	1.2
ERS Benchmark	9.3	6.9	0.0	1.2	--	--	1.0

# Notable CMERS Manager Events

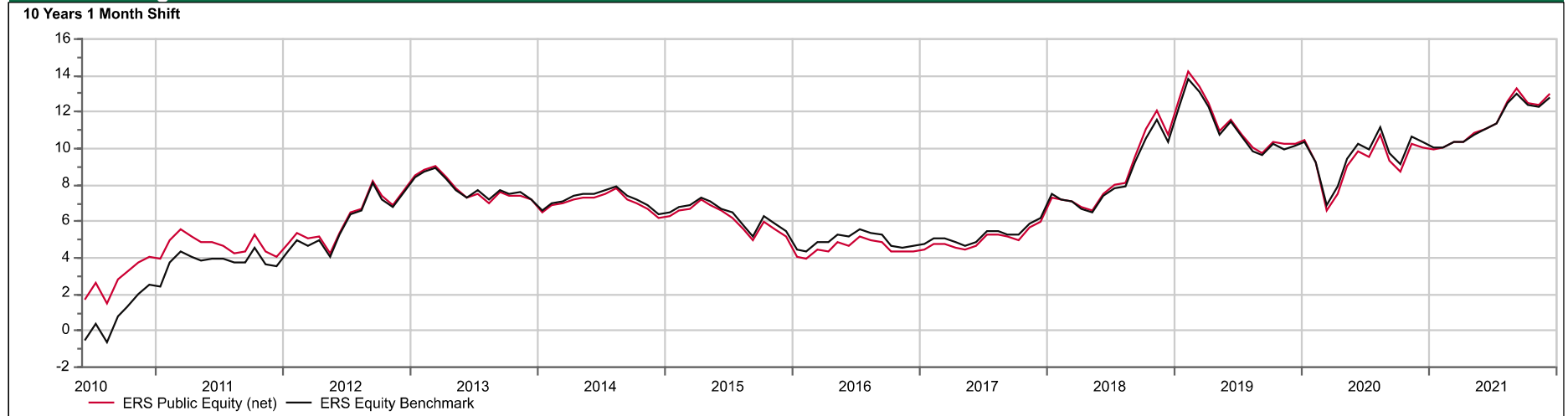
Manager	Event	Date
William Blair	Ken McAtamney, head of Blair's global equity team and PM on our International Growth strategy, is being added as a PM on Blair's Emerging Markets Leaders strategy. Andy Siepker, who has been a research analyst at Blair since 2006, is being added as a PM on our International Growth strategy. Mr. Siepker will retain his research analyst responsibilities. These new roles are not expected to change the philosophy or process of the International Growth strategy. ERS Staff and Callan will continue to monitor the change.	January 2022



# Public Equity

# Public Equity Performance

## 10 Year Rolling Returns – 7/1/2000 to 12/31/2021

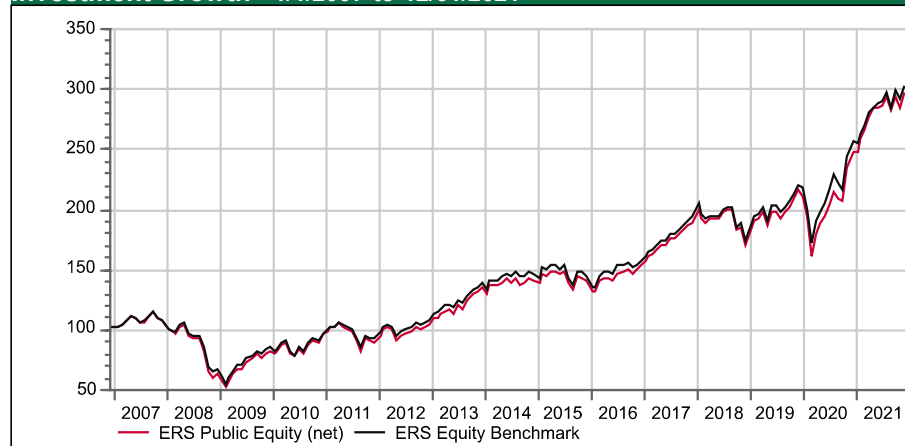


## Trailing Returns

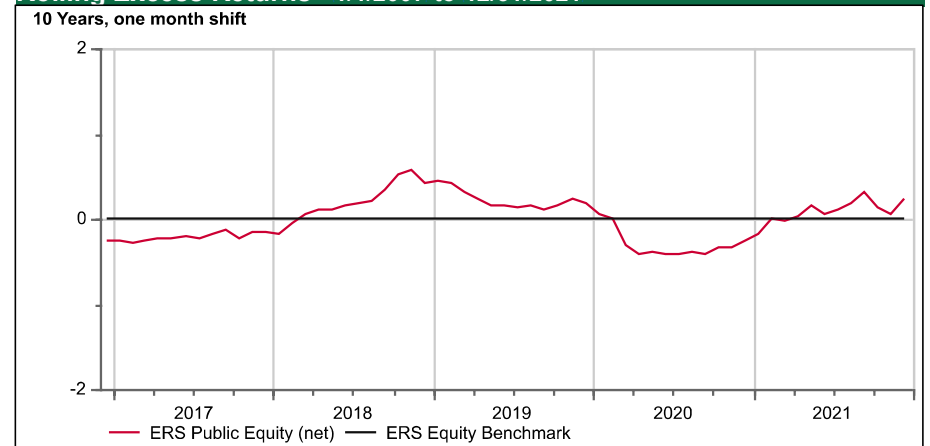
### Annualized Return

	QTR	1 Year	3 Year	5 Year	7 Year	10 Year	15 Year
ERS Public Equity (Gross)	5.6	21.0	20.9	14.7	11.7	13.3	7.9
ERS Public Equity (Net)	5.5	20.6	20.5	14.3	11.3	12.9	7.5
ERS Public Equity Benchmark	6.1	18.2	20.2	14.1	11.1	12.7	7.6
MSCI AC World IMI	6.1	18.2	20.2	14.1	10.8	11.8	7.2

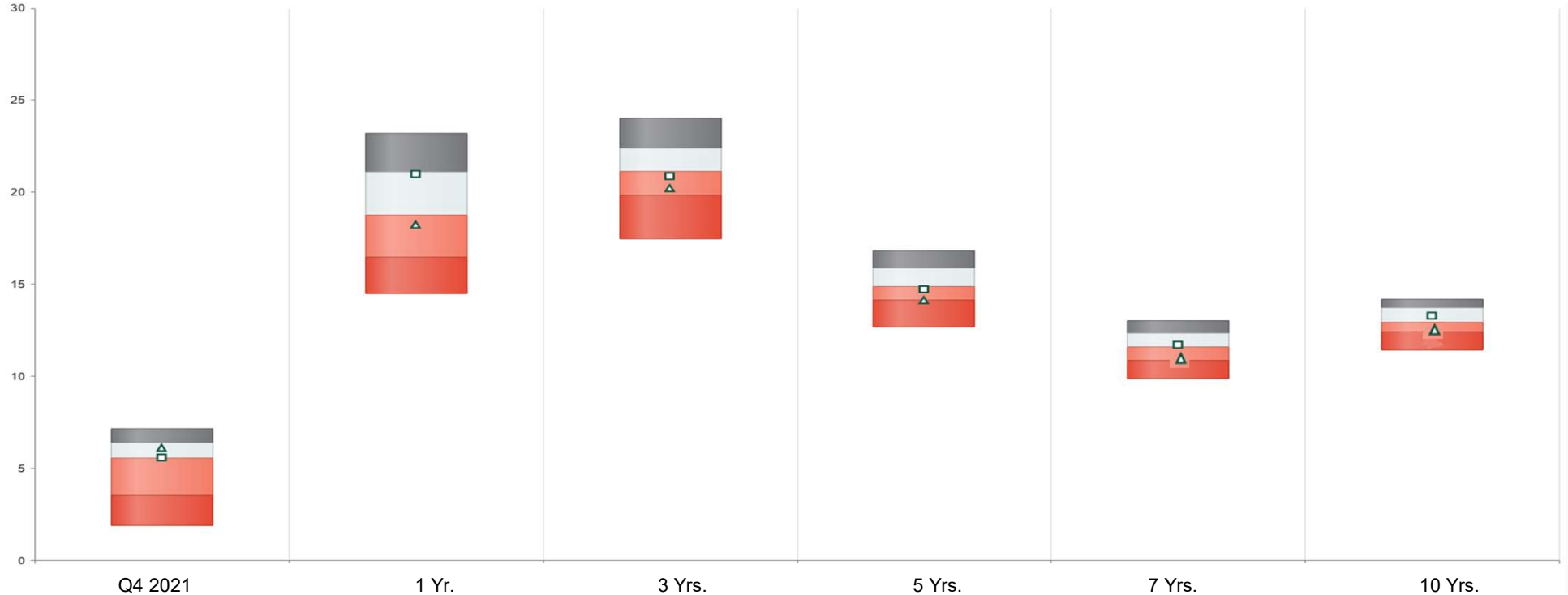
## Investment Growth –1/1/2007 to 12/31/2021



## Rolling Excess Returns –1/1/2007 to 12/31/2021



# Public Equity vs Universe

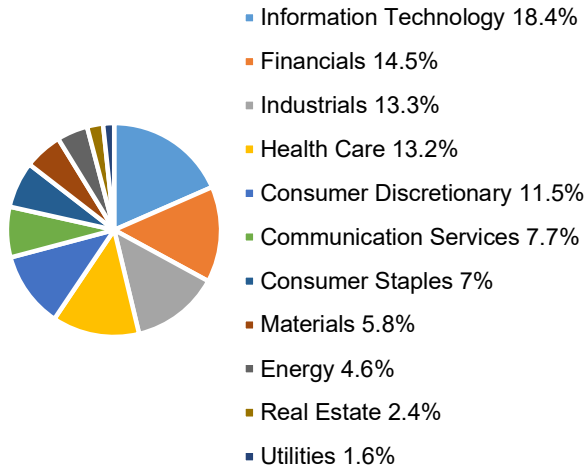


□ Account
 △ Index

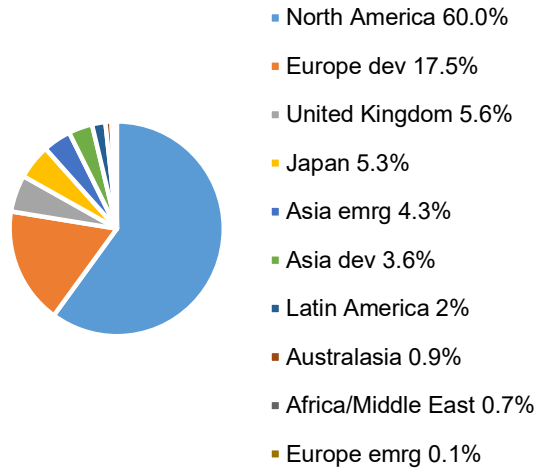
	<b>Q4 2021</b>	<b>1 Yr.</b>	<b>3 Yrs.</b>	<b>5 Yrs.</b>	<b>7 Yrs.</b>	<b>10 Yrs.</b>
Account Return	5.6	21.0	20.9	14.7	11.7	13.3
Percentile Rank	50	27	55	56	44	42
Index Return	6.1	18.2	20.2	14.1	11.1	12.7
Percentile Rank	39	58	72	76	3rd Quartile	3rd Quartile
1st Quartile	6.4	21.1	22.4	15.9	12.3	13.7
Median	5.6	18.8	21.1	14.9	11.6	12.9
3rd Quartile	3.5	16.5	19.8	14.1	10.9	12.4
Observations	137	135	136	135	126	111

# Public Equity Portfolio Snapshot

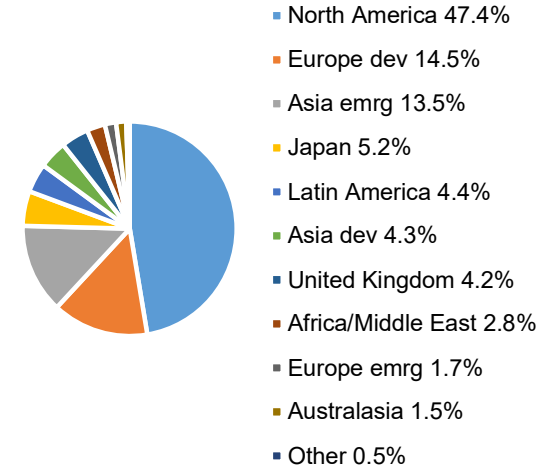
## Equity Sector Exposure (GICS)



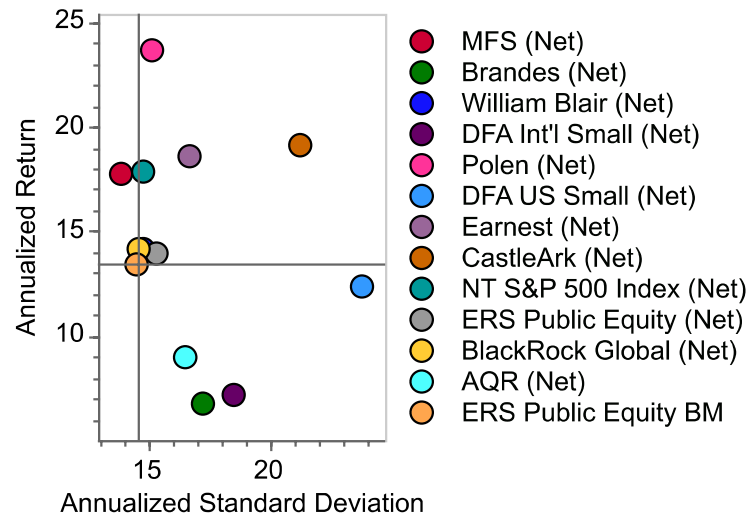
## Regional Exposure by Domicile



## Regional Exposure by Source of Revenue



## Risk – Reward – 8/1/2016 to 12/31/2021



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## Top 10 Holdings

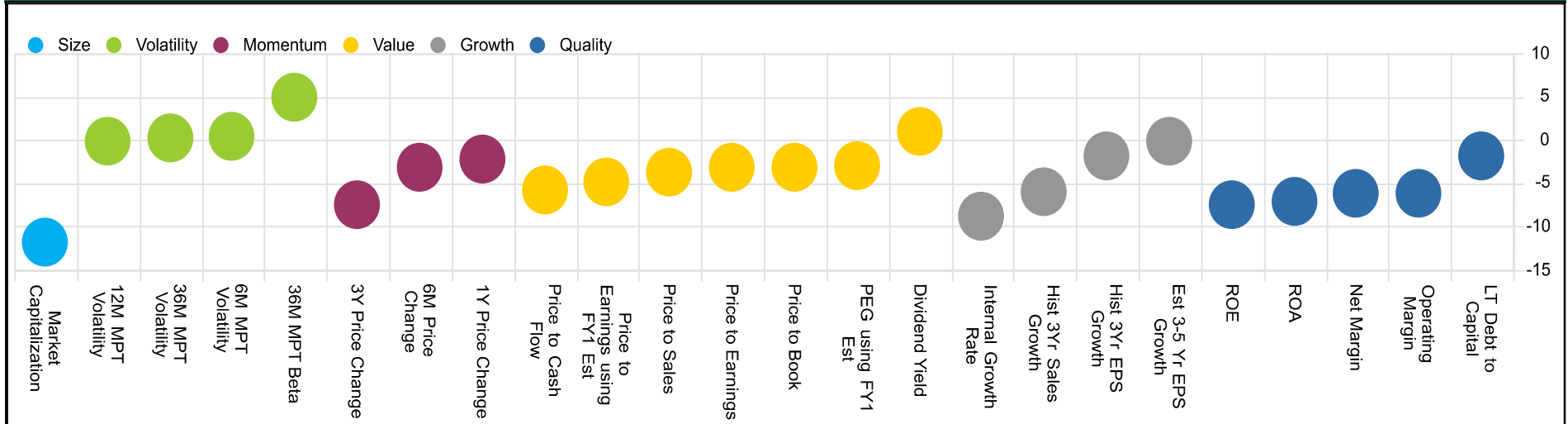
Portfolio Date 6/30/21	Weight %	Return %
Microsoft Corporation	1.9	19.5
Alphabet Inc.	1.8	8.5
Apple Inc.	1.5	25.7
Amazon.com, Inc.	1.1	1.5
Meta Platforms, Inc.	0.6	-0.9
Accenture plc	0.6	29.9
Visa Inc.	0.6	-2.5
Alibaba Group Holding	0.6	-16.5
Abbott Laboratories	0.6	19.6
Taiwan Semi Mfg. Co.	0.6	7.9

## Top 10 Managers

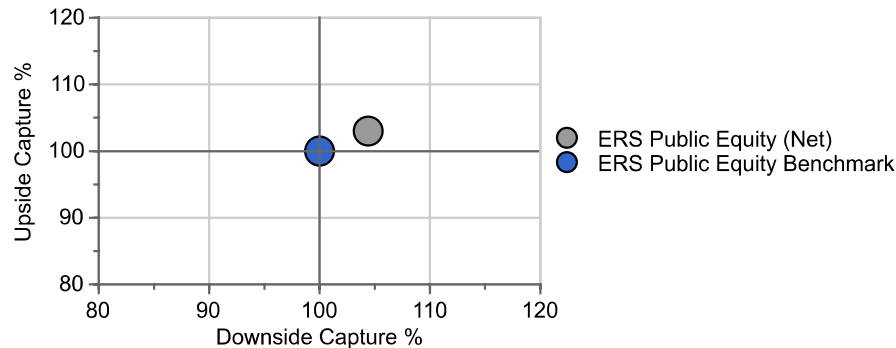
Portfolio Date 12/31/21	Weight %
Brandes Int'l Value	14.2
NTQA S&P 500 Index Core	12.1
BlackRock Global Core	11.4
William Blair Int'l Growth	10.9
MFS Global Growth	7.5
DFA US Small Cap Value	7.3
DFA Int'l Small Cap Value	7.3
BlackRock R1000 Value Index	6.0
DFA US Large Cap Value	5.9
Polen US Large Cap Growth	5.7

# Public Equity Statistics

## Characteristics Tilt vs MSCI ACWI IMI 12/31/2021

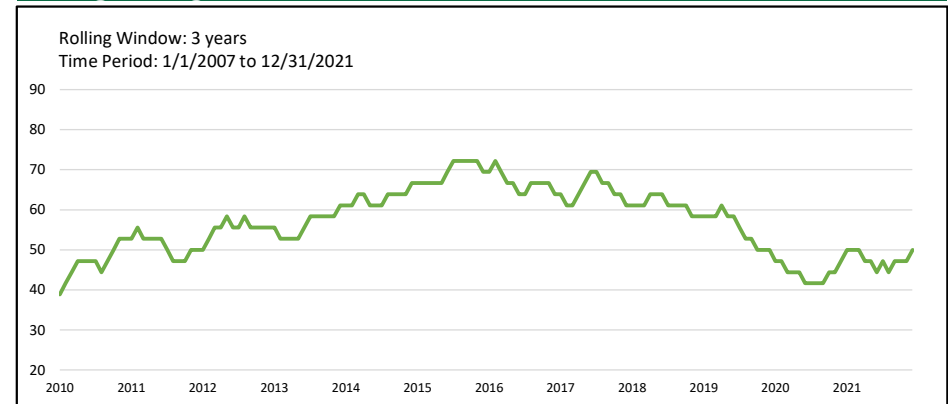


## 15 Year Upside-Downside –1/1/2007 to 12/31/2021



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## Batting Average



## 15 Year Risk –1/1/2007 to 12/31/2021

	Annualized Return	Standard Deviation	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Public Equity (Net)	7.5	16.7	0.0	0.4	0.0	1.7
ERS Public Equity Benchmark	7.6	15.9	0.0	0.4	--	1.0

## Risk – 7/1/2013 to 12/31/2021

	Annualized Return	Standard Deviation	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Public Equity (Net)	12.1	14.2	0.0	0.8	0.1	1.7
ERS Public Equity Benchmark	11.8	13.6	0.0	0.8	--	1.0

# Public Equity Valuation Characteristics

As of December 31, 2021.

	Price/ Earnings	P/E using FY2 Est	Price/ Book	Price/ CF	Dividend Yield
ERS Public Equity	15.9	14.7	1.8	11.0	1.71
MSCI AC World IMI	19.0	17.3	2.8	13.8	1.67

Domestic Managers	Price/ Earnings	P/E using FY2 Est	Price/ Book	Price/ CF	Dividend Yield
BlackRock R1000 Value Index	17.6	16.2	2.6	13.1	1.84
CastleArk Small Growth	28.3	23.4	5.0	23.6	0.16
DFA Large Value	13.6	12.6	2.1	9.7	1.88
DFA Small Value	11.2	10.4	1.3	7.5	1.36
Earnest Mid Core	18.3	16.5	3.2	16.5	1.06
NT S&P 500 Index	24.4	21.1	4.6	18.7	1.25
Polen Large Growth	42.9	37.0	11.6	35.3	0.32

Global & International Managers	Price/ Earnings	P/E using FY2 Est	Price/ Book	Price/ CF	Dividend Yield
AQR Emerging Markets Core	8.4	8.3	1.4	5.5	3.65
BlackRock Global Core	20.5	18.2	3.3	15.2	1.57
Brandes Int'l Value	10.7	9.4	1.0	6.1	3.77
DFA Int'l Small Value	9.6	10.1	0.8	6.1	2.61
MFS Global Growth	27.6	24.3	5.4	22.7	0.88
William Blair Int'l Growth	32.9	30.1	6.0	30.8	0.72

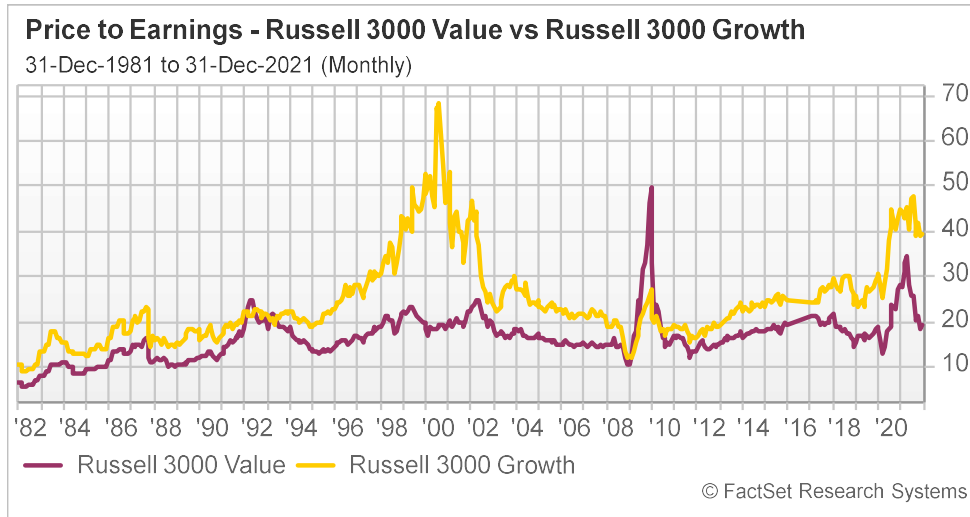
\*"Price/Earnings" and "P/E using FY2 Est" values exclude companies with negative earnings from calculations.

# P/E Ratio Comparisons in the U.S. Since 1980 - As of December 31, 2021

## Value vs. Growth



## Large vs. Small



Price to Earnings ratios for Value vs. Growth charts include companies with negative earnings in calculations.

Price to Earnings ratios for Large vs Small: Top chart includes companies with negative earnings in calculations; bottom chart excludes companies with negative earnings from calculation.

# Relative Investment Performance – Active Equity Managers

## As of December 31, 2021

### Outperforming Equity Managers

	4th Qtr	1 Year	3 Year	5 Year	7 Year	10 Year
Earnest <i>Russell MidCap</i>	11.4% 5.0%	25.4% 2.8%	27.8% 4.5%	18.7% 3.6%	15.5% 3.3%	16.4% 1.5%
CastleArk <i>Russell 2000 Growth</i>	4.8% 4.8%	11.6% 8.7%	25.3% 4.2%	20.0% 5.5%	13.8% 2.2%	N/A
DFA U.S. Small Value <i>Russell 2000 Value</i>	6.6% 2.2%	40.4% 12.1%	20.0% 2.0%	9.6% 0.5%	9.6% 0.2%	13.2% 1.1%
DFA International <i>MSCI EAFE Small Cap</i>	2.0% 1.9%	15.9% 5.8%	12.2% 3.4%	6.8% 4.3%	6.5% 3.0%	9.1% 1.7%
MFS <i>MSCI ACWI</i>	8.4% 1.7%	19.1% 0.5%	25.6% 5.2%	20.3% 5.9%	14.8% 3.9%	N/A
William Blair <i>MSCI ACWI ex US</i>	2.5% 0.6%	12.8% 4.5%	24.5% 10.8%	16.0% 5.8%	10.9% 3.8%	11.7% 3.9%
BlackRock Global Alpha Tilts <i>MSCI ACWI</i>	7.1% 0.4%	18.7% 0.1%	20.4% 0.0%	14.8% 0.4%	N/A	N/A
AQR <i>MSCI EM</i>	-1.2% 0.1%	0.2% 2.8%	12.1% 1.2%	9.3% 0.5%	N/A	N/A
ERS Public Equity <i>ERS Equity Benchmark</i>	5.5% 0.6%	20.6% 2.4%	20.5% 0.3%	14.3% 0.2%	11.3% 0.2%	12.9% 0.2%

Relative outperformance in blue

Relative underperformance in red

\*Returns net of fees



# Relative Investment Performance – Active Equity Managers

As of December 31, 2021

## Underperforming Equity Managers

	4th Qtr	1 Year	3 Year	5 Year	7 Year	10 Year
Polen	5.2%	24.3%	32.3%	26.2%	20.7%	N/A
<i>S&amp;P 500</i>	5.8%	4.4%	6.2%	7.7%	5.7%	
Brandes	0.1%	13.9%	8.7%	6.2%	5.3%	7.0%
<i>MSCI EAFE</i>	2.6%	2.7%	4.8%	3.3%	1.4%	1.0%
DFA U.S. Large Value	6.9%	27.3%	16.5%	N/A	N/A	N/A
<i>Russell 1000 Value</i>	0.9%	2.1%	1.2%			
ERS Public Equity	5.5%	20.6%	20.5%	14.3%	11.3%	12.9%
<i>ERS Equity Benchmark</i>	0.6%	2.4%	0.3%	0.2%	0.2%	0.2%

Relative outperformance in blue

Relative underperformance in red

\*Returns net of fees

# Relative Investment Performance – Passive Equity Managers & Other

As of December 31, 2021

## Passive Equity Managers

	4th Qtr	1 Year	3 Year	5 Year	7 Year	10 Year
Northern Trust S&P 500 Index <i>S&amp;P 500</i>	11.0% 0.0%	28.7% 0.0%	26.1% 0.0%	18.5% 0.0%	15.0% 0.0%	16.6% 0.0%
BlackRock Russell 1000 Value Index <i>Russell 1000 Value</i>	7.8% 0.0%	25.2% 0.0%	17.8% 0.1%	N/A	N/A	N/A

## Real Assets Manager

	4th Qtr	1 Year	3 Year	5 Year	7 Year	10 Year
Principal Diversified Real Assets <i>Blended Benchmark</i>	4.7% 0.7%	17.6% 1.7%	12.0% 1.3%	7.5% 0.6%	N/A	N/A

Relative outperformance in blue

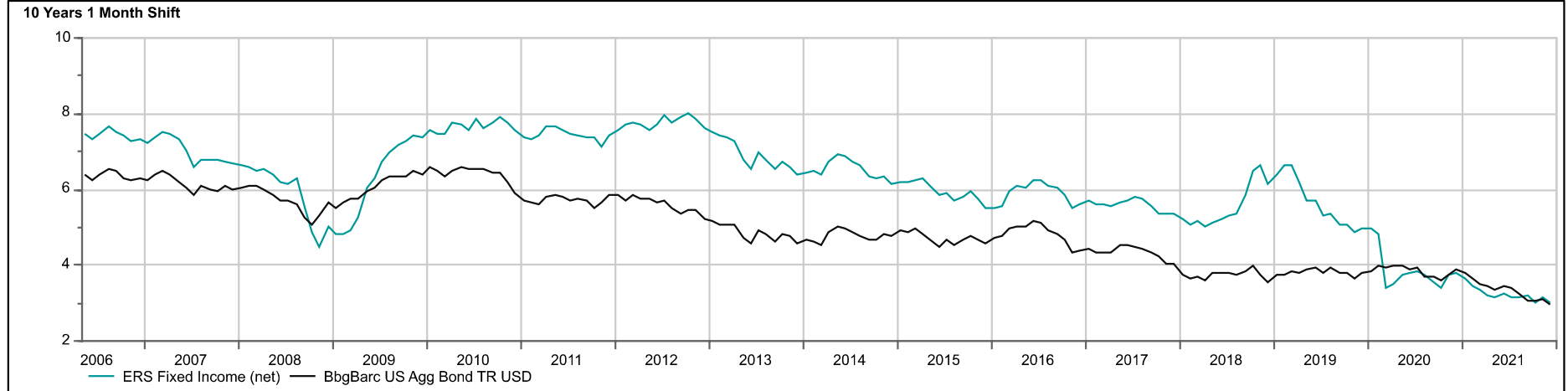
Relative underperformance in red

\*Returns net of fees

# Fixed Income

# Fixed Income Performance

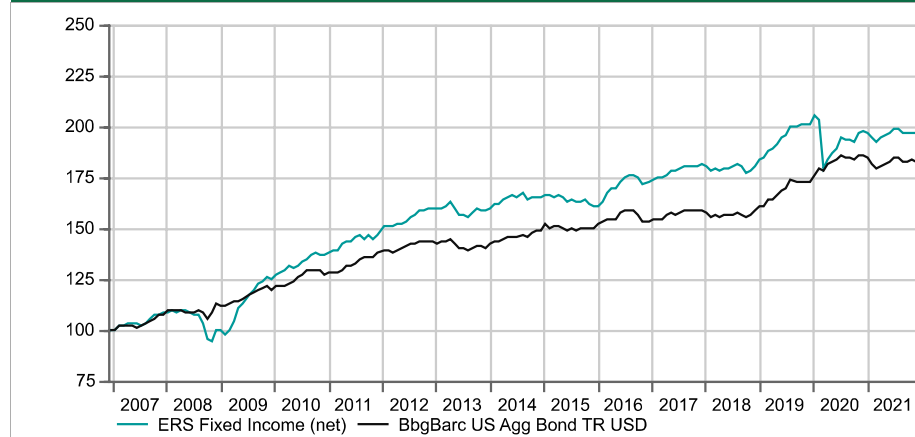
## 10 Year Rolling Returns – 6/1/1996 to 12/31/2021



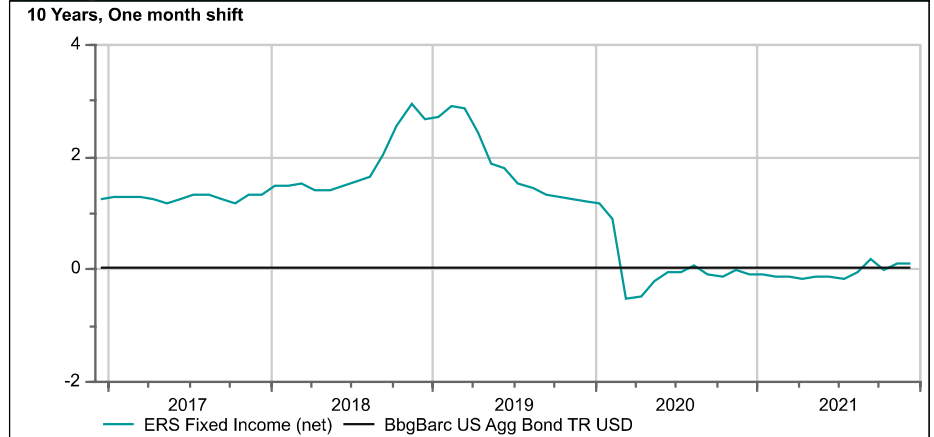
## Trailing Returns

		Annualized Return					
	QTR	1 Year	3 Year	5 Year	7 Year	10 Year	15 Year
ERS Fixed Income (Gross)	0.0	-0.3	3.0	2.8	2.7	3.1	4.7
ERS Fixed Income (Net)	0.0	-0.4	2.9	2.7	2.6	3.0	4.6
Bloomberg Barclays US Aggregate	0.0	-1.5	4.8	3.6	3.0	2.9	4.1

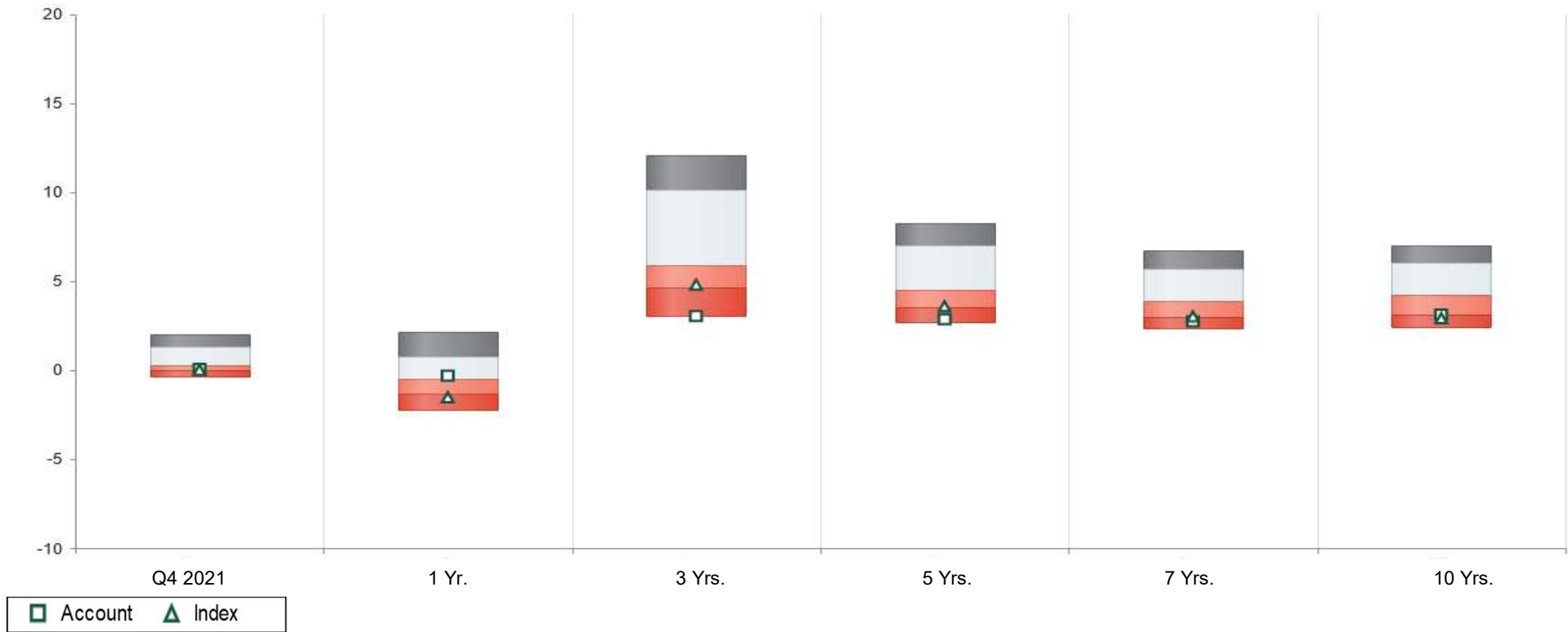
## Investment Growth –1/1/2007 to 12/31/2021



## Rolling Excess Return –1/1/2007 to 12/31/2021



# Fixed Income vs Universe



	Q4 2021	1 Yr.	3 Yrs.	5 Yrs.	7 Yrs.	10 Yrs.
Account Return	0.0	-0.3	3.0	2.8	2.7	3.1
Percentile Rank	68	45	90	88	83	77
Index Return	0.0	-1.5	4.8	3.6	3.0	2.9
Percentile Rank	74	81	74	75	75	81
1st Quartile	1.3	0.8	10.1	7.0	5.7	6.0
Median	0.3	-0.5	5.9	4.5	3.9	4.2
3rd Quartile	0.0	-1.3	4.6	3.5	3.0	3.1
Observations	98	99	100	99	97	89

## Relative Investment Performance – Fixed Income Managers

As of December 31, 2021

	4th Qtr	1 Year	3 Year	5 Year	7 Year	10 Year
<b>BlackRock Index</b>	0.1%	-1.4%	4.9%	3.7%	N/A	N/A
<i>Bloomberg Barclays US Agg.</i>	0.0%	0.1%	0.1%	0.1%		
<b>Loomis Sayles</b>	-0.1%	2.0%	7.7%	5.7%	5.0%	5.8%
<i>Bloomberg Barclays US Agg.</i>	0.1%	3.5%	2.9%	2.2%	2.0%	2.9%
<b>Reams</b>	0.4%	-1.4%	7.9%	5.7%	4.7%	4.3%
<i>Bloomberg Barclays US Agg.</i>	0.3%	0.2%	3.1%	2.1%	1.7%	1.4%
<b>ERS Fixed Income</b>	0.0%	-0.4%	2.9%	2.7%	2.6%	3.0%
<i>Bloomberg Barclays US Agg.</i>	0.0%	1.1%	1.9%	0.9%	0.4%	0.1%

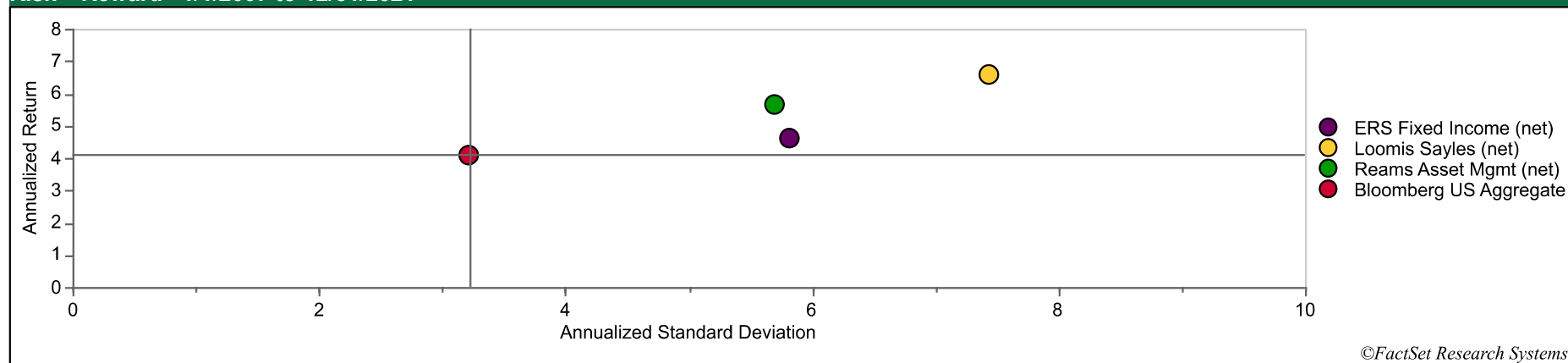
Relative outperformance in blue

Relative underperformance in red

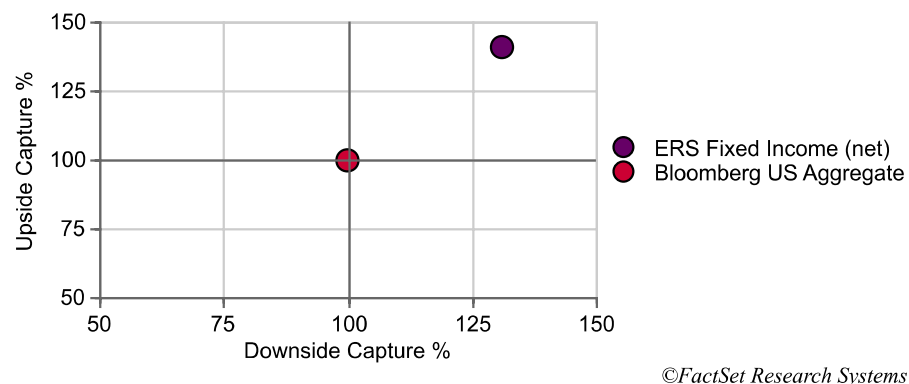
\*Returns net of fees

# Fixed Income Statistics

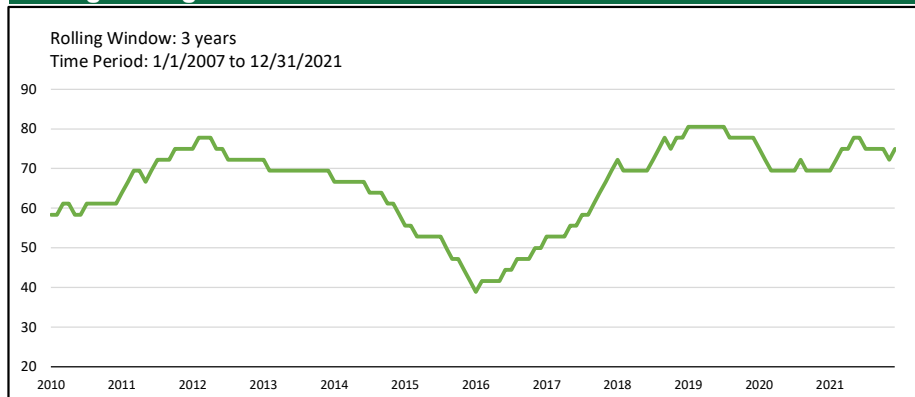
Risk – Reward –1/1/2007 to 12/31/2021



15 Year Upside-Downside –1/1/2007 to 12/31/2021



Batting Average



15 Year Risk –1/1/2007 to 12/31/2021

	Annualized Return	Standard Deviation	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Fixed Income (Net)	4.6	5.8	0.0	0.6	0.0	4.6
Bloomberg Barclays US Aggregate	4.1	3.2	0.0	1.0	--	1.0

Risk – 7/1/2013 to 12/31/2021

	Annualized Return	Standard Deviation	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Fixed Income (Net)	2.8	5.3	0.0	0.4	0.0	4.4
Bloomberg Barclays US Aggregate	3.2	3.0	0.0	0.8	--	1.0

# Absolute Return



## Relative Investment Performance – Absolute Return Managers

As of December 31, 2021

	4th Qtr	1 Year	3 Year	5 Year	7 Year
UBS A&Q <i>1 Year Libor + 4%</i>	2.5% 1.7%	8.1% 3.9%	10.0% 3.8%	7.3% 1.1%	6.1% 0.2%
ERS Absolute Return <i>3 Month T-Bill + 3%</i>	2.5% 1.8%	8.2% 5.1%	1.4% 2.4%	2.3% 1.8%	3.0% 0.8%

Relative outperformance in blue

Relative underperformance in red

### Risk Adjusted Returns (6/30/14 - 12/31/21)

	Return	Std Dev	Sharpe Ratio	Max Drawdown
ERS Public Equity (net)	10.4%	14.7%	0.7	-25.3%
ERS Fixed Income (net)	2.3%	5.6%	0.3	-12.6%
ERS Absolute Return (net)	3.3%	9.3%	0.3	-27.1%

\*Returns net of fees

# Private Equity

# Private Equity

## Milwaukee ERS Private Equity Portfolio as of September 30, 2021

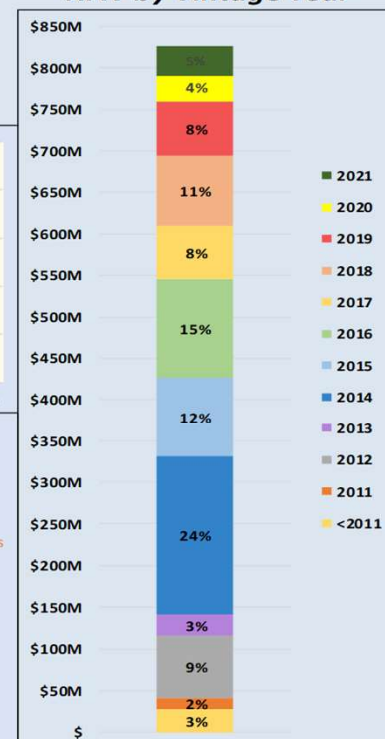
### PE Summary - Portfolio Capital Calls, Distributions & NAV

Partnership	Vintage Year	Committed	Invested Capital*	Uncalled Commitments*	Distributions*	NAV	TVPI*
Abbott 2010	2010	35,000,000	34,650,405	349,595	41,917,859	35,087,100	2.22
Abbott 2011	2011	55,000,000	54,730,191	269,809	63,024,737	69,951,207	2.43
Abbott 2012	2012	40,000,000	39,400,000	600,000	36,000,000	59,339,691	2.42
Abbott 2013	2013	35,000,000	34,650,000	350,000	29,925,000	56,199,397	2.49
Abbott 2014	2014	35,000,000	34,300,000	700,000	22,925,000	63,145,588	2.51
Abbott 2015	2015	25,000,000	25,050,000	-	10,337,500	41,455,084	2.07
Abbott 2016	2016	20,000,000	18,727,500	1,272,500	6,535,000	28,779,416	1.89
Abbott 2018	2018	20,000,000	11,890,000	8,110,000	2,430,000	16,017,563	1.55
Abbott 2019	2019	20,000,000	6,333,750	13,666,250	-	10,990,148	1.74
Abbott 2020	2020	40,000,000	4,025,000	35,975,000	-	6,729,608	1.67
Abbott 2021	2021	20,000,000	2,679,749	17,320,251	-	2,982,156	1.11
Mesirow V	2008	75,000,000	70,346,194	4,653,806	106,948,045	74,086,033	2.57
Mesirow VI	2013	60,000,000	51,900,000	8,100,000	43,176,748	104,268,559	2.84
Mesirow VII	2017	100,000,000	65,014,499	34,985,501	-	114,916,758	1.77
Mesirow VIII	2020	120,000,000	21,600,000	98,400,000	-	24,135,632	1.12
Neuberger Berman III	2013	30,000,000	31,047,645	-	36,579,296	9,882,254	1.50
Neuberger Berman IV	2017	25,000,000	21,625,000	3,375,000	11,711,055	21,304,008	1.53
Neuberger Berman V	2021	100,000,000	-	100,000,000	-	1,417,881	N/A
Private Advisors VI	2014	30,000,000	32,077,763	-	27,368,674	29,800,143	1.78
Private Advisors VII	2016	15,000,000	15,913,477	-	6,048,770	17,748,604	1.50
Private Advisors VIII	2018	15,000,000	10,480,141	4,519,859	2,427,838	13,733,902	1.54
Private Advisors IX	2019	35,000,000	16,592,658	18,407,342	5,495,808	15,956,975	1.29
Total ERS		950,000,000	603,033,972	351,054,913	452,851,330	817,927,707	2.11
% of ERS Fund				5.7%		13.4%	

### Sub-Asset Class Breakdown



### NAV by Vintage Year



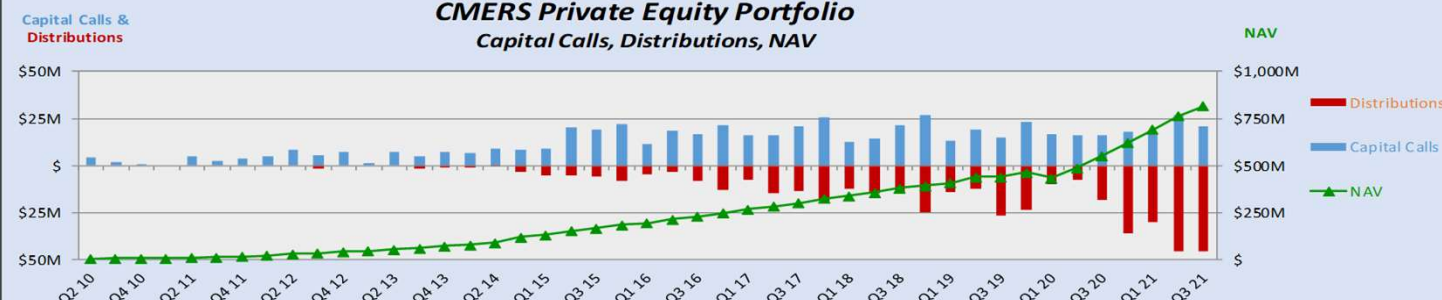
### Vintage Year\*\*



### Age of Investment\*\*\*



### CMERS Private Equity Portfolio Capital Calls, Distributions, NAV



\* Invested capital, uncalled commitments, and distributions will not necessarily match partnership statement. Estimates reflect best efforts to incorporate actual ERS experience. TVPI stands for "Total Value to Paid in Capital."

\*\* Vintage Year Investments Prior to 2005 are deemed to not be material figures and are not illustrated in above graph. Excludes Neuberger Berman.

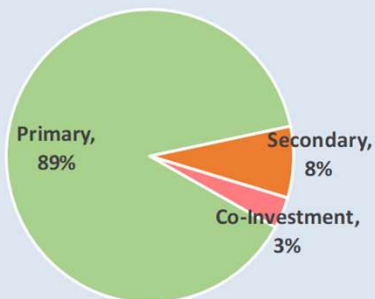
\*\*\* Portfolio Companies by Age of Investment figures have not been fully adjusted for overlapping investments. Excludes Neuberger Berman.

# Private Equity Continued

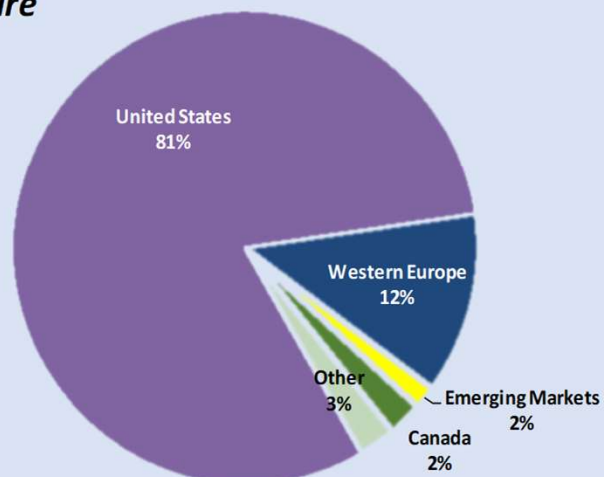
Total Managers	208*
Number of Partnerships	480*
Number of Portfolio Companies	4937*

\*Data in the above table is estimated. Actual data may be slightly different.

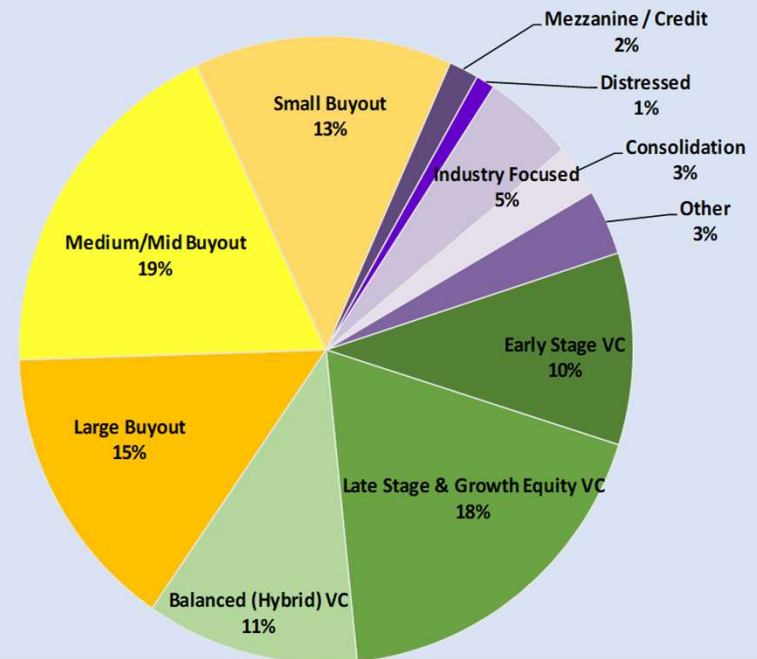
## Transaction Type



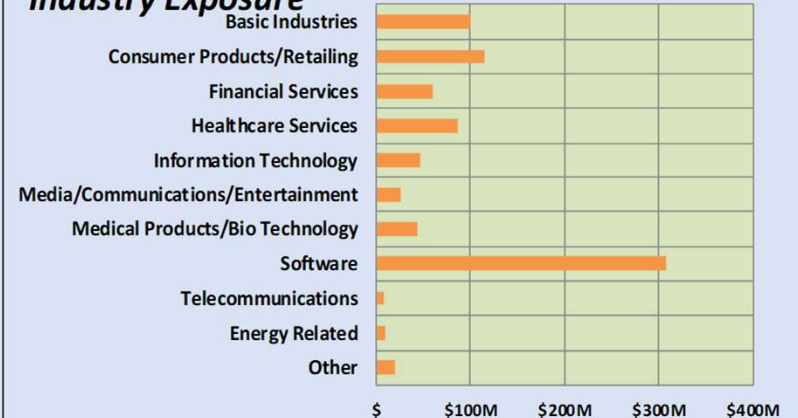
## Geographic Exposure



## Strategy Exposure



## Industry Exposure



# Performance Update

# Performance Update

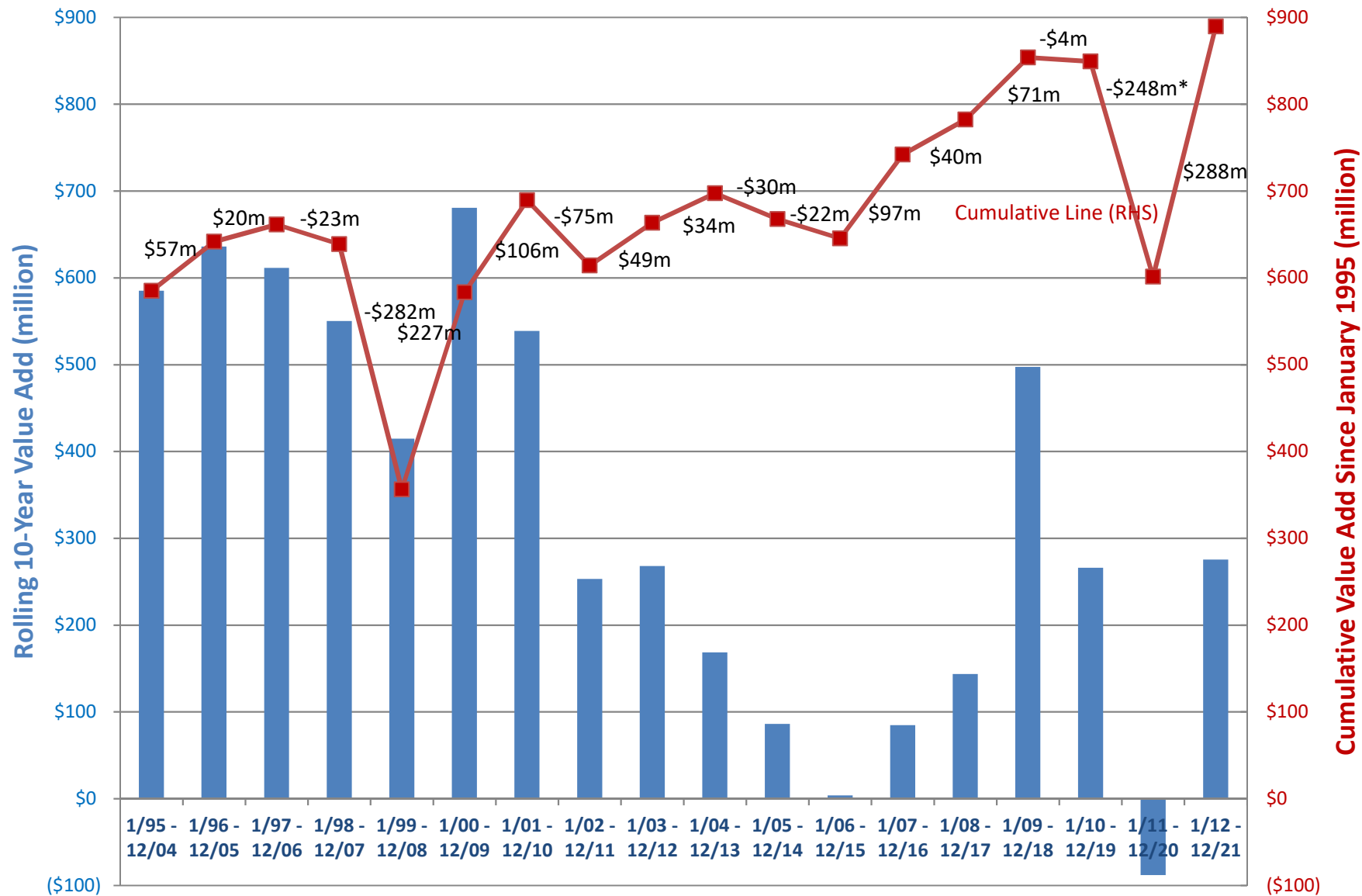
Estimated ERS Total Fund Market Value is \$6.13 billion as of February 3, 2022

Period	ERS Fund*	Benchmark
January (Estimate)	-2.2%	-2.7%
February MTD (Estimate)	0.1%	-0.1%
YTD Through February 3, 2022 (Estimate)	-2.1%	-2.8%

\*Returns Net of Fees

## Historical Value Add - 1995-2021

### CMERS Total Fund (everything except Real Assets)



\*Data includes Allianz, which CMERS categorized within the Fixed Income and Absolute Return Asset Classes.

## Historical Value Add - 1995-2021

### CMERS Total Fund (everything except Real Assets)

<b>MERS' decision to hire some active managers versus hiring only passive managers</b>								
		Time Weighted Returns			Dollar Weighted Estimates (Net of fees)			
		Annualized MERS Asset Class		Annualized Index	Value of a Dollar Invested in		Active Management Impact <sup>(c)</sup>	
		Gross	Net of fees	Net of fees <sup>(a)</sup>	MERS Asset Class	Index	\$Millions	
<b>Domestic Equity</b>	Russell 3000	11.29%	11.03%	11.11%	\$ 16.86	\$ 17.19	\$ 86.3	
<b>International Equity<sup>(b)</sup></b>	MSCI EAFE	7.55%	7.12%	5.05%	\$ 5.82	\$ 3.54	\$ 391.5	
<b>Global Equity<sup>(b)</sup></b>	MSCI World / ACWI	11.19%	10.81%	10.42%	\$ 3.34	\$ 3.21	\$ 27.4	
<b>Fixed Income<sup>(d)</sup></b>	Bloomberg Barclays US Aggregate	6.30%	6.19%	5.36%	\$ 5.06	\$ 4.08	\$ 182.2	
<b>Private Equity<sup>(b)</sup></b>	Russell 3000	N/A	15.93%	16.30%	\$ 5.48	\$ 5.68	\$ 209.8	
<b>Absolute Return<sup>(b)(d)</sup></b>	Bloomberg Barclays US Aggregate	N/A	3.30%	3.05%	\$ 1.28	\$ 1.25	\$ (7.4)	
Estimate of Fund's benefit from its decision to hire active managers over past 27 years							\$ 889.7	

<sup>(a)</sup> Manager Fees for indices are assumed to be:

Russell 3000 Index - 2 basis points

MSCI EAFE Index - 5 basis points

MSCI World / ACWI Index - 5 basis points

Bloomberg Barclays US Aggregate Index - 2 basis points

<sup>(b)</sup> Inception Dates if less than 27 years:

International Equity Composite is May 1, 1996

Global Equity Composite is April 1, 2010

Private Equity Composite is July 1, 2010

Absolute Return Composite is July 1, 2014

<sup>(c)</sup> Active Management Impact \$Millions Estimate is based on monthly ERS asset class balances.

<sup>(d)</sup> CMERS Fixed Income and Absolute Return data includes Allianz.



## Historical Value Add - 2012-2021

### CMERS Total Fund (everything except Real Assets)

<b>MERS' decision to hire some active managers versus hiring only passive managers</b>								
		<b>Time Weighted Returns</b>			<b>Dollar Weighted Estimates (Net of fees)</b>			
		<b>Annualized MERS Asset Class</b>		<b>Annualized Index</b>	<b>Value of a Dollar Invested in</b>		<b>Active Management Impact<sup>(c)</sup></b>	
<b>MERS Asset Class</b>	<b>Index</b>	<b>Gross</b>	<b>Net of fees</b>	<b>Net of fees<sup>(a)</sup></b>	<b>MERS Asset Class</b>	<b>Index</b>	<b>\$Millions</b>	
<b>Domestic Equity</b>	Russell 3000	15.89%	15.60%	16.28%	\$ 4.26	\$ 4.52	\$ (62.0)	
<b>International Equity</b>	MSCI EAFE	9.60%	9.10%	7.98%	\$ 2.39	\$ 2.15	\$ 111.5	
<b>Global Equity</b>	MSCI World / ACWI	13.54%	13.16%	12.11%	\$ 3.44	\$ 3.14	\$ 44.4	
<b>Fixed Income<sup>(d)</sup></b>	Bloomberg Barclays US Aggregate	3.11%	2.97%	2.88%	\$ 1.34	\$ 1.33	\$ (22.5)	
<b>Private Equity</b>	Russell 3000	N/A	18.39%	16.28%	\$ 5.41	\$ 4.52	\$ 211.5	
<b>Absolute Return<sup>(b)(d)</sup></b>	Bloomberg Barclays US Aggregate	N/A	3.30%	3.05%	\$ 1.28	\$ 1.25	\$ (7.4)	
Estimate of Fund's benefit from its decision to hire active managers over past 10 years							\$ 275.5	

<sup>(a)</sup>Manager Fees for indices are assumed to be:

Russell 3000 Index - 2 basis points

MSCI EAFE Index - 5 basis points

MSCI World / ACWI Index - 5 basis points

Bloomberg Barclays US Aggregate Index - 2 basis points

<sup>(b)</sup>Inception Dates if less than 10 years:

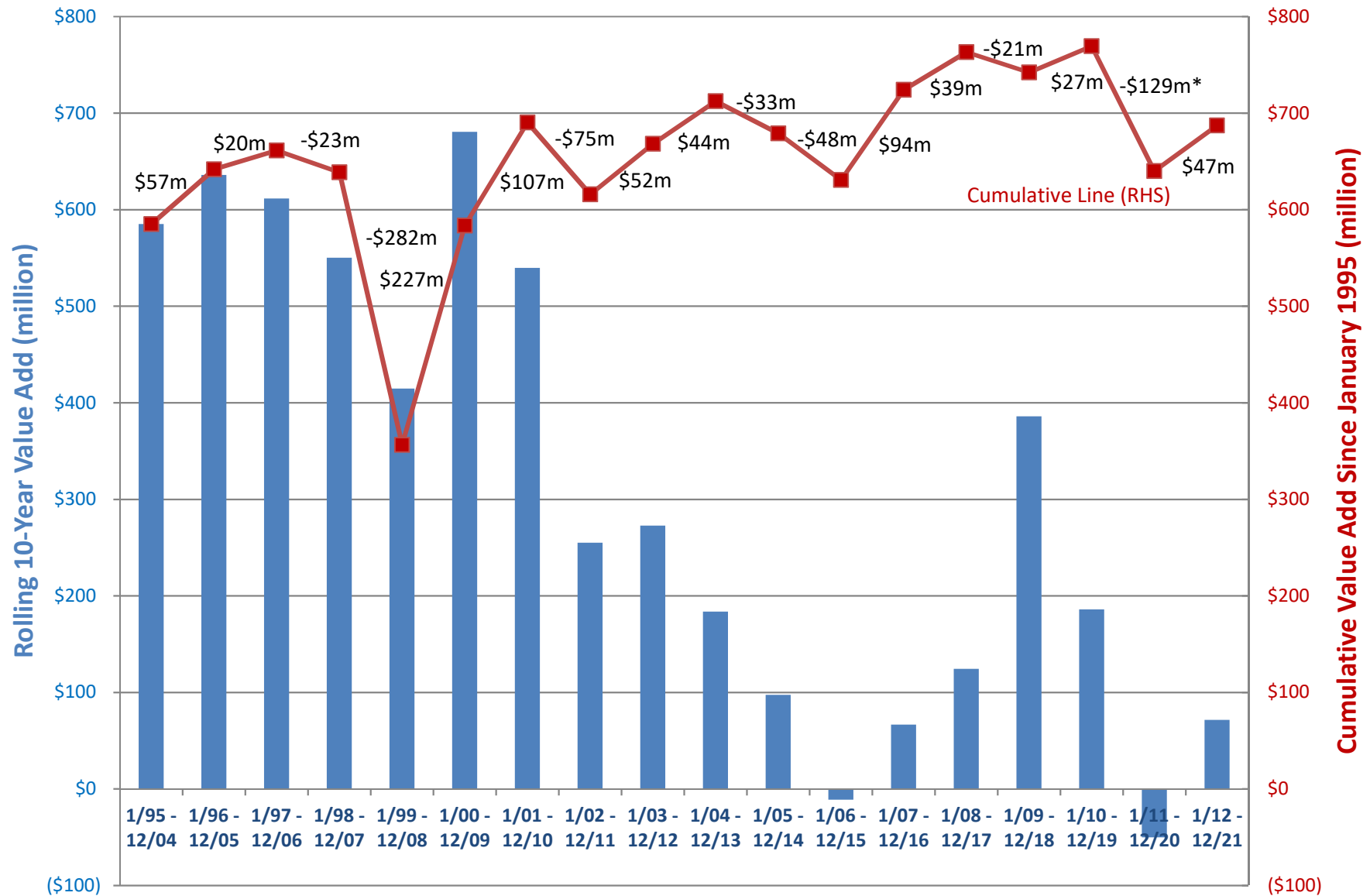
Absolute Return Composite is July 1, 2014

<sup>(c)</sup>Active Management Impact \$Millions Estimate is based on monthly ERS asset class balances.

<sup>(d)</sup>CMERS Fixed Income and Absolute Return data includes Allianz.

## Historical Value Add - 1995-2021

### CMERS Public Equity and Fixed Income only



\*Data includes Allianz, which CMERS categorized within the Fixed Income and Absolute Return Asset Classes.

## Historical Value Add - 1995-2021 CMERS Public Equity and Fixed Income only

MERS' decision to hire some active managers versus hiring only passive managers							
		Time Weighted Returns			Dollar Weighted Estimates (Net of fees)		
		Annualized MERS Asset Class		Annualized Index	Value of a Dollar Invested in		Active Management Impact <sup>(c)</sup>
				Net of fees <sup>(a)</sup>	MERS		
MERS Asset Class	Index	Gross	Net of fees		Asset Class	Index	\$Millions
Domestic Equity	Russell 3000	11.29%	11.03%	11.11%	\$ 16.86	\$ 17.19	\$ 86.3
International Equity <sup>(b)</sup>	MSCI EAFE	7.55%	7.12%	5.05%	\$ 5.82	\$ 3.54	\$ 391.5
Global Equity <sup>(b)</sup>	MSCI World / ACWI	11.19%	10.81%	10.42%	\$ 3.34	\$ 3.21	\$ 27.4
Fixed Income <sup>(d)</sup>	Bloomberg Barclays US Aggregate	6.30%	6.19%	5.36%	\$ 5.06	\$ 4.08	\$ 182.2
Estimate of Fund's benefit from its decision to hire active managers over past 27 years							\$ 687.3

<sup>(a)</sup> Manager Fees for indices are assumed to be:

Russell 3000 Index - 2 basis points

MSCI EAFE Index - 5 basis points

MSCI World / ACWI Index - 5 basis points

Bloomberg Barclays US Aggregate Index - 2 basis points

<sup>(b)</sup> Inception Dates if less than 27 years:

International Equity Composite is May 1, 1996

Global Equity Composite is April 1, 2010

<sup>(c)</sup> Active Management Impact \$Millions Estimate is based on monthly ERS asset class balances.

<sup>(d)</sup> CMERS Fixed Income data includes Allianz.

## Historical Value Add - 2012-2021 CMERS Public Equity and Fixed Income only

<b>MERS' decision to hire some active managers versus hiring only passive managers</b>							
MERS Asset Class	Index	Time Weighted Returns			Dollar Weighted Estimates (Net of fees)		
		Annualized MERS Asset Class		Annualized Index	Value of a Dollar Invested in		Active Management Impact <sup>(b)</sup>
		Gross	Net of fees	Net of fees <sup>(a)</sup>	MERS Asset Class	Index	\$Millions
Domestic Equity	Russell 3000	15.89%	15.60%	16.28%	\$ 4.26	\$ 4.52	\$ (62.0)
International Equity	MSCI EAFE	9.60%	9.10%	7.98%	\$ 2.39	\$ 2.15	\$ 111.5
Global Equity	MSCI World / ACWI	13.54%	13.16%	12.11%	\$ 3.44	\$ 3.14	\$ 44.4
Fixed Income <sup>(c)</sup>	Bloomberg Barclays US Aggregate	3.11%	2.97%	2.88%	\$ 1.34	\$ 1.33	\$ (22.5)
Estimate of Fund's benefit from its decision to hire active managers over past 10 years							\$ 71.4

<sup>(a)</sup> Manager Fees for indices are assumed to be:

Russell 3000 Index - 2 basis points

MSCI EAFE Index - 5 basis points

MSCI World / ACWI Index - 5 basis points

Bloomberg Barclays US Aggregate Index - 2 basis points

<sup>(b)</sup> Active Management Impact \$Millions  
Estimate is based on monthly ERS asset class balances

<sup>(c)</sup> CMERS Fixed Income data includes Allianz.