MILWAUKEE
ERS
Employes' Retirement System

City of Milwaukee
Employes' Retirement System

Bernard J. Allen
Executive Director

David M. Silber, CFA, CAIA
Chief Investment Officer

Melody Johnson
Deputy Director

November 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, November 10, 2022 at 9:00 a.m.** This meeting will be conducted via teleconference.
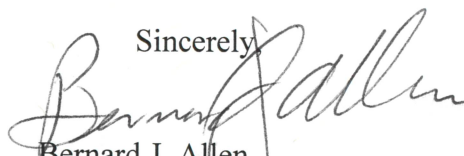
Special Notice: Instructions for the public on how to observe the meeting will be available on the ERS's website (www.cmers.com) prior to the meeting.

The agenda is as follows:

Please be advised that the Investment Committee may vote to convene in closed session on the following items (I., II., III., IV. and V.) 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.

I.   UBS Hedge Fund Solutions Presentation.
II.   UBS Hedge Fund Solutions Due Diligence Report.
III.   Approval of Recommendation Regarding UBS Hedge Fund Solutions Allocation.
IV.   Callan Real Estate Manager Search Update.
V.   Approval of Real Estate Manager Search Finalists.
VI.   Chief Investment Officer Report.
VII.   Approval of Statement of Investment Policy Update.
VIII.   CMERS 3rd Quarter 2022 Performance Update.
IX.   Due Diligence Reports.
    a.   MFS Investment Management.
    b.   William Blair Investment Management.
    c.   Dimensional Fund Advisors.

Sincerely

Bernard J. Allen
Executive Director

BJA:jmw

Memorandum

To: CMERS Investment Committee
From: David M. Silber, CFA, CAIA
Date: November 4, 2022
Re: Chief Investment Officer Report

Summary

Staff is balancing a number of challenges and considerations in its implementation of the Fund. First, significant declines in stock and bond markets in 2022 have pushed the Fund's illiquid asset classes above target and have led Callan to make material updates to their Capital Market Assumptions (CMAs). Second, Staff was recently informed about the pending retirement of the key person who manages the Fund's UBS Hedge Fund of Funds mandate. Third, Staff is closely monitoring the Fund's liquidity sources to ensure there will not be any issues meeting the Fund's approximately $500 million in cash obligations in 2023, being cognizant that the average bear market in stocks lasts about 20 months and sees stocks go down about 38% when occurring at the same time as an economic recession. Finally, Staff is discovering that the Fund's Statement of Investment Policy (Investment Policy) may not adequately address some of the considerations Staff is trying to take into account in preparing for the possibility of a prolonged stock and bond market downturn.

Staff initiated conversations with Callan in early October to make sure that the confluence of these factors are adequately addressed. While the conversations are ongoing, one clear outcome is that Callan recommends CMERS conduct an Asset Liability Modeling (ALM) study once Callan's 2023 CMA's are finalized in late December/early January. Callan and Staff agree that many of the challenges and considerations identified are best addressed within an ALM study. The Conclusion and Recommendations are listed on the last page of this memo. A summary of some of the challenges and considerations that need to be taken into account are broken out by Asset Class and in a Liquidity Projections section as follows:

Absolute Return (relatively illiquid; estimated to be close to target as of 10/31/2022)

- Staff was recently notified that the Portfolio Manager for the Fund's UBS Hedge Fund of Funds strategy, who CMERS considers to be a key person, is retiring on March 1, 2023;
- UBS currently has a 7% target within the Fund. This allocation will likely need to be reduced to reflect the retirement news, and this will be a major focus of the November Committee meeting;
- In September 2022, Staff made a $70 million redemption request from UBS that may take until June 2023 to be completed. This $70 million redemption will only get UBS closer to its existing 7% target, and was made independent of any decision the Committee makes to reduce the target to reflect the retirement news;
- From a practical standpoint, initiating steps now to reduce UBS' allocation from 7% to 4% of Fund assets (as an example) may take approximately 24 months to complete;
- Callan's preliminary 2023 CMAs do not appear to support the Fund's current 10% allocation to Absolute Return. Rather, Callan's preliminary assumptions show that Fixed Income has more attractive risk and return characteristics than Absolute Return, which probably makes sense given how high interest rates have risen in 2022;
- The implication is that if CMERS reduces its target to UBS, the Fund may be better off increasing the Fund's Fixed Income allocation rather than keeping the money within the Absolute Return allocation.

Private Equity (very illiquid; estimated to be 3% overweight as of 6/30/2022)

- The annual Private Equity presentation that Callan made to the Committee in September projects it will take 9 years for this allocation to get back to its 10% target;
- From a liquidity perspective, one big unknown is how a prolonged stock market and economic downturn could affect the timing of the approximately $500 million in uncalled commitments the Fund is obligated to meet in future years. This allocation has been net cash-flow positive in recent years

(more distributions received than capital commitments paid), but that also occurred in a very favorable market for equities;
- Callan's preliminary 2023 CMAs tend to like higher allocations to Private Equity;
- From a practical standpoint, because this is an illiquid asset class, CMERS needs to prepare to either be overweight Private Equity for a long time or to raise its target in the ALM study to reflect this anticipated reality. If the former is selected, then CMERS will have to decide whether to address the implication that its Private Equity overweight makes the Fund's actual risk greater than what the current strategic asset allocation envisioned when it was adopted in late 2020, all else equal.

Real Assets (relatively illiquid; estimated to be about 1% overweight as of 10/31/2022)
- The Fund has an ongoing search for a 5th open end real estate manager. Cash will have to be raised to invest in this new manager once the manager is selected and contract negotiations are completed;
- This asset class has a liquid component (Principal), but it is slightly underweight its target because Staff has already withdrawn $55 million from Principal in 2022 to help fund benefit payments;
- CMERS has approximately $176 million remaining in its liquid Principal real assets investment, which Staff believes could be reliably relied on to meet Fund obligations in stressed market environments;
- Staff proactively initiated steps earlier this year that resulted in the Fund's receipt of a net $45 million in withdrawals from Real Estate. Staff also has a separate $14 million redemption request from Morgan Stanley, made in June 2022, still outstanding. These steps were motivated by the desire to reduce the Fund's overweight to Real Estate and reduce the Fund's exposure to the Industrial sector;
- From a practical standpoint, any additional redemption requests CMERS initiates from Real Estate may not be completed until mid-to-late 2023;
- Callan's preliminary 2023 CMAs tend to like higher allocations to Real Estate;
- The Fund may want to complete its ALM study before taking actions to push Real Estate back to target if there is a reasonable belief that an increase to the Real Estate allocation will be considered.

Public Equity (liquid; estimated to be about 1% underweight as of 10/31/2022)
- CMERS has been a net buyer of stocks in 2022, largely a result of a rebalance conducted in June that was triggered by sharp market declines;
- Public Equity is in the portfolio because Callan's CMAs show that the allocation is necessary to give the Fund a chance to generate a 7.5% return over the long-term;
- Unless CMERS is prepared to challenge Callan's CMAs, Staff believes that, as a long-term investor, it is not in the Fund's best interests to redeem Public Equity investments to make benefit payments when Public Equity is down about 20% year-to-date and is underweight its target, as it is now;
- Staff doesn't believe that the Investment Policy adequately contemplates the market environment CMERS has been navigating in 2022, and without another reduction to the minimum Fixed Income range, Staff may be forced by the Investment Policy to redeem investments from the Public Equity allocation to make benefit payments as soon as this month;
- CMERS' ALM study may evaluate some scenarios that result in an increase in the Private Equity allocation, with a corresponding reduction to Public Equity. If these types of strategic asset allocations end up showing that a more attractive risk and return portfolio can potentially be achieved, and the Board ends up being comfortable with these types of mixes, then there is potential for the ALM study to quickly address some of the Public and Private Equity challenges noted in this memo.

Fixed Income (liquid; estimated to be more than 3% underweight as of 10/31/2022)
- As a result of the foresight included within Staff's September 2021 Asset Allocation memo, the Fund had a 24.9% allocation to Fixed Income as of January 31, 2022 (an almost 2% overweight), which put CMERS in a very healthy position going into the 2022 market downturn;
- Staff has relied heavily on withdrawals from Fixed Income managers to meet the Fund's cash needs in 2022, and is estimated to have a 19.5% allocation to Fixed Income as of October 31, 2022;
- CMERS recently lowered the minimum Fixed Income allocation permitted in the Investment Policy from 20% to 19% (on an interim basis) in order to provide Staff with continued flexibility as it raises cash to meet the Fund's near term cash obligations. However, until stocks make a more meaningful recovery, the Investment Policy may make it difficult for Staff to continue to rely on Fixed Income

withdrawals because the underweight to Fixed Income remains close to the bottom limit allowed by the Investment Policy. As previously mentioned, Staff doesn't currently have good options for meeting the Fund's near term cash needs because the Fund's overweight asset classes are illiquid, and withdrawing from Public Equity would result in the Fund selling investments that are down about 20% year-to-date;

- Staff anticipates receiving over $100 million in cash in the first quarter of 2023 from Actuarial contributions and pending redemptions from Real Estate and UBS;
- CMERS has approximately $214 million remaining in its U.S. Government Bond Index investment, which Staff views as an emergency fund within its Fixed Income allocation that can be reliably relied on to meet Fund obligations in stressed market environments;
- Callan's preliminary 2023 CMAs like higher allocations to Fixed Income, particularly low-risk core Fixed Income, given the significant rise in interest rates seen in 2022;
- CMERS' ALM study may contemplate some scenarios that lower the Absolute Return allocation, with a corresponding increase to Fixed Income. If these types of strategic asset allocations end up showing that a more attractive risk and return portfolio can potentially be achieved, then there is potential for the ALM study to help address some of the Absolute Return and Fixed Income challenges noted in this memo.

Liquidity Projections

The table below shows what the impact of CMERS' upcoming 14-months of projected cash flows could have on the Fund under two dire scenarios: one where the Fund's return is flat and the other where stocks decline 15% between now and the end of 2023. Staff is not predicting that these scenarios will happen, but also doesn't believe the possibility of these scenarios happening should be completely dismissed. Importantly, Staff believes there is sufficient liquidity in the Fund to meet its 2023 cash obligations. At the same time, as mentioned multiple times above, the Investment Policy doesn't offer Staff flexibility to withdraw money from Fixed Income to meet its obligations when the Fixed Income allocation is as underweight as it is now, and Staff believes it's worthwhile to discuss the implications of this constraint given the current market environment.

	10/31/22	Projected Cash Flows Nov-22 thru Dec-23 (Estimates)									
		Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul-Dec	Total
Cash Balance	$48m										
Benefit Payments		($39m)	($39m)	($39m)	($39m)	($39m)	($39m)	($39m)	($39m)	($234m)	($546m)
Goldman Sachs			($30m)	($15m)						$0	($45m)
UBS				$28m					$14m	$0	$42m
Private Equity		For now, assuming Capital Calls and Distributions roughly offset									$0
Real Estate		For now, assuming Distributions and Funding of New Mandate roughly offset									$0
Contributions		$2	$2	$84m	$2	$3	$2	$2	$2	$16m	$115m
Net Cash Flows		($37m)	($67m)	$58m	($37m)	($36m)	($37m)	($37m)	($23m)	($218m)	($434m)
							% of 10/31/2022 Fund Value ($5.4b)				8.0%
Projected Fixed Income allocation if solely relied on for Cash Needs & Fund return 0%	19.5%	19.0%	17.9%	18.8%	18.2%	17.7%	17.1%	16.5%	16.2%	12.5%	
Projected Fixed Income allocation if solely relied on for Cash Needs & Stock return -15%	19.5%	20.3%	19.1%	20.1%	19.5%	18.9%	18.3%	17.7%	17.3%	13.4%	
Sources available for Raising Cash (excluding Equity)											
U.S. Gov't Bond Index	$214m	100% liquid									
Reams	$468m	40-50% liquid									
Loomis Sayles	$324m	20%-30% liquid									
Principal	$176m	100% liquid									
UBS	$438m	Relatively illiquid									

Conclusion and Recommendations
While there are many challenges and considerations noted in this memo, not all of them need to be solved at today's meeting. If CMERS is fortunate, markets will stabilize and rise again soon, and that would solve many of these issues. ==Until markets recover though, plans need to be made to thoughtfully navigate these upcoming challenges. Below, you will find three Action items to consider taking today, and three additional items that Staff believes can be deferred until next years' ALM study.==

Recommendations for today's meeting:
- **Action #1: Approve a reduced target allocation to UBS so Staff can immediately put in a withdrawal request from this mandate;**
  - UBS' current target is 7% of Fund assets. Dropping the target to 4% (as an example) equates to a withdrawal of approximately $180 million that would be expected to be received in pieces over the next 24 months.
  - Rationale:
    - Uncertainty created by the pending retirement of the key Portfolio Manager;
    - Provides an additional liquidity source to meet the Fund's 2023 cash obligations;
    - ==Callan's preliminary CMAs indicate that the Absolute Return allocation may decline and the Fixed Income allocation may increase when next years' ALM study is conducted. Action #1 would be consistent with both of these possibilities.==

- **Action #2: Within the Investment Policy, Approve further reducing the Minimum allocation permitted for the Fixed Income allocation on an Interim basis, and also updating the date that the Interim allocation will revert back to 20% from February 1, 2023 to March 1, 2023;**
  - The minimum allocation to Fixed Income permitted in the Investment Policy was recently reduced on a temporary basis from 20% to 19%. The Liquidity Projections table on the previous page shows that it's not unrealistic to expect that the Fixed Income allocation could drop below 18% by year-end.
  - Rationale:
    - Without taking action, the Investment Policy may place Staff in a position where it has no choice but to sell stocks to meet the Fund's upcoming cash obligations;
    - Public Equity is in the portfolio because Callan's CMAs show that the allocation is necessary to give the Fund a chance to generate a 7.5% return over the long-term. Therefore, if the Fund is forced to sell stocks when they are down as much as they are in 2022, this would result in a negative compounding effect that may not be in the best interest of a long-term investor like CMERS;
    - Before March 1, 2023, Staff will come back to the Committee with a liquidity analysis that will result in a recommendation to either:
      1. Implement a Liquidity Management Framework similar to what the Committee approved during the 2020 bear market in stocks, or;
      2. Implement a plan to prudently move the Fixed Income allocation closer to target.

- **Action #3: Remove references to actions taken as a result of the September 2021 Asset Allocation memo from the Investment Policy.**
  - Rationale:
    - The considerations included in the September 2021 Asset Allocation memo were made during a market environment that is very different than the current market. It achieved its goals and added value, but is no longer relevant given the current downturn and the ALM study scheduled for next year.

==Challenges and Considerations to be addressed in 2023:==
- ==Identify optimal strategic asset allocation weights for the Fund's asset classes (ALM study);==
- ==Complete further liquidity analyses at the Fund level (ALM study);==
- Settle on a final long-term target for the UBS allocation (ALM study and Structure Study).

STATEMENT OF INVESTMENT POLICY
Updated November~~September~~ 2022

THE EMPLOYES' RETIREMENT
SYSTEM OF THE CITY OF MILWAUKEE
789 N. Water Street, 3rd Floor
Milwaukee, WI 53202
(414) 286-3557

Individual manager guidelines are updated upon Annuity and Pension Board Approval

To fulfill such responsibilities, the Trustees are authorized and in the case of Investment Managers, required to retain professional experts including but not limited to:

1. **Staff**: The Retirement Staff ("Staff"), as designated by the Board is the agent of the Board. The Board does not delegate investment management responsibility through the use of its Staff. Staff duties include:

    A. Monitoring Investment Managers for adherence to policies and guidelines.

    B. Evaluating and managing the relationships with the Investment Consultant to ensure they are providing all necessary assistance to Staff and the Board as agreed to in service contracts.

    C. Monitoring the Investment Consultant's manager search process, and conducting due diligence on any Investment Manager selected for hire by the Investment Committee that was considered and recommended to ERS by its Investment Consultant.

    D. Identifying Investment Managers to withdraw funds from, and taking actions necessary to raise cash from the identified Investment Managers to pay Fund benefits, Fund expenses, and Fund capital call commitments, as necessary. Given there are many factors that are considered when deciding how much money to withdraw from Investment Managers at a given time, Staff retains discretion in its implementation of raising funds from Investment Managers. That said, Staff will strive to minimize the subjectivity involved in raising funds by implementing a process that works within the framework of the target allocations stated within the Investment Policy, the Asset Allocation memo dated September 2, 2021, and each asset allocation's respective structure. Staff will include a report on cash activity at the regularly scheduled Board meetings.

    E. In the rare instance when the Fund has a cash-flow positive month (i.e. contributions are greater than cash outflows), Staff may deposit funds into Investment Managers if their strategy is below the target allocation approved within each asset allocation's respective structure or the Asset Allocation memo dated September 2, 2021. Staff will include a report on cash activity at the regularly scheduled Board meetings.

    F. Restructuring the portfolio following manager terminations with the assistance of its Investment Consultant and Investment Manager(s).

    G. Organizing and/or participating in any special research required to manage the Fund more effectively and in response to any questions raised by the Board.

    H. Supporting the Board in the development and approval of the Investment Policy Statement, implementing the Policy Statement and reporting at least monthly on investment activity and matters of significance.

    I. Ensuring the Investment Managers conform to the terms of their contracts and that performance monitoring systems are sufficient to provide the Board with timely, accurate and useful information.

TARGET ALLOCATIONS

The Board has determined that the following asset allocation policy is appropriate for the Fund. This allocation policy will be reviewed periodically and may be modified, if appropriate, in light of changes in the structure or goals of the Fund. ~~The following asset allocation policy reflects interim Maximum and Minimum ranges for the Fixed Income and Absolute Return allocations, respectively, that were approved by the Board at its September 2021 meeting~~.

Public Equity	**Target**	**Minimum**	**Maximum**
Domestic Equity			
Passive Large Cap	7.8%		
Active Large Cap	5.0%		
Active Mid/Small Cap	7.0%		
Total Domestic Equity	**19.8%**	**15.8%**	**23.8%**
Total International Equity	**15.4%**	**12.4%**	**18.4%**
Total Global Equity	**8.8%**	**4.8%**	**12.8%**
Total Public Equity	**44%**	**39%**	**49%**
Fixed Income			
Cash	1%	0%	2.0%
Passive Fixed Income	5.5%		
Core Opportunistic Fixed Income	16.5%		
Total Fixed Income	**23%**	**17.5~~19~~%***	**30~~26~~%****
Real Assets			
Private Real Estate	**9.7%**		
Public Diversified Real Assets	**3.3%**	**1.3%**	**5.3%**
Total Real Assets	**13%**	**10%**	**16%**
Private Equity	**10%**	**7%**	**15%**
Absolute Return	**10%**	**7~~6~~%****	**15%**
Total	**100%**		

*Fixed Income Minimum range lowered on an Interim basis ~~from 20%~~ to 1~~7.5~~9% in~~at the~~ ~~Sept~~November 2022 ~~Board meeting~~ for the purpose of providing Staff with additional flexibility to fund a new Absolute Return strategy and to make monthly benefit payments to beneficiaries. Absent further action, the Minimum Fixed Income range will revert back to 20% on March~~February~~ 1, 2023.

~~**Reflects Interim Maximum and Minimum ranges approved by the Board at its September 2021 meeting.~~

3rd Quarter 2022 Performance Report

November 10, 2022

Employes' Retirement System

Presentation Agenda

- Fund Overview
- Public Equity
- Fixed Income
- Absolute Return
- Private Equity
- Recent Performance Update
- Appendix: Manager Charts & Statistics

Market Environment

Asset Class	Benchmark	Target Weight	Benchmark Return Q3 2022
Public Equity	MSCI ACWI IMI	44%	-6.6%
Fixed Income	Bloomberg U.S. Agg.	23%	-4.8%
Real Assets[1]	Blended Benchmark	13%	0.9%
Private Equity[1]	Russell 3000 + 2%	10%	-16.1%
Absolute Return	90-Day T-Bill + 3%	10%	1.4%

	Q3 2022
CMERS Benchmark	**-5.3%**

[1]Real Estate and Private Equity benchmark returns are reported on a 1-quarter lag.

Relative Performance Expectations

		Q3 2022		Q3 2022	Q3 2022
Value Equity Bias	Russell 3000 Value	-5.6%	Russell 3000 Growth	-3.4%	↓
Small Cap Equity Bias	Russell 2000	-2.2%	Russell 1000	-4.6%	↑
Fixed Income Credit	Loomis Sayles (net)	-2.8%	Bloomberg US Agg.	-4.8%	↑
Private Equity[1][2]	CMERS PE (net)	-4.4%	PE Benchmark	-16.1%	↑↑

	Q3 2022
CMERS Total Fund (net)	**-4.5%**
CMERS Benchmark	**-5.3%**

[1]Private Equity benchmark return is reported on a 1-quarter lag.
[2]All of the Fund's Q2 2022 and a small number of the Fund's Q1 2022 Private Equity returns are reflected in the July-September time period.

Total Fund Performance

Trailing Returns

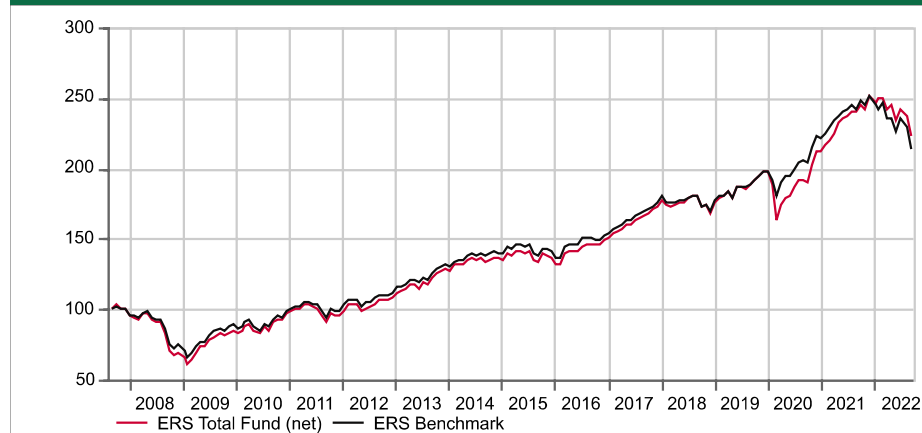|	QTR	YTD	1 Year	3 Year	5 Year	7 Year	10 Year	15 Year
			Annualized Return					
ERS Total Fund (net)	-4.5	-11.4	-7.1	5.8	6.0	7.7	7.7	5.5
ERS Benchmark	-5.3	-14.8	-11.7	4.2	4.8	6.6	7.0	5.2

Investment Growth – 10/1/2007 to 9/30/2022

Rolling Excess Returns – 10/1/2007 to 9/30/2022

ERS Fund Attribution – 3rd Quarter 2022

Asset Class	Benchmark	Average Weight %	Policy Weight %	+/-	Portfolio Return	Benchmark Return	+/-	Broad Category Group Allocation	Manager Selection	Style Bias	Total Active Return
								Attribution Effect(%)			
Public Equity	MSCI ACWI IMI NR USD	42.1	44.0	-1.9	-7.2	-6.6	-0.5	0.0	-0.2	-0.1	-0.2
Fixed Income	Bbg US Agg Bond TR USD	22.2	23.0	-0.8	-3.8	-4.8	1.0	0.0	0.1	0.1	0.2
Real Assets[2]	Real Assets Benchmark[1]	13.9	13.0	1.0	-1.1	0.9	-2.0	0.0	-0.4	0.1	-0.2
Private Equity[2]	Russell 3000 (Qtr Lag) + 200bps[1]	13.4	10.0	3.4	-4.4	-16.1	11.7	-0.4	1.6	0.0	1.2
Absolute Return	90 Day T-Bill +3%	8.3	10.0	-1.7	0.6	1.4	-0.8	-0.1	-0.1	0.0	-0.1
Total		100.0	100.0	0.0	-4.5	-5.3	0.8	-0.5	1.2	0.1	0.8

Main Drivers of Q3 2022 Relative Performance

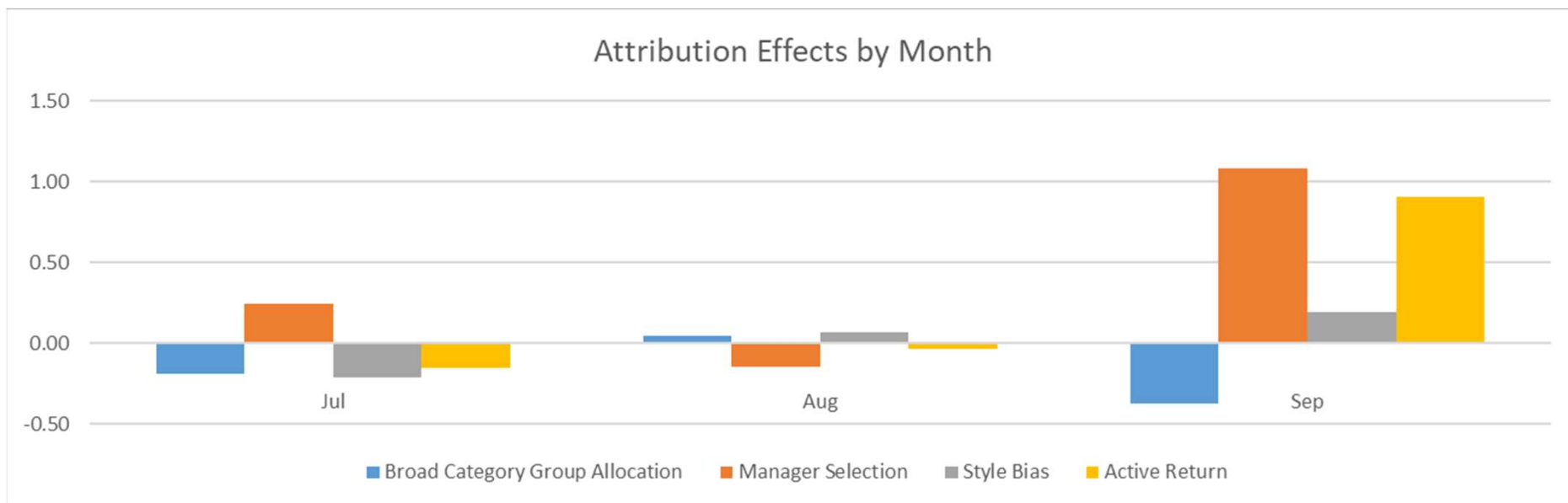| Main Drivers of Q3 2022 Relative Performance	Impact %	Attribution Category
- Private Equity	1.6%	Manager Selection
- Real Estate	-0.4%	Manager Selection
- Overweight to Private Equity	-0.4%	Overall Allocation

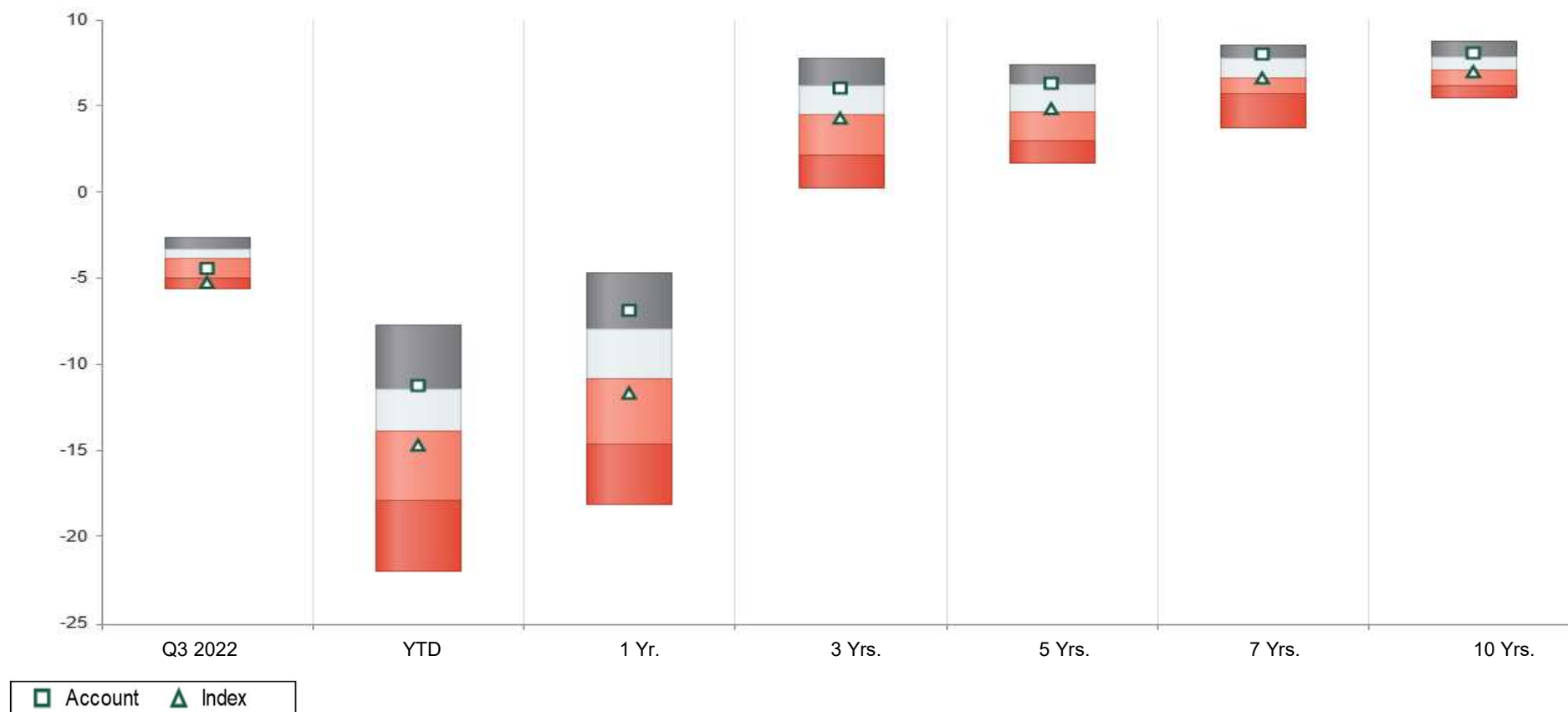[1] Real Estate and Private Equity benchmark returns are reported on a 1-quarter lag.
[2] All of the Fund's Q2 2022 and a small number of the Fund's Q1 2022 Private Equity returns are reflected in the July-September time period. Some Real Estate returns are reported on a 1-quarter lag.

3rd Quarter 2022 Attribution

Total Fund vs Universe
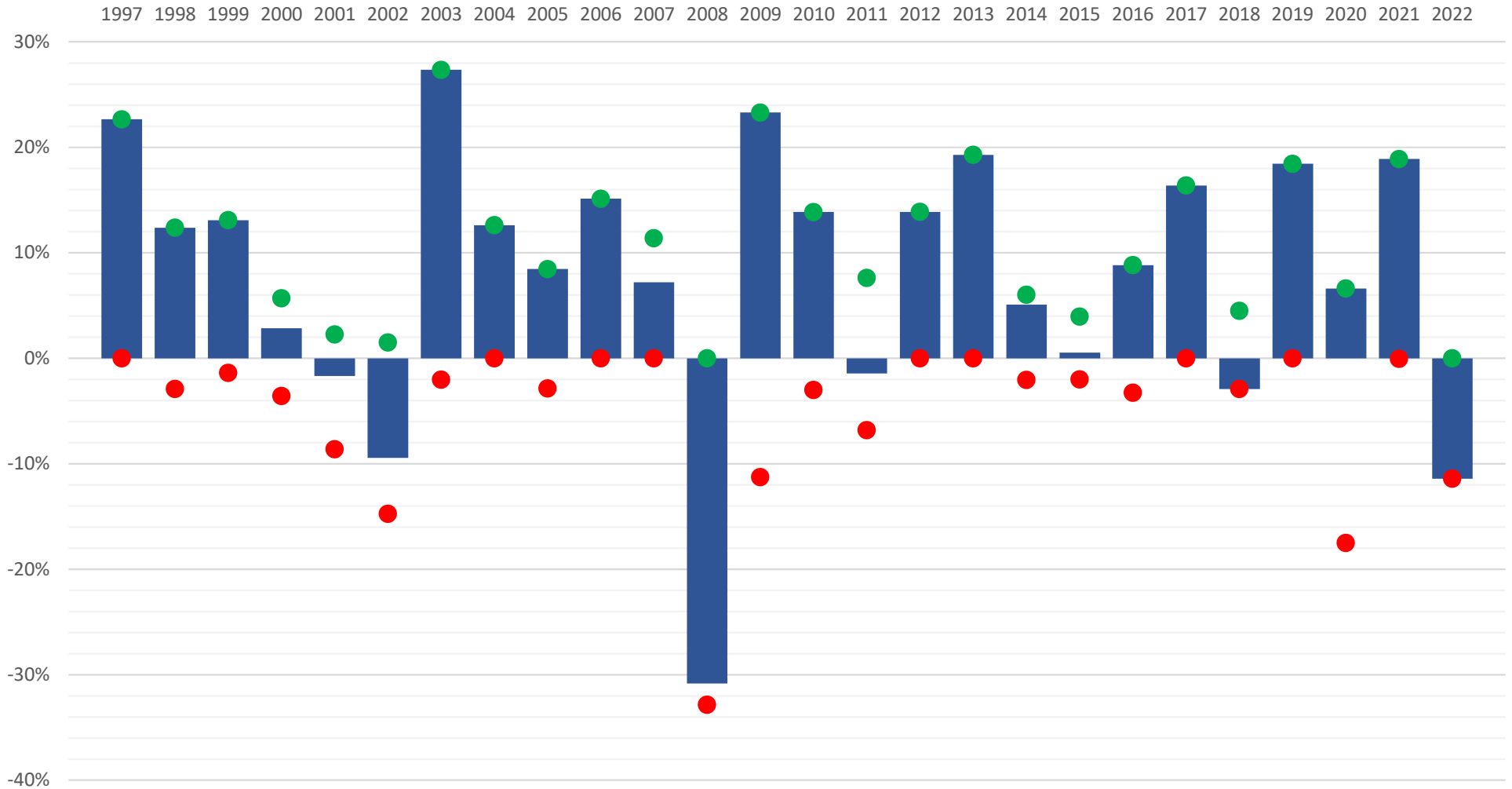

	Q3 2022	YTD	1 Yr.	3 Yrs.	5 Yrs.	7 Yrs.	10 Yrs.
Account Return	-4.5	-11.3	-6.9	6.0	6.3	8.0	8.0
Percentile Rank	62	22	17	31	24	17	16
Index Return	-5.3	-14.8	-11.7	4.2	4.8	6.6	7.0
Percentile Rank	84	56	55	58	48	52	52
1st Quartile	-3.3	-11.4	-7.9	6.1	6.2	7.8	7.8
Median	-3.8	-13.9	-10.9	4.5	4.6	6.6	7.1
3rd Quartile	-5.0	-18.0	-14.6	2.1	3.0	5.7	6.1
Observations	44	44	44	42	42	37	26

Annual Returns, Peaks and Troughs

■ CMERS ● Peak ● Trough

	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	YTD 2022
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%	-11.4%
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%	0.0%
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%	-11.4%

*Net of Fees

Asset Allocation as of September 30, 2022

Actual Asset Allocation*

Public Equity, 40.9%
Fixed Income, 20.9%
Absolute Return, 10.5%
Real Assets, 14.0%
Private Equity, 13.8%

Actual Asset Allocation vs. Policy Target

	Public Equity	Private Equity	Fixed Income	Absolute Return	Real Assets
	-3.1%	3.8%	-2.1%	0.5%	1.0%

YTD Market Value Change

December 31, 2021 Market Value including City Reserve & PABF Accounts .... $ 6,260,134,748

Monthly Cash Outflows thru _September 30, 2022_

Retiree Payroll Expense	$ (335,486,791)	
PABF Payroll Expense	$ (38,825)	
Expenses Paid	$ (11,536,842)	
GPS Benefit Payments	$ (7,605,876)	
Sub-Total Monthly Cash Outflows		$ (354,668,333)

Monthly Cash Inflows thru _September 30, 2022_

Contributions	$ 101,405,098	
PABF Contribution	$ 41,407	
Sub-Total Monthly Contributions		$ 101,446,505

City Reserve Fund Contribution .... $ 40,000,000

Capital Market Gain/(Loss) .... $ (690,889,240)

Value including City Reserve & PABF Accounts as of _September 30, 2022_ .... $ 5,356,023,680

Less City Reserve Account[1] .... $ 79,892,367

Less PABF Fund[2] .... $ 2,505

Net Projected ERS Fund Value as of _September 30, 2022_ .... $ 5,276,128,809

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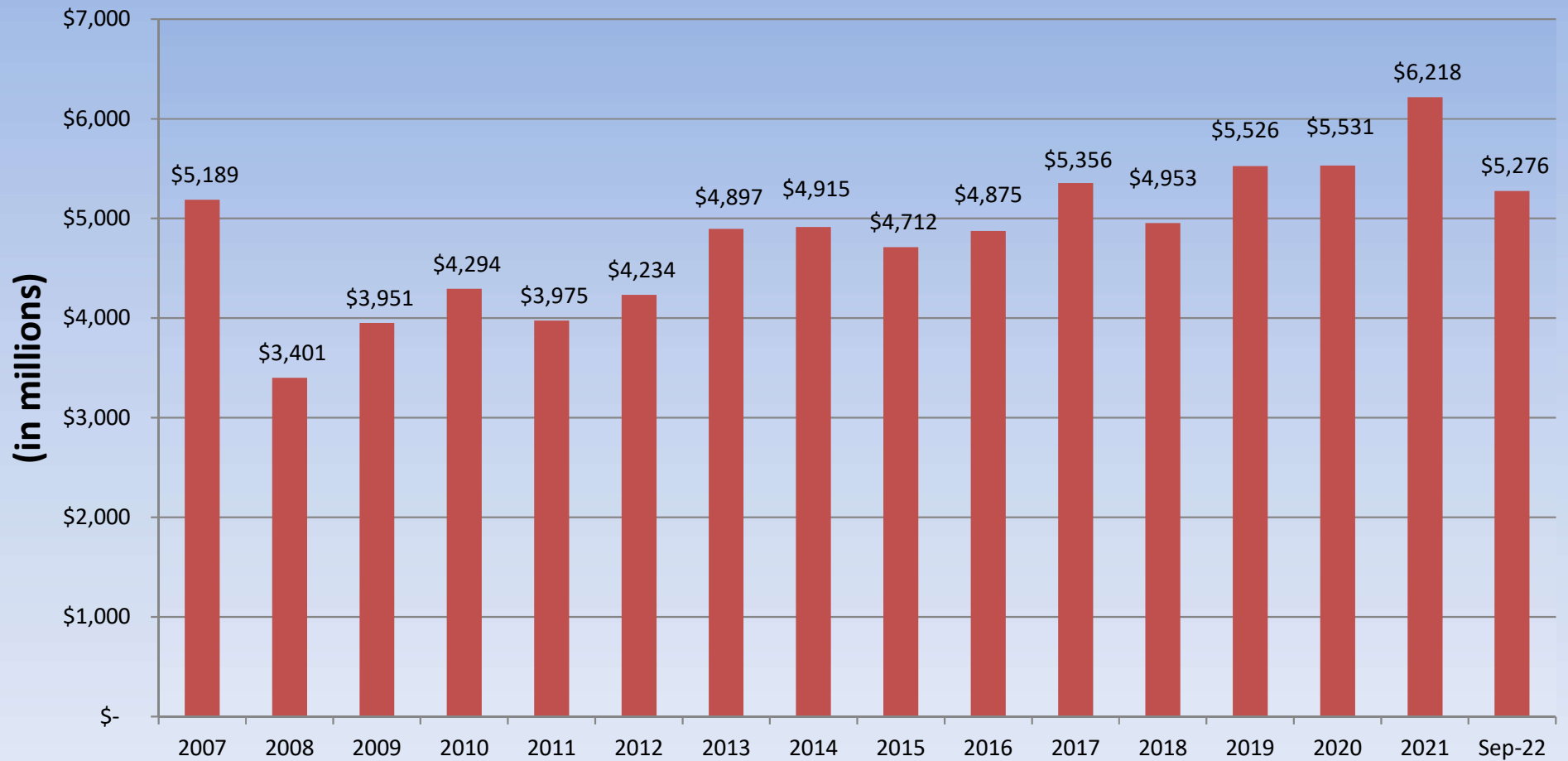
2 PABF Fund balance equals the market value currently held in the PABF account.

> 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.

Fund Value of Assets: 2007 – September 30, 2022
(Year Ended Dates Reflect 12/31 Fund Values)

Market Value of Fund Assets*

Benefit Payments	$5.1 billion
Expenses	$259 million
Contributions	$1.4 billion
Investment Gain	$4.0 billion

14 3/4 Year Estimates (1/1/2008 - 9/30/2022)

Most recent Actuarial valuation projects benefit payments to total $5.2 billion in next 10 years.

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.

*Private Equity and some Real Estate values are reported on a 1-quarter lag.

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Total Fund Rolling Returns as of September 30, 2022

1 Year Rolling Returns – 12/1/1997 to 9/30/2022

1 Year 1 Month Shift

ERS Total Fund (net) — ERS Benchmark

©FactSet Research Systems

10 Year Rolling Returns – 12/1/1997 to 9/30/2022

10 Years 1 Month Shift

ERS Total Fund (net) — ERS Benchmark

©FactSet Research Systems

5 Year Rolling Returns – 12/1/1997 to 9/30/2022

5 Years 1 Month Shift

ERS Total Fund (net) — ERS Benchmark

©FactSet Research Systems

15 Year Rolling Returns – 12/1/1997 to 9/30/2022

15 Years 1 Month Shift

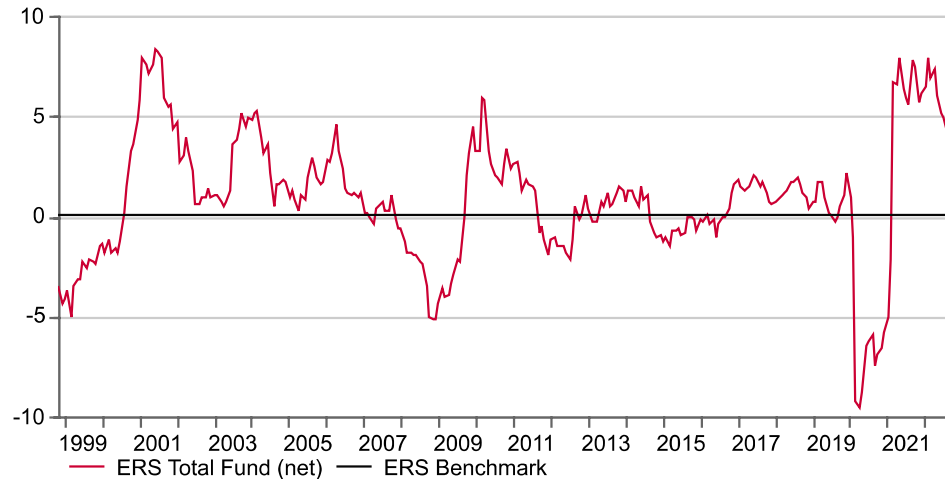ERS Total Fund (net) — ERS Benchmark

©FactSet Research Systems

Total Fund Rolling Excess Returns as September 30, 2022
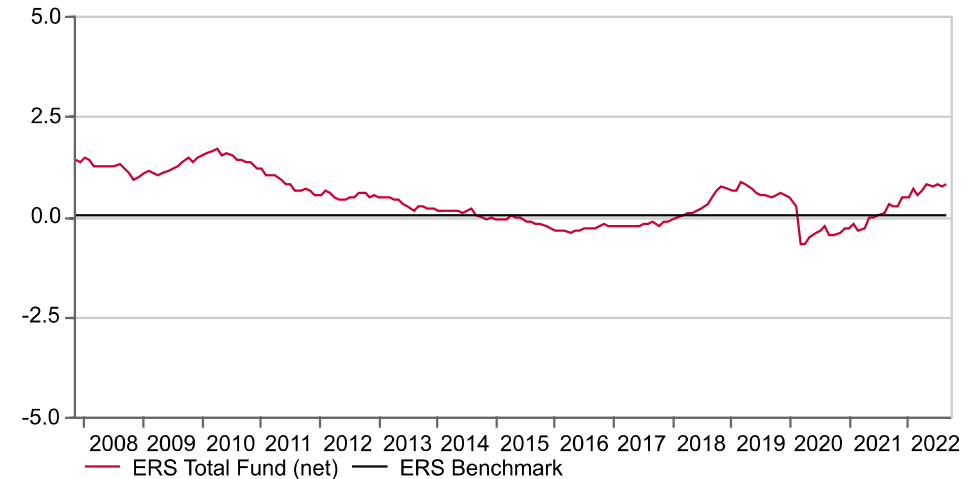

1 Year Rolling Excess Returns – 12/1/1997 to 9/30/2022

1 Year 1 Month Shift

ERS Total Fund (net) — ERS Benchmark

©FactSet Research Systems

10 Year Rolling Excess Returns – 12/1/1997 to 9/30/2022

10 Years 1 Month Shift

ERS Total Fund (net) — ERS Benchmark

©FactSet Research Systems

5 Year Rolling Excess Returns – 12/1/1997 to 9/30/2022

5 Years 1 Month Shift

ERS Total Fund (net) — ERS Benchmark

©FactSet Research Systems

15 Year Rolling Excess Returns – 12/1/1997 to 9/30/2022

15 Years 1 Month Shift
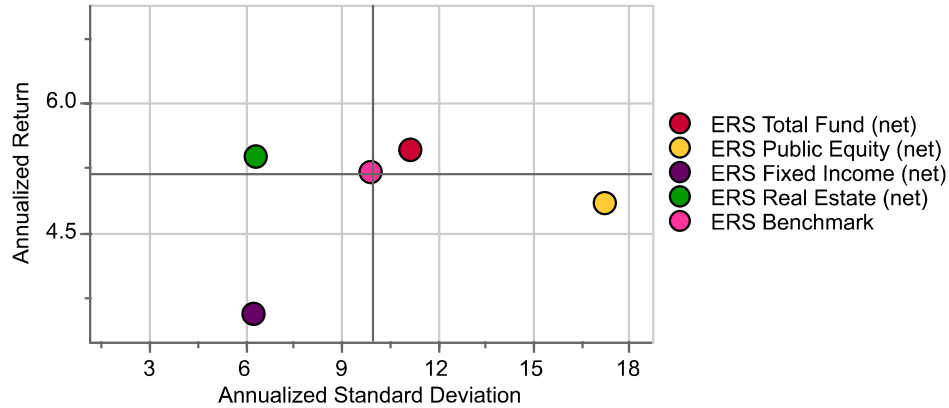
ERS Total Fund (net) — ERS Benchmark
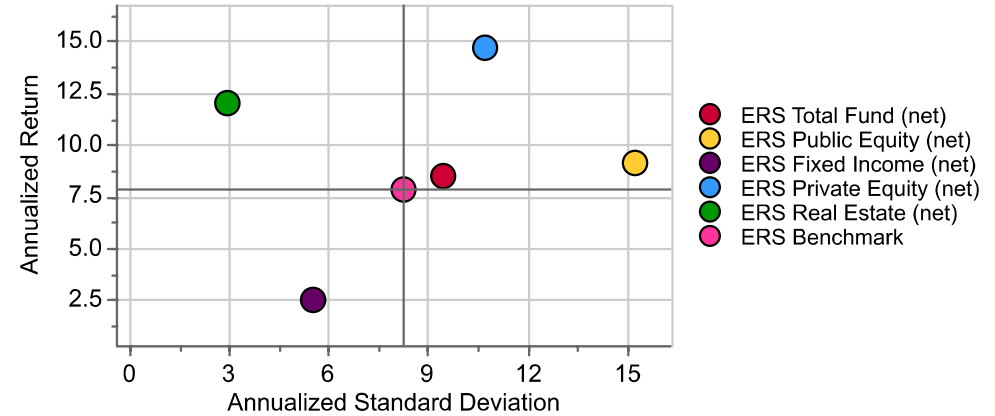
©FactSet Research Systems

Total Fund Statistics

15 Year Risk-Reward – 10/1/2007 to 9/30/2022
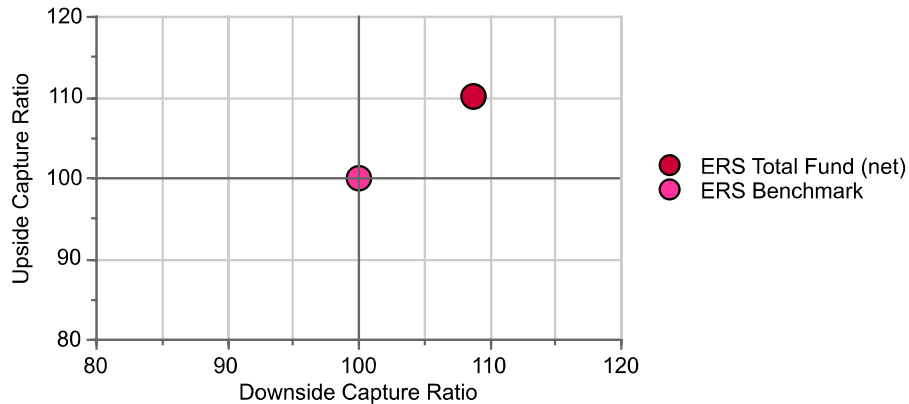

©FactSet Research Systems

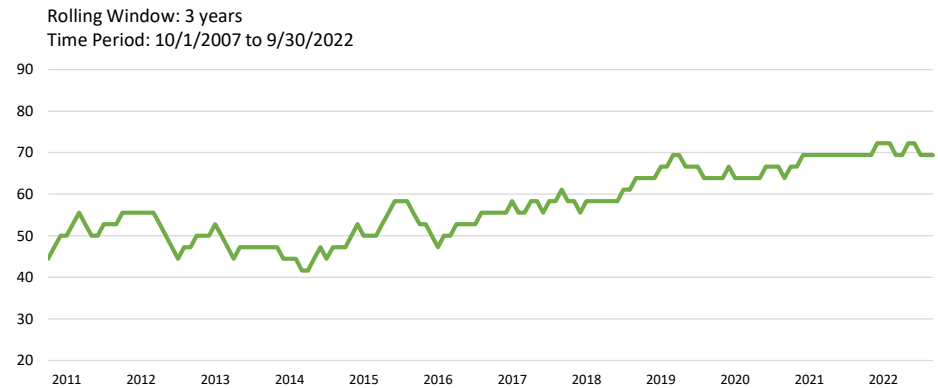## Risk-Reward Since Private Equity Inception – 7/1/2010 to 9/30/2022

©FactSet Research Systems

15 Year Upside-Downside –10/1/2007 to 9/30/2022

©FactSet Research Systems

Batting Average

Rolling Window: 3 years
Time Period: 10/1/2007 to 9/30/2022

15 Year Risk –10/1/2007 to 9/30/2022

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Total Fund (net)	5.5	11.2	0.0	0.4	0.0	2.8	1.1
ERS Benchmark	5.2	9.9	0.0	0.5	--	--	1.0

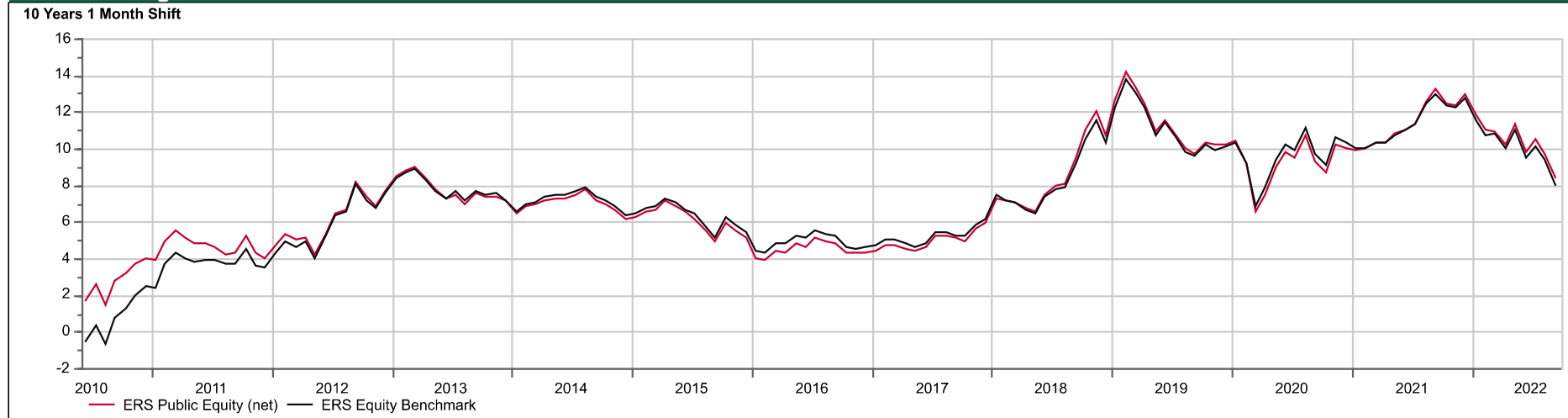## Risk – 7/1/2013 to 9/30/2022

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Total Fund (net)	7.5	9.0	0.0	0.7	0.1	3.2	1.1
ERS Benchmark	6.6	7.7	0.0	0.8	--	--	1.0

* Real Estate returns calculated by Northern Trust

Public Equity

Public Equity Performance

10 Years 1 Month Shift

Legend: ERS Public Equity (net) — ERS Equity Benchmark

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	7 Year	10 Year	15 Year
				Annualized Return				
ERS Public Equity (Gross)	-7.1	-24.8	-20.6	4.5	4.8	8.0	8.7	5.2
ERS Public Equity (Net)	-7.2	-25.0	-20.9	4.2	4.5	7.7	8.3	4.8
ERS Public Equity Benchmark	-6.6	-25.7	-21.2	3.6	4.2	7.4	8.0	4.8
MSCI AC World IMI	-6.6	-25.7	-21.2	3.6	4.2	7.3	7.2	4.2

Investment Growth – 10/1/2007 to 9/30/2022

Legend: ERS Public Equity (net) — ERS Equity Benchmark

Rolling Excess Returns –10/1/2007 to 9/30/2022

10 Years, one month shift

Legend: ERS Public Equity (net) — ERS Equity Benchmark

MILWAUKEE ERS Employees' Retirement System

Public Equity vs Universe

	Q3 2022	YTD	1 Yr.	3 Yrs.	5 Yrs.	7 Yrs.	10 Yrs.
Account Return	-7.1	-24.8	-20.6	4.5	4.8	8.0	8.7
Percentile Rank	86	43	41	46	54	43	36
Index Return	-6.6	-25.7	-21.2	3.6	4.2	7.4	8.0
Percentile Rank	67	56	51	68	74	3rd Quartile	3rd Quartile
1st Quartile	-4.8	-24.0	-19.0	5.6	6.0	8.5	9.0
Median	-6.1	-25.5	-21.1	4.3	4.9	7.9	8.2
3rd Quartile	-6.8	-27.3	-23.7	3.4	4.2	7.4	7.7
Observations	132	132	132	132	131	124	111

Public Equity Portfolio Snapshot

Equity Sector Exposure (GICS)

- Financials 16.2%
- Information Technology 16.1%
- Health Care 13.7%
- Industrials 12.7%
- Consumer Discretionary 10.5%
- Consumer Staples 7.5%
- Communication Services 7%
- Energy 6.4%
- Materials 5.5%
- Real Estate 2.3%
- Utilities 2%

Regional Exposure by Domicile

- North America 62.1%
- Europe dev 15.9%
- Japan 5.8%
- United Kingdom 5.1%
- Asia emrg 3.9%
- Asia dev 3.0%
- Latin America 2.1%
- Australasia 1.0%
- Africa/Middle East 0.8%
- Europe emrg 0.1%

Regional Exposure by Source of Revenue

- North America 49.1%
- Europe dev 14%
- Asia emrg 12.9%
- Japan 5.5%
- Latin America 4.5%
- United Kingdom 3.8%
- Asia dev 3.7%
- Africa/Middle East 3%
- Europe emrg 1.6%
- Australasia 1.4%
- Other 0.5%

Risk – Reward – 8/1/2016 to 9/30/2022

- MFS (Net)
- Brandes (Net)
- William Blair (Net)
- DFA Int'l Small (Net)
- Polen (Net)
- DFA US Small (Net)
- Earnest (Net)
- CastleArk (Net)
- NT S&P 500 Index (Net)
- ERS Public Equity (Net)
- BlackRock Global (Net)
- AQR (Net)
- ERS Public Equity BM

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Top 10 Holdings

Portfolio Date 9/30/22	Weight %	Return %
Microsoft Corporation	1.7	-9.1
Alphabet Inc.	1.6	-12.1
Apple Inc.	1.4	1.2
Amazon.com, Inc.	1.1	6.4
Meta Platforms, Inc.	0.7	-15.9
Exxon Mobil Corporation	0.7	2.7
Visa Inc.	0.7	-9.6
Takeda Pharmaceutical	0.6	-5.2
JPMorgan Chase & Co.	0.6	-6.4
Berkshire Hathaway Inc.	0.6	-2.1

Top 10 Managers

Portfolio Date 9/30/22	Weight %
Brandes Int'l Value	13.8
William Blair Int'l Growth	11.1
BlackRock Global Core	10.5
NTQA S&P 500 Index Core	9.9
BlackRock R1000 Value Index	8.6
DFA US Small Cap Value	7.8
MFS Global Growth	7.5
DFA Int'l Small Cap Value	7.3
DFA US Large Cap Value	6.2
Polen US Large Cap Growth	5.9

Public Equity Statistics
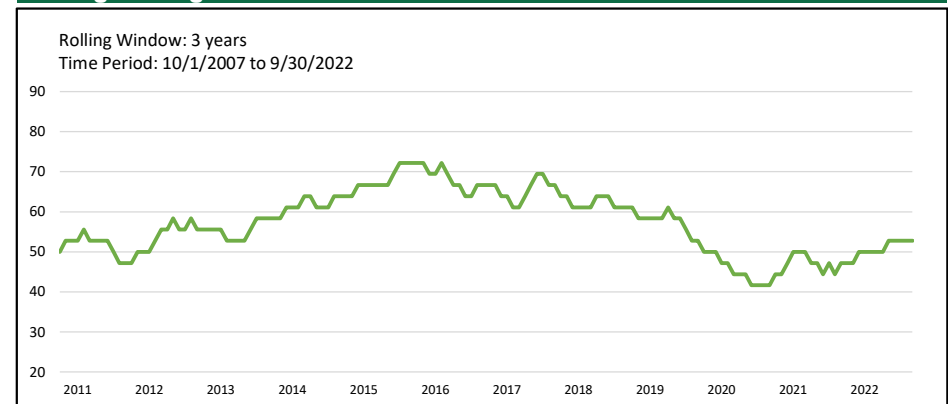
Characteristics Tilt vs MSCI ACWI IMI 9/30/2022

Legend: Size, Volatility, Momentum, Value, Growth, Quality

15 Year Upside-Downside – 10/1/2007 to 9/30/2022

- ERS Public Equity (Net)
- ERS Public Equity Benchmark

©FactSet Research Systems

Batting Average

Rolling Window: 3 years
Time Period: 10/1/2007 to 9/30/2022

15 Year Risk –10/1/2007 to 9/30/2022

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Public Equity (Net)	4.8	17.3	0.0	0.2	0.0	1.8	1.0
ERS Public Equity Benchmark	4.8	16.6	0.0	0.3	--	--	1.0

Risk – 7/1/2013 to 9/30/2022

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Public Equity (Net)	7.6	15.0	0.0	0.5	0.1	1.7	1.0
ERS Public Equity Benchmark	7.2	14.5	0.0	0.4	--	--	1.0

*"Price to Earnings," "Price to Earnings using FY1 Est," and "PEG using FY1 Est" values exclude companies with negative earnings from calculations.

Public Equity Valuation Characteristics

As of September 30, 2022

	Price/ Earnings	P/E using FY2 Est	Price/ Book	Price/ CF	Dividend Yield
ERS Public Equity	11.1	10.7	1.4	7.2	2.64
MSCI AC World IMI	13.8	12.6	2.2	9.3	2.42

Domestic Managers	Price/ Earnings	P/E using FY2 Est	Price/ Book	Price/ CF	Dividend Yield
BlackRock R1000 Value Index	13.8	12.0	2.0	9.3	2.45
CastleArk Small Growth	25.9	17.6	4.4	15.7	0.18
DFA Large Value	10.3	9.6	1.7	7.0	2.64
DFA Small Value	7.0	7.5	1.0	5.0	1.87
Earnest Mid Core	15.4	11.7	2.5	10.8	1.74
NT S&P 500 Index	18.2	14.9	3.4	12.6	1.80
Polen Large Growth	30.5	22.5	6.3	19.1	0.39

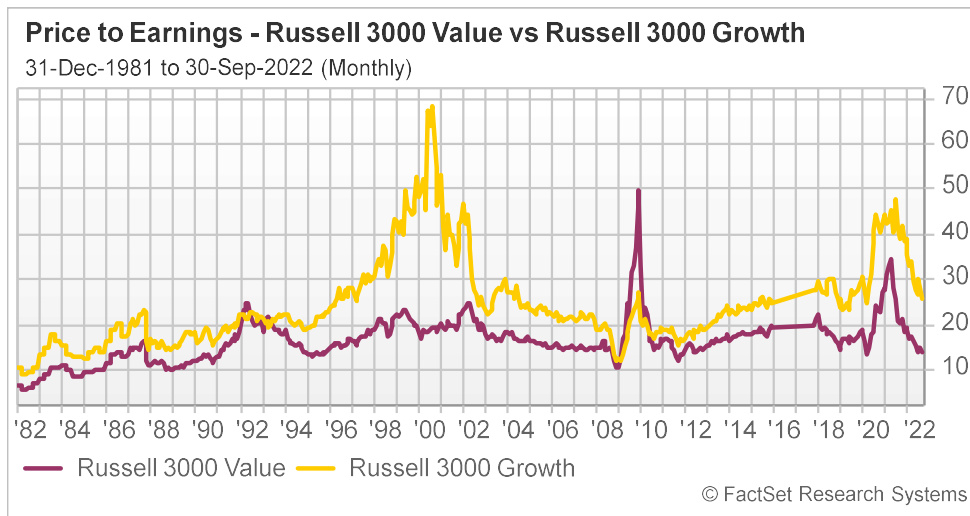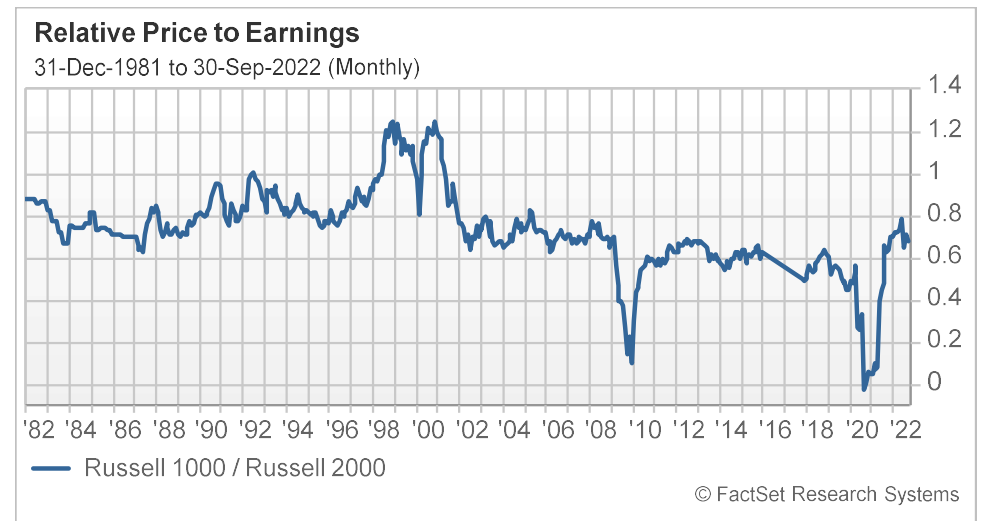| Global & International Managers	Price/ Earnings	P/E using FY2 Est	Price/ Book	Price/ CF	Dividend Yield
AQR Emerging Markets Core	5.5	6.1	1.0	3.5	7.11
BlackRock Global Core	12.8	11.9	2.2	8.8	2.73
Brandes Int'l Value	8.2	7.4	0.7	4.0	5.47
DFA Int'l Small Value	6.4	7.2	0.6	4.2	3.94
MFS Global Growth	23.1	17.6	3.8	15.8	1.21
William Blair Int'l Growth	19.5	16.8	3.3	14.9	1.86

*"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 September 30, 2022

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 September 30, 2022

Outperforming Equity Managers

	3rd Qtr	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
William Blair	-8.0%	-36.5%	-34.9%	1.1%	1.3%	4.6%	5.1%
MSCI ACWI ex US	1.8%	10.3%	10.1%	2.2%	1.7%	0.8%	1.7%
CastleArk	1.4%	-30.9%	-27.6%	6.0%	7.8%	9.1%	N/A
Russell 2000 Growth	1.2%	1.6%	1.7%	3.0%	4.2%	2.0%	
DFA U.S. Small Value	-3.4%	-14.6%	-8.9%	10.6%	5.3%	8.6%	9.8%
Russell 2000 Value	1.2%	6.5%	8.8%	5.8%	2.4%	1.2%	1.8%
DFA U.S. Large Value	-5.4%	-16.9%	-11.2%	4.3%	N/A	N/A	N/A
Russell 1000 Value	0.2%	0.8%	0.1%	0.1%			
ERS Public Equity	-7.2%	-25.0%	-20.9%	4.2%	4.5%	7.7%	8.3%
ERS Equity Benchmark	0.5%	0.7%	0.3%	0.6%	0.3%	0.3%	0.3%

Relative outperformance in blue
Relative underperformance in red

*Returns net of fees

Relative Investment Performance – Active Equity Managers
As of September 30, 2022

Underperforming Equity Managers

	3rd Qtr	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
Brandes	-12.0%	-23.4%	-23.3%	-2.5%	-1.8%	2.0%	3.6%
MSCI EAFE	2.6%	3.7%	1.8%	0.7%	1.0%	0.8%	0.1%
Earnest	-5.8%	-21.5%	-12.6%	8.6%	9.6%	12.2%	12.4%
Russell MidCap	2.3%	2.7%	6.8%	3.4%	3.1%	3.4%	2.1%
AQR	-12.8%	-27.6%	-28.5%	-1.1%	-2.7%	N/A	N/A
MSCI EM	1.2%	0.4%	0.4%	1.0%	0.9%		
MFS	-7.8%	-26.3%	-20.2%	5.2%	8.4%	10.8%	N/A
MSCI ACWI	0.9%	0.7%	0.5%	1.5%	4.0%	3.4%	
BlackRock Global Alpha Tilts	-7.5%	-25.5%	-20.2%	3.8%	4.3%	N/A	N/A
MSCI ACWI	0.7%	0.2%	0.5%	0.0%	0.2%		
Polen	-5.2%	-38.1%	-34.8%	4.6%	10.4%	11.7%	12.6%
S&P 500	0.3%	14.2%	19.4%	3.5%	1.1%	0.3%	0.9%
DFA International	-10.1%	-24.4%	-22.9%	-0.4%	-3.2%	2.4%	4.9%
MSCI EAFE Small Cap	0.3%	7.8%	9.2%	1.8%	1.4%	0.9%	0.4%
ERS Public Equity	-7.2%	-25.0%	-20.9%	4.2%	4.5%	7.7%	8.3%
ERS Equity Benchmark	0.5%	0.7%	0.3%	0.6%	0.3%	0.3%	0.3%

Relative outperformance in blue
Relative underperformance in red

*Returns net of fees

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Relative Investment Performance – Passive Equity Managers & Other
As of September 30, 2022

Passive Equity Managers

	3rd Qtr	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
Northern Trust S&P 500 Index	-4.9%	-23.9%	-15.5%	8.2%	9.3%	11.4%	11.7%
S&P 500	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
BlackRock Russell 1000 Value Index	-5.6%	-17.8%	-11.4%	4.4%	5.4%	N/A	N/A
Russell 1000 Value	0.0%	0.0%	0.0%	0.1%	0.1%		

Real Assets Manager

	3rd Qtr	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
Principal Diversified Real Assets	-8.2%	-12.5%	-8.4%	3.8%	3.1%	N/A	N/A
Blended Benchmark	0.3%	0.3%	0.3%	1.2%	0.3%		

Relative outperformance in blue
Relative underperformance in red

*Returns net of fees

Fixed Income

Fixed Income Performance

10 Years 1 Month Shift

ERS Fixed Income (net) — Bloomberg US Agg Bond TR USD

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	7 Year	10 Year	15 Year
				Annualized Return				
Total Fixed Income (Gross)	-3.9	-9.4	-9.3	-3.6	-0.1	1.4	1.3	3.7
Total Fixed Income (Net)	-3.9	-9.4	-9.4	-3.7	-0.2	1.3	1.2	3.6
Bloomberg US Aggregate	-4.8	-14.6	-14.6	-3.3	-0.3	0.5	0.9	2.7

Investment Growth – 10/1/2007 to 9/30/2022

ERS Fixed Income (net) — Bloomberg US Agg Bond TR USD

Rolling Excess Return – 10/1/2007 to 9/30/2022

10 Years, One month shift

ERS Fixed Income (net) — Bloomberg US Agg Bond TR USD

Fixed Income vs Universe

	Q3 2022	YTD	1 Yr.	3 Yrs.	5 Yrs.	7 Yrs.	10 Yrs.
Account Return	-3.9	-9.4	-9.3	-3.6	-0.1	1.4	1.3
Percentile Rank	52	26	26	71	70	55	66
Index Return	-4.8	-14.6	-14.6	-3.3	-0.3	0.5	0.9
Percentile Rank	70	59	58	68	81	93	88
1st Quartile	-2.3	-9.4	-9.3	-1.0	0.8	2.0	2.1
Median	-3.7	-14.0	-13.9	-2.2	0.4	1.5	1.6
3rd Quartile	-7.0	-25.0	-24.1	-4.9	-0.2	1.0	1.3
Observations	95	96	96	97	97	93	89

Relative Investment Performance – Fixed Income Managers
As of September 30, 2022

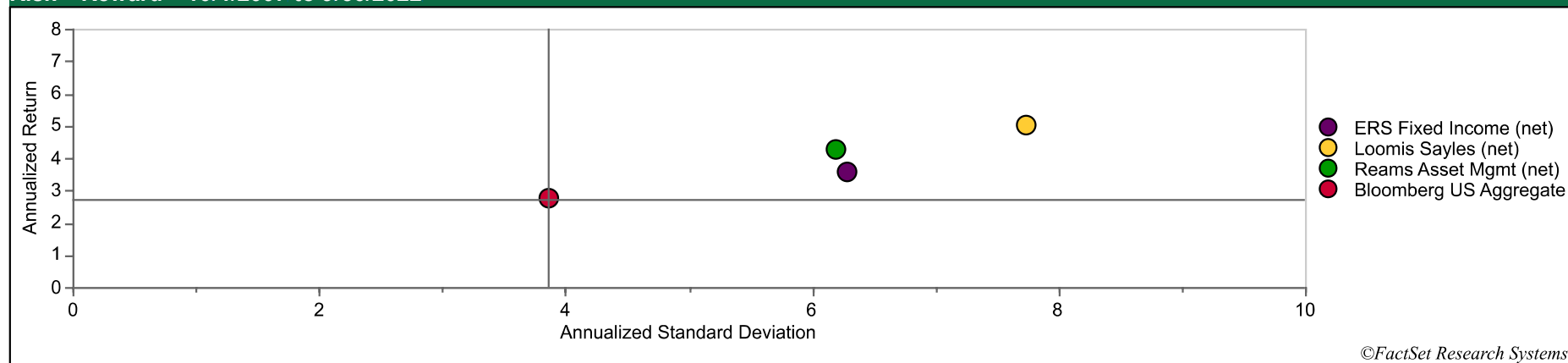|	3rd Qtr	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
Loomis Sayles	-2.8%	-14.7%	-14.8%	-1.7%	1.0%	3.3%	2.9%
Bloomberg U.S. Agg.	2.0%	0.1%	0.2%	1.5%	1.3%	2.7%	2.0%
Reams	-4.6%	-14.4%	-14.1%	-0.4%	1.8%	2.1%	2.0%
Bloomberg U.S. Agg.	0.1%	0.2%	0.5%	2.9%	2.1%	1.6%	1.1%
BlackRock Index	-4.3%	-12.8%	N/A	N/A	N/A	N/A	N/A
Bloomberg U.S. Government	0.0%	0.1%					
ERS Fixed Income	-3.9%	-9.4%	-9.4%	-3.7%	-0.2%	1.3%	1.2%
Bloomberg U.S. Agg.	0.8%	5.2%	5.2%	0.5%	0.1%	0.8%	0.3%

Relative outperformance in blue
Relative underperformance in red

*Returns net of fees
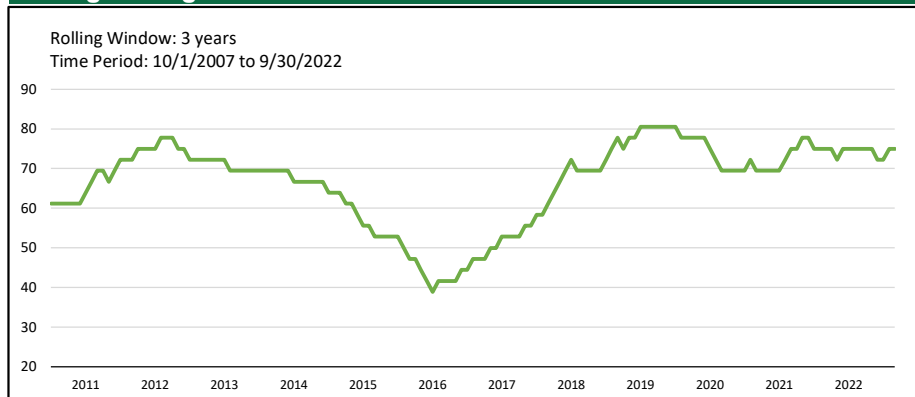
Fixed Income Statistics

Risk – Reward – 10/1/2007 to 9/30/2022

Legend:
- ERS Fixed Income (net)
- Loomis Sayles (net)
- Reams Asset Mgmt (net)
- Bloomberg US Aggregate

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15 Year Upside-Downside – 10/1/2007 to 9/30/2022

Legend:
- ERS Fixed Income (net)
- Bloomberg US Aggregate

©FactSet Research Systems

Batting Average

Rolling Window: 3 years
Time Period: 10/1/2007 to 9/30/2022

15 Year Risk – 10/1/2007 to 9/30/2022							
	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Total Fixed Income (Net)	3.6	6.3	0.1	0.5	0.1	4.8	1.0
Bloomberg US Aggregate	2.7	3.9	0.0	0.5	--	--	1.0

Risk – 7/1/2013 to 9/30/2022							
	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Total Fixed Income (Net)	1.4	6.0	0.0	0.1	0.0	4.6	1.0
Bloomberg US Aggregate	1.2	4.0	0.0	0.1	--	--	1.0

Absolute Return

Relative Investment Performance – Absolute Return Managers
As of September 30, 2022

	3rd Qtr	YTD	1 Year	3 Year	5 Year	7 Year
UBS A&Q	0.6%	5.2%	7.9%	9.8%	7.7%	6.4%
1 Year Libor / SOFR + 4%	0.8%	2.2%	4.0%	4.7%	1.9%	0.6%
ERS Absolute Return	0.6%	20.3%	23.3%	4.9%	5.3%	5.4%
3 Month T-Bill + 3%	0.8%	17.0%	19.3%	1.2%	1.1%	1.4%

Relative outperformance in blue
Relative underperformance in red

Risk Adjusted Returns (6/30/14 - 9/30/22)

	Return		Std Dev	Sharpe Ratio	Max Drawdown
ERS Public Equity (net)	5.6%		15.5%	0.3	-25.3%
ERS Fixed Income (net)	0.8%		6.3%	0.0	-13.0%
ERS Absolute Return (net)	5.3%		10.2%	0.4	-27.1%

*Returns net of fees
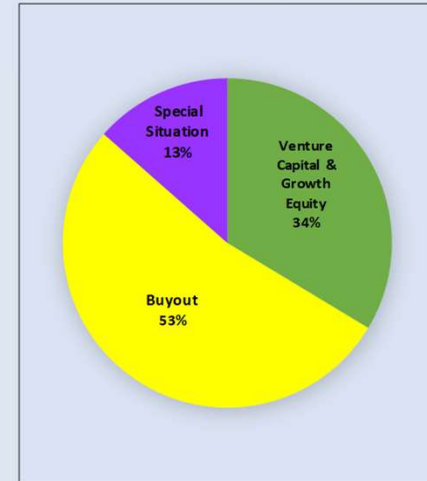****Initial funding to Aptitude took place on 9/26/2022. Performance will begin as of 10/1/2022.**

Private Equity

Milwaukee ERS Private Equity Portfolio as of June 30, 2022

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	48,699,896	24,397,046	2.11
Abbott 2011	2011	55,000,000	54,730,191	269,809	74,636,750	49,798,208	2.27
Abbott 2012	2012	40,000,000	39,600,000	400,000	46,512,898	44,454,246	2.30
Abbott 2013	2013	35,000,000	34,650,000	350,000	38,369,575	43,696,219	2.37
Abbott 2014	2014	35,000,000	34,300,000	700,000	34,125,000	48,564,280	2.41
Abbott 2015	2015	25,000,000	25,050,000	-	15,587,500	36,039,166	2.06
Abbott 2016	2016	20,000,000	19,717,500	282,500	8,555,000	28,673,925	1.89
Abbott 2018	2018	20,000,000	15,525,000	4,475,000	3,745,000	19,827,486	1.52
Abbott 2019	2019	20,000,000	10,900,000	9,100,000	2,115,000	14,475,416	1.52
Abbott 2020	2020	40,000,000	14,115,000	25,885,000	-	17,193,929	1.22
Abbott 2021	2021	20,000,000	4,352,249	15,647,751	-	4,739,260	1.09
Abbott 2022	2022	35,000,000	1,225,000	33,775,000	-	1,189,708	0.97
Mesirow V	2008	75,000,000	70,721,194	4,278,806	121,798,045	49,696,706	2.42
Mesirow VI	2013	60,000,000	52,800,000	7,200,000	61,356,748	77,761,820	2.63
Mesirow VII	2017	100,000,000	72,014,499	27,985,501	3,498,942	118,745,407	1.70
Mesirow VIII	2020	120,000,000	33,600,000	86,400,000	-	36,569,307	1.09
Neuberger Berman III	2013	30,000,000	31,415,273		38,470,320	8,268,133	1.49
Neuberger Berman IV	2017	25,000,000	22,623,659	2,376,341	16,482,659	17,977,801	1.52
Neuberger Berman V	2021	100,000,000	3,125,000	96,875,000	-	8,761,635	N/A
Private Advisors VI	2014	30,000,000	32,647,677	-	36,244,040	23,650,315	1.83
Private Advisors VII	2016	15,000,000	17,251,809	-	11,767,519	17,007,684	1.67
Private Advisors VIII	2018	15,000,000	13,621,685	1,378,315	4,644,162	17,358,872	1.62
Private Advisors IX	2019	35,000,000	23,801,494	11,198,506	8,611,847	23,756,197	1.36
Total ERS		985,000,000	662,437,635	328,927,124	575,220,901	732,602,766	1.97
% of ERS Fund				5.9%		13.1%	

Sub-Asset Class Breakdown

Vintage Year**

Age of Investment***

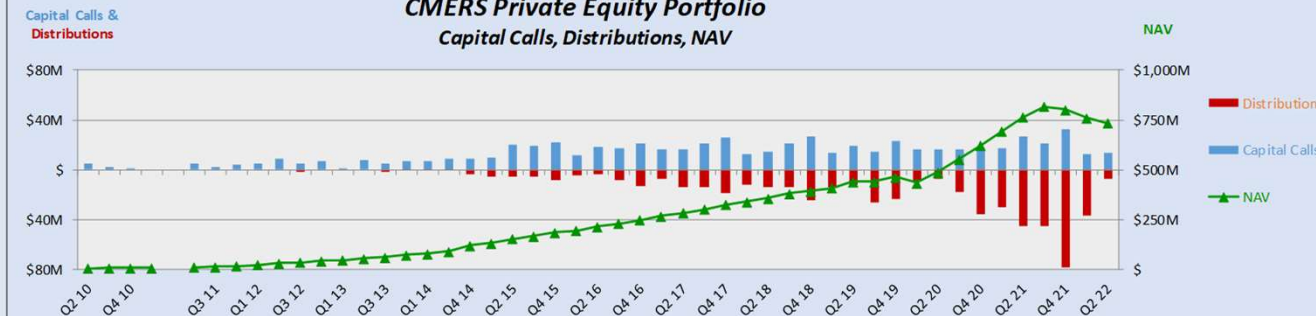## NAV by Vintage Year

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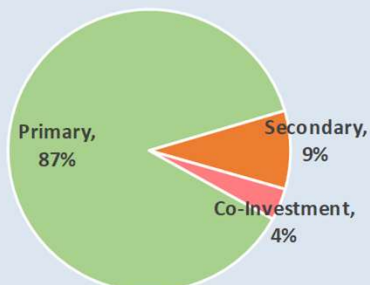*** Portfolio Companies by Age of Investment figures have not been fully adjusted for overlapping investments. Excludes Neuberger Berman.
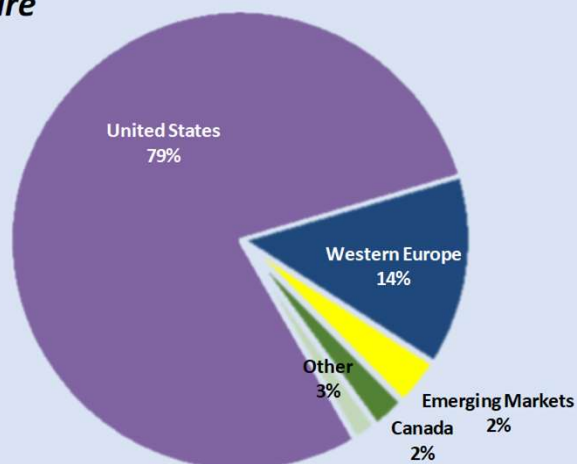
Private Equity Continued

Total Managers	204*
Number of Partnerships	559*
Number of Portfolio Companies	5806*

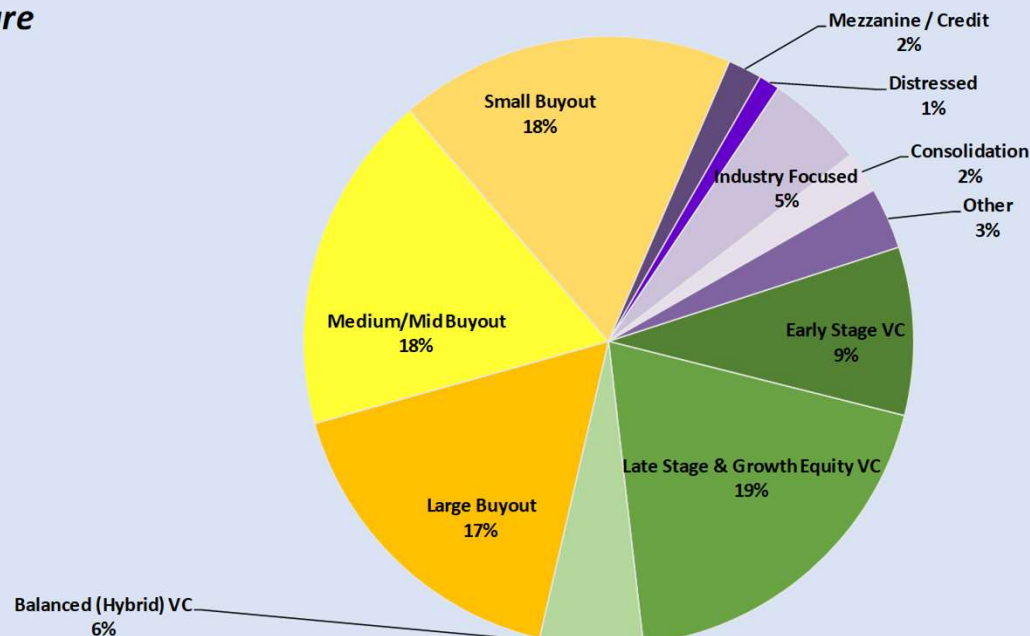*Data in the above table is estimated. Actual data may be slightly different.
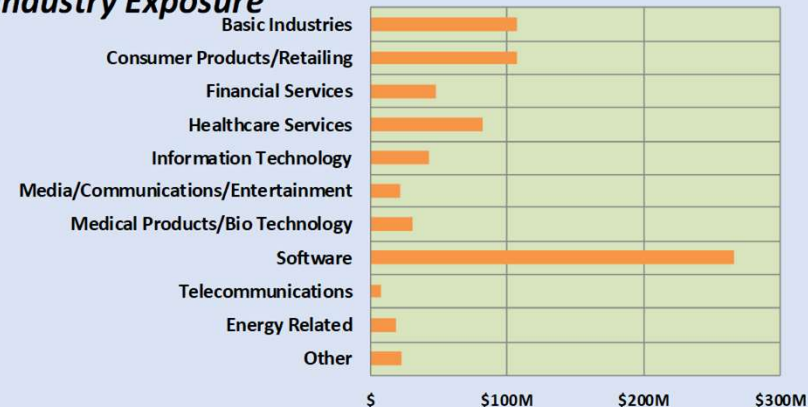
Transaction Type

- Primary, 87%
- Secondary, 9%
- Co-Investment, 4%

Strategy Exposure

- Small Buyout 18%
- Mezzanine / Credit 2%
- Distressed 1%
- Consolidation 2%
- Other 3%
- Industry Focused 5%
- Early Stage VC 9%
- Late Stage & Growth Equity VC 19%
- Balanced (Hybrid) VC 6%
- Large Buyout 17%
- Medium/Mid Buyout 18%

Geographic Exposure

- United States 79%
- Western Europe 14%
- Other 3%
- Canada 2%
- Emerging Markets 2%

Industry Exposure

- Basic Industries
- Consumer Products/Retailing
- Financial Services
- Healthcare Services
- Information Technology
- Media/Communications/Entertainment
- Medical Products/Bio Technology
- Software
- Telecommunications
- Energy Related
- Other

$, $100M, $200M, $300M

Performance Update

Performance Update

Estimated ERS Total Fund Market Value is $5.37 billion as of November 2, 2022

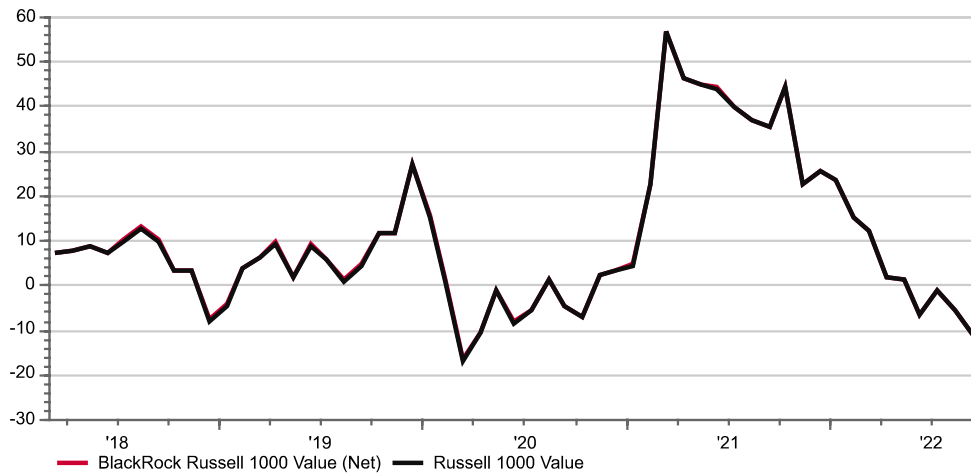| Period	ERS Fund*	Benchmark
3rd Quarter YTD	-11.4%	-14.8%
October (Estimate)	3.1%	2.6%
November MTD (Estimate)	-0.5%	-0.6%
YTD Through November 2, 2022 (Estimate)	-9.2%	-13.0%

*Returns Net of Fees

Appendix

Appendix – Table of Contents

BlackRock Russell 1000 Value Portfolio Snapshot – September 30, 2022

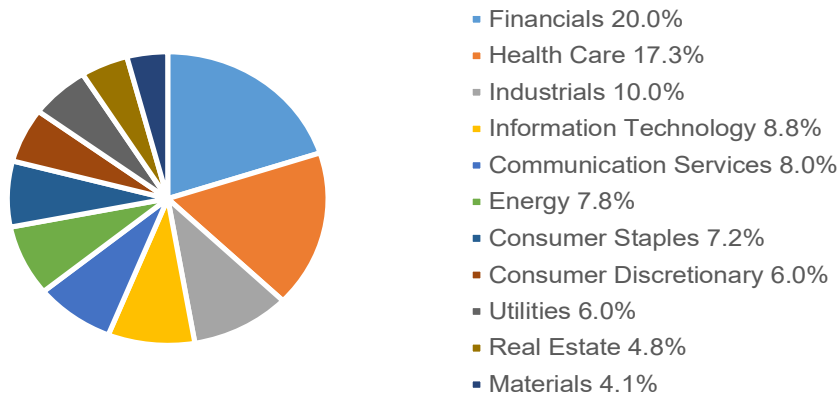## Rolling Returns Since Inception 4/1/2017 (One Year, One Month Shift)

Legend: BlackRock Russell 1000 Value (Net) — Russell 1000 Value

©FactSet Research Systems

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	Inception 4/1/2017
BlackRock R1000 Value (Net)	-5.6	-17.8	-11.4	4.4	5.4	5.7
Russell 1000 Value	-5.6	-17.8	-11.4	4.4	5.3	5.6

Equity Sector Exposure (GICS)

- Financials 20.0%
- Health Care 17.3%
- Industrials 10.0%
- Information Technology 8.8%
- Communication Services 8.0%
- Energy 7.8%
- Consumer Staples 7.2%
- Consumer Discretionary 6.0%
- Utilities 6.0%
- Real Estate 4.8%
- Materials 4.1%

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Berkshire Hathaway Inc.	2.91	-2.14
Johnson & Johnson	2.60	-7.33
Exxon Mobil Corporation	2.20	2.89
JPMorgan Chase & Co.	1.84	-6.40
Chevron Corporation	1.71	0.12
Pfizer Inc.	1.50	-15.88
Meta Platforms, Inc.	1.48	-15.86
Bank of America Corporation	1.28	-2.28
Walmart Inc.	1.13	7.13
Thermo Fisher Scientific Inc.	1.05	-6.59

Regional Exposure by Domicile

- North America 99.8%
- Latin America 0.1%

Regional Exposure by Source of Revenue

- North America 69.9%
- Europe dev 8.4%
- Asia emrg 7.8%
- Latin America 2.8%
- United Kingdom 2.4%
- Africa/Middle East 2.1%
- Japan 2.1%
- Asia dev 2.0%
- Europe emrg 1.2%
- Australasia 0.9%
- Other 0.4%

BlackRock Russell 1000 Value vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022
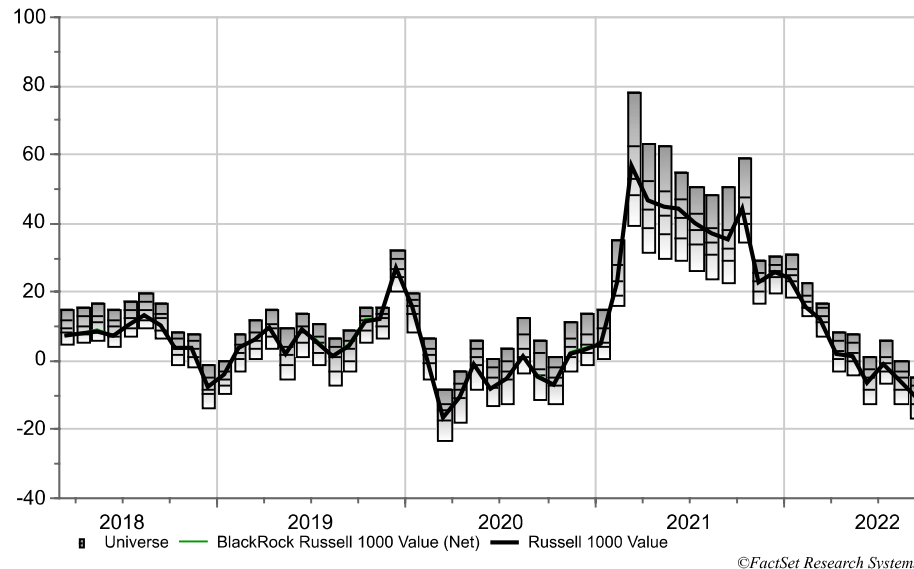**Universe: Lipper US:Large-Cap Value**

Legend: ▪ Universe ● BlackRock Russell 1000 Value (Net) ◇ Russell 1000 Value

©FactSet Research Systems

Investment Growth Since Inception 4/1/2017

Legend: — BlackRock Russell 1000 Value (Net) — Russell 1000 Value

©FactSet Research Systems

Rolling Returns 4/1/2017 –9/30/2022 (1 Year, 1 Month Shift)
Universe: Lipper US:Large-Cap Value

Legend: ▪ Universe — BlackRock Russell 1000 Value (Net) — Russell 1000 Value

©FactSet Research Systems

Risk Since Inception 4/1/2017

	Return	Std Dev	Sharpe Ratio	Tracking Error
BlackRock R1000 Value (Net)	5.7	17.1	0.3	0.1
Russell 1000 Value	5.6	17.2	0.3	--

CastleArk Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 9/1/2013 (Three Year, One Month Shift)

©FactSet Research Systems

Legend: CastleArk (Net) — Russell 2000 Growth

Top 10 Holdings

	Portfolio Weight	Quarterly Return
WillScot Mobile Mini Holdings Corp.	2.22	24.40
Calix, Inc.	2.16	79.09
Option Care Health, Inc.	2.14	13.24
Acadia Healthcare Company, Inc.	2.05	15.60
Shockwave Medical, Inc.	2.01	45.46
Casella Waste Systems, Inc.	1.70	5.10
Axon Enterprise, Inc.	1.70	-0.80
Axonics, Inc.	1.66	24.30
Halozyme Therapeutics, Inc.	1.63	-10.14
Box, Inc.	1.63	-2.98

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	Inception 9/1/2013
CastleArk (Net)	1.4	-30.9	-27.6	6.0	7.8	8.8
Russell 2000 Growth	0.2	-29.3	-29.3	2.9	3.6	7.1

Regional Exposure by Domicile

- North America 100.0%

Equity Sector Exposure (GICS)

- Health Care 32.7%
- Industrials 22.7%
- Information Technology 18.4%
- Consumer Discretionary 8.7%
- Consumer Staples 4.5%
- Financials 3.2%
- Materials 2.9%
- Communication Services 2.7%
- Energy 2.6%
- Real Estate 1.5%

Regional Exposure by Source of Revenue

- North America 85.5%
- Europe dev 4.1%
- Asia emrg 3.7%
- Japan 1.5%
- United Kingdom 1.2%
- Asia dev 1.2%
- Latin America 0.9%
- Africa/Middle East 0.8%
- Europe emrg 0.4%
- Australasia 0.4%
- Other 0.2%

CastleArk vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US Small-Cap Growth

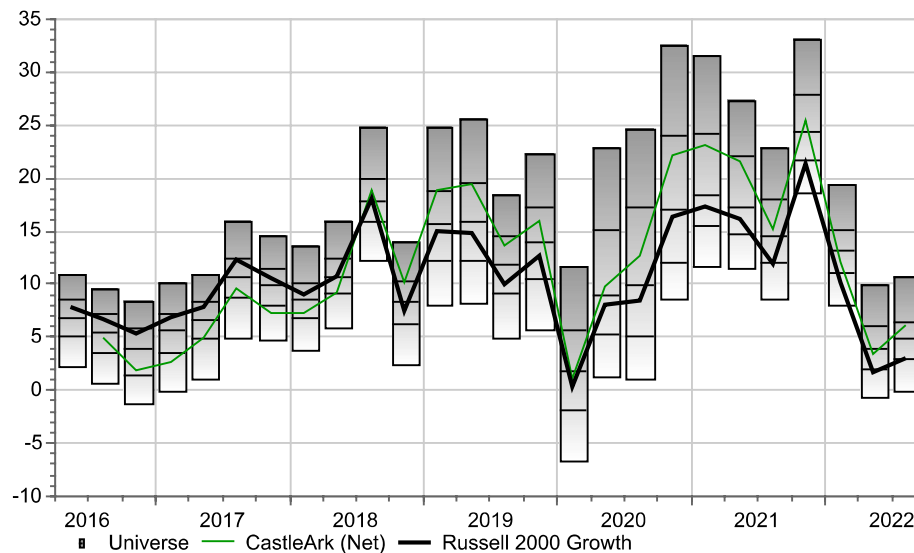- ▪ Universe
- ● CastleArk (Net)
- ◇ Russell 2000 Growth

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Three-Year Rolling Return Versus Benchmark

- ◆ CastleArk (Net)
- ▲ CastleArk (Net) Oldest 2 Yrs
- —— Relative Performance Line
- ■ CastleArk (Net) Recent 2 Yrs

Rolling Returns 9/1/2013 –9/30/2022 (3 Year, 3 Month Shift)

Universe: Lipper US:Small-Cap Growth

- ▪ Universe
- —— CastleArk (Net)
- —— Russell 2000 Growth

©FactSet Research Systems

Over/Under Benchmark Analysis

17	Outperform
8	Underperform
25	# Observations
68%	% Outperform

CastleArk Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Calix, Inc.	1.67	1.48	0.79
Shockwave Medical, Inc.	1.95	1.26	0.56
WillScot Mobile Mini Holdings Corp.	2.01	2.01	0.44
Advanced Drainage Systems, Inc.	1.12	1.12	0.32
Acadia Healthcare Company, Inc.	2.06	2.06	0.31
LPL Financial Holdings Inc.	1.58	1.58	0.25
Option Care Health, Inc.	2.08	1.71	0.22
Super Micro Computer, Inc.	0.98	0.78	0.22
Cytokinetics, Incorporated	1.37	1.09	0.20
Sierra Wireless Inc.	0.41	0.41	0.19

Top 10 Leading Detractors

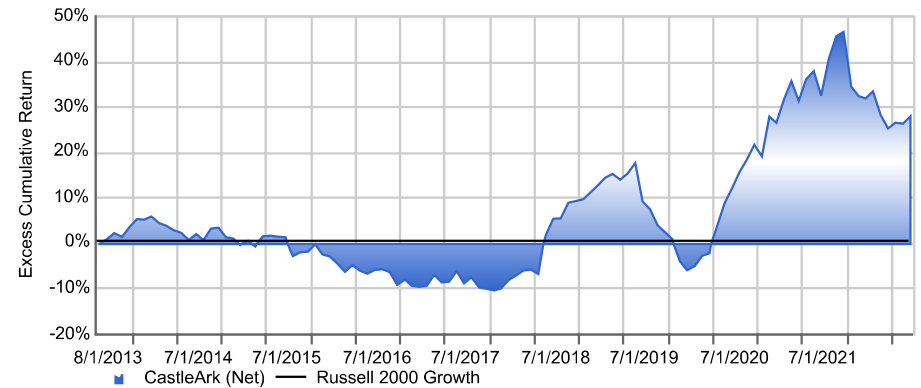|	Avg. Weights	Relative Weights	Active Return
Mercury Systems, Inc.	0.82	0.82	-0.30
Grocery Outlet Holding Corp.	1.18	1.18	-0.25
Karuna Therapeutics, Inc.	0.12	-0.27	-0.22
Celsius Holdings, Inc.	0.28	-0.10	-0.21
Simply Good Foods Co.	0.80	0.55	-0.21
Americold Realty Trust, Inc.	0.53	0.53	-0.20
Planet Fitness, Inc.	1.55	1.55	-0.20
Five9, Inc.	0.96	0.96	-0.20
CryoPort, Inc.	0.30	0.20	-0.18
Shoals Technologies Group, Inc.	0.30	0.09	-0.18

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-0.1	-6.9	-4.9	0.0	0.0	0.0
Consumer Discretionary	-2.5	-9.8	0.8	0.0	-0.9	-0.9
Consumer Staples	0.6	-17.4	-6.8	-0.1	-0.6	-0.6
Energy	-3.9	0.4	3.6	-0.2	-0.1	-0.3
Financials	-2.5	11.2	-0.7	0.0	0.4	0.4
Health Care	8.2	5.5	8.1	0.7	-0.8	-0.2
Industrials	5.1	1.5	0.0	0.0	0.4	0.3
Information Technology	-2.2	5.2	-4.3	0.1	1.7	1.8
Materials	-1.9	18.5	-1.3	0.0	0.5	0.5
Real Estate	0.3	-10.1	-18.2	-0.1	0.3	0.2
Utilities	-1.8	0.0	-3.1	0.1	0.0	0.1
Cash	0.9	0.6	0.0	-0.1	0.0	-0.1
Total	0.0	1.5	0.2	0.5	0.8	1.3

CastleArk Inception Performance & Statistics

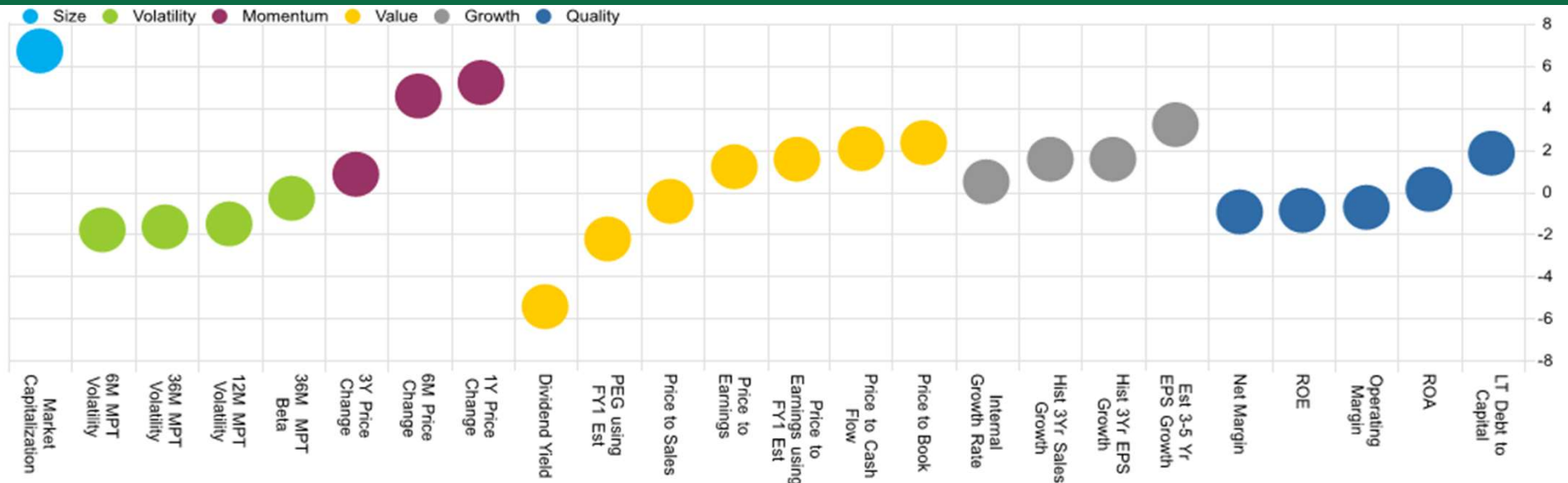## Investment Growth Since Inception 9/1/2013

©FactSet Research Systems

Relative Cumulative Performance Since Inception 9/1/2013

©FactSet Research Systems

Risk Since Inception 9/1/2013

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
CastleArk (Net)	8.8	20.5	1.7	0.4	0.3	5.1	1.0
Russell 2000 Growth	7.1	20.0	--	0.3	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

DFA LCV Portfolio Snapshot – September 30, 2022

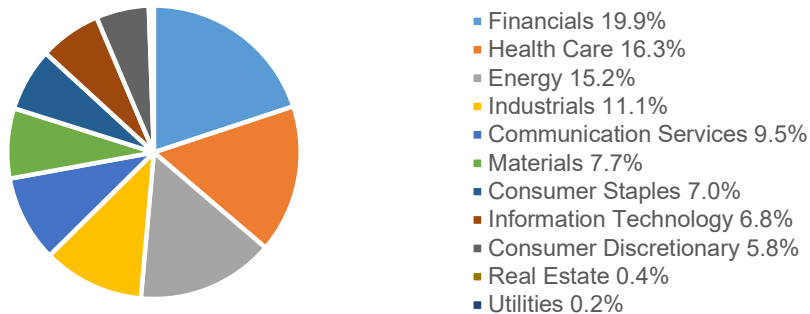## Rolling Returns Since Inception 12/1/2017 (One Year, One Month Shift)

Legend: DFA Large Cap Value (Net) — Russell 1000 Value

©FactSet Research Systems

Trailing Returns

	QTR	YTD	1 Year	3 Year	Inception 12/1/2017
DFA US Large Value (Net)	-5.4	-16.9	-11.2	4.3	3.5
Russell 1000 Value	-5.6	-17.8	-11.4	4.4	4.7

Equity Sector Exposure (GICS)

- Financials 19.9%
- Health Care 16.3%
- Energy 15.2%
- Industrials 11.1%
- Communication Services 9.5%
- Materials 7.7%
- Consumer Staples 7.0%
- Information Technology 6.8%
- Consumer Discretionary 5.8%
- Real Estate 0.4%
- Utilities 0.2%

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Exxon Mobil Corporation	4.15	2.89
JPMorgan Chase & Co.	3.32	-6.40
Chevron Corporation	3.09	0.12
Pfizer Inc.	2.99	-15.88
ConocoPhillips	2.13	16.00
Berkshire Hathaway Inc.	2.03	-2.20
Walmart Inc.	1.97	7.13
Verizon Communications Inc.	1.65	-24.15
Comcast Corporation	1.57	-24.72
Meta Platforms, Inc.	1.35	-16.72

Regional Exposure by Domicile

- North America 100.0%

Regional Exposure by Source of Revenue

- North America 70.8%
- Asia emrg 7.9%
- Europe dev 7.8%
- Latin America 2.7%
- United Kingdom 2.5%
- Asia dev 2.3%
- Japan 2.0%
- Africa/Middle East 1.9%
- Europe emrg 1.0%
- Australasia 0.9%
- Other 0.2%

DFA LCV vs Universe & Benchmark

Universe: Lipper US Large Cap Value

Universe ● DFA Large Cap Value (Net) ◇ Russell 1000 Value

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One-Year Rolling Return Versus Benchmark

◆ DFA LCV (Net) —— Relative Performance Line

Rolling Returns 12/1/2017 –9/30/2022 (1 Year, 1 Month Shift)

Universe: Lipper US Large Cap Value

Universe —— DFA Large Cap Value (Net) —— Russell 1000 Value

©FactSet Research Systems

Over/Under Benchmark Analysis

5	Outperform
11	Underperform
16	# Observations
31%	% Outperform

DFA LCV Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
ConocoPhillips	1.89	1.19	0.14
Meta Platforms, Inc.	0.25	-1.35	0.13
Abbott Laboratories	0.03	-0.84	0.08
Albemarle Corporation	0.44	0.36	0.08
Biogen Inc.	0.37	0.20	0.06
Salesforce, Inc.	0.19	-0.50	0.06
Cisco Systems, Inc.	0.04	-0.97	0.05
S&P Global, Inc.	0.07	-0.59	0.05
Carlisle Companies Incorporated	0.34	0.33	0.05
Walmart Inc.	1.79	0.78	0.04

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Intel Corporation	1.59	0.80	-0.25
Pfizer Inc.	3.09	1.56	-0.25
Comcast Corporation	1.85	0.93	-0.24
AT&T Inc.	1.55	0.80	-0.22
Verizon Communications Inc.	1.56	0.49	-0.13
FedEx Corporation	0.66	0.37	-0.12
JPMorgan Chase & Co.	3.16	1.34	-0.11
Tyson Foods, Inc.	0.52	0.39	-0.09
Lumen Technologies, Inc.	0.26	0.20	-0.06
International Paper Company	0.34	0.26	-0.06

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	0.4	-18.6	-13.6	0.0	-0.5	-0.5
Consumer Discretionary	0.1	-5.7	-2.9	0.0	-0.2	-0.2
Consumer Staples	-0.3	-3.3	-6.5	0.0	0.2	0.2
Energy	6.9	3.4	2.7	0.6	0.1	0.7
Financials	0.3	-3.5	-3.6	0.0	0.0	0.0
Health Care	-0.8	-5.6	-5.8	0.0	0.0	0.0
Industrials	1.4	-3.9	-4.7	0.0	0.1	0.1
Information Technology	-1.8	-13.1	-8.3	0.1	-0.4	-0.3
Materials	4.0	-5.2	-8.1	-0.1	0.2	0.1
Real Estate	-4.7	-10.3	-10.7	0.2	0.0	0.2
Utilities	-5.8	-3.3	-5.9	0.0	0.0	0.0
Cash	0.3	0.6	0.0	0.0	0.0	0.0
Total	0.0	-5.3	-5.8	0.8	-0.3	0.4

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian
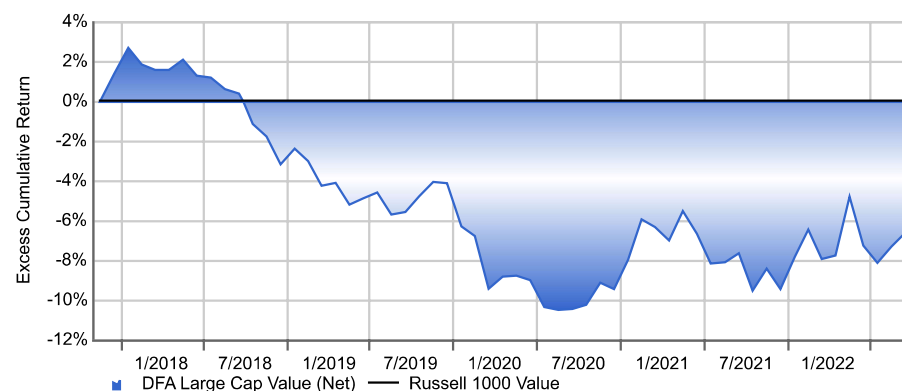
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DFA LCV Inception Performance & Statistics

Investment Growth Since Inception 12/1/2017

©FactSet Research Systems

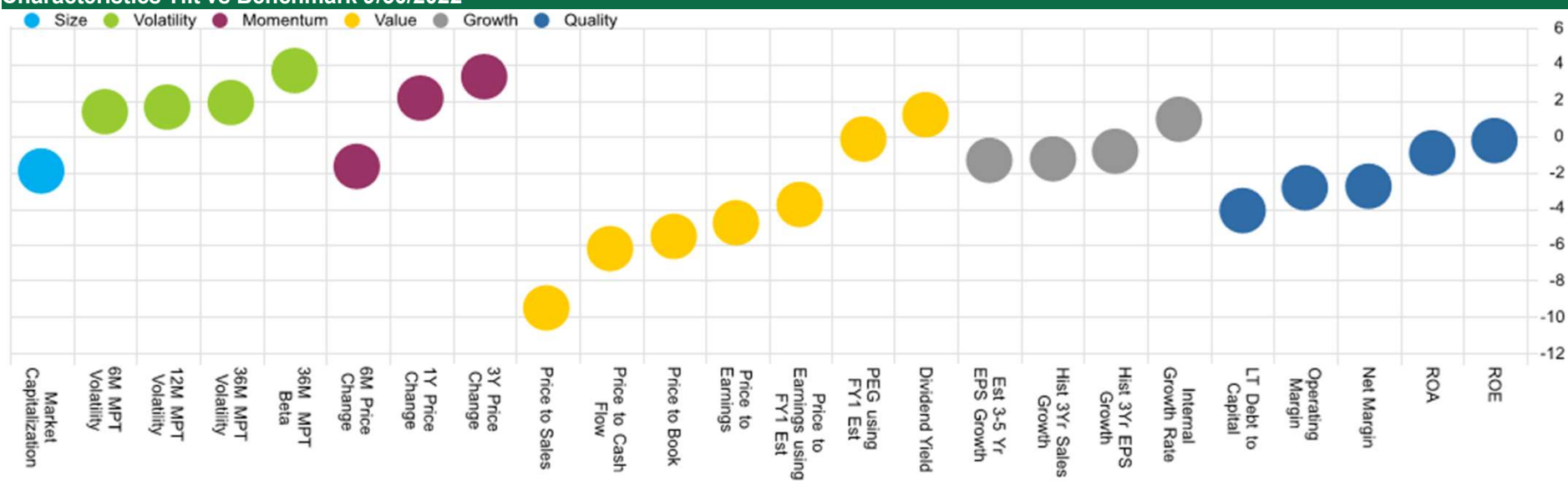## Relative Cumulative Performance Since Inception 12/1/2017

©FactSet Research Systems

Risk Since Inception 12/1/2017

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
DFA US Large Value (Net)	3.5	20.9	-1.3	0.1	-0.3	4.0	1.1
Russell 1000 Value	4.7	18.2	--	0.2	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

DFA US SCV Portfolio Snapshot – September 30, 2022

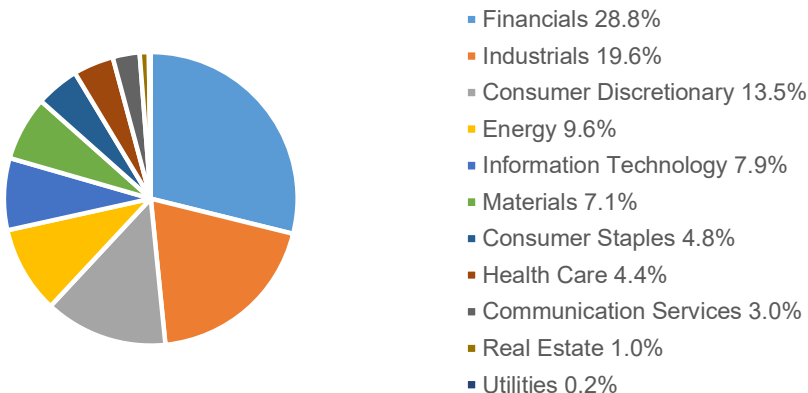## Rolling Returns Since Inception 10/1/1996 (Ten Year, One Month Shift)

Legend: DFA Small Cap Value (Net), Russell 2000 Value

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Unum Group	0.99	15.22
Acadia Healthcare Company, Inc.	0.95	15.60
Murphy Oil Corporation	0.83	17.24
American Equity Investment Life Hldg Co.	0.69	1.97
Amkor Technology, Inc.	0.67	0.88
F.N.B. Corporation	0.61	7.92
Air Lease Corporation	0.60	-6.69
United Bankshares, Inc.	0.60	2.97
Element Solutions Inc	0.60	-8.20
Sanmina Corporation	0.58	13.14

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
DFA Small Cap Value (Net)	-3.4	-14.6	-9.0	10.6	5.3	9.7	7.4
Russell 2000 Value	-4.6	-21.1	-17.7	4.7	2.9	7.9	5.7

Regional Exposure by Domicile

- North America 99.4%
- Europe emrg 0.4%
- Africa/Middle East 0.1%
- Europe dev 0.0%

Equity Sector Exposure (GICS)

- Financials 28.8%
- Industrials 19.6%
- Consumer Discretionary 13.5%
- Energy 9.6%
- Information Technology 7.9%
- Materials 7.1%
- Consumer Staples 4.8%
- Health Care 4.4%
- Communication Services 3.0%
- Real Estate 1.0%
- Utilities 0.2%

Regional Exposure by Source of Revenue

- North America 79.7%
- Europe dev 4.9%
- Asia emrg 4.4%
- Latin America 2.4%
- United Kingdom 1.6%
- Asia dev 1.5%
- Other 1.5%
- Africa/Middle East 1.4%
- Japan 1.1%
- Europe emrg 0.8%
- Australasia 0.6%

DFA US SCV vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022
Universe: Lipper US Small Cap Value

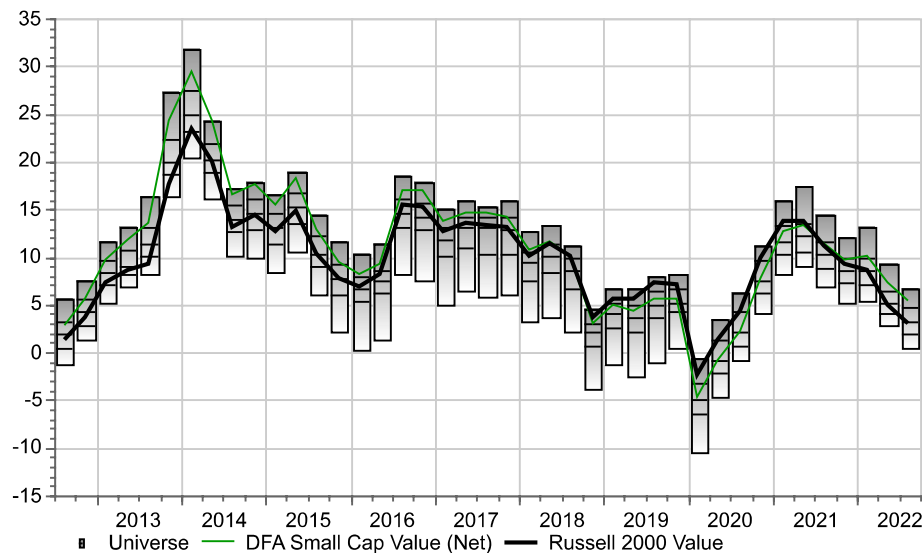■ Universe ● DFA Small Cap Value (Net) ◇ Russell 2000 Value

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

◆ DFA US SCV (Net) ▬ Relative Performance Line
▲ DFA US SCV (Net) Oldest 2 Yrs ■ DFA US SCV (Net) Recent 2 Yrs

Rolling Returns 7/1/2006 –9/30/2022 (5 Year, 3 Month Shift)
Universe: Lipper US Small Cap Value

■ Universe — DFA Small Cap Value (Net) ▬ Russell 2000 Value

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Over/Under Benchmark Analysis
21	Outperform
19	Underperform
40	# Observations
53%	% Outperform

DFA US SCV Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Antero Resources Corporation	0.53	0.53	0.13
Acadia Healthcare Company, Inc.	0.88	0.88	0.11
Unum Group	0.79	0.79	0.10
Dillard's, Inc.	0.47	0.47	0.10
CONSOL Energy Inc.	0.30	0.29	0.09
Atlas Air Worldwide Holdings, Inc.	0.41	0.22	0.08
Resolute Forest Products Inc.	0.26	0.19	0.08
TechnipFMC plc	0.35	0.35	0.07
HF Sinclair Corp	0.36	0.36	0.07
MillerKnoll, Inc.	0.01	-0.17	0.07

Top 10 Leading Detractors

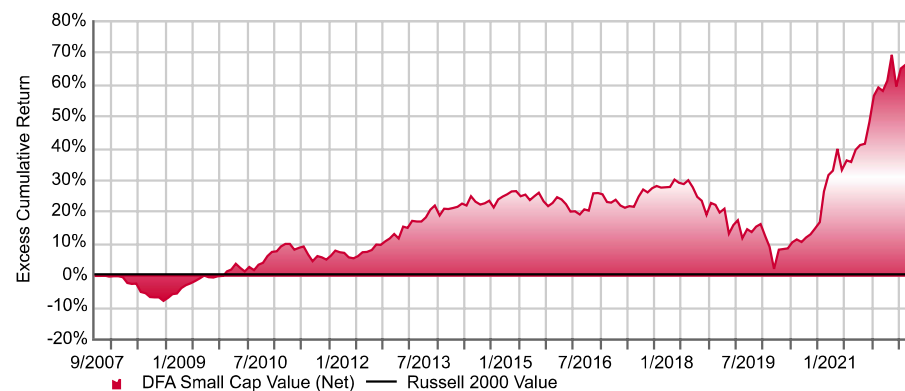|	Avg. Weights	Relative Weights	Active Return
PVH Corp.	0.45	0.45	-0.09
Avnet, Inc.	0.62	0.62	-0.09
Kohl's Corporation	0.26	0.26	-0.08
Howard Hughes Corporation	0.37	0.37	-0.07
Transocean Ltd.	0.25	0.25	-0.07
JetBlue Airways Corporation	0.31	0.31	-0.06
Seaboard Flour LLC	0.52	0.52	-0.06
Axis Capital Holdings Limited	0.46	0.46	-0.06
MKS Instruments, Inc.	0.14	0.14	-0.06
Patterson-UTI Energy, Inc.	0.31	0.22	-0.05

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-0.1	-12.5	-14.6	0.0	0.1	0.1
Consumer Discretionary	4.0	-6.0	-4.9	0.0	-0.2	-0.2
Consumer Staples	2.2	-9.1	-9.8	-0.1	0.0	-0.1
Energy	5.9	4.3	5.2	0.6	-0.1	0.5
Financials	-0.8	-0.4	-2.3	0.0	0.5	0.5
Health Care	-6.5	-5.9	3.1	-0.5	-0.4	-0.9
Industrials	6.2	-3.9	-6.2	-0.1	0.5	0.4
Information Technology	1.9	-4.7	-4.5	0.0	0.0	0.0
Materials	3.0	-4.8	-8.6	-0.1	0.3	0.1
Real Estate	-10.6	-17.8	-11.6	0.8	-0.1	0.7
Utilities	-5.0	-10.1	-8.8	0.2	0.0	0.2
Total	0.0	-3.3	-4.6	0.7	0.6	1.3

DFA US SCV 15 Year Performance & Statistics
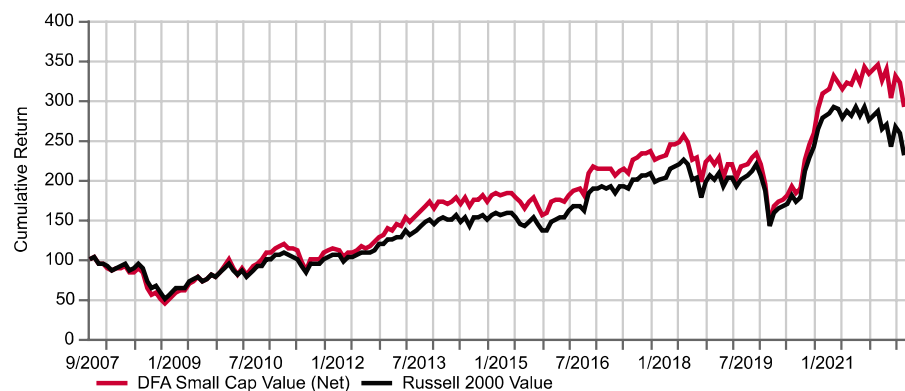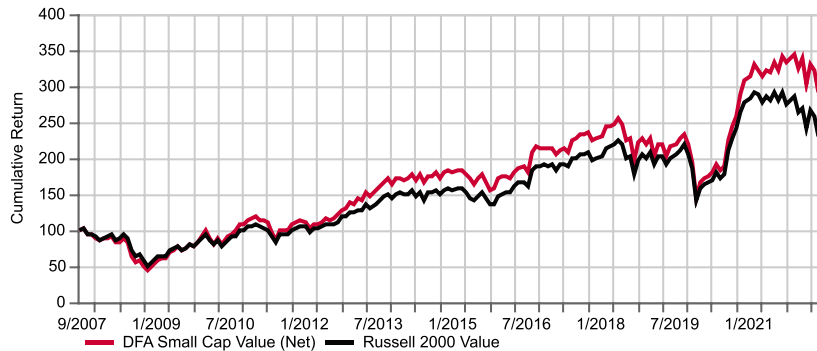
Investment Growth – 15 Years

DFA Small Cap Value (Net) — Russell 2000 Value

©FactSet Research Systems

Relative Cumulative Performance – 15 Years

DFA Small Cap Value (Net) — Russell 2000 Value
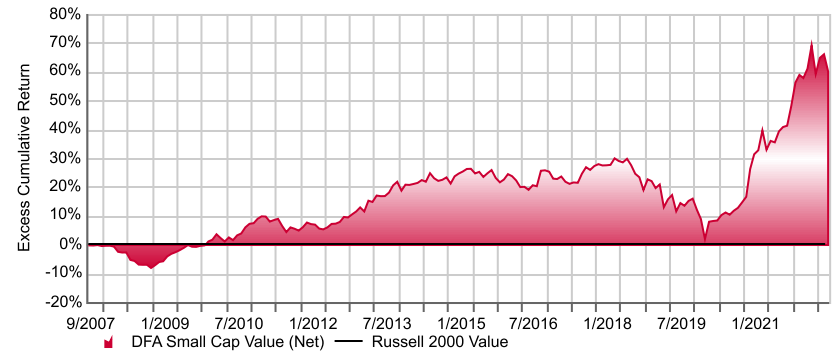
©FactSet Research Systems

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
DFA Small Cap Value (Net)	7.4	23.2	1.4	0.3	0.4	3.9	1.1
Russell 2000 Value	5.7	21.2	--	0.2	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022
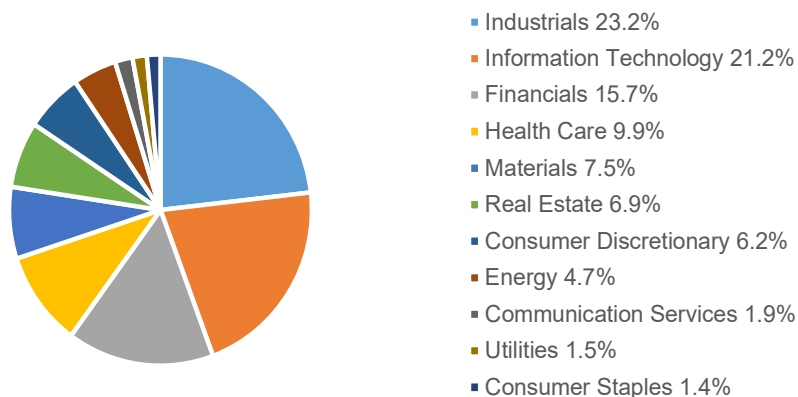
Earnest Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 5/1/2005 (Ten Year, One Month Shift)

Earnest (Net) — Russell Midcap

©FactSet Research Systems
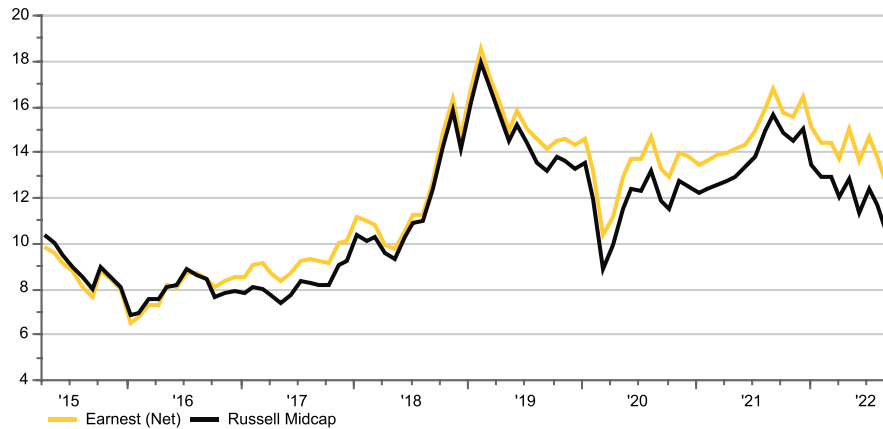
Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
Earnest (Net)	-5.8	-21.5	-12.6	8.6	9.6	12.4	9.3
Russell Midcap	-3.4	-24.3	-19.4	5.2	6.5	10.3	7.5

Equity Sector Exposure (GICS)

- Industrials 23.2%
- Information Technology 21.2%
- Financials 15.7%
- Health Care 9.9%
- Materials 7.5%
- Real Estate 6.9%
- Consumer Discretionary 6.2%
- Energy 4.7%
- Communication Services 1.9%
- Utilities 1.5%
- Consumer Staples 1.4%

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Republic Services, Inc.	3.39	4.33
Coterra Energy Inc.	3.17	3.41
Albemarle Corporation	3.03	26.73
Keysight Technologies, Inc.	2.94	14.15
Progressive Corporation	2.65	0.04
Raymond James Financial, Inc.	2.50	10.90
Darden Restaurants, Inc.	2.46	12.75
D.R. Horton, Inc.	2.41	2.07
Reinsurance Grp of America, Inc.	2.36	7.95
CBRE Group, Inc.	2.30	-8.29

Regional Exposure by Domicile

- North America 100.0%

Regional Exposure by Source of Revenue

- North America 65.7%
- Asia emrg 9.4%
- Europe dev 8.9%
- Asia dev 3.9%
- Latin America 3.1%
- Japan 2.5%
- United Kingdom 2.1%
- Africa/Middle East 1.7%
- Europe emrg 1.2%
- Australasia 0.9%
- Other 0.5%

Earnest vs Universe & Benchmark

Universe: Lipper US: Mid Cap Core

Universe ▪   Earnest (Net) ●   Russell Midcap ◇

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

- ◆ Earnest (Net)
- ▲ Earnest (Net) Oldest 2 Yrs
- ▬ Relative Performance Line
- ◼ Earnest (Net) Recent 2 Yrs

Rolling Returns 7/1/2007 –9/30/2022 (5 Year, 3 Month Shift)

Universe: Lipper US: Mid Cap Core

Universe ▪   Earnest (Net) —   Russell Midcap ▬

©FactSet Research Systems

Over/Under Benchmark Analysis

27	Outperform
13	Underperform
40	# Observations
68%	% Outperform

Earnest Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Albemarle Corporation	2.48	2.19	0.45
Keysight Technologies, Inc.	2.61	2.31	0.25
Darden Restaurants, Inc.	2.11	1.96	0.21
Raymond James Financial, Inc.	2.22	2.03	0.17
Reinsurance Grp of America, Inc.	2.03	1.95	0.13
TJX Companies, Inc.	1.06	1.06	0.10
Republic Services, Inc.	3.09	2.80	0.09
Cummins Inc.	1.37	1.07	0.04
D.R. Horton, Inc.	2.31	2.07	0.03
Agilent Technologies, Inc.	2.00	1.60	0.03

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Scotts Miracle-Gro Company	1.25	1.22	-0.53
Spirit AeroSystems Holdings, Inc.	0.98	0.94	-0.49
Syneos Health, Inc.	1.55	1.47	-0.48
Catalent, Inc.	1.46	1.28	-0.40
Sealed Air Corporation	1.81	1.73	-0.37
Americold Realty Trust, Inc.	1.66	1.58	-0.26
Arrow Electronics, Inc.	1.70	1.62	-0.26
Sysco Corporation	1.52	1.52	-0.25
Bio-Rad Laboratories, Inc.	1.77	1.65	-0.24
Lumentum Holdings, Inc.	1.85	1.79	-0.23

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-2.0	-4.5	-7.5	0.1	0.1	0.1
Consumer Discretionary	-5.7	7.9	-2.7	0.0	0.6	0.5
Consumer Staples	-2.1	-16.5	-6.4	0.1	-0.2	-0.1
Energy	-0.4	2.8	1.2	0.0	0.1	0.0
Financials	1.0	-0.7	-1.9	0.0	0.2	0.2
Health Care	-0.2	-16.3	-6.7	0.0	-1.0	-1.0
Industrials	7.2	-5.3	0.0	0.2	-1.1	-0.9
Information Technology	3.5	-4.6	-1.1	0.1	-0.7	-0.6
Materials	1.5	-11.1	-5.7	0.0	-0.4	-0.5
Real Estate	-1.6	-12.4	-9.2	0.1	-0.2	-0.1
Utilities	-4.4	-10.7	-5.5	0.1	-0.1	0.0
Cash	3.2	0.6	0.0	0.0	0.0	0.0
Total	0.0	-5.7	-3.4	0.5	-2.9	-2.3

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian

Earnest 15 Year Performance & Statistics

Investment Growth – 15 Years

Earnest (Net) — Russell Midcap

©FactSet Research Systems

Relative Cumulative Performance – 15 Years

Earnest (Net) — Russell Midcap

©FactSet Research Systems

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Earnest (Net)	9.3	18.8	1.7	0.5	0.5	3.7	1.0
Russell Midcap	7.5	18.6	--	0.4	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

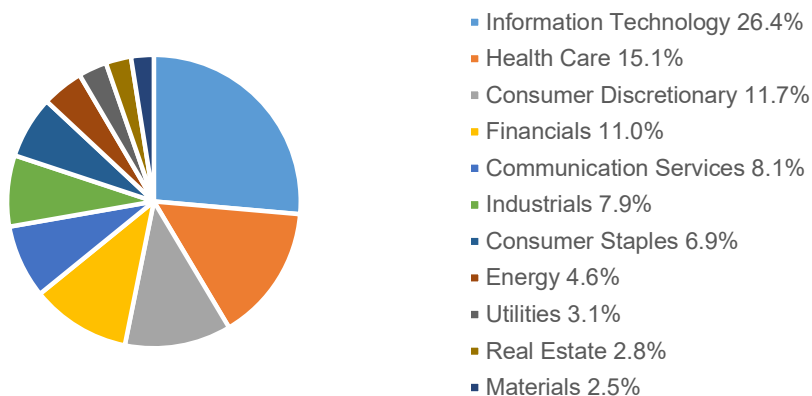# Northern Trust S&P 500 Portfolio Snapshot – September 30, 2022

Rolling Returns Since 10/1/1999 (Ten Year, One Month Shift)

©FactSet Research Systems

Legend: NT S&P 500 Index (Net) — S&P 500

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Apple Inc.	6.89	1.23
Microsoft Corporation	5.73	-9.10
Alphabet Inc.	3.60	-12.16
Amazon.com, Inc.	3.31	6.39
Tesla, Inc.	2.33	18.17
Berkshire Hathaway Inc.	1.59	-2.20
UnitedHealth Group Incorporated	1.56	-1.35
Johnson & Johnson	1.42	-7.33
Exxon Mobil Corporation	1.20	2.89
Meta Platforms, Inc.	1.10	-15.86

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
NT S&P 500 Index (Net)	-4.9	-23.9	-15.5	8.2	9.3	11.7	8.0
S&P 500	-4.9	-23.9	-15.5	8.2	9.2	11.7	8.0

Regional Exposure by Domicile

- North America 100.0%

Equity Sector Exposure (GICS)

- Information Technology 26.4%
- Health Care 15.1%
- Consumer Discretionary 11.7%
- Financials 11.0%
- Communication Services 8.1%
- Industrials 7.9%
- Consumer Staples 6.9%
- Energy 4.6%
- Utilities 3.1%
- Real Estate 2.8%
- Materials 2.5%

Regional Exposure by Source of Revenue

- North America 62.4%
- Asia emrg 11.7%
- Europe dev 9.6%
- Latin America 3.0%
- Japan 2.9%
- Asia dev 2.8%
- Africa/Middle East 2.8%
- United Kingdom 2.4%
- Europe emrg 1.4%
- Australasia 1.0%
- Other 0.2%

Northern Trust S&P 500 vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022
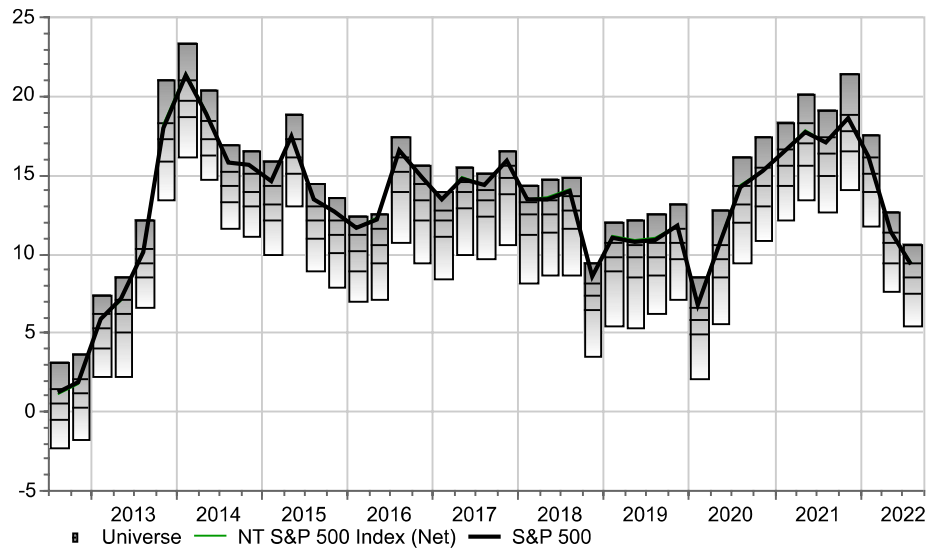### Universe: Lipper US: Large Cap Core

Legend: ▯ Universe ● NT S&P 500 Index (Net) ◇ S&P 500

©FactSet Research Systems

Investment Growth – 15 Years

Legend: — NT S&P 500 Index (Net) — S&P 500

©FactSet Research Systems

Rolling Returns 7/1/2007 –9/30/2022 (5 Year, 3 Month Shift)
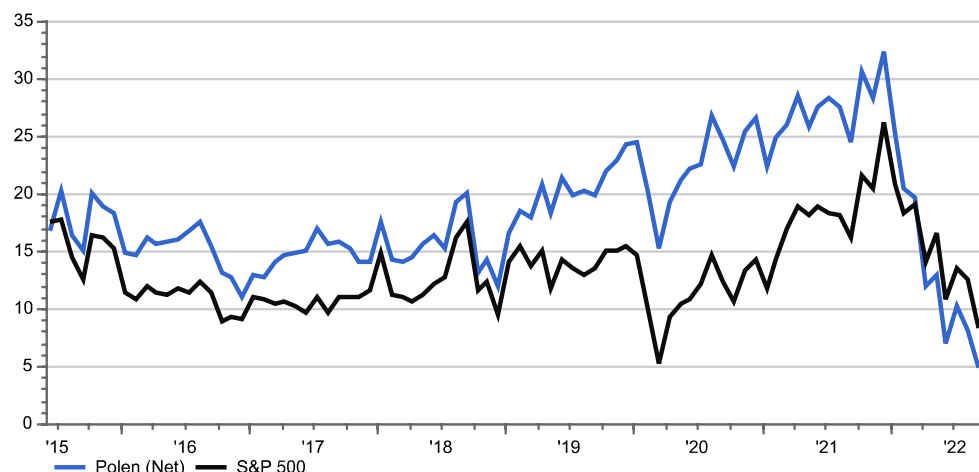### Universe: Lipper US: Large Cap Core

Legend: ▯ Universe — NT S&P 500 Index (Net) — S&P 500

©FactSet Research Systems

Risk – 15 Years

	Return	Std Dev	Sharpe Ratio	Tracking Error
NT S&P 500 Index (Net)	8.0	16.1	0.5	0.2
S&P 500	8.0	16.1	0.5	--

Polen Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 7/1/2012 (Three Year, One Month Shift)

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Amazon.com, Inc.	9.67	6.39
Alphabet Inc.	8.49	-12.09
Microsoft Corporation	6.22	-9.10
Netflix, Inc.	5.28	34.64
Adobe Incorporated	5.21	-24.82
Meta Platforms, Inc.	5.06	-15.86
Salesforce, Inc.	4.95	-12.85
ServiceNow, Inc.	4.53	-20.59
Mastercard Incorporated	4.40	-9.75
UnitedHealth Group Incorporated	4.32	-1.35

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	Inception 7/1/2012
Polen (Net)	-5.2	-38.0	-34.8	4.6	10.4	12.6	12.9
S&P 500	-4.9	-23.9	-15.5	8.2	9.2	11.7	12.1
S&P 500 Growth	-3.9	-30.4	-21.1	9.9	11.4	13.2	13.5

Regional Exposure by Domicile

- North America 100.0%

Equity Sector Exposure (GICS)
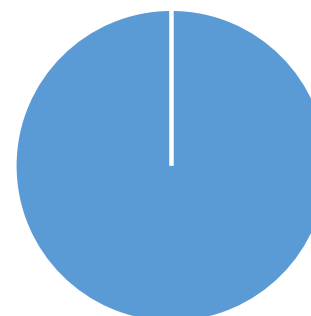

- Information Technology 47.9%
- Communication Services 20.0%
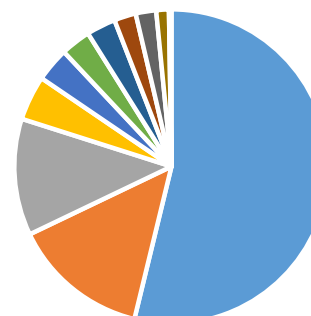- Consumer Discretionary 16.3%
- Health Care 15.7%

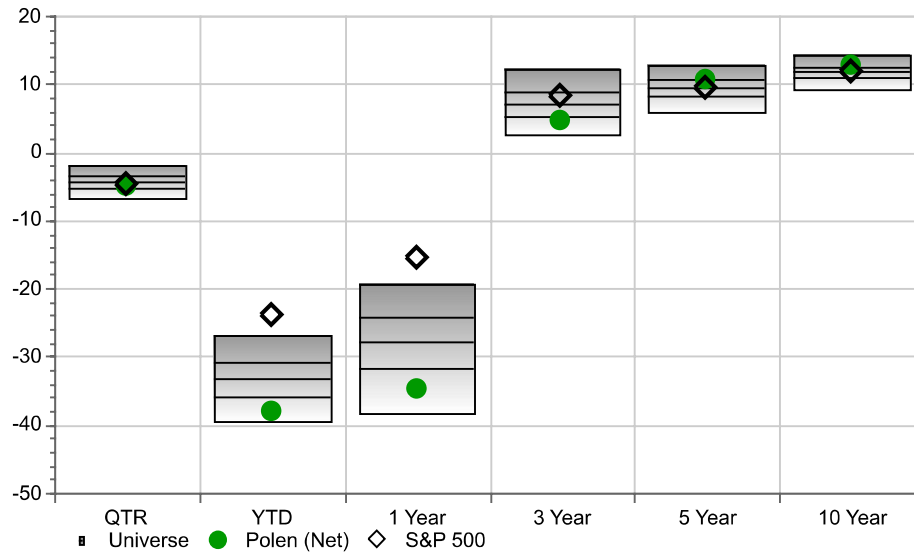## Regional Exposure by Source of Revenue

- North America 53.8%
- Europe dev 14.1%
- Asia emrg 12.0%
- Africa/Middle East 4.6%
- Latin America 3.5%
- Japan 3.1%
- United Kingdom 3.0%
- Asia dev 2.2%
- Europe emrg 2.1%
- Australasia 1.3%
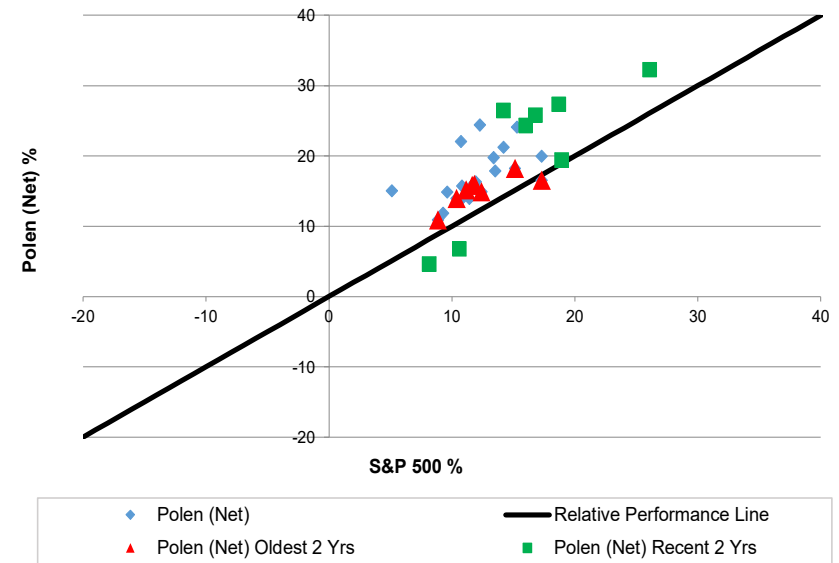- Other 0.3%

Polen vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US Large Cap Growth

Legend: Universe, Polen (Net), S&P 500

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

Legend: Polen (Net), Relative Performance Line, Polen (Net) Oldest 2 Yrs, Polen (Net) Recent 2 Yrs

Rolling Returns 7/1/2012 –9/30/2022 (3 Year, 3 Month Shift)

Universe: Lipper US Large Cap Growth

Legend: Universe, Polen (Net), S&P 500

©FactSet Research Systems

Over/Under Benchmark Analysis

27	Outperform
3	Underperform
30	# Observations
90%	% Outperform

61

Polen Attribution Analysis – September 30, 2022

Contributors

	Avg. Weights	Relative Weights	Active Return
Netflix, Inc.	3.21	2.94	0.73
Airbnb, Inc.	3.55	3.55	0.46
PayPal Holdings, Inc.	2.90	2.61	0.42
Amazon.com, Inc.	9.91	6.70	0.41
Autodesk, Inc.	4.05	3.92	0.25
Gartner, Inc.	2.20	2.13	0.24
Intuitive Surgical, Inc.	1.27	1.05	0.06
Illumina, Inc.	1.38	1.28	0.03

Top 10 Leading Detractors

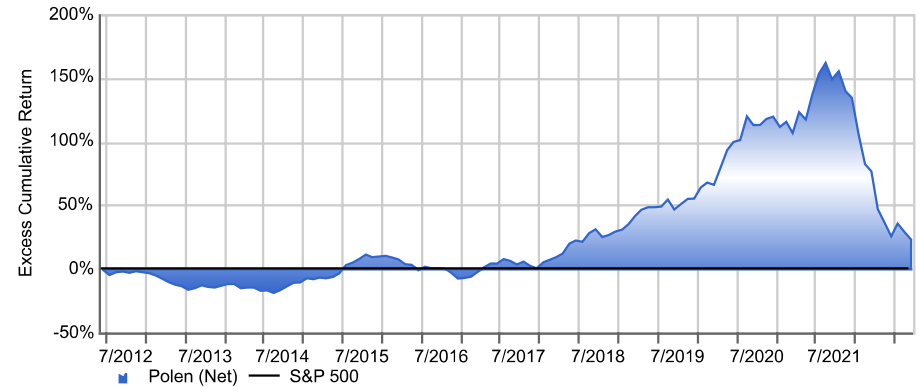|	Avg. Weights	Relative Weights	Active Return
Adobe Incorporated	6.53	5.98	-1.41
ServiceNow, Inc.	3.73	3.46	-0.71
Meta Platforms, Inc.	5.42	4.31	-0.69
Alphabet Inc.	8.89	5.04	-0.58
Mastercard Incorporated	6.57	5.72	-0.53
Visa Inc.	6.27	5.27	-0.48
Salesforce, Inc.	4.42	3.92	-0.44
Abbott Laboratories	3.98	3.42	-0.34
Zoetis Inc.	2.71	2.48	-0.30
NIKE, Inc.	2.05	1.64	-0.29

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	9.0	-5.5	-12.7	-0.7	1.3	0.6
Consumer Discretionary	4.4	5.4	4.4	0.4	0.2	0.6
Consumer Staples	-6.8	0.0	-6.6	0.1	0.0	0.1
Energy	-4.5	0.0	2.4	-0.3	0.0	-0.3
Financials	-10.8	0.0	-3.1	-0.2	0.0	-0.2
Health Care	-0.1	-6.7	-5.2	-0.1	-0.2	-0.3
Industrials	-7.8	0.0	-4.8	0.0	0.0	0.0
Information Technology	21.2	-8.4	-6.2	-0.2	-1.1	-1.3
Materials	-2.5	0.0	-7.1	0.1	0.0	0.1
Real Estate	-2.9	0.0	-11.1	0.2	0.0	0.2
Utilities	-3.1	0.0	-6.0	0.0	0.0	0.0
Cash	3.9	0.6	0.6	0.3	0.0	0.3
Total	0.0	-5.2	-4.9	-0.5	0.2	-0.3

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian

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Polen Inception Performance & Statistics

Investment Growth Since Inception 7/1/2012

©FactSet Research Systems

Relative Cumulative Performance Since Inception 7/1/2012

©FactSet Research Systems

Risk Since Inception 7/1/2012

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Polen (Net)	12.9	15.8	0.6	0.8	0.1	6.2	1.0
S&P 500	12.1	14.2	--	0.8	--	--	1.0
S&P 500 Growth	13.5	15.5	--	0.8	--	--	1.1

Characteristics Tilt vs Benchmark 9/30/2022

AQR Portfolio Snapshot – September 30, 2022

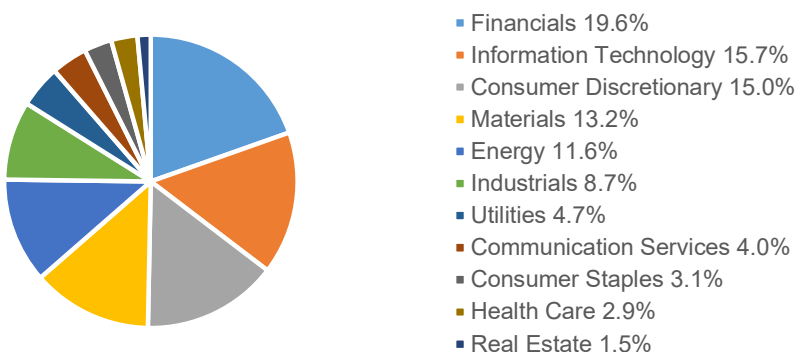## Rolling Returns Since Inception 8/1/2016 (Three Year, One Month Shift)

©FactSet Research Systems

Legend: AQR (Net), MSCI EM

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Taiwan Semiconductor Mfg Co., Ltd.	5.10	-16.43
Alibaba Group Holding Ltd.	5.00	-30.36
Samsung Electronics Co., Ltd.	2.68	-14.88
Tencent Holdings Ltd.	2.28	-24.85
China Construction Bank Corporation	1.93	-13.68
Petroleo Brasileiro SA	1.81	24.08
Saudi Basic Industries Corp.	1.28	-10.80
Kia Corp.	1.22	-15.58
NTPC Limited	1.18	10.41
Oil & Natural Gas Corp. Ltd.	1.15	-16.92

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	Inception 8/1/16
AQR (Net)	-12.8	-27.6	-28.5	-1.1	-2.7	2.3
MSCI EM	-11.6	-27.2	-28.1	-2.1	-1.8	2.4

Equity Sector Exposure (GICS)

- Financials 19.6%
- Information Technology 15.7%
- Consumer Discretionary 15.0%
- Materials 13.2%
- Energy 11.6%
- Industrials 8.7%
- Utilities 4.7%
- Communication Services 4.0%
- Consumer Staples 3.1%
- Health Care 2.9%
- Real Estate 1.5%

Regional Exposure by Domicile

- Asia emrg 53.4%
- Asia dev 25.9%
- Africa/Middle East 10.5%
- Latin America 9.7%
- Europe emrg 0.4%
- North America 0.1%

Regional Exposure by Source of Revenue

- Asia emrg 53.8%
- Asia dev 11.3%
- North America 9.7%
- Africa/Middle East 8.6%
- Latin America 8.0%
- Europe dev 4.1%
- Japan 2.0%
- Europe emrg 0.9%
- Australasia 0.8%
- United Kingdom 0.7%
- Other 0.1%

AQR vs Universe & Benchmark

AQR Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Tencent Holdings Ltd.	2.71	-1.36	0.34
Petroleo Brasileiro SA	1.85	1.02	0.27
Taiwan Semiconductor Mfg Co., Ltd.	4.76	-1.52	0.26
JD.com, Inc.	0.26	-0.83	0.22
BYD Company Limited	0.06	-0.50	0.19
Wuxi Biologics (Cayman) Inc.	0.30	-0.21	0.16
Ping An Insurance Group Co. China, Ltd.	0.13	-0.57	0.15
Volcan Investments Ltd.	0.93	0.90	0.15
Reliance Industries Limited	0.30	-1.23	0.13
Banco do Brasil S.A.	1.12	0.97	0.12

Top 10 Leading Detractors

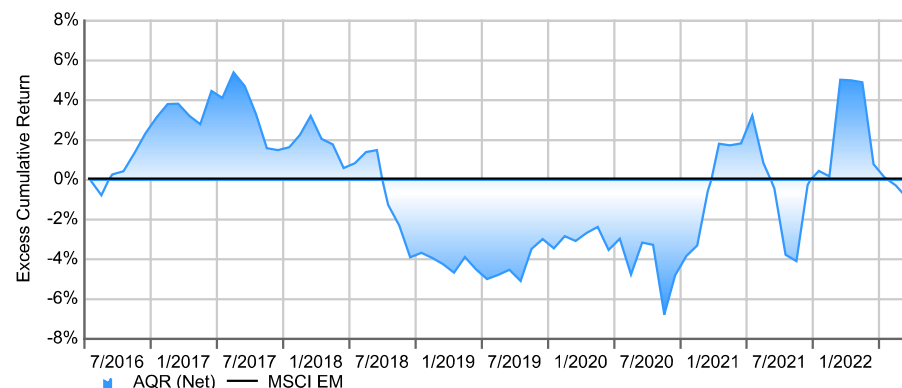|	Avg. Weights	Relative Weights	Active Return
Evergreen Marine Corp. (Taiwan) Ltd.	1.00	0.88	-0.29
Sinotruk Hong Kong Ltd.	0.71	0.70	-0.27
Chinasoft International Ltd.	0.64	0.60	-0.26
Great Wall Motor Co., Ltd.	0.48	0.39	-0.24
Woori Financial Group, Inc.	1.15	1.07	-0.22
COSCO SHIPPING Holdings Co., Ltd.	1.23	1.13	-0.19
Kia Corp.	1.24	0.98	-0.18
Hana Financial Group Inc.	0.84	0.70	-0.17
Alibaba Group Holding Ltd.	3.40	0.30	-0.17
Oil & Natural Gas Corp. Ltd.	1.13	1.05	-0.16

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-4.0	-16.5	-19.3	0.4	0.2	0.5
Consumer Discretionary	-0.3	-20.5	-18.7	0.0	-0.3	-0.3
Consumer Staples	-2.9	-11.2	-4.6	-0.2	-0.2	-0.4
Energy	7.0	2.7	-2.5	0.6	0.7	1.2
Financials	-3.3	-8.5	-5.2	-0.2	-0.5	-0.8
Health Care	0.0	-11.6	-13.8	0.0	0.0	0.0
Industrials	3.0	-17.1	-10.0	0.1	-0.8	-0.6
Information Technology	-3.1	-15.9	-15.4	0.0	0.0	0.0
Materials	3.8	-12.6	-7.4	0.2	-0.6	-0.5
Real Estate	-0.4	-25.1	-19.8	0.0	-0.1	-0.1
Utilities	0.2	0.0	-4.3	0.0	0.1	0.1
Total	0.0	-12.2	-11.6	0.9	-1.6	-0.7

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian

AQR Inception Performance & Statistics

Investment Growth Since Inception 8/1/2016

©FactSet Research Systems

Relative Cumulative Performance Since Inception 8/1/2016

©FactSet Research Systems

Risk Since Inception 8/1/2016

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
AQR (Net)	2.3	17.1	-0.1	0.1	0.0	3.5	1.0
MSCI EM	2.4	16.4	--	0.1	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

Brandes Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 2/1/1998 (Ten Year, One Month Shift)

Legend: Brandes (Net) — MSCI EAFE

©FactSet Research Systems

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
Brandes (Net)	-12.0	-23.4	-23.3	-2.5	-1.8	3.6	0.5
MSCI EAFE	-9.4	-27.1	-25.1	-1.8	-0.8	3.7	0.6
MSCI EAFE Value	-10.2	-21.1	-20.2	-2.8	-2.7	2.4	-0.6

Equity Sector Exposure (GICS)

- Financials 20.2%
- Health Care 19.0%
- Consumer Discretionary 18.1%
- Consumer Staples 13.4%
- Energy 7.9%
- Materials 5.7%
- Communication Services 5.6%
- Industrials 3.3%
- Real Estate 2.5%
- Information Technology 2.4%
- Utilities 1.8%

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Takeda Pharmaceutical Company Limited	4.40	-5.18
Novartis AG	2.55	-9.13
Fibra Uno Administracion SA de CV	2.49	6.42
Henkel AG & Co. KGaA	2.44	-6.45
Publicis Groupe SA	2.43	2.75
UBS Group AG	2.42	-8.52
Sanofi	2.39	-23.74
SAP SE	2.36	-9.32
GSK plc	2.31	-31.84
Alibaba Group Holding Ltd.	2.22	-30.37

Regional Exposure by Domicile

- Europe dev 49.3%
- United Kingdom 16.0%
- Japan 14.8%
- Latin America 10.9%
- Asia dev 4.9%
- Asia emrg 3.3%
- North America 0.9%

Regional Exposure by Source of Revenue

- Europe dev 24.6%
- North America 22.9%
- Asia emrg 12.5%
- Latin America 11.1%
- Japan 8.9%
- United Kingdom 7.9%
- Asia dev 4.7%
- Africa/Middle East 2.9%
- Europe emrg 2.9%
- Australasia 1.2%
- Other 0.3%

Brandes vs Universe & Benchmark

Universe: Lipper US Int'l Multi-Cap Value

Legend: ▢ Universe ● Brandes (Net) ◇ MSCI EAFE

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

Legend:
- ◆ Brandes (Net)
- ▲ Brandes (Net) Oldest 2 Yrs
- —— Relative Performance Line
- ■ Brandes (Net) Recent 2 Yrs

Rolling Returns 7/1/2007 –9/30/2022 (5 Year, 3 Month Shift)
Universe: Lipper US Int'l Multi Cap Value

Legend: ▢ Universe —— Brandes (Net) —— MSCI EAFE

©FactSet Research Systems

Over/Under Benchmark Analysis

17	Outperform
23	Underperform
40	# Observations
43%	% Outperform

Brandes Attribution Analysis – September 30, 2022

Contributors

	Avg. Weights	Relative Weights	Active Return
Petroleo Brasileiro SA	2.21	2.21	0.46
TechnipFMC plc	1.27	1.27	0.25
Fibra Uno Administracion SA de CV	2.53	2.53	0.14
Societe BIC SA	1.07	1.07	0.13
Renault SA	0.57	0.54	0.04
Publicis Groupe SA	2.22	2.14	0.02
ENGIE SA.	1.81	1.65	0.02
Willis Towers Watson Public Ltd Co.	0.76	0.76	0.01

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Grifols, S.A.	2.26	2.23	-1.16
Alibaba Group Holding Ltd.	2.54	2.54	-0.81
GSK plc	2.76	2.14	-0.68
Credit Suisse Group AG	2.01	1.90	-0.55
Fresenius SE & Co. KGaA	1.60	1.52	-0.46
Carrefour SA	2.16	2.08	-0.45
Orange SA	2.04	1.89	-0.44
Sanofi	2.43	1.66	-0.39
J Sainsbury plc	1.77	1.74	-0.37
Koninklijke Philips N.V.	1.48	1.36	-0.37

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	4.2	-14.2	-13.8	-0.2	0.0	-0.2
Consumer Discretionary	-1.2	-15.3	-9.9	0.0	-0.7	-0.5
Consumer Staples	6.3	-13.8	-7.0	0.1	-1.1	-1.0
Energy	3.2	7.1	-5.0	0.2	0.6	1.0
Financials	2.1	-11.2	-9.6	0.0	-0.4	-0.3
Health Care	4.9	-21.9	-10.5	-0.1	-2.2	-2.3
Industrials	-10.9	-7.0	-8.3	-0.1	0.1	-0.1
Information Technology	-6.5	-9.3	-8.3	-0.1	0.0	-0.1
Materials	-1.9	-13.9	-8.8	0.0	-0.4	-0.3
Real Estate	-0.4	6.4	-13.1	0.0	0.4	0.5
Utilities	-1.7	1.2	-13.3	0.1	0.3	0.3
Cash	1.7	0.2	0.0	0.1	0.0	0.1
Total	0.0	-12.2	-9.3	0.1	-3.5	-2.9

Brandes 15 Year Performance & Statistics

Investment Growth – 15 Years

Brandes (Net) — MSCI EAFE Value — MSCI EAFE

©FactSet Research Systems

Relative Cumulative Performance – 15 Years

Brandes (Net) — MSCI EAFE

©FactSet Research Systems

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Brandes (Net)	0.5	18.4	0.0	0.0	0.0	5.5	1.0
MSCI EAFE	0.6	17.9	--	0.0	--	--	1.0
MSCI EAFE Value	-0.6	19.2	--	-0.1	--	--	1.1

Characteristics Tilt vs Benchmark 9/30/2022

DFA International Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 5/1/2006 (Ten Year, One Month Shift)

Legend: DFA Int'l Small Cap (Net); MSCI EAFE Small Cap

©FactSet Research Systems

Top 10 Holdings

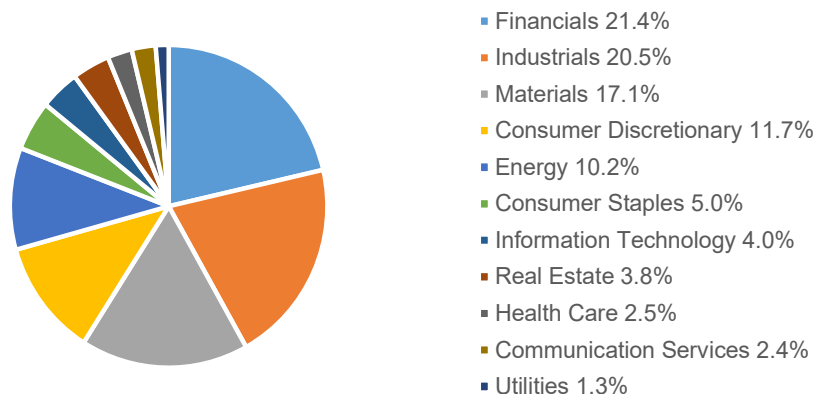|	Portfolio Weight	Quarterly Return
ASR Nederland NV	0.97	-2.36
K+S Aktiengesellschaft	0.79	-22.19
Whitehaven Coal Limited	0.79	80.27
Bankinter SA	0.76	-9.42
Crescent Point Energy Corp.	0.71	-12.65
Jyske Bank A/S	0.69	5.58
Helvetia Holding AG	0.67	-20.21
Banco de Sabadell, S.A.	0.66	-16.25
Alamos Gold, Inc.	0.66	5.90
MEG Energy Corp.	0.65	-19.15

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
DFA Int'l Small Cap (Net)	-10.1	-24.3	-22.9	-0.4	-3.2	4.9	1.9
MSCI EAFE Small Cap	-9.8	-32.1	-32.1	-2.2	-1.8	5.3	1.9
MSCI World ex US Small Cap Value	-10.1	-26.4	-25.8	-1.7	-2.0	4.4	2.0

Regional Exposure by Domicile

- Europe dev 36.5%
- Japan 27.0%
- North America 13.0%
- United Kingdom 11.0%
- Australasia 7.5%
- Asia dev 3.5%
- Africa/Middle East 1.4%

Equity Sector Exposure (GICS)

- Financials 21.4%
- Industrials 20.5%
- Materials 17.1%
- Consumer Discretionary 11.7%
- Energy 10.2%
- Consumer Staples 5.0%
- Information Technology 4.0%
- Real Estate 3.8%
- Health Care 2.5%
- Communication Services 2.4%
- Utilities 1.3%

Regional Exposure by Source of Revenue

- Europe dev 27.2%
- Japan 21.4%
- North America 15.9%
- United Kingdom 8.5%
- Asia emrg 8.0%
- Australasia 5.4%
- Africa/Middle East 3.7%
- Latin America 3.5%
- Asia dev 3.2%
- Europe emrg 1.7%
- Other 1.6%

DFA International vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022
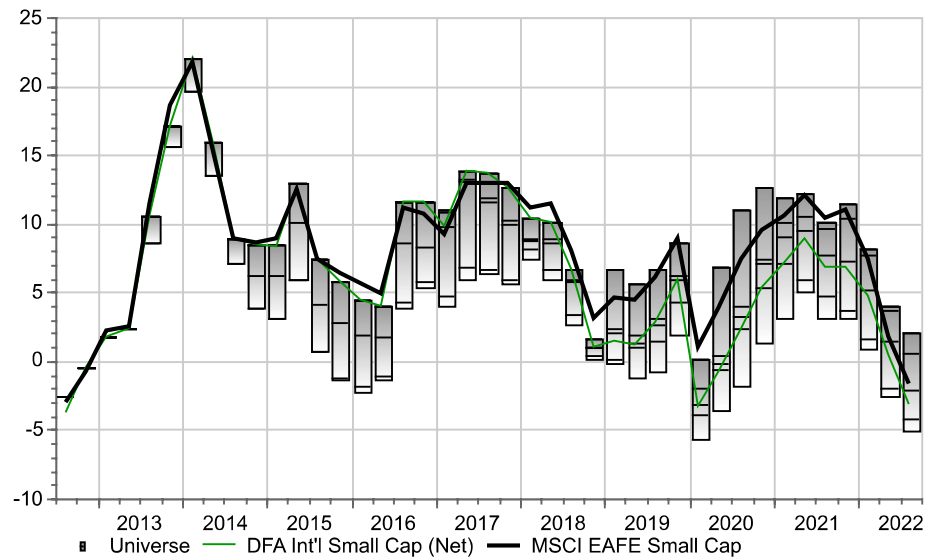
Universe: Lipper US: Int'l Sm/Mid Cap Value

Legend:
- Universe
- ● DFA Int'l Small Cap (Net)
- ◇ MSCI EAFE Small Cap

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

Y-axis: DFA Int'l SCV (Net) %
X-axis: MSCI EAFE Small Cap %

Legend:
- ◆ DFA Int'l SCV (Net)
- ▲ DFA Int'l SCV (Net) Oldest 2 Yrs
- ── Relative Performance Line
- ■ DFA Int'l SCV (Net) Recent 2 Yrs

Rolling Returns 7/1/2006 –9/30/2022 (5 Year, 3 Month Shift)

Universe: Lipper US: Int'l Sm/Mid Cap Value

Legend:
- Universe
- ── DFA Int'l Small Cap (Net)
- ── MSCI EAFE Small Cap

©FactSet Research Systems

Over/Under Benchmark Analysis

12	Outperform
28	Underperform
40	# Observations
30%	% Outperform

DFA International Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Whitehaven Coal Limited	0.52	0.36	0.21
Euronav NV	0.48	0.38	0.09
New Hope Corporation Limited	0.17	0.11	0.06
TP ICAP Group Plc	0.16	0.11	0.06
Fomento Economico Mexicano SAB de CV	0.19	0.16	0.05
Faurecia Societe europeenne	0.00	-0.11	0.05
Siegfried Holding AG	0.45	0.33	0.04
RPS Group Plc	0.06	0.06	0.04
Direct Line Insurance Group Plc	0.01	-0.13	0.04
Alamos Gold, Inc.	0.56	0.56	0.03

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Rheinmetall AG	0.46	0.46	-0.17
Vistry Group plc	0.51	0.42	-0.14
K+S Aktiengesellschaft	0.81	0.63	-0.14
MEG Energy Corp.	0.68	0.68	-0.13
Aurubis AG	0.65	0.56	-0.12
Helvetia Holding AG	0.71	0.54	-0.10
Crescent Point Energy Corp.	0.73	0.73	-0.10
Travis Perkins plc	0.51	0.41	-0.10
SES SA	0.37	0.25	-0.10
Centerra Gold Inc.	0.27	0.27	-0.09

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-1.6	-20.8	-14.3	0.1	-0.2	-0.1
Consumer Discretionary	0.1	-11.0	-10.8	0.0	0.0	0.0
Consumer Staples	-1.2	-13.8	-11.4	0.0	-0.1	-0.1
Energy	7.2	-1.2	3.7	1.0	-0.6	0.5
Financials	10.0	-8.3	-8.8	0.1	0.0	0.2
Health Care	-4.4	-8.4	-11.5	0.1	0.1	0.1
Industrials	-1.9	-8.9	-8.8	0.0	0.0	0.0
Information Technology	-5.3	-7.8	-9.7	0.0	0.1	0.1
Materials	7.1	-9.7	-5.9	0.3	-0.7	-0.3
Real Estate	-8.2	-12.8	-13.3	0.3	-0.1	0.3
Utilities	-1.9	-17.5	-10.9	0.0	-0.1	-0.1
Total	0.0	-9.3	-9.7	1.9	-1.6	0.5

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian
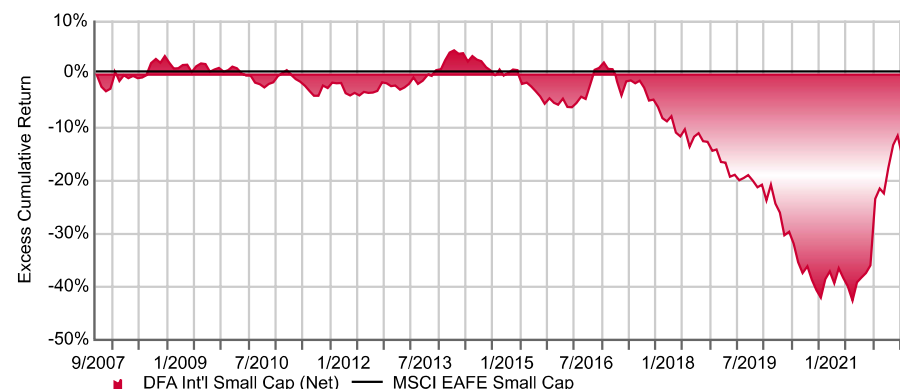
DFA International Inception Performance & Statistics

Investment Growth – 15 Years

©FactSet Research Systems
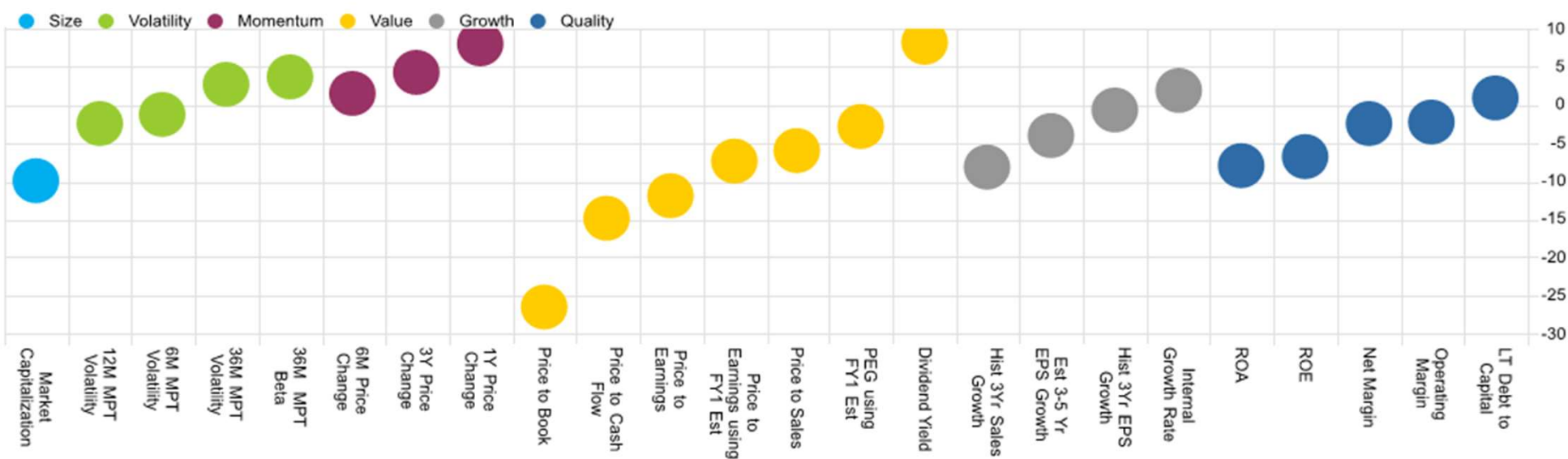
Relative Cumulative Performance – 15 Years
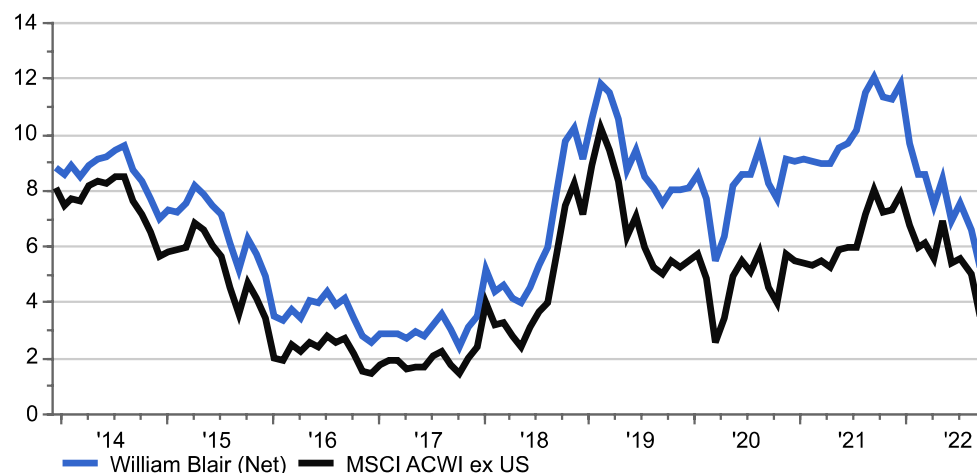

©FactSet Research Systems

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
DFA Int'l Small Cap (Net)	1.9	20.4	-0.4	0.1	-0.1	4.6	1.0
MSCI EAFE Small Cap	1.9	19.5	--	0.1	--	--	1.0
MSCI World ex USA Small Cap Value	2.0	19.9	--	0.1	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

William Blair Portfolio Snapshot – September 30, 2022

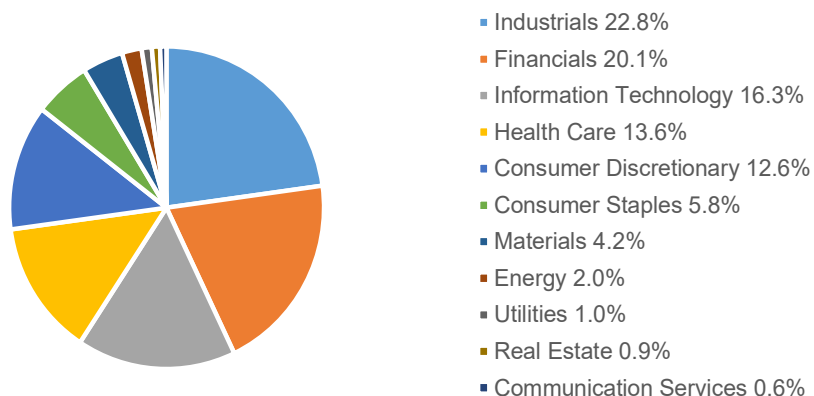## Rolling Returns Since Inception 1/1/2004 (Ten Year, One Month Shift)

Legend: William Blair (Net) — MSCI ACWI ex US

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Zurich Insurance Group AG	1.91	-7.88
VINCI SA	1.86	-8.27
Intact Financial Corporation	1.84	1.60
Thales SA	1.67	-9.54
Linde plc	1.61	-5.83
Novo Nordisk A/S	1.57	-8.86
Compass Group PLC	1.55	-1.24
Dollarama Inc.	1.52	0.51
Canadian National Railway Company	1.50	-2.80
ICON plc	1.49	-15.19

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
William Blair (Net)	-8.0	-36.5	-34.9	1.1	1.3	5.1	2.4
MSCI ACWI ex US	-9.8	-26.2	-24.8	-1.1	-0.3	3.5	1.0
MSCI ACWI ex US Growth	-9.3	-31.6	-30.0	-1.1	0.5	4.3	1.7

Regional Exposure by Domicile

- Europe dev 39.9%
- North America 13.6%
- United Kingdom 13.5%
- Japan 10.1%
- Asia emrg 9.7%
- Asia dev 6.5%
- Australasia 2.3%
- Africa/Middle East 2.3%
- Latin America 2.0%
- Europe emrg 0.1%

Equity Sector Exposure (GICS)

- Industrials 22.8%
- Financials 20.1%
- Information Technology 16.3%
- Health Care 13.6%
- Consumer Discretionary 12.6%
- Consumer Staples 5.8%
- Materials 4.2%
- Energy 2.0%
- Utilities 1.0%
- Real Estate 0.9%
- Communication Services 0.6%

Regional Exposure by Source of Revenue

- North America 30.4%
- Europe dev 21.2%
- Asia emrg 18.0%
- Japan 7.4%
- Asia dev 5.8%
- United Kingdom 4.9%
- Latin America 4.8%
- Africa/Middle East 3.9%
- Europe emrg 1.7%
- Australasia 1.4%
- Other 0.6%

William Blair vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022
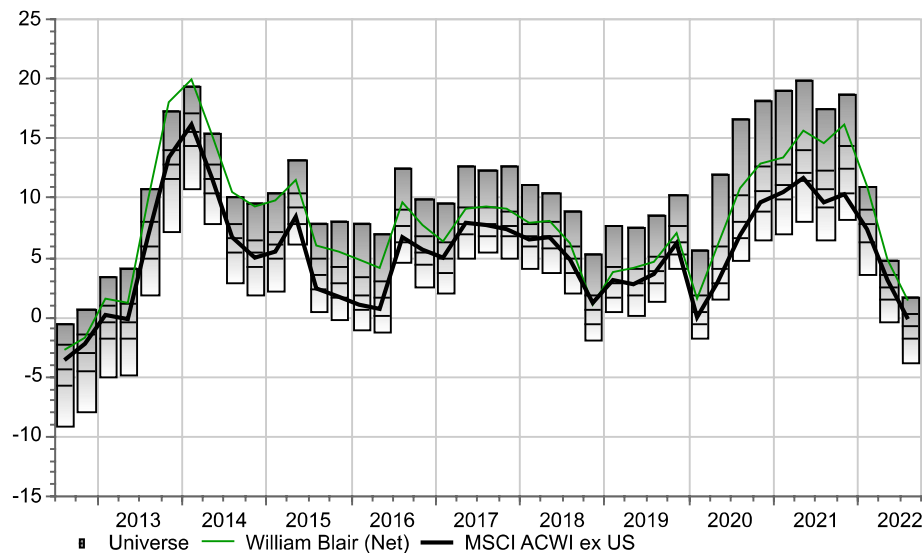
Universe: Lipper US:International Multi-Cap Growth

Legend: ▪ Universe   ● William Blair (Net)   ◇ MSCI ACWI ex US

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

Y-axis: William Blair (Net) %
X-axis: MSCI ACWI Ex US %

Legend:
◆ William Blair (Net)
▲ William Blair (Net) Oldest 2 Yrs
— Relative Performance Line
■ William Blair (Net) Recent 2 Yrs

Rolling Returns 7/1/2007 –9/30/2022 (5 Year, 3 Month Shift)

Universe: Lipper US:International Multi-Cap Growth

Legend: ▪ Universe   — William Blair (Net)   — MSCI ACWI ex US

©FactSet Research Systems

Over/Under Benchmark Analysis

36	Outperform
4	Underperform
40	# Observations
90%	% Outperform

William Blair Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Tencent Holdings Ltd.	0.28	-0.90	0.23
Taiwan Semiconductor Mfg Co., Ltd.	1.34	-0.51	0.09
Samsung Electronics Co., Ltd.	0.60	-0.53	0.09
Ashtead Group plc	0.83	0.73	0.05
Atlassian Corporation	0.73	0.73	0.05
DBS Group Holdings Ltd	0.76	0.58	0.05
HOYA CORPORATION	0.69	0.53	0.05
PT Bank Central Asia Tbk	0.49	0.36	0.05
Tecan Group AG	0.28	0.28	0.04
Itau Unibanco Holding S.A.	0.33	0.22	0.04

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
AIA Group Limited	2.04	1.48	-0.27
MTU Aero Engines AG	1.59	1.55	-0.25
ICON plc	1.60	1.60	-0.23
Amadeus IT Group SA	1.53	1.41	-0.21
DSV A/S	1.16	1.03	-0.15
Kingspan Group Plc	0.63	0.59	-0.14
KBC Group N.V.	1.03	0.97	-0.14
SEGRO plc	0.56	0.49	-0.13
Straumann Holding AG	0.70	0.64	-0.13
Eurofins Scientific Societe Europeenne	0.62	0.57	-0.13

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-4.9	-16.1	-16.5	0.4	0.0	0.3
Consumer Discretionary	-1.7	-6.0	-13.1	0.1	0.8	0.7
Consumer Staples	-5.0	-5.2	-6.3	-0.2	0.1	-0.1
Energy	-3.2	-4.9	-6.3	-0.1	0.0	-0.1
Financials	-4.0	-7.7	-7.9	-0.1	0.0	-0.1
Health Care	4.1	-6.5	-10.9	0.0	0.6	0.6
Industrials	13.4	-7.9	-8.2	0.3	0.1	0.4
Information Technology	4.5	-8.0	-12.2	-0.1	0.6	0.6
Materials	-3.0	-7.1	-7.8	-0.1	-0.1	0.0
Real Estate	-1.4	-25.7	-14.7	0.1	-0.1	0.0
Utilities	-2.3	-17.4	-10.9	0.0	-0.1	0.0
Cash	3.6	0.6	0.0	0.2	0.0	0.3
Total	0.0	-7.4	-9.9	0.4	2.0	2.5

William Blair 15 Year Performance & Statistics

Investment Growth – 15 Years

©FactSet Research Systems

Legend: William Blair (Net) — MSCI ACWI ex US Growth — MSCI ACWI ex US

Relative Cumulative Performance – 15 Years

©FactSet Research Systems

Legend: William Blair (Net) — MSCI ACWI ex US

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
William Blair (Net)	2.4	18.6	1.5	0.1	0.3	5.4	1.0
MSCI ACWI ex US	1.0	18.1	--	0.0	--	--	1.0
MSCI ACWI ex US Growth	1.7	17.8	--	0.1	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

Legend: Size, Volatility, Momentum, Value, Growth, Quality

BlackRock Global Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 3/1/2016 (Three Year, One Month Shift)

Legend: BlackRock Global Alpha Tilts (Net) — MSCI ACWI

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Apple Inc.	5.27	1.23
Microsoft Corporation	4.20	-9.10
Alphabet Inc.	2.18	-12.15
Amazon.com, Inc.	1.59	6.39
Johnson & Johnson	1.53	-7.33
JPMorgan Chase & Co.	1.48	-6.40
Bristol-Myers Squibb Company	1.33	-7.68
Visa Inc.	1.23	-9.60
Tesla, Inc.	1.20	18.17
General Dynamics Corporation	1.09	-4.10

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	Inception 3/1/2016
BlackRock Global Alpha Tilts (Net)	-7.5	-25.5	-20.2	3.8	4.3	8.6
MSCI ACWI	-6.8	-25.6	-20.7	3.7	4.4	8.2

Equity Sector Exposure (GICS)

- Information Technology 23.8%
- Health Care 15.9%
- Financials 11.5%
- Consumer Discretionary 11.4%
- Consumer Staples 8.1%
- Energy 6.9%
- Industrials 6.3%
- Communication Services 5.5%
- Utilities 4.0%
- Materials 3.8%
- Real Estate 2.8%

Regional Exposure by Domicile

- North America 68.8%
- Europe dev 10.4%
- Japan 5.2%
- Asia emrg 4.6%
- Asia dev 3.8%
- United Kingdom 2.1%
- Australasia 2.1%
- Africa/Middle East 1.7%
- Latin America 0.9%
- Europe emrg 0.4%

Regional Exposure by Source of Revenue

- North America 48.5%
- Asia emrg 16.2%
- Europe dev 12.1%
- Japan 5.3%
- Asia dev 4.5%
- Latin America 3.7%
- Africa/Middle East 3.3%
- United Kingdom 2.3%
- Australasia 1.9%
- Europe emrg 1.8%
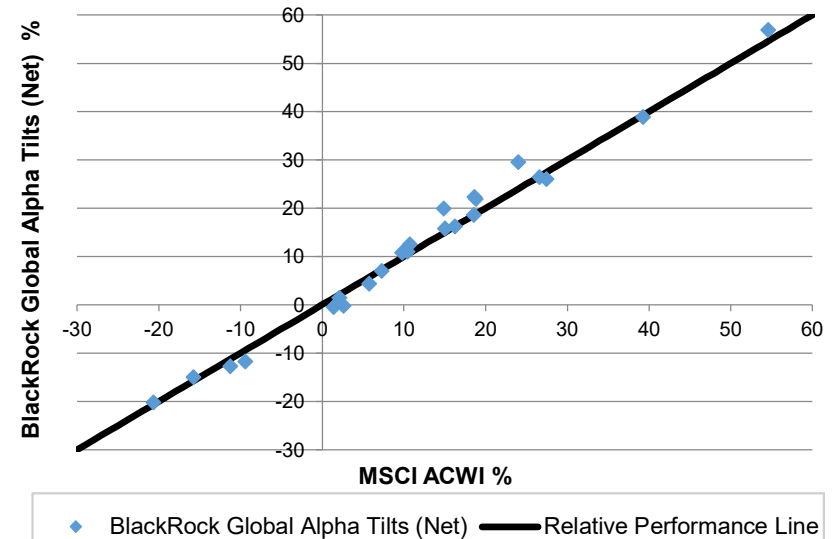- Other 0.4%

BlackRock Global vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US:Global

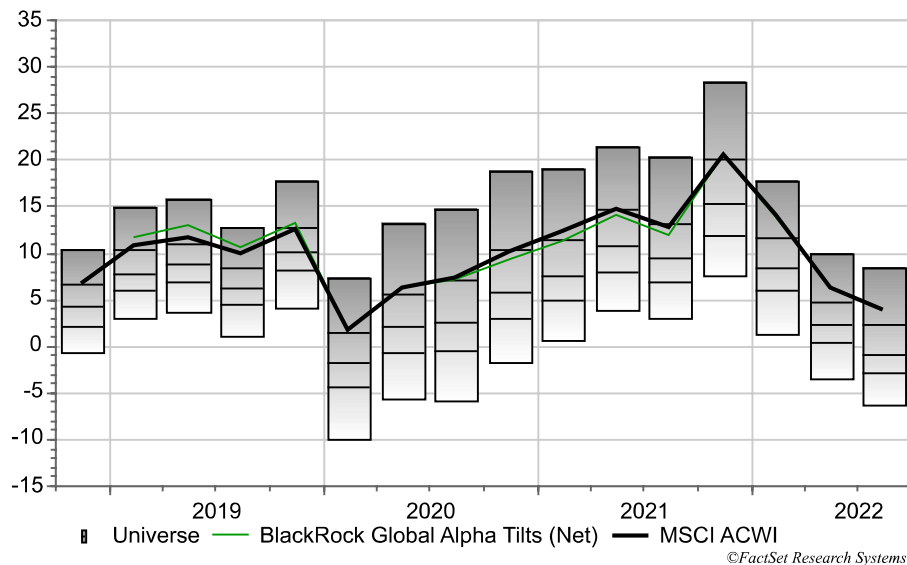Universe ■ ● BlackRock Global Alpha Tilts (Net) ◇ MSCI ACWI

©FactSet Research Systems

One-Year Rolling Return Versus Benchmark

◆ BlackRock Global Alpha Tilts (Net) ——— Relative Performance Line

Rolling Returns 3/1/2016 –9/30/2022 (3 Year, 3 Month Shift)

Universe: Lipper US Global Equity

Universe ■ ——— BlackRock Global Alpha Tilts (Net) ——— MSCI ACWI

©FactSet Research Systems

Over/Under Benchmark Analysis

13	Outperform
10	Underperform
23	# Observations
57%	% Outperform

BlackRock Global Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Boeing Company	0.20	0.05	0.09
NVIDIA Corporation	0.42	-0.29	0.07
Costco Wholesale Corporation	0.55	0.16	0.07
Exxon Mobil Corporation	1.12	0.44	0.05
Citigroup Inc.	0.08	-0.09	0.04
ASML Holding NV	0.74	0.38	0.04
Samsung Electronics Co., Ltd.	0.22	-0.22	0.03
Raytheon Technologies Corp.	0.01	-0.23	0.03
Charter Communications, Inc.	0.01	-0.08	0.03
Cisco Systems, Inc.	0.08	-0.24	0.03

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Intel Corporation	0.93	0.68	-0.19
Adobe Incorporated	0.75	0.43	-0.16
BYD Company Limited	0.56	0.49	-0.15
Tesla, Inc.	0.89	-0.33	-0.14
British American Tobacco p.l.c.	1.05	0.90	-0.12
Alphabet Inc.	3.12	0.85	-0.11
Philip Morris International Inc.	0.83	0.57	-0.09
Canadian Natural Resources Limited	0.63	0.51	-0.09
Microsoft Corporation	4.23	0.93	-0.09
Tokyo Electron Ltd.	0.46	0.38	-0.08

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-0.2	-15.2	-13.6	0.0	-0.1	-0.1
Consumer Discretionary	-2.5	-5.1	-2.7	-0.1	-0.2	-0.3
Consumer Staples	0.0	-6.7	-6.5	0.0	0.1	0.0
Energy	0.7	-3.9	-1.4	0.0	-0.2	-0.1
Financials	-2.2	-5.5	-5.9	-0.1	-0.1	0.0
Health Care	2.1	-5.7	-7.0	0.0	0.1	0.2
Industrials	-0.6	-6.9	-6.0	0.0	-0.1	-0.1
Information Technology	2.5	-8.6	-7.3	-0.1	-0.3	-0.4
Materials	-0.3	-8.6	-7.6	0.0	0.0	-0.1
Real Estate	-0.4	-9.6	-12.3	0.0	0.0	0.1
Utilities	0.9	-7.8	-7.8	0.0	0.0	0.0
Total	0.0	-7.5	-6.7	-0.2	-0.9	-0.8

BlackRock Global Inception Performance & Statistics

Investment Growth Since Inception 3/1/2016

BlackRock Global Alpha Tilts (Net) — MSCI ACWI

©FactSet Research Systems

Relative Cumulative Performance Since Inception 3/1/2016

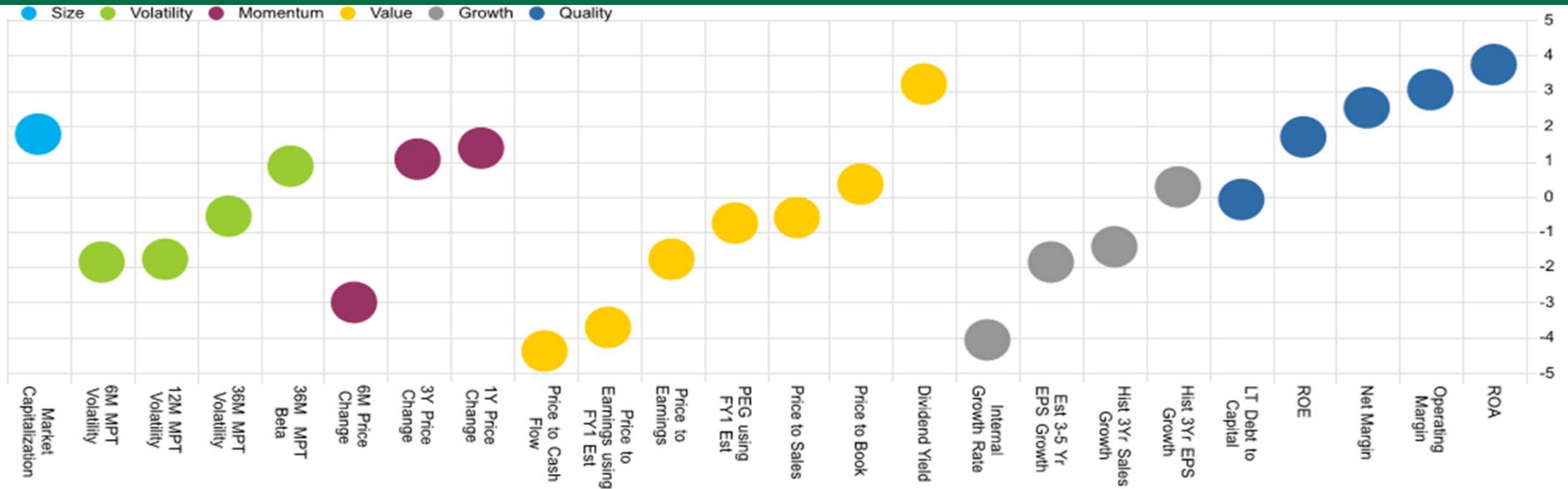

BlackRock Global Alpha Tilts (Net) — MSCI ACWI

©FactSet Research Systems

Risk Since Inception 3/1/2016

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
BlackRock Global Alpha Tilts (Net)	8.6	15.5	0.3	0.5	0.2	1.6	1.0
MSCI ACWI	8.2	15.3	--	0.5	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

MFS Portfolio Snapshot – September 30, 2022

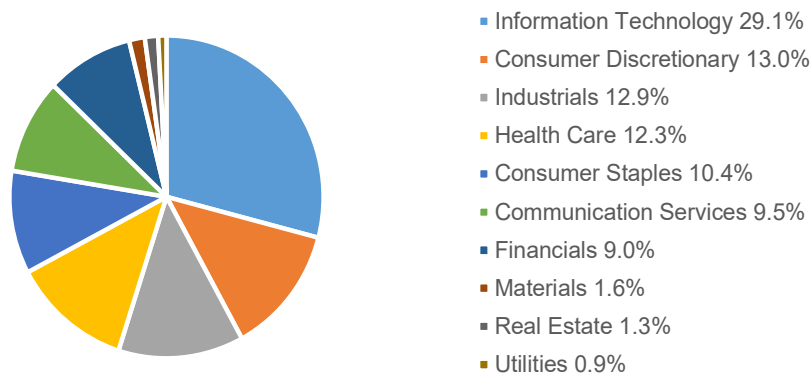## Rolling Returns Since Inception 12/1/2012 (Three Year, One Month Shift)

MFS (Net)   MSCI ACWI

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Alphabet Inc.	5.26	-12.22
Microsoft Corporation	4.94	-9.10
Canadian Pacific Railway Limited	2.71	-4.27
Accenture plc	2.48	-7.04
Apple Inc.	2.34	1.23
Visa Inc.	2.33	-9.60
ICON plc	2.08	-15.19
Fiserv, Inc.	2.00	5.17
Tencent Holdings Ltd.	1.95	-24.86
Electronic Arts Inc.	1.94	-4.74

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	Inception 12/1/2012
MFS (Net)	-7.8	-26.3	-20.2	5.2	8.4	10.0
MSCI ACWI	-6.8	-25.6	-20.7	3.7	4.4	7.3
MSCI ACWI Growth	-5.9	-32.2	-27.5	5.4	6.6	9.0

Equity Sector Exposure (GICS)

- Information Technology 29.1%
- Consumer Discretionary 13.0%
- Industrials 12.9%
- Health Care 12.3%
- Consumer Staples 10.4%
- Communication Services 9.5%
- Financials 9.0%
- Materials 1.6%
- Real Estate 1.3%
- Utilities 0.9%

Regional Exposure by Domicile

- North America 71.1%
- Europe dev 12.1%
- Asia emrg 5.7%
- United Kingdom 4.7%
- Asia dev 3.3%
- Japan 2.3%
- Latin America 0.8%

Regional Exposure by Source of Revenue

- North America 48.7%
- Asia emrg 17.8%
- Europe dev 12.5%
- Asia dev 4.1%
- United Kingdom 3.6%
- Latin America 3.5%
- Africa/Middle East 3.3%
- Japan 3.2%
- Europe emrg 1.6%
- Australasia 1.3%
- Other 0.3%

MFS vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US:Global

■ Universe ● MFS (Net) ◇ MSCI ACWI

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

◆ MFS (Net) ——— Relative Performance Line
▲ MFS (Net) Oldest 2 Yrs ■ MFS (Net) Recent 2 Yrs

Rolling Returns 12/1/2012 –9/30/2022 (3 Year, 3 Month Shift)

Universe: Lipper US Global Equity

■ Universe —— MFS (Net) —— MSCI ACWI

©FactSet Research Systems

Over/Under Benchmark Analysis

28	Outperform
0	Underperform
28	# Observations
100%	% Outperform

MFS Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Ross Stores, Inc.	1.30	1.25	0.19
KOSE Corporation	1.23	1.22	0.15
Charles Schwab Corporation	1.41	1.24	0.13
Starbucks Corporation	1.39	1.23	0.11
Fortive Corporation	1.52	1.48	0.07
TJX Companies, Inc.	0.84	0.72	0.07
Fiserv, Inc.	1.88	1.77	0.06
Flutter Entertainment Plc	0.83	0.80	0.05
Boston Scientific Corporation	1.73	1.63	0.05
Amphenol Corporation	1.85	1.77	0.04

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
NAVER Corp.	1.62	1.58	-0.46
Tencent Holdings Ltd.	2.07	1.61	-0.42
adidas AG	1.23	1.18	-0.40
Church & Dwight Co., Inc.	1.80	1.76	-0.40
Alibaba Group Holding Ltd.	1.61	1.26	-0.40
Alphabet Inc.	5.46	3.19	-0.38
ICON plc	2.24	2.24	-0.32
NIKE, Inc.	1.49	1.25	-0.26
Adobe Incorporated	1.06	0.74	-0.23
Cellnex Telecom SA	0.93	0.89	-0.22

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	2.8	-14.9	-14.0	-0.3	-0.2	-0.3
Consumer Discretionary	2.0	-8.0	-2.5	0.1	-0.6	-0.7
Consumer Staples	3.2	-8.7	-6.5	0.0	-0.1	-0.3
Energy	-4.8	0.0	-0.6	-0.3	0.0	-0.3
Financials	-6.4	0.9	-5.8	-0.1	0.3	0.5
Health Care	-1.1	-3.2	-6.9	0.0	0.2	0.4
Industrials	4.3	-7.0	-6.3	0.0	-0.2	-0.1
Information Technology	6.0	-7.8	-7.5	-0.1	-0.1	-0.2
Materials	-3.4	-9.2	-7.5	0.0	-0.1	0.0
Real Estate	-1.1	-16.0	-12.3	0.1	-0.1	0.0
Utilities	-2.6	-9.1	-8.3	0.0	0.0	0.0
Cash	0.8	0.6	0.0	0.0	0.0	0.1
Total	0.0	-7.5	-6.7	-0.5	-0.8	-0.8

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian

MFS Inception Performance & Statistics

Investment Growth Since Inception 12/1/2012

©FactSet Research Systems

Legend: MFS (Net) — MSCI ACWI Growth — MSCI ACWI

Relative Cumulative Performance Since Inception 12/1/2012

©FactSet Research Systems

Legend: MFS (Net) — MSCI ACWI

Risk Since Inception 12/1/2012

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
MFS (Net)	10.0	14.1	2.6	0.7	0.8	3.2	1.0
MSCI ACWI	7.3	14.0	--	0.5	--	--	1.0
MSCI ACWI Growth	9.0	15.0	--	0.6	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

Legend: Size, Volatility, Momentum, Value, Growth, Quality
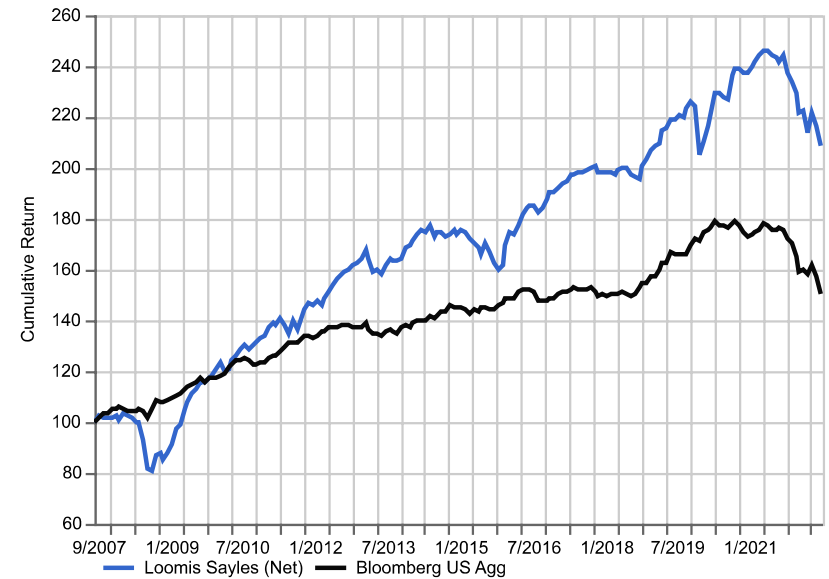
MILWAUKEE
ERS
Employees' Retirement System

Loomis Sayles Portfolio Snapshot – September 30, 2022

Rolling Returns Since 10/1/1999 (Ten Year, One Month Shift)

Loomis Sayles (Net) — Bloomberg US Agg

©FactSet Research Systems

Investment Growth – 15 Years

Loomis Sayles (Net) — Bloomberg US Agg

©FactSet Research Systems

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
Loomis Sayles (Net)	-2.8	-14.7	-14.8	-1.7	1.0	2.9	5.0
Bloomberg US Agg	-4.8	-14.6	-14.6	-3.3	-0.3	0.9	2.7

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Loomis Sayles (Net)	5.0	7.7	2.2	0.6	0.3	6.5	1.1
Bloomberg US Agg	2.7	3.9	--	0.5	--	--	1.0

Relative Cumulative Performance – 15 Years

Loomis Sayles (Net) — Bloomberg US Agg

©FactSet Research Systems

Loomis Sayles vs Universe & Benchmark

Reams Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 1/1/2001 (Ten Year, One Month Shift)

Reams (Net) — Bloomberg US Agg

©FactSet Research Systems

Investment Growth – 15 Years

Reams (Net) — Bloomberg US Agg

©FactSet Research Systems

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
Reams (Net)	-4.6	-14.4	-14.1	-0.4	1.8	2.0	4.3
Bloomberg US Aggregate	-4.8	-14.6	-14.6	-3.3	-0.3	0.9	2.7

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Reams (Net)	4.3	6.2	1.4	0.6	0.3	4.6	1.1
Bloomberg US Aggregate	2.7	3.9	--	0.5	--	--	1.0

Relative Cumulative Performance – 15 Years

Reams (Net) — Bloomberg US Agg

©FactSet Research Systems

Reams vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US Core Plus Bond

Legend: ▪ Universe ● Reams (Net) ◇ Bloomberg US Agg

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

Legend: ♦ Reams (Net) ━ Relative Performance Line ▲ Reams (Net) Oldest 2 Yrs ■ Reams (Net) Recent 2 Yrs

Rolling Returns 7/1/2007 – 9/30/2022 (5 Year, 3 Month Shift)
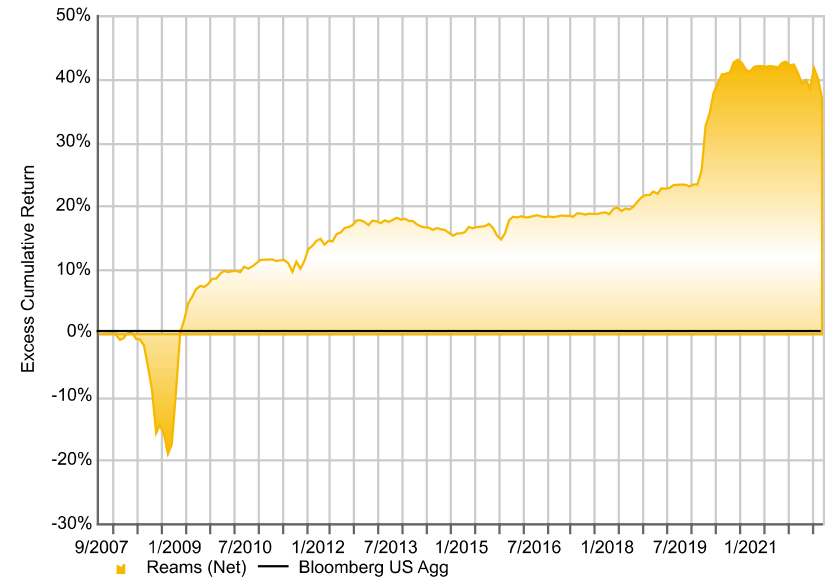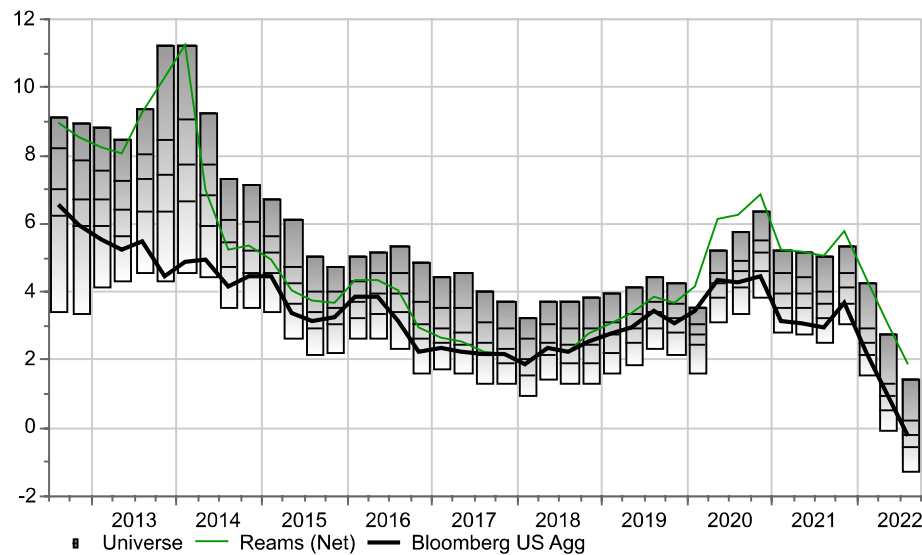
Universe: Lipper US Core Plus Bond

Legend: ▪ Universe — Reams (Net) ━ Bloomberg US Agg

©FactSet Research Systems

Over/Under Benchmark Analysis

33	Outperform
7	Underperform
40	# Observations
83%	% Outperform

3rd Quarter 2022 Performance Report

November 10, 2022

Employes' Retirement System

Presentation Agenda

- Fund Overview
- Public Equity
- Fixed Income
- Absolute Return
- Private Equity
- Recent Performance Update
- Appendix: Manager Charts & Statistics

Market Environment

Asset Class	Benchmark	Target Weight	Benchmark Return Q3 2022
Public Equity	MSCI ACWI IMI	44%	-6.6%
Fixed Income	Bloomberg U.S. Agg.	23%	-4.8%
Real Assets[1]	Blended Benchmark	13%	0.9%
Private Equity[1]	Russell 3000 + 2%	10%	-16.1%
Absolute Return	90-Day T-Bill + 3%	10%	1.4%

	Q3 2022
CMERS Benchmark	**-5.3%**

[1]Real Estate and Private Equity benchmark returns are reported on a 1-quarter lag.

Relative Performance Expectations

		Q3 2022		Q3 2022	Q3 2022
Value Equity Bias	Russell 3000 Value	-5.6%	Russell 3000 Growth	-3.4%	↓
Small Cap Equity Bias	Russell 2000	-2.2%	Russell 1000	-4.6%	↑
Fixed Income Credit	Loomis Sayles (net)	-2.8%	Bloomberg US Agg.	-4.8%	↑
Private Equity[1][2]	CMERS PE (net)	-4.4%	PE Benchmark	-16.1%	↑↑

	Q3 2022
CMERS Total Fund (net)	**-4.5%**
CMERS Benchmark	**-5.3%**

[1]Private Equity benchmark return is reported on a 1-quarter lag.
[2]All of the Fund's Q2 2022 and a small number of the Fund's Q1 2022 Private Equity returns are reflected in the July-September time period.

Total Fund Performance
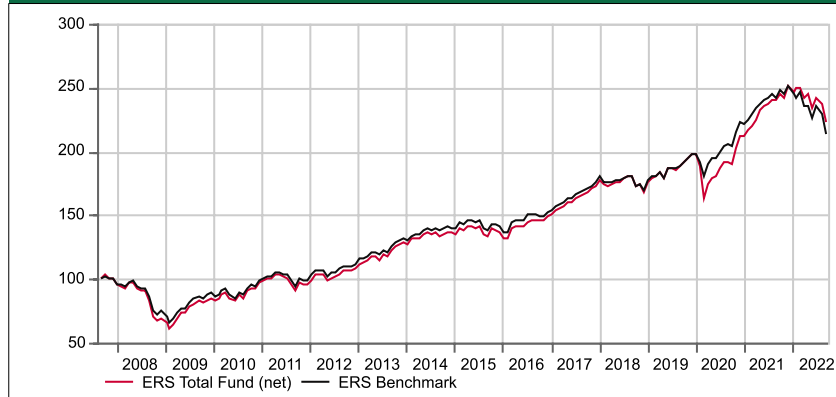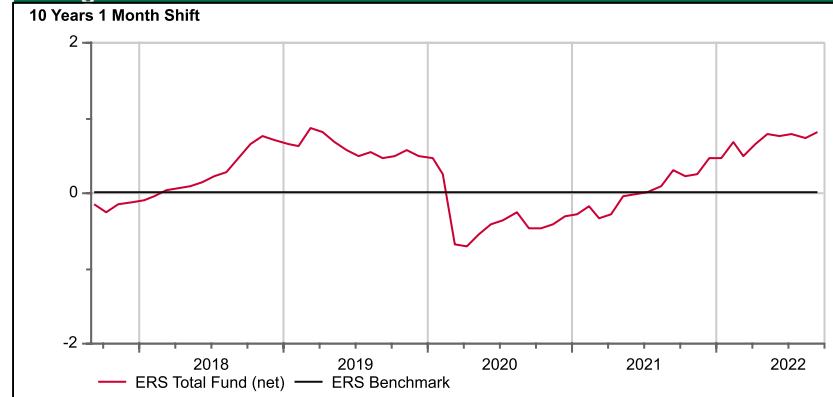
10 Year Rolling Returns – 11/1/1997 to 9/30/2022

10 Years 1 Month Shift

Legend: ERS Total Fund (net), ERS Benchmark

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	7 Year	10 Year	15 Year
				Annualized Return				
ERS Total Fund (net)	-4.5	-11.4	-7.1	5.8	6.0	7.7	7.7	5.5
ERS Benchmark	-5.3	-14.8	-11.7	4.2	4.8	6.6	7.0	5.2

Investment Growth – 10/1/2007 to 9/30/2022

Legend: ERS Total Fund (net), ERS Benchmark

Rolling Excess Returns – 10/1/2007 to 9/30/2022

10 Years 1 Month Shift

Legend: ERS Total Fund (net), ERS Benchmark

5

ERS Fund Attribution – 3rd Quarter 2022

								Attribution Effect(%)			
Asset Class	Benchmark	Average Weight %	Policy Weight %	+/-	Portfolio Return	Benchmark Return	+/-	Broad Category Group Allocation	Manager Selection	Style Bias	Total Active Return
Public Equity	MSCI ACWI IMI NR USD	**42.1**	**44.0**	**-1.9**	**-7.2**	**-6.6**	**-0.5**	**0.0**	**-0.2**	**-0.1**	**-0.2**
Fixed Income	Bbg US Agg Bond TR USD	**22.2**	**23.0**	**-0.8**	**-3.8**	**-4.8**	**1.0**	**0.0**	**0.1**	**0.1**	**0.2**
Real Assets[2]	Real Assets Benchmark[1]	**13.9**	**13.0**	**1.0**	**-1.1**	**0.9**	**-2.0**	**0.0**	**-0.4**	**0.1**	**-0.2**
Private Equity[2]	Russell 3000 (Qtr Lag) + 200bps[1]	**13.4**	**10.0**	**3.4**	**-4.4**	**-16.1**	**11.7**	**-0.4**	**1.6**	**0.0**	**1.2**
Absolute Return	90 Day T-Bill +3%	**8.3**	**10.0**	**-1.7**	**0.6**	**1.4**	**-0.8**	**-0.1**	**-0.1**	**0.0**	**-0.1**
Total		**100.0**	**100.0**	**0.0**	**-4.5**	**-5.3**	**0.8**	**-0.5**	**1.2**	**0.1**	**0.8**

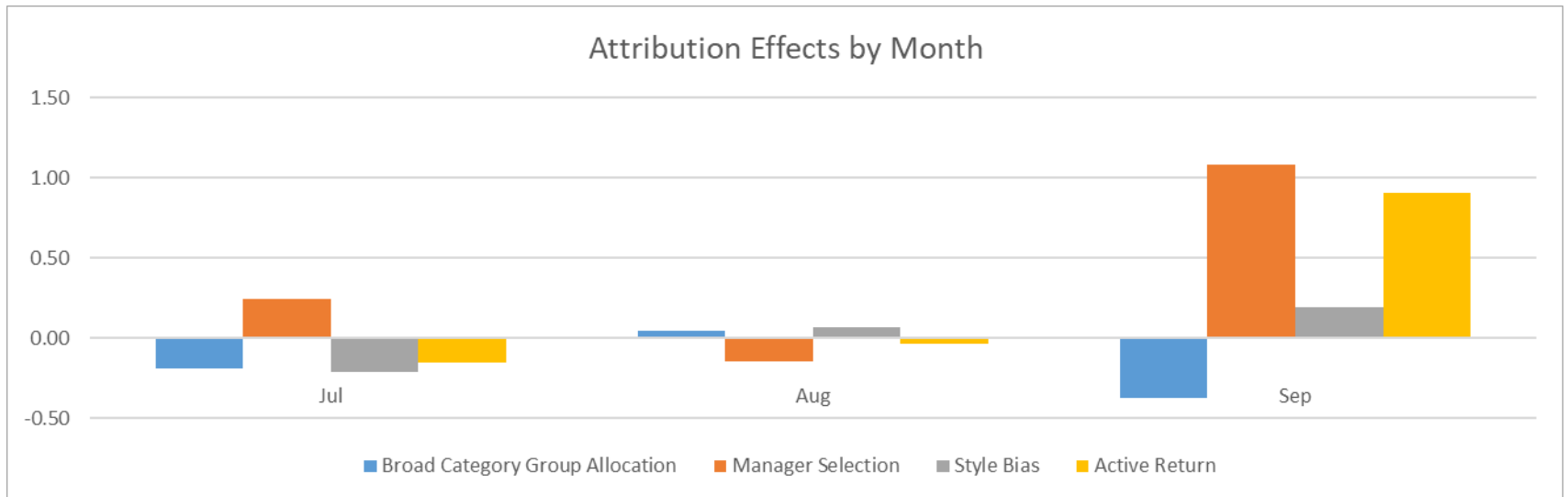| **Main Drivers of Q3 2022 Relative Performance**	**Impact %**	**Attribution Category**
- Private Equity	**1.6%**	**Manager Selection**
- Real Estate	**-0.4%**	**Manager Selection**
- Overweight to Private Equity	**-0.4%**	**Overall Allocation**

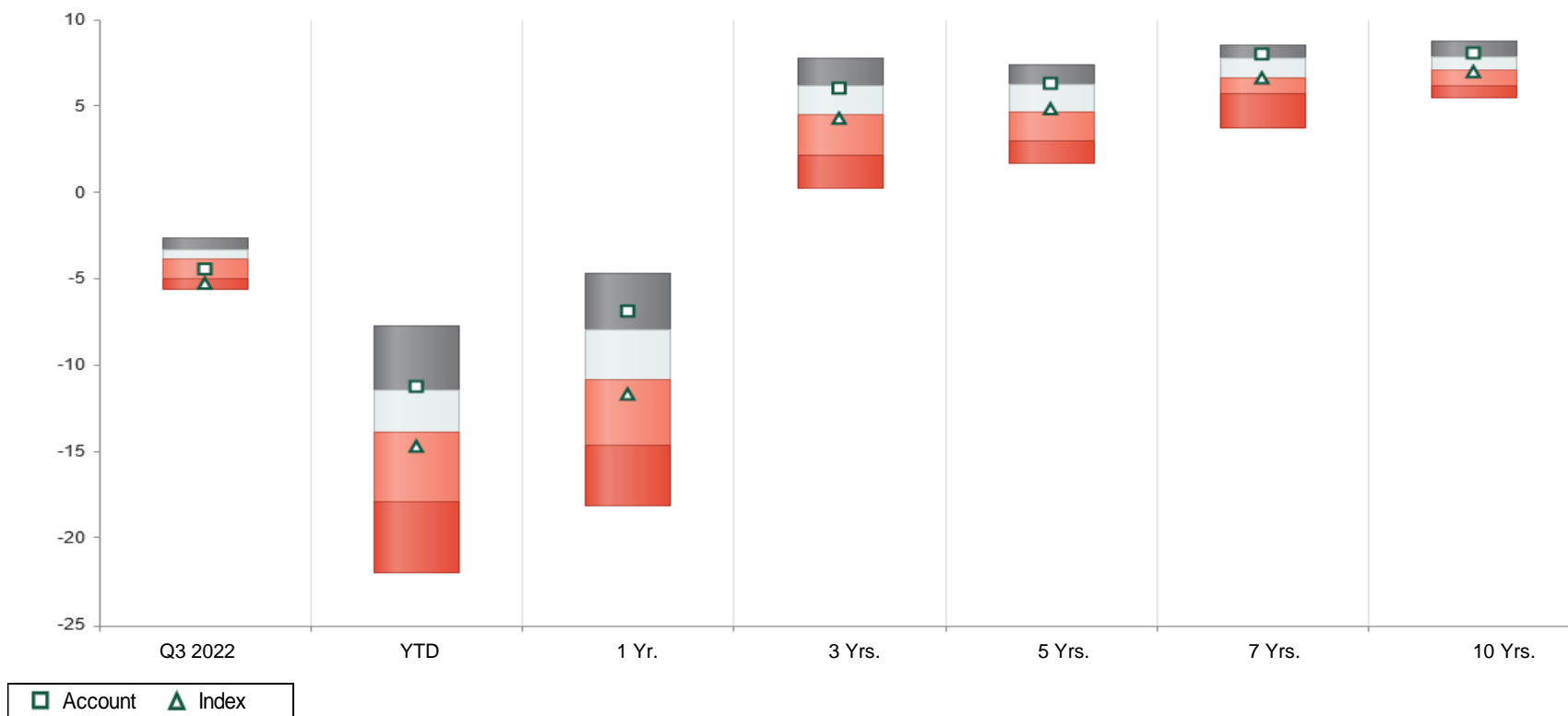[1]Real Estate and Private Equity benchmark returns are reported on a 1-quarter lag.
[2]All of the Fund's Q2 2022 and a small number of the Fund's Q1 2022 Private Equity returns are reflected in the July-September time period. Some Real Estate returns are reported on a 1-quarter lag.
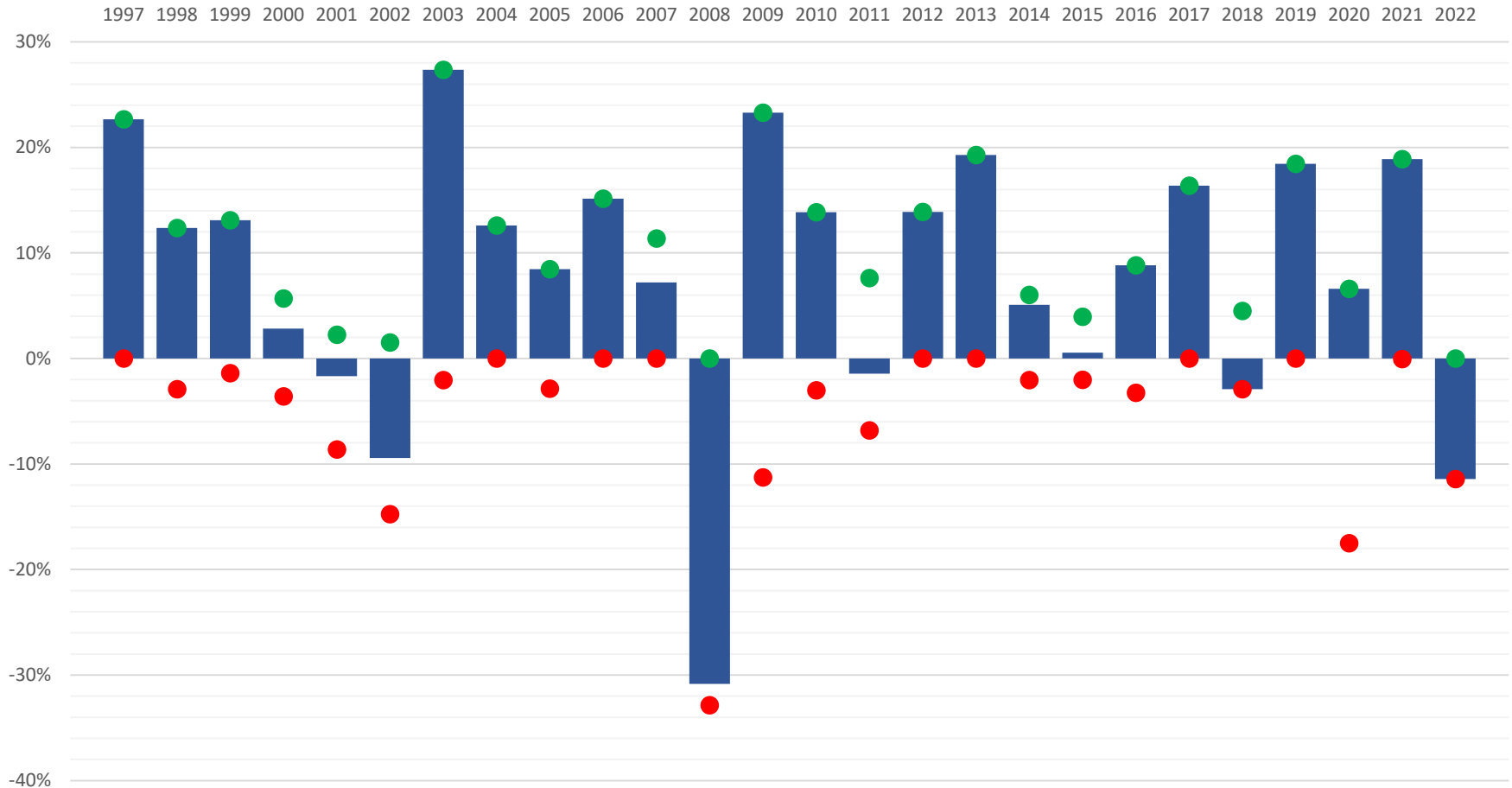
3rd Quarter 2022 Attribution

Attribution Effects by Month

Total Fund vs Universe

	Q3 2022	YTD	1 Yr.	3 Yrs.	5 Yrs.	7 Yrs.	10 Yrs.
Account Return	-4.5	-11.3	-6.9	6.0	6.3	8.0	8.0
Percentile Rank	62	22	17	31	24	17	16
Index Return	-5.3	-14.8	-11.7	4.2	4.8	6.6	7.0
Percentile Rank	84	56	55	58	48	52	52
1st Quartile	-3.3	-11.4	-7.9	6.1	6.2	7.8	7.8
Median	-3.8	-13.9	-10.9	4.5	4.6	6.6	7.1
3rd Quartile	-5.0	-18.0	-14.6	2.1	3.0	5.7	6.1
Observations	44	44	44	42	42	37	26

Annual Returns, Peaks and Troughs

■ CMERS ● Peak ● Trough

	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	YTD 2022
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%	-11.4%
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%	0.0%
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%	-11.4%

*Net of Fees

9

Asset Allocation as of September 30, 2022

Actual Asset Allocation*

Public Equity, 40.9%
Fixed Income, 20.9%
Absolute Return, 10.5%
Real Assets, 14.0%
Private Equity, 13.8%

Actual Asset Allocation vs. Policy Target

	Public Equity	Private Equity	Fixed Income	Absolute Return	Real Assets
	-3.1%	3.8%	-2.1%	0.5%	1.0%

*May not sum to 100% due to rounding; Private Equity and some Real Estate values are reported on a 1-quarter lag.

YTD Market Value Change

December 31, 2021 Market Value including City Reserve & PABF Accounts $ 6,260,134,748

Monthly Cash Outflows thru	September 30, 2022		
Retiree Payroll Expense		$ (335,486,791)	
PABF Payroll Expense		$ (38,825)	
Expenses Paid		$ (11,536,842)	
GPS Benefit Payments		$ (7,605,876)	
Sub-Total Monthly Cash Outflows			$ (354,668,333)

Monthly Cash Inflows thru	September 30, 2022		
Contributions		$ 101,405,098	
PABF Contribution		$ 41,407	
Sub-Total Monthly Contributions			$ 101,446,505

City Reserve Fund Contribution $ 40,000,000

Capital Market Gain/(Loss) $ (690,889,240)

Value including City Reserve & PABF Accounts as of September 30, 2022 $ 5,356,023,680

Less City Reserve Account[1] $ 79,892,367

Less PABF Fund[2] $ 2,505

Net Projected ERS Fund Value as of September 30, 2022 $ 5,276,128,809

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.

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.

Fund Value of Assets: 2007 – September 30, 2022
(Year Ended Dates Reflect 12/31 Fund Values)

Market Value of Fund Assets*

Year	Value (in millions)
2007	$5,189
2008	$3,401
2009	$3,951
2010	$4,294
2011	$3,975
2012	$4,234
2013	$4,897
2014	$4,915
2015	$4,712
2016	$4,875
2017	$5,356
2018	$4,953
2019	$5,526
2020	$5,531
2021	$6,218
Sep-22	$5,276

Most recent Actuarial valuation projects benefit payments to total $5.2 billion in next 10 years.

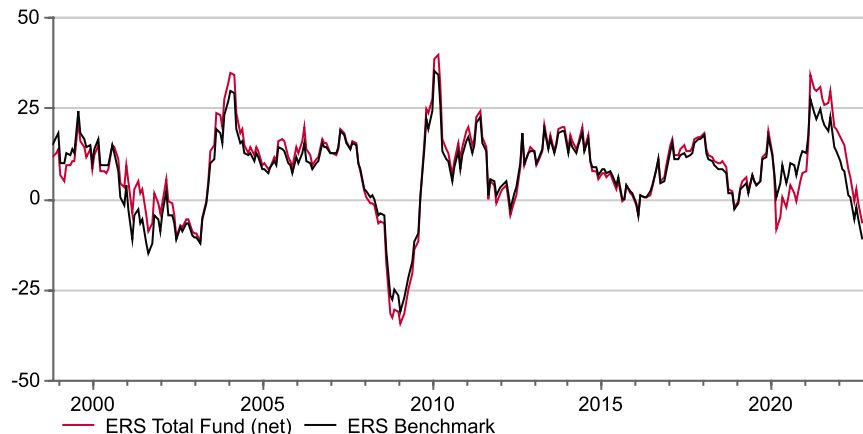|	
Benefit Payments	$5.1 billion
Expenses	$259 million
Contributions	$1.4 billion
Investment Gain	$4.0 billion

14 3/4 Year Estimates (1/1/2008 - 9/30/2022)

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.

*Private Equity and some Real Estate values are reported on a 1-quarter lag.

Total Fund Rolling Returns as of September 30, 2022

1 Year Rolling Returns – 12/1/1997 to 9/30/2022

1 Year 1 Month Shift

ERS Total Fund (net) — ERS Benchmark

©FactSet Research Systems

10 Year Rolling Returns – 12/1/1997 to 9/30/2022

10 Years 1 Month Shift

ERS Total Fund (net) — ERS Benchmark

©FactSet Research Systems

5 Year Rolling Returns – 12/1/1997 to 9/30/2022

5 Years 1 Month Shift

ERS Total Fund (net) — ERS Benchmark

©FactSet Research Systems

15 Year Rolling Returns – 12/1/1997 to 9/30/2022

15 Years 1 Month Shift

ERS Total Fund (net) — ERS Benchmark

©FactSet Research Systems

Total Fund Rolling Excess Returns as September 30, 2022

Total Fund Statistics

Annualized Return vs. Annualized Standard Deviation

- ● ERS Total Fund (net)
- ● ERS Public Equity (net)
- ● ERS Fixed Income (net)
- ● ERS Real Estate (net)
- ● ERS Benchmark

©FactSet Research Systems

Risk-Reward Since Private Equity Inception – 7/1/2010 to 9/30/2022

Annualized Return vs. Annualized Standard Deviation

- ● ERS Total Fund (net)
- ● ERS Public Equity (net)
- ● ERS Fixed Income (net)
- ● ERS Private Equity (net)
- ● ERS Real Estate (net)
- ● ERS Benchmark

©FactSet Research Systems

15 Year Upside-Downside –10/1/2007 to 9/30/2022

Upside Capture Ratio vs. Downside Capture Ratio

- ● ERS Total Fund (net)
- ● ERS Benchmark

©FactSet Research Systems

Batting Average

Rolling Window: 3 years
Time Period: 10/1/2007 to 9/30/2022

15 Year Risk –10/1/2007 to 9/30/2022

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Total Fund (net)	5.5	11.2	0.0	0.4	0.0	2.8	1.1
ERS Benchmark	5.2	9.9	0.0	0.5	--	--	1.0

Risk – 7/1/2013 to 9/30/2022

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Total Fund (net)	7.5	9.0	0.0	0.7	0.1	3.2	1.1
ERS Benchmark	6.6	7.7	0.0	0.8	--	--	1.0

* Real Estate returns calculated by Northern Trust

Public Equity

Public Equity Performance

10 Year Rolling Returns – 7/1/2000 to 9/30/2022

10 Years 1 Month Shift

Legend: — ERS Public Equity (net) — ERS Equity Benchmark

Trailing Returns

	QTR	YTD	Annualized Return					
			1 Year	3 Year	5 Year	7 Year	10 Year	15 Year
ERS Public Equity (Gross)	-7.1	-24.8	-20.6	4.5	4.8	8.0	8.7	5.2
ERS Public Equity (Net)	-7.2	-25.0	-20.9	4.2	4.5	7.7	8.3	4.8
ERS Public Equity Benchmark	-6.6	-25.7	-21.2	3.6	4.2	7.4	8.0	4.8
MSCI AC World IMI	-6.6	-25.7	-21.2	3.6	4.2	7.3	7.2	4.2

Investment Growth – 10/1/2007 to 9/30/2022

Legend: — ERS Public Equity (net) — ERS Equity Benchmark

Rolling Excess Returns –10/1/2007 to 9/30/2022

10 Years, one month shift

Legend: — ERS Public Equity (net) — ERS Equity Benchmark

Public Equity vs Universe

	Q3 2022	YTD	1 Yr.	3 Yrs.	5 Yrs.	7 Yrs.	10 Yrs.
Account Return	-7.1	-24.8	-20.6	4.5	4.8	8.0	8.7
Percentile Rank	86	43	41	46	54	43	36
Index Return	-6.6	-25.7	-21.2	3.6	4.2	7.4	8.0
Percentile Rank	67	56	51	68	74	3rd Quartile	3rd Quartile
1st Quartile	-4.8	-24.0	-19.0	5.6	6.0	8.5	9.0
Median	-6.1	-25.5	-21.1	4.3	4.9	7.9	8.2
3rd Quartile	-6.8	-27.3	-23.7	3.4	4.2	7.4	7.7
Observations	132	132	132	132	131	124	111

Public Equity Portfolio Snapshot

Equity Sector Exposure (GICS)

- Financials 16.2%
- Information Technology 16.1%
- Health Care 13.7%
- Industrials 12.7%
- Consumer Discretionary 10.5%
- Consumer Staples 7.5%
- Communication Services 7%
- Energy 6.4%
- Materials 5.5%
- Real Estate 2.3%
- Utilities 2%

Regional Exposure by Domicile

- North America 62.1%
- Europe dev 15.9%
- Japan 5.8%
- United Kingdom 5.1%
- Asia emrg 3.9%
- Asia dev 3.0%
- Latin America 2.1%
- Australasia 1.0%
- Africa/Middle East 0.8%
- Europe emrg 0.1%

Regional Exposure by Source of Revenue

- North America 49.1%
- Europe dev 14%
- Asia emrg 12.9%
- Japan 5.5%
- Latin America 4.5%
- United Kingdom 3.8%
- Asia dev 3.7%
- Africa/Middle East 3%
- Europe emrg 1.6%
- Australasia 1.4%
- Other 0.5%

Risk – Reward – 8/1/2016 to 9/30/2022

- MFS (Net)
- Brandes (Net)
- William Blair (Net)
- DFA Int'l Small (Net)
- Polen (Net)
- DFA US Small (Net)
- Earnest (Net)
- CastleArk (Net)
- NT S&P 500 Index (Net)
- ERS Public Equity (Net)
- BlackRock Global (Net)
- AQR (Net)
- ERS Public Equity BM

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Top 10 Holdings

Portfolio Date 9/30/22	Weight %	Return %
Microsoft Corporation	1.7	-9.1
Alphabet Inc.	1.6	-12.1
Apple Inc.	1.4	1.2
Amazon.com, Inc.	1.1	6.4
Meta Platforms, Inc.	0.7	-15.9
Exxon Mobil Corporation	0.7	2.7
Visa Inc.	0.7	-9.6
Takeda Pharmaceutical	0.6	-5.2
JPMorgan Chase & Co.	0.6	-6.4
Berkshire Hathaway Inc.	0.6	-2.1

Top 10 Managers

Portfolio Date 9/30/22	Weight %
Brandes Int'l Value	13.8
William Blair Int'l Growth	11.1
BlackRock Global Core	10.5
NTQA S&P 500 Index Core	9.9
BlackRock R1000 Value Index	8.6
DFA US Small Cap Value	7.8
MFS Global Growth	7.5
DFA Int'l Small Cap Value	7.3
DFA US Large Cap Value	6.2
Polen US Large Cap Growth	5.9

Public Equity Statistics

Characteristics Tilt vs MSCI ACWI IMI 9/30/2022

Legend: ● Size ● Volatility ● Momentum ● Value ● Growth ● Quality

Scale: 10, 5, 0, -5, -10, -15

Categories (x-axis):
Market Capitalization, 12M MPT Volatility, 36M MPT Volatility, 6M MPT Volatility, 36M MPT Beta, 3Y Price Change, 6M Price Change, 1Y Price Change, Price to Cash Flow, Price to Earnings using FY1 Est, Price to Sales, Price to Earnings, Price to Book, PEG using FY1 Est, Dividend Yield, Internal Growth Rate, Hist 3Yr Sales Growth, Hist 3Yr EPS Growth, Est 3-5 Yr EPS Growth, ROE, ROA, Net Margin, Operating Margin, LT Debt to Capital

15 Year Upside-Downside – 10/1/2007 to 9/30/2022

Upside Capture % (y-axis) vs Downside Capture % (x-axis)

● ERS Public Equity (Net)
● ERS Public Equity Benchmark

©FactSet Research Systems

Batting Average

Rolling Window: 3 years
Time Period: 10/1/2007 to 9/30/2022

(Line chart from 2011 to 2022, values ranging approximately 40–90)

15 Year Risk –10/1/2007 to 9/30/2022

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Public Equity (Net)	4.8	17.3	0.0	0.2	0.0	1.8	1.0
ERS Public Equity Benchmark	4.8	16.6	0.0	0.3	--	--	1.0

Risk – 7/1/2013 to 9/30/2022

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Public Equity (Net)	7.6	15.0	0.0	0.5	0.1	1.7	1.0
ERS Public Equity Benchmark	7.2	14.5	0.0	0.4	--	--	1.0

*"Price to Earnings," "Price to Earnings using FY1 Est," and "PEG using FY1 Est" values exclude companies with negative earnings from calculations.

Public Equity Valuation Characteristics

As of September 30, 2022

	Price/ Earnings	P/E using FY2 Est	Price/ Book	Price/ CF	Dividend Yield
ERS Public Equity	11.1	10.7	1.4	7.2	2.64
MSCI AC World IMI	13.8	12.6	2.2	9.3	2.42

Domestic Managers	Price/ Earnings	P/E using FY2 Est	Price/ Book	Price/ CF	Dividend Yield
BlackRock R1000 Value Index	13.8	12.0	2.0	9.3	2.45
CastleArk Small Growth	25.9	17.6	4.4	15.7	0.18
DFA Large Value	10.3	9.6	1.7	7.0	2.64
DFA Small Value	7.0	7.5	1.0	5.0	1.87
Earnest Mid Core	15.4	11.7	2.5	10.8	1.74
NT S&P 500 Index	18.2	14.9	3.4	12.6	1.80
Polen Large Growth	30.5	22.5	6.3	19.1	0.39

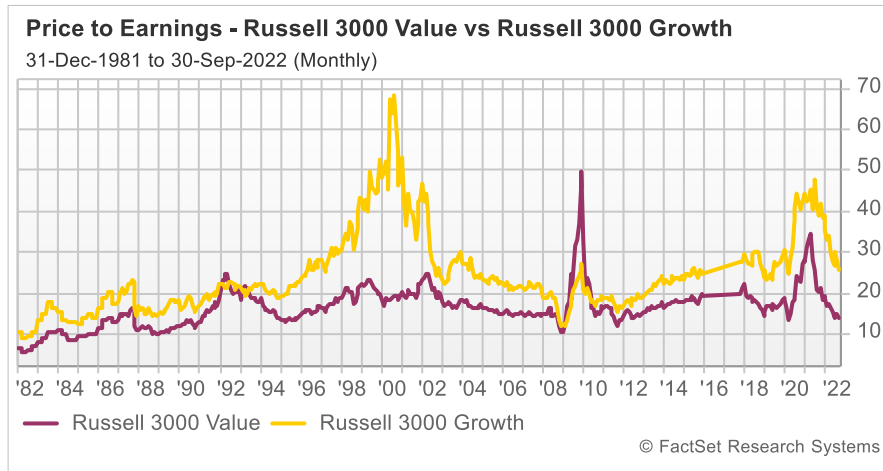| Global & International Managers	Price/ Earnings	P/E using FY2 Est	Price/ Book	Price/ CF	Dividend Yield
AQR Emerging Markets Core	5.5	6.1	1.0	3.5	7.11
BlackRock Global Core	12.8	11.9	2.2	8.8	2.73
Brandes Int'l Value	8.2	7.4	0.7	4.0	5.47
DFA Int'l Small Value	6.4	7.2	0.6	4.2	3.94
MFS Global Growth	23.1	17.6	3.8	15.8	1.21
William Blair Int'l Growth	19.5	16.8	3.3	14.9	1.86

*"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 September 30, 2022

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 September 30, 2022

Outperforming Equity Managers

	3rd Qtr	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
William Blair	-8.0%	-36.5%	-34.9%	1.1%	1.3%	4.6%	5.1%
MSCI ACWI ex US	1.8%	10.3%	10.1%	2.2%	1.7%	0.8%	1.7%
CastleArk	1.4%	-30.9%	-27.6%	6.0%	7.8%	9.1%	N/A
Russell 2000 Growth	1.2%	1.6%	1.7%	3.0%	4.2%	2.0%	
DFA U.S. Small Value	-3.4%	-14.6%	-8.9%	10.6%	5.3%	8.6%	9.8%
Russell 2000 Value	1.2%	6.5%	8.8%	5.8%	2.4%	1.2%	1.8%
DFA U.S. Large Value	-5.4%	-16.9%	-11.2%	4.3%	N/A	N/A	N/A
Russell 1000 Value	0.2%	0.8%	0.1%	0.1%			
ERS Public Equity	-7.2%	-25.0%	-20.9%	4.2%	4.5%	7.7%	8.3%
ERS Equity Benchmark	0.5%	0.7%	0.3%	0.6%	0.3%	0.3%	0.3%

Relative outperformance in blue
Relative underperformance in red

*Returns net of fees

Relative Investment Performance – Active Equity Managers
As of September 30, 2022

Underperforming Equity Managers

	3rd Qtr	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
Brandes	-12.0%	-23.4%	-23.3%	-2.5%	-1.8%	2.0%	3.6%
MSCI EAFE	2.6%	3.7%	1.8%	0.7%	1.0%	0.8%	0.1%
Earnest	-5.8%	-21.5%	-12.6%	8.6%	9.6%	12.2%	12.4%
Russell MidCap	2.3%	2.7%	6.8%	3.4%	3.1%	3.4%	2.1%
AQR	-12.8%	-27.6%	-28.5%	-1.1%	-2.7%	N/A	N/A
MSCI EM	1.2%	0.4%	0.4%	1.0%	0.9%		
MFS	-7.8%	-26.3%	-20.2%	5.2%	8.4%	10.8%	N/A
MSCI ACWI	0.9%	0.7%	0.5%	1.5%	4.0%	3.4%	
BlackRock Global Alpha Tilts	-7.5%	-25.5%	-20.2%	3.8%	4.3%	N/A	N/A
MSCI ACWI	0.7%	0.2%	0.5%	0.0%	0.2%		
Polen	-5.2%	-38.1%	-34.8%	4.6%	10.4%	11.7%	12.6%
S&P 500	0.3%	14.2%	19.4%	3.5%	1.1%	0.3%	0.9%
DFA International	-10.1%	-24.4%	-22.9%	-0.4%	-3.2%	2.4%	4.9%
MSCI EAFE Small Cap	0.3%	7.8%	9.2%	1.8%	1.4%	0.9%	0.4%
ERS Public Equity	-7.2%	-25.0%	-20.9%	4.2%	4.5%	7.7%	8.3%
ERS Equity Benchmark	0.5%	0.7%	0.3%	0.6%	0.3%	0.3%	0.3%

Relative outperformance in blue
Relative underperformance in red

*Returns net of fees

Relative Investment Performance – Passive Equity Managers & Other
As of September 30, 2022

Passive Equity Managers

	3rd Qtr	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
Northern Trust S&P 500 Index	-4.9%	-23.9%	-15.5%	8.2%	9.3%	11.4%	11.7%
S&P 500	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
BlackRock Russell 1000 Value Index	-5.6%	-17.8%	-11.4%	4.4%	5.4%	N/A	N/A
Russell 1000 Value	0.0%	0.0%	0.0%	0.1%	0.1%		

Real Assets Manager

	3rd Qtr	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
Principal Diversified Real Assets	-8.2%	-12.5%	-8.4%	3.8%	3.1%	N/A	N/A
Blended Benchmark	0.3%	0.3%	0.3%	1.2%	0.3%		

Relative outperformance in blue
Relative underperformance in red

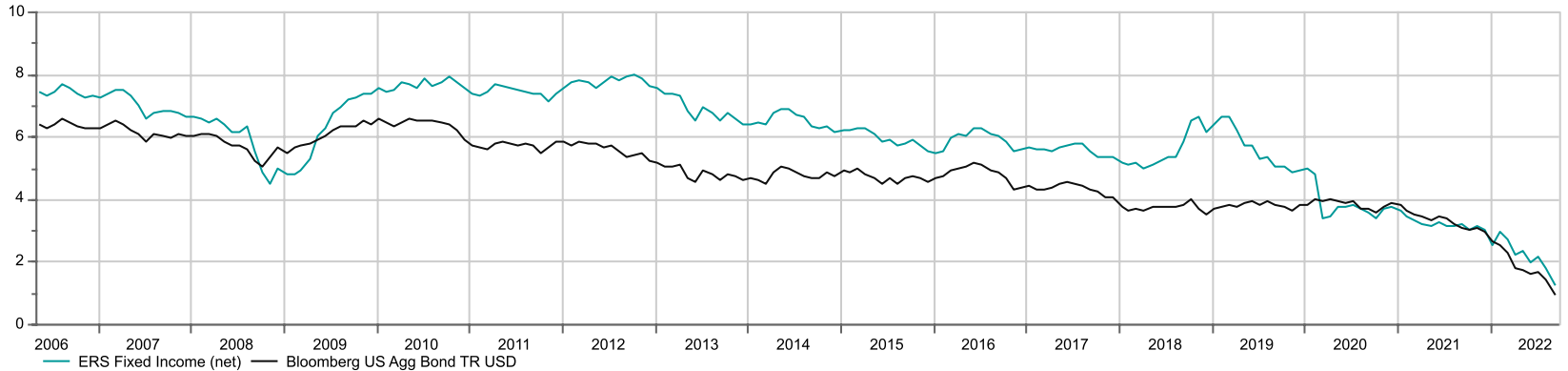***Returns net of fees**

Fixed Income

Fixed Income Performance

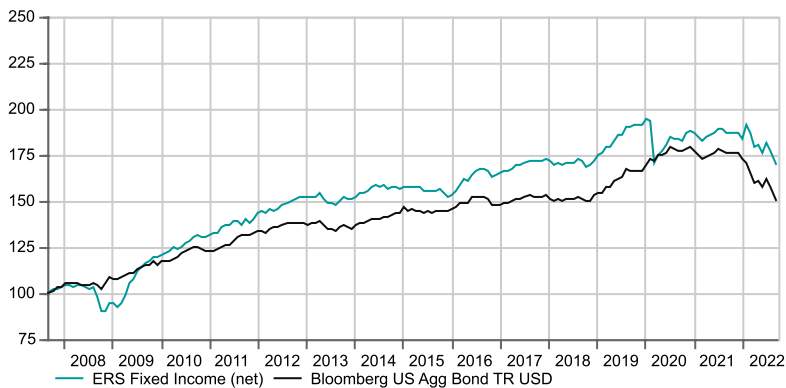## 10 Year Rolling Returns – 6/1/1996 to 9/30/2022
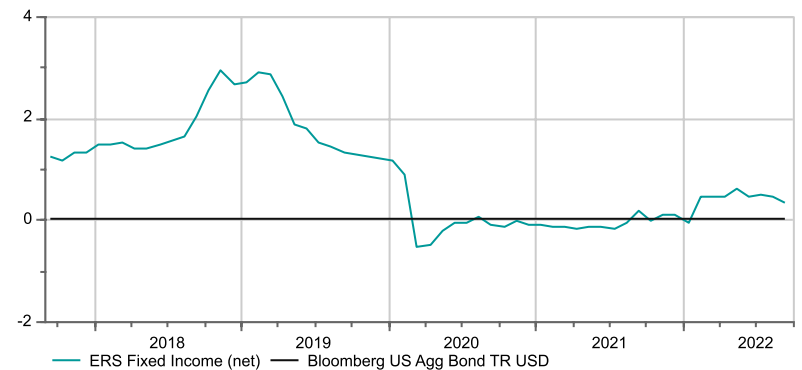

10 Years 1 Month Shift

ERS Fixed Income (net) — Bloomberg US Agg Bond TR USD

Trailing Returns

	Annualized Return							
	QTR	YTD	1 Year	3 Year	5 Year	7 Year	10 Year	15 Year
Total Fixed Income (Gross)	-3.9	-9.4	-9.3	-3.6	-0.1	1.4	1.3	3.7
Total Fixed Income (Net)	-3.9	-9.4	-9.4	-3.7	-0.2	1.3	1.2	3.6
Bloomberg US Aggregate	-4.8	-14.6	-14.6	-3.3	-0.3	0.5	0.9	2.7

Investment Growth – 10/1/2007 to 9/30/2022

ERS Fixed Income (net) — Bloomberg US Agg Bond TR USD

Rolling Excess Return – 10/1/2007 to 9/30/2022

10 Years, One month shift

ERS Fixed Income (net) — Bloomberg US Agg Bond TR USD

Fixed Income vs Universe

	Q3 2022	YTD	1 Yr.	3 Yrs.	5 Yrs.	7 Yrs.	10 Yrs.
Account Return	-3.9	-9.4	-9.3	-3.6	-0.1	1.4	1.3
Percentile Rank	52	26	26	71	70	55	66
Index Return	-4.8	-14.6	-14.6	-3.3	-0.3	0.5	0.9
Percentile Rank	70	59	58	68	81	93	88
1st Quartile	-2.3	-9.4	-9.3	-1.0	0.8	2.0	2.1
Median	-3.7	-14.0	-13.9	-2.2	0.4	1.5	1.6
3rd Quartile	-7.0	-25.0	-24.1	-4.9	-0.2	1.0	1.3
Observations	95	96	96	97	97	93	89

Relative Investment Performance – Fixed Income Managers
As of September 30, 2022

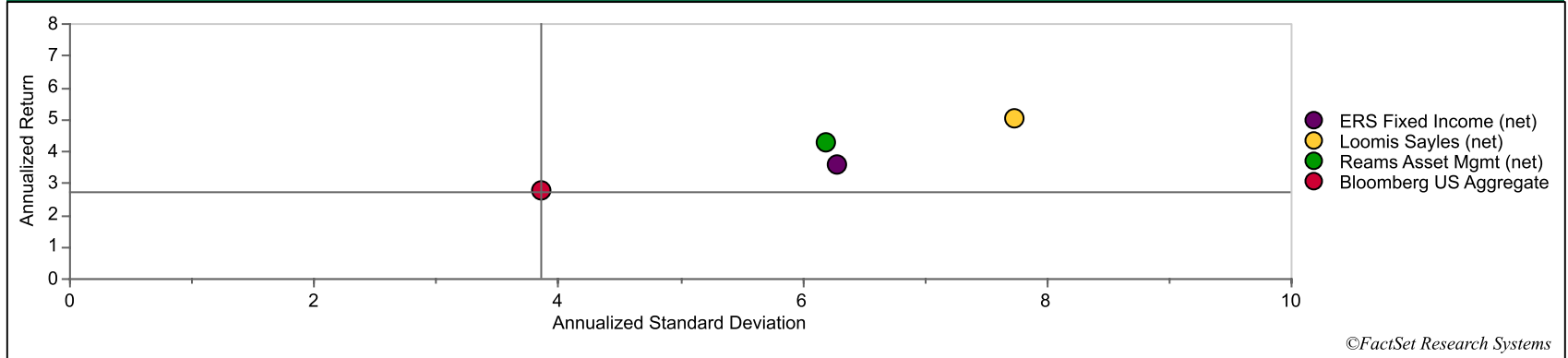|	3rd Qtr	YTD	1 Year	3 Year	5 Year	7 Year	10 Year
Loomis Sayles	-2.8%	-14.7%	-14.8%	-1.7%	1.0%	3.3%	2.9%
Bloomberg U.S. Agg.	2.0%	0.1%	0.2%	1.5%	1.3%	2.7%	2.0%
Reams	-4.6%	-14.4%	-14.1%	-0.4%	1.8%	2.1%	2.0%
Bloomberg U.S. Agg.	0.1%	0.2%	0.5%	2.9%	2.1%	1.6%	1.1%
BlackRock Index	-4.3%	-12.8%	N/A	N/A	N/A	N/A	N/A
Bloomberg U.S. Government	0.0%	0.1%					
ERS Fixed Income	-3.9%	-9.4%	-9.4%	-3.7%	-0.2%	1.3%	1.2%
Bloomberg U.S. Agg.	0.8%	5.2%	5.2%	0.5%	0.1%	0.8%	0.3%

Relative outperformance in blue
Relative underperformance in red

*Returns net of fees
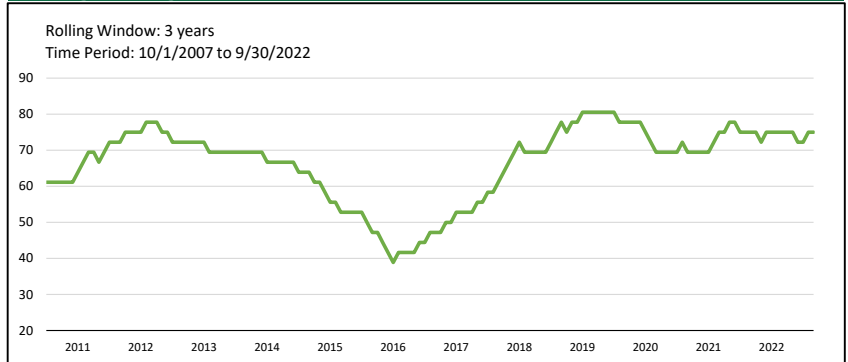
Fixed Income Statistics

Risk – Reward – 10/1/2007 to 9/30/2022

©FactSet Research Systems

15 Year Upside-Downside – 10/1/2007 to 9/30/2022

©FactSet Research Systems

Batting Average

Rolling Window: 3 years
Time Period: 10/1/2007 to 9/30/2022

15 Year Risk – 10/1/2007 to 9/30/2022

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Total Fixed Income (Net)	3.6	6.3	0.1	0.5	0.1	4.8	1.0
Bloomberg US Aggregate	2.7	3.9	0.0	0.5	--	--	1.0

Risk – 7/1/2013 to 9/30/2022

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Total Fixed Income (Net)	1.4	6.0	0.0	0.1	0.0	4.6	1.0
Bloomberg US Aggregate	1.2	4.0	0.0	0.1	--	--	1.0

Absolute Return

Relative Investment Performance – Absolute Return Managers
As of September 30, 2022

	3rd Qtr	YTD	1 Year	3 Year	5 Year	7 Year
UBS A&Q	0.6%	5.2%	7.9%	9.8%	7.7%	6.4%
1 Year Libor / SOFR + 4%	0.8%	2.2%	4.0%	4.7%	1.9%	0.6%
ERS Absolute Return	0.6%	20.3%	23.3%	4.9%	5.3%	5.4%
3 Month T-Bill + 3%	0.8%	17.0%	19.3%	1.2%	1.1%	1.4%

Relative outperformance in blue
Relative underperformance in red

Risk Adjusted Returns (6/30/14 - 9/30/22)

	Return		Std Dev	Sharpe Ratio	Max Drawdown
ERS Public Equity (net)	5.6%		15.5%	0.3	-25.3%
ERS Fixed Income (net)	0.8%		6.3%	0.0	-13.0%
ERS Absolute Return (net)	5.3%		10.2%	0.4	-27.1%

*Returns net of fees
**Initial funding to Aptitude took place on 9/26/2022. Performance will begin as of 10/1/2022.
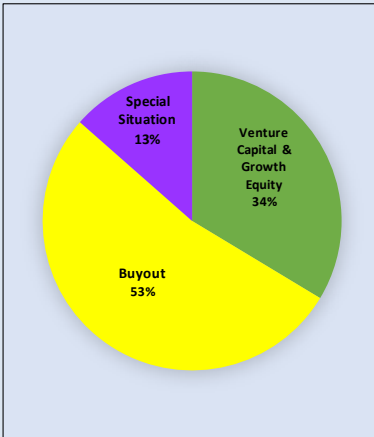
Private Equity

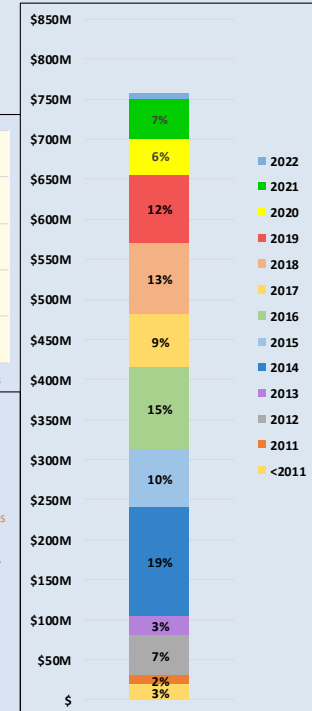# Milwaukee ERS Private Equity Portfolio as of June 30, 2022

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	48,699,896	24,397,046	2.11
Abbott 2011	2011	55,000,000	54,730,191	269,809	74,636,750	49,798,208	2.27
Abbott 2012	2012	40,000,000	39,600,000	400,000	46,512,898	44,454,246	2.30
Abbott 2013	2013	35,000,000	34,650,000	350,000	38,369,575	43,696,219	2.37
Abbott 2014	2014	35,000,000	34,300,000	700,000	34,125,000	48,564,280	2.41
Abbott 2015	2015	25,000,000	25,050,000	-	15,587,500	36,039,166	2.06
Abbott 2016	2016	20,000,000	19,717,500	282,500	8,555,000	28,673,925	1.89
Abbott 2018	2018	20,000,000	15,525,000	4,475,000	3,745,000	19,827,486	1.52
Abbott 2019	2019	20,000,000	10,900,000	9,100,000	2,115,000	14,475,416	1.52
Abbott 2020	2020	40,000,000	14,115,000	25,885,000	-	17,193,929	1.22
Abbott 2021	2021	20,000,000	4,352,249	15,647,751	-	4,739,260	1.09
Abbott 2022	2022	35,000,000	1,225,000	33,775,000	-	1,189,708	0.97
Mesirow V	2008	75,000,000	70,721,194	4,278,806	121,798,045	49,696,706	2.42
Mesirow VI	2013	60,000,000	52,800,000	7,200,000	61,356,748	77,761,820	2.63
Mesirow VII	2017	100,000,000	72,014,499	27,985,501	3,498,942	118,745,407	1.70
Mesirow VIII	2020	120,000,000	33,600,000	86,400,000	-	36,569,307	1.09
Neuberger Berman III	2013	30,000,000	31,415,273	-	38,470,320	8,268,133	1.49
Neuberger Berman IV	2017	25,000,000	22,623,659	2,376,341	16,482,659	17,977,801	1.52
Neuberger Berman V	2021	100,000,000	3,125,000	96,875,000	-	8,761,635	N/A
Private Advisors VI	2014	30,000,000	32,647,677	-	36,244,040	23,650,315	1.83
Private Advisors VII	2016	15,000,000	17,251,809	-	11,767,519	17,007,684	1.67
Private Advisors VIII	2018	15,000,000	13,621,685	1,378,315	4,644,162	17,358,872	1.62
Private Advisors IX	2019	35,000,000	23,801,494	11,198,506	8,611,847	23,756,197	1.36
Total ERS		**985,000,000**	**662,437,635**	**328,927,124**	**575,220,901**	**732,602,766**	**1.97**
% of ERS Fund				**5.9%**		**13.1%**	

Sub-Asset Class Breakdown

Special Situation 13%
Venture Capital & Growth Equity 34%
Buyout 53%

Vintage Year**

(chart: Invested Capital by Vintage (Green), Commitments by Vintage Yr (Red), years 2005–2022)

Age of Investment***

(chart: <1 Year, 1 Year, 2 Years, 3 Years, 4 Years, 5 Years, 6+ Years)

NAV by Vintage Year

(stacked bar chart)
- 2022: 7%
- 2021: 6%
- 2020: 12%
- 2019: 13%
- 2018: 9%
- 2017
- 2016: 15%
- 2015: 10%
- 2014: 19%
- 2013: 3%
- 2012: 7%
- 2011: 2%
- <2011: 3%

CMERS Private Equity Portfolio
Capital Calls, Distributions, NAV

Capital Calls & Distributions

(chart: Distributions (red), Capital Calls (blue), NAV (green), Q2 10 – Q2 22)

* 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.
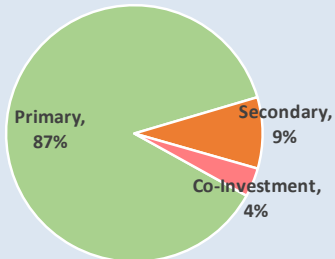
*** Portfolio Companies by Age of Investment figures have not been fully adjusted for overlapping investments. Excludes Neuberger Berman.
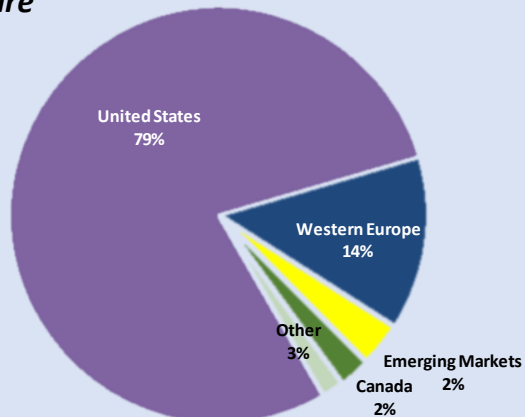
34

Private Equity Continued

Total Managers	**204***
Number of Partnerships	**559***
Number of Portfolio Companies	**5806***

Data in the above table is estimated. Actual data may be slightly different.
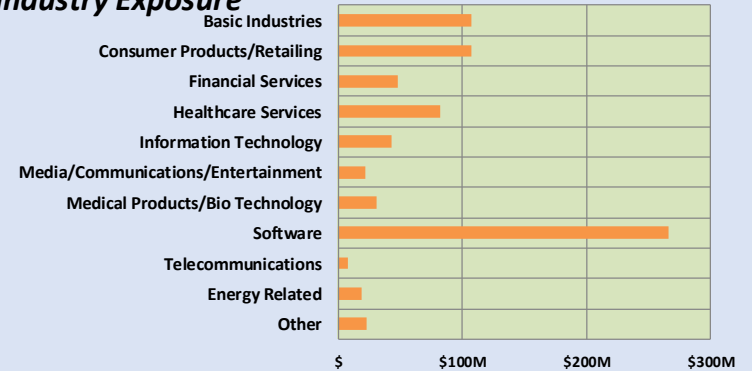
Transaction Type

Primary, 87%
Secondary, 9%
Co-Investment, 4%

Strategy Exposure

Small Buyout 18%
Mezzanine / Credit 2%
Distressed 1%
Industry Focused 5%
Consolidation 2%
Other 3%
Early Stage VC 9%
Medium/Mid Buyout 18%
Late Stage & Growth Equity VC 19%
Large Buyout 17%
Balanced (Hybrid) VC 6%

Geographic Exposure

United States 79%
Western Europe 14%
Other 3%
Emerging Markets 2%
Canada 2%

Industry Exposure

Basic Industries
Consumer Products/Retailing
Financial Services
Healthcare Services
Information Technology
Media/Communications/Entertainment
Medical Products/Bio Technology
Software
Telecommunications
Energy Related
Other

$ $100M $200M $300M

Performance Update

Performance Update

Estimated ERS Total Fund Market Value is $5.40 billion as of November 9, 2022

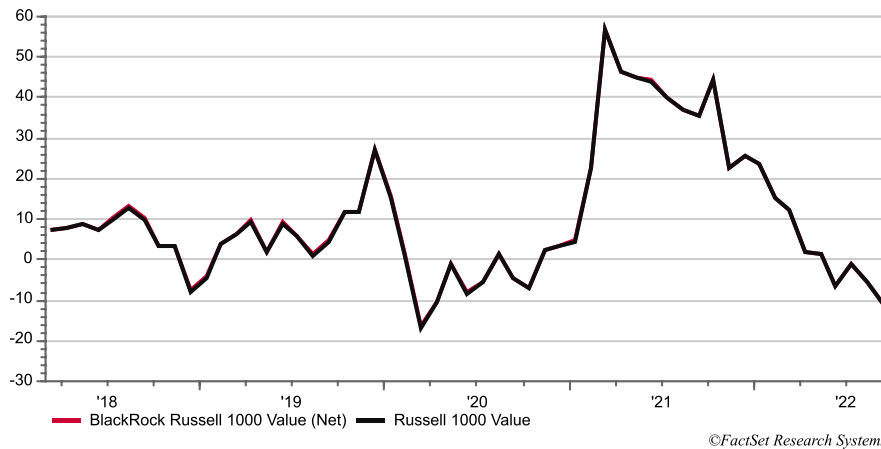| Period	ERS Fund*	Benchmark
3rd Quarter YTD	-11.4%	-14.8%
October (Estimate)	3.1%	2.6%
November MTD (Estimate)	-0.1%	-0.3%
YTD Through November 2, 2022 (Estimate)	-8.7%	-12.8%

*Returns Net of Fees

Appendix

Appendix – Table of Contents

BlackRock Russell 1000 Value Portfolio Snapshot – September 30, 2022

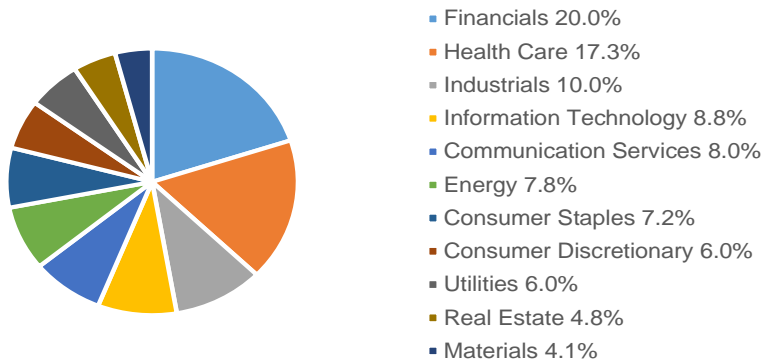## Rolling Returns Since Inception 4/1/2017 (One Year, One Month Shift)

Legend: BlackRock Russell 1000 Value (Net) — Russell 1000 Value

©FactSet Research Systems

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	Inception 4/1/2017
BlackRock R1000 Value (Net)	-5.6	-17.8	-11.4	4.4	5.4	5.7
Russell 1000 Value	-5.6	-17.8	-11.4	4.4	5.3	5.6

Equity Sector Exposure (GICS)

- Financials 20.0%
- Health Care 17.3%
- Industrials 10.0%
- Information Technology 8.8%
- Communication Services 8.0%
- Energy 7.8%
- Consumer Staples 7.2%
- Consumer Discretionary 6.0%
- Utilities 6.0%
- Real Estate 4.8%
- Materials 4.1%

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Berkshire Hathaway Inc.	2.91	-2.14
Johnson & Johnson	2.60	-7.33
Exxon Mobil Corporation	2.20	2.89
JPMorgan Chase & Co.	1.84	-6.40
Chevron Corporation	1.71	0.12
Pfizer Inc.	1.50	-15.88
Meta Platforms, Inc.	1.48	-15.86
Bank of America Corporation	1.28	-2.28
Walmart Inc.	1.13	7.13
Thermo Fisher Scientific Inc.	1.05	-6.59

Regional Exposure by Domicile

- North America 99.8%
- Latin America 0.1%

Regional Exposure by Source of Revenue

- North America 69.9%
- Europe dev 8.4%
- Asia emrg 7.8%
- Latin America 2.8%
- United Kingdom 2.4%
- Africa/Middle East 2.1%
- Japan 2.1%
- Asia dev 2.0%
- Europe emrg 1.2%
- Australasia 0.9%
- Other 0.4%

BlackRock Russell 1000 Value vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US:Large-Cap Value
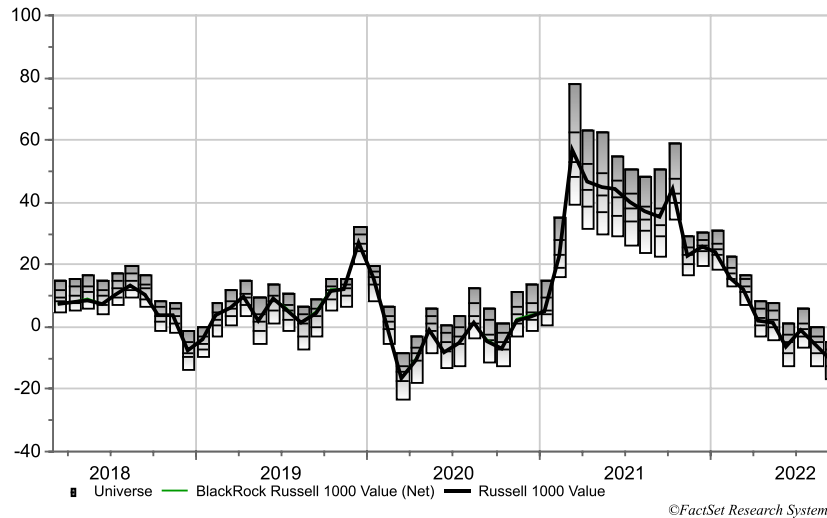

Legend: ▪ Universe ● BlackRock Russell 1000 Value (Net) ◇ Russell 1000 Value

X-axis: QTR, YTD, 1 Year, 3 Year, 5 Year, Inception 4/1/2017

©FactSet Research Systems

Investment Growth Since Inception 4/1/2017

Y-axis: Cumulative Return

Legend: — BlackRock Russell 1000 Value (Net) — Russell 1000 Value

X-axis: 3/1/2017, 1/1/2018, 1/1/2019, 1/1/2020, 1/1/2021, 1/1/2022

©FactSet Research Systems

Rolling Returns 4/1/2017 –9/30/2022 (1 Year, 1 Month Shift)

Universe: Lipper US:Large-Cap Value

Legend: ▪ Universe — BlackRock Russell 1000 Value (Net) — Russell 1000 Value

X-axis: 2018, 2019, 2020, 2021, 2022

©FactSet Research Systems

Risk Since Inception 4/1/2017

	Return	Std Dev	Sharpe Ratio	Tracking Error
BlackRock R1000 Value (Net)	5.7	17.1	0.3	0.1
Russell 1000 Value	5.6	17.2	0.3	--

CastleArk Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 9/1/2013 (Three Year, One Month Shift)

Legend: — CastleArk (Net) — Russell 2000 Growth

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
WillScot Mobile Mini Holdings Corp.	2.22	24.40
Calix, Inc.	2.16	79.09
Option Care Health, Inc.	2.14	13.24
Acadia Healthcare Company, Inc.	2.05	15.60
Shockwave Medical, Inc.	2.01	45.46
Casella Waste Systems, Inc.	1.70	5.10
Axon Enterprise, Inc.	1.70	-0.80
Axonics, Inc.	1.66	24.30
Halozyme Therapeutics, Inc.	1.63	-10.14
Box, Inc.	1.63	-2.98

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	Inception 9/1/2013
CastleArk (Net)	1.4	-30.9	-27.6	6.0	7.8	8.8
Russell 2000 Growth	0.2	-29.3	-29.3	2.9	3.6	7.1

Regional Exposure by Domicile

- North America 100.0%

Equity Sector Exposure (GICS)

- Health Care 32.7%
- Industrials 22.7%
- Information Technology 18.4%
- Consumer Discretionary 8.7%
- Consumer Staples 4.5%
- Financials 3.2%
- Materials 2.9%
- Communication Services 2.7%
- Energy 2.6%
- Real Estate 1.5%

Regional Exposure by Source of Revenue

- North America 85.5%
- Europe dev 4.1%
- Asia emrg 3.7%
- Japan 1.5%
- United Kingdom 1.2%
- Asia dev 1.2%
- Latin America 0.9%
- Africa/Middle East 0.8%
- Europe emrg 0.4%
- Australasia 0.4%
- Other 0.2%

CastleArk vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US Small-Cap Growth

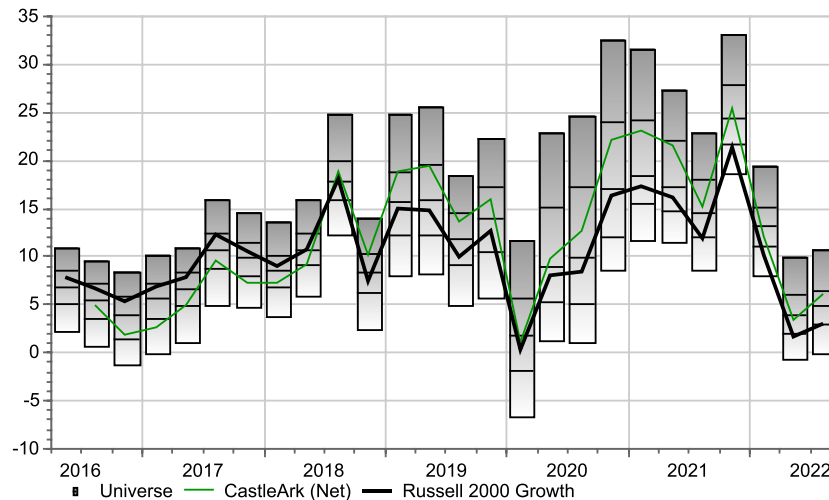Legend: ▫ Universe ● CastleArk (Net) ◇ Russell 2000 Growth

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

Y-axis: CastleArk (Net) %
X-axis: Russell 2000 Growth %

Legend:
◆ CastleArk (Net) — Relative Performance Line
▲ CastleArk (Net) Oldest 2 Yrs   ■ CastleArk (Net) Recent 2 Yrs

Rolling Returns 9/1/2013 –9/30/2022 (3 Year, 3 Month Shift)

Universe: Lipper US:Small-Cap Growth

Legend: ▫ Universe — CastleArk (Net) — Russell 2000 Growth

©FactSet Research Systems

Over/Under Benchmark Analysis

17	Outperform
8	Underperform
25	# Observations
68%	% Outperform

CastleArk Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Calix, Inc.	1.67	1.48	0.79
Shockwave Medical, Inc.	1.95	1.26	0.56
WillScot Mobile Mini Holdings Corp.	2.01	2.01	0.44
Advanced Drainage Systems, Inc.	1.12	1.12	0.32
Acadia Healthcare Company, Inc.	2.06	2.06	0.31
LPL Financial Holdings Inc.	1.58	1.58	0.25
Option Care Health, Inc.	2.08	1.71	0.22
Super Micro Computer, Inc.	0.98	0.78	0.22
Cytokinetics, Incorporated	1.37	1.09	0.20
Sierra Wireless Inc.	0.41	0.41	0.19

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Mercury Systems, Inc.	0.82	0.82	-0.30
Grocery Outlet Holding Corp.	1.18	1.18	-0.25
Karuna Therapeutics, Inc.	0.12	-0.27	-0.22
Celsius Holdings, Inc.	0.28	-0.10	-0.21
Simply Good Foods Co.	0.80	0.55	-0.21
Americold Realty Trust, Inc.	0.53	0.53	-0.20
Planet Fitness, Inc.	1.55	1.55	-0.20
Five9, Inc.	0.96	0.96	-0.20
CryoPort, Inc.	0.30	0.20	-0.18
Shoals Technologies Group, Inc.	0.30	0.09	-0.18

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-0.1	-6.9	-4.9	0.0	0.0	0.0
Consumer Discretionary	-2.5	-9.8	0.8	0.0	-0.9	-0.9
Consumer Staples	0.6	-17.4	-6.8	-0.1	-0.6	-0.6
Energy	-3.9	0.4	3.6	-0.2	-0.1	-0.3
Financials	-2.5	11.2	-0.7	0.0	0.4	0.4
Health Care	8.2	5.5	8.1	0.7	-0.8	-0.2
Industrials	5.1	1.5	0.0	0.0	0.4	0.3
Information Technology	-2.2	5.2	-4.3	0.1	1.7	1.8
Materials	-1.9	18.5	-1.3	0.0	0.5	0.5
Real Estate	0.3	-10.1	-18.2	-0.1	0.3	0.2
Utilities	-1.8	0.0	-3.1	0.1	0.0	0.1
Cash	0.9	0.6	0.0	-0.1	0.0	-0.1
Total	0.0	1.5	0.2	0.5	0.8	1.3

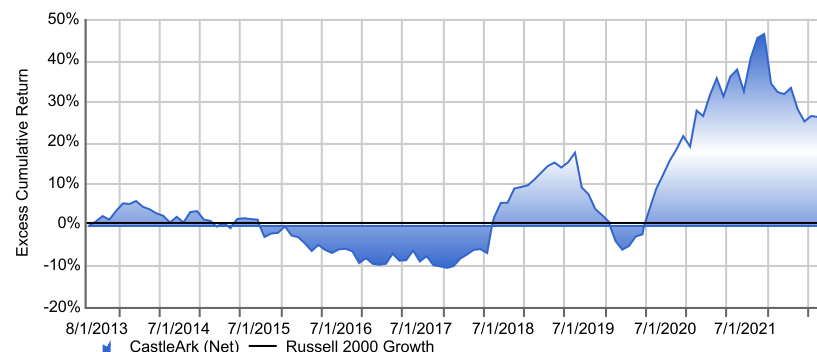MILWAUKEE ERS
Employes' Retirement System

CastleArk Inception Performance & Statistics

Investment Growth Since Inception 9/1/2013

©FactSet Research Systems

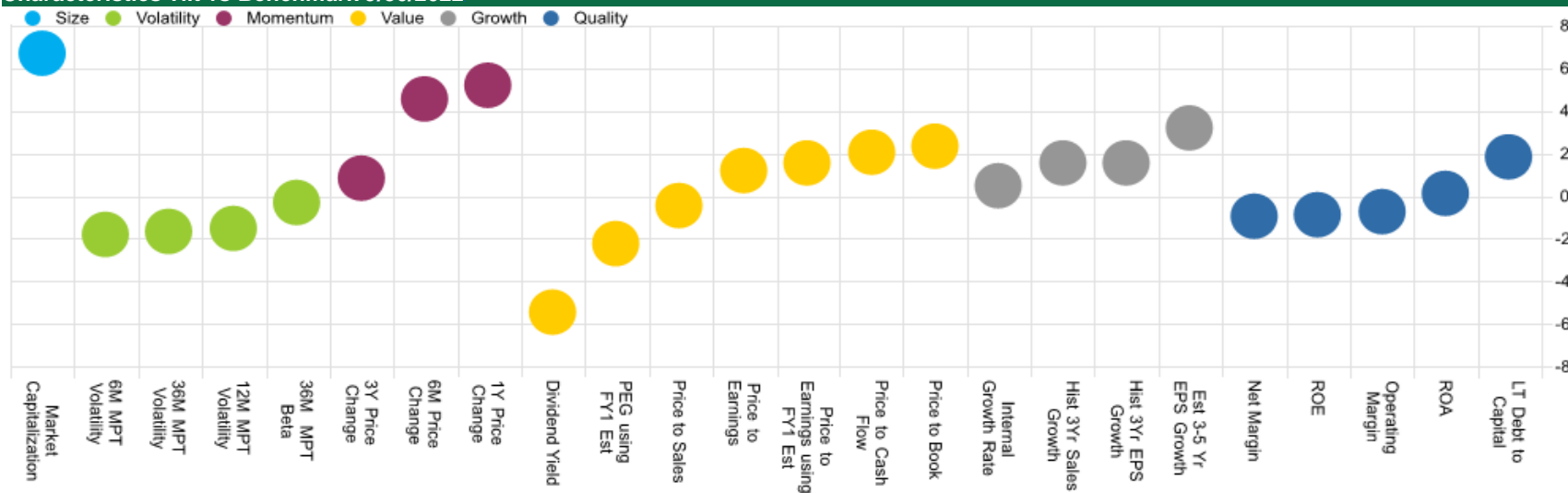## Relative Cumulative Performance Since Inception 9/1/2013

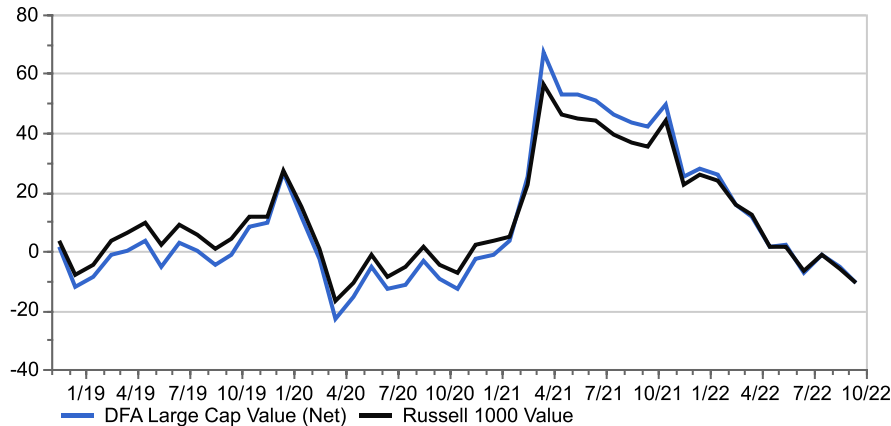*©FactSet Research Systems*

Risk Since Inception 9/1/2013

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
CastleArk (Net)	8.8	20.5	1.7	0.4	0.3	5.1	1.0
Russell 2000 Growth	7.1	20.0	--	0.3	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

DFA LCV Portfolio Snapshot – September 30, 2022

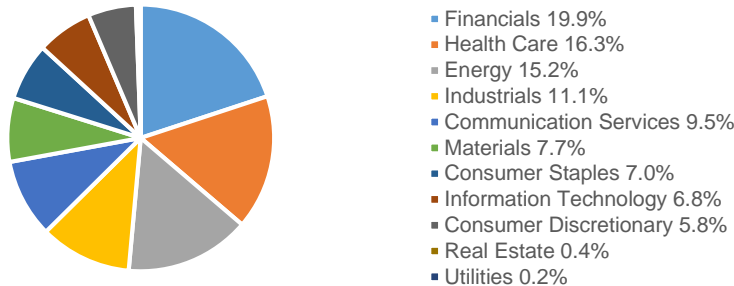## Rolling Returns Since Inception 12/1/2017 (One Year, One Month Shift)

DFA Large Cap Value (Net) — Russell 1000 Value

©FactSet Research Systems

Trailing Returns

	QTR	YTD	1 Year	3 Year	Inception 12/1/2017
DFA US Large Value (Net)	-5.4	-16.9	-11.2	4.3	3.5
Russell 1000 Value	-5.6	-17.8	-11.4	4.4	4.7

Equity Sector Exposure (GICS)

- Financials 19.9%
- Health Care 16.3%
- Energy 15.2%
- Industrials 11.1%
- Communication Services 9.5%
- Materials 7.7%
- Consumer Staples 7.0%
- Information Technology 6.8%
- Consumer Discretionary 5.8%
- Real Estate 0.4%
- Utilities 0.2%

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Exxon Mobil Corporation	4.15	2.89
JPMorgan Chase & Co.	3.32	-6.40
Chevron Corporation	3.09	0.12
Pfizer Inc.	2.99	-15.88
ConocoPhillips	2.13	16.00
Berkshire Hathaway Inc.	2.03	-2.20
Walmart Inc.	1.97	7.13
Verizon Communications Inc.	1.65	-24.15
Comcast Corporation	1.57	-24.72
Meta Platforms, Inc.	1.35	-16.72

Regional Exposure by Domicile

- North America 100.0%

Regional Exposure by Source of Revenue

- North America 70.8%
- Asia emrg 7.9%
- Europe dev 7.8%
- Latin America 2.7%
- United Kingdom 2.5%
- Asia dev 2.3%
- Japan 2.0%
- Africa/Middle East 1.9%
- Europe emrg 1.0%
- Australasia 0.9%
- Other 0.2%

DFA LCV vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022
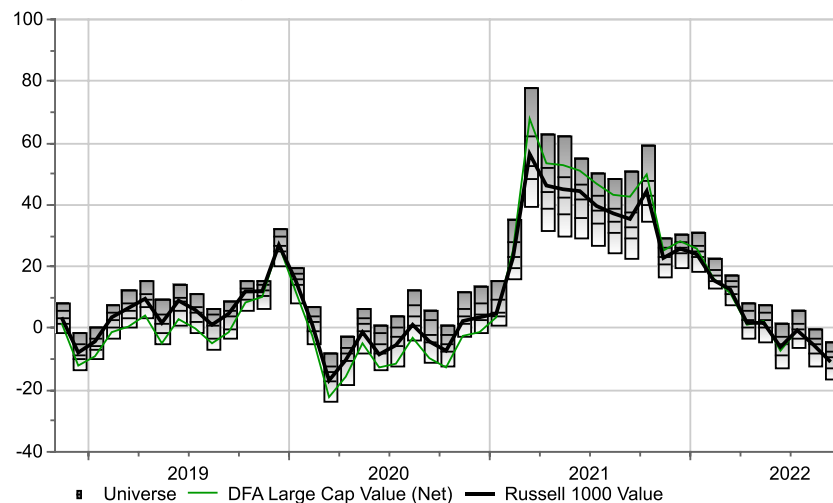
Universe: Lipper US Large Cap Value

Legend: ▪ Universe ● DFA Large Cap Value (Net) ◇ Russell 1000 Value

©FactSet Research Systems

One-Year Rolling Return Versus Benchmark

X-axis: **Russell 1000 Value %**
Y-axis: **DFA US Large Value (Net) %**

Legend: ◆ DFA LCV (Net) ──── Relative Performance Line

Rolling Returns 12/1/2017 –9/30/2022 (1 Year, 1 Month Shift)

Universe: Lipper US Large Cap Value

Legend: ▪ Universe ── DFA Large Cap Value (Net) ── Russell 1000 Value

©FactSet Research Systems

Over/Under Benchmark Analysis

5	Outperform
11	Underperform
16	# Observations
31%	% Outperform

DFA LCV Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
ConocoPhillips	1.89	1.19	0.14
Meta Platforms, Inc.	0.25	-1.35	0.13
Abbott Laboratories	0.03	-0.84	0.08
Albemarle Corporation	0.44	0.36	0.08
Biogen Inc.	0.37	0.20	0.06
Salesforce, Inc.	0.19	-0.50	0.06
Cisco Systems, Inc.	0.04	-0.97	0.05
S&P Global, Inc.	0.07	-0.59	0.05
Carlisle Companies Incorporated	0.34	0.33	0.05
Walmart Inc.	1.79	0.78	0.04

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Intel Corporation	1.59	0.80	-0.25
Pfizer Inc.	3.09	1.56	-0.25
Comcast Corporation	1.85	0.93	-0.24
AT&T Inc.	1.55	0.80	-0.22
Verizon Communications Inc.	1.56	0.49	-0.13
FedEx Corporation	0.66	0.37	-0.12
JPMorgan Chase & Co.	3.16	1.34	-0.11
Tyson Foods, Inc.	0.52	0.39	-0.09
Lumen Technologies, Inc.	0.26	0.20	-0.06
International Paper Company	0.34	0.26	-0.06

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	0.4	-18.6	-13.6	0.0	-0.5	-0.5
Consumer Discretionary	0.1	-5.7	-2.9	0.0	-0.2	-0.2
Consumer Staples	-0.3	-3.3	-6.5	0.0	0.2	0.2
Energy	6.9	3.4	2.7	0.6	0.1	0.7
Financials	0.3	-3.5	-3.6	0.0	0.0	0.0
Health Care	-0.8	-5.6	-5.8	0.0	0.0	0.0
Industrials	1.4	-3.9	-4.7	0.0	0.1	0.1
Information Technology	-1.8	-13.1	-8.3	0.1	-0.4	-0.3
Materials	4.0	-5.2	-8.1	-0.1	0.2	0.1
Real Estate	-4.7	-10.3	-10.7	0.2	0.0	0.2
Utilities	-5.8	-3.3	-5.9	0.0	0.0	0.0
Cash	0.3	0.6	0.0	0.0	0.0	0.0
Total	0.0	-5.3	-5.8	0.8	-0.3	0.4

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian

DFA LCV Inception Performance & Statistics

Investment Growth Since Inception 12/1/2017

DFA Large Cap Value (Net) — Russell 1000 Value

©FactSet Research Systems

Relative Cumulative Performance Since Inception 12/1/2017

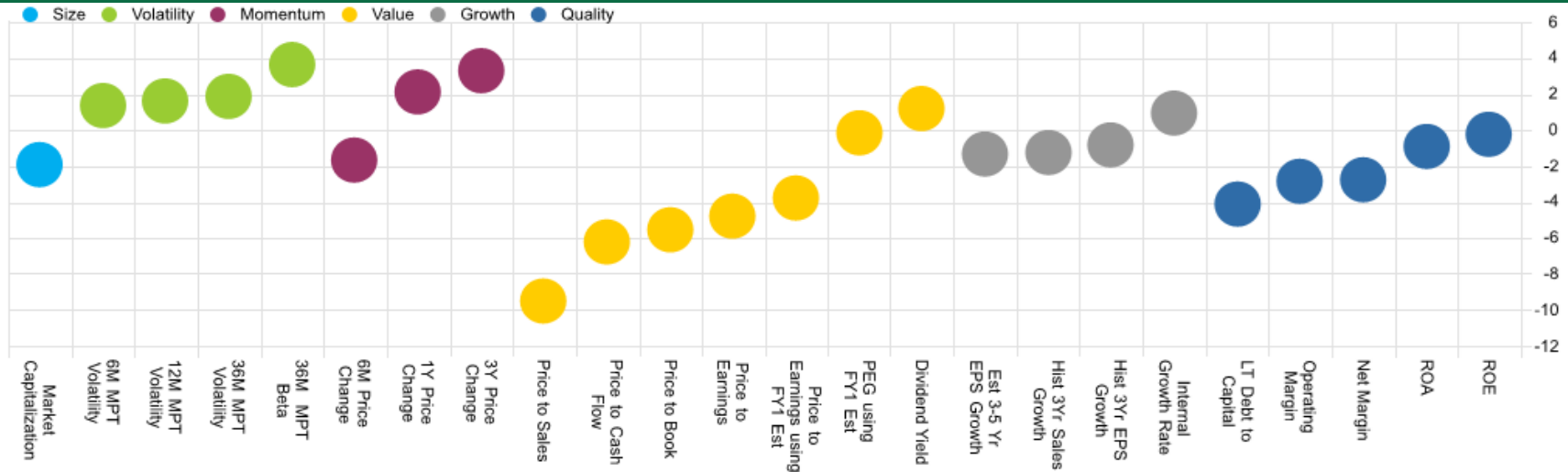DFA Large Cap Value (Net) — Russell 1000 Value

©FactSet Research Systems

Risk Since Inception 12/1/2017

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
DFA US Large Value (Net)	3.5	20.9	-1.3	0.1	-0.3	4.0	1.1
Russell 1000 Value	4.7	18.2	--	0.2	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

DFA US SCV Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 10/1/1996 (Ten Year, One Month Shift)

Legend: DFA Small Cap Value (Net) — Russell 2000 Value

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Unum Group	0.99	15.22
Acadia Healthcare Company, Inc.	0.95	15.60
Murphy Oil Corporation	0.83	17.24
American Equity Investment Life Hldg Co.	0.69	1.97
Amkor Technology, Inc.	0.67	0.88
F.N.B. Corporation	0.61	7.92
Air Lease Corporation	0.60	-6.69
United Bankshares, Inc.	0.60	2.97
Element Solutions Inc	0.60	-8.20
Sanmina Corporation	0.58	13.14

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
DFA Small Cap Value (Net)	-3.4	-14.6	-9.0	10.6	5.3	9.7	7.4
Russell 2000 Value	-4.6	-21.1	-17.7	4.7	2.9	7.9	5.7

Regional Exposure by Domicile

- North America 99.4%
- Europe emrg 0.4%
- Africa/Middle East 0.1%
- Europe dev 0.0%

Equity Sector Exposure (GICS)

- Financials 28.8%
- Industrials 19.6%
- Consumer Discretionary 13.5%
- Energy 9.6%
- Information Technology 7.9%
- Materials 7.1%
- Consumer Staples 4.8%
- Health Care 4.4%
- Communication Services 3.0%
- Real Estate 1.0%
- Utilities 0.2%

Regional Exposure by Source of Revenue

- North America 79.7%
- Europe dev 4.9%
- Asia emrg 4.4%
- Latin America 2.4%
- United Kingdom 1.6%
- Asia dev 1.5%
- Other 1.5%
- Africa/Middle East 1.4%
- Japan 1.1%
- Europe emrg 0.8%
- Australasia 0.6%

DFA US SCV vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022
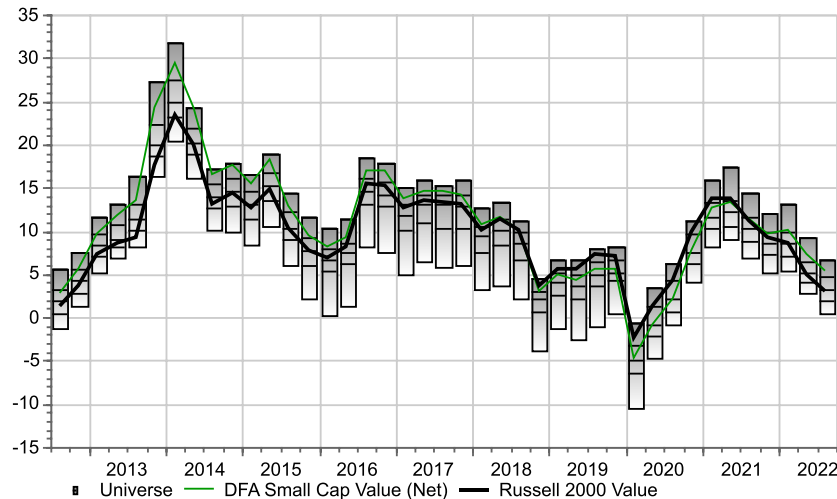
Universe: Lipper US Small Cap Value

Universe ▪ | DFA Small Cap Value (Net) ● | Russell 2000 Value ◇

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

DFA US SCV (Net) ◆ | Relative Performance Line ——
DFA US SCV (Net) Oldest 2 Yrs ▲ | DFA US SCV (Net) Recent 2 Yrs ■

Rolling Returns 7/1/2006 –9/30/2022 (5 Year, 3 Month Shift)

Universe: Lipper US Small Cap Value

Universe ▪ | DFA Small Cap Value (Net) —— | Russell 2000 Value ——

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Over/Under Benchmark Analysis

21	Outperform
19	Underperform
40	# Observations
53%	% Outperform

DFA US SCV Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Antero Resources Corporation	0.53	0.53	0.13
Acadia Healthcare Company, Inc.	0.88	0.88	0.11
Unum Group	0.79	0.79	0.10
Dillard's, Inc.	0.47	0.47	0.10
CONSOL Energy Inc.	0.30	0.29	0.09
Atlas Air Worldwide Holdings, Inc.	0.41	0.22	0.08
Resolute Forest Products Inc.	0.26	0.19	0.08
TechnipFMC plc	0.35	0.35	0.07
HF Sinclair Corp	0.36	0.36	0.07
MillerKnoll, Inc.	0.01	-0.17	0.07

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
PVH Corp.	0.45	0.45	-0.09
Avnet, Inc.	0.62	0.62	-0.09
Kohl's Corporation	0.26	0.26	-0.08
Howard Hughes Corporation	0.37	0.37	-0.07
Transocean Ltd.	0.25	0.25	-0.07
JetBlue Airways Corporation	0.31	0.31	-0.06
Seaboard Flour LLC	0.52	0.52	-0.06
Axis Capital Holdings Limited	0.46	0.46	-0.06
MKS Instruments, Inc.	0.14	0.14	-0.06
Patterson-UTI Energy, Inc.	0.31	0.22	-0.05

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-0.1	-12.5	-14.6	0.0	0.1	0.1
Consumer Discretionary	4.0	-6.0	-4.9	0.0	-0.2	-0.2
Consumer Staples	2.2	-9.1	-9.8	-0.1	0.0	-0.1
Energy	5.9	4.3	5.2	0.6	-0.1	0.5
Financials	-0.8	-0.4	-2.3	0.0	0.5	0.5
Health Care	-6.5	-5.9	3.1	-0.5	-0.4	-0.9
Industrials	6.2	-3.9	-6.2	-0.1	0.5	0.4
Information Technology	1.9	-4.7	-4.5	0.0	0.0	0.0
Materials	3.0	-4.8	-8.6	-0.1	0.3	0.1
Real Estate	-10.6	-17.8	-11.6	0.8	-0.1	0.7
Utilities	-5.0	-10.1	-8.8	0.2	0.0	0.2
Total	0.0	-3.3	-4.6	0.7	0.6	1.3

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian

DFA US SCV 15 Year Performance & Statistics

DFA Small Cap Value (Net) — Russell 2000 Value

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DFA Small Cap Value (Net) — Russell 2000 Value

©FactSet Research Systems

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
DFA Small Cap Value (Net)	7.4	23.2	1.4	0.3	0.4	3.9	1.1
Russell 2000 Value	5.7	21.2	--	0.2	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

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Earnest Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 5/1/2005 (Ten Year, One Month Shift)

Earnest (Net) — Russell Midcap

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Republic Services, Inc.	3.39	4.33
Coterra Energy Inc.	3.17	3.41
Albemarle Corporation	3.03	26.73
Keysight Technologies, Inc.	2.94	14.15
Progressive Corporation	2.65	0.04
Raymond James Financial, Inc.	2.50	10.90
Darden Restaurants, Inc.	2.46	12.75
D.R. Horton, Inc.	2.41	2.07
Reinsurance Grp of America, Inc.	2.36	7.95
CBRE Group, Inc.	2.30	-8.29

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
Earnest (Net)	-5.8	-21.5	-12.6	8.6	9.6	12.4	9.3
Russell Midcap	-3.4	-24.3	-19.4	5.2	6.5	10.3	7.5

Regional Exposure by Domicile

- North America 100.0%

Equity Sector Exposure (GICS)

- Industrials 23.2%
- Information Technology 21.2%
- Financials 15.7%
- Health Care 9.9%
- Materials 7.5%
- Real Estate 6.9%
- Consumer Discretionary 6.2%
- Energy 4.7%
- Communication Services 1.9%
- Utilities 1.5%
- Consumer Staples 1.4%

Regional Exposure by Source of Revenue

- North America 65.7%
- Asia emrg 9.4%
- Europe dev 8.9%
- Asia dev 3.9%
- Latin America 3.1%
- Japan 2.5%
- United Kingdom 2.1%
- Africa/Middle East 1.7%
- Europe emrg 1.2%
- Australasia 0.9%
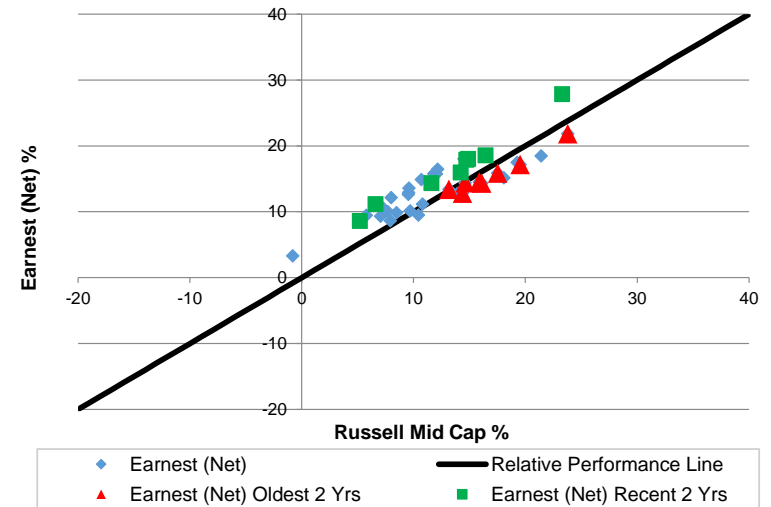- Other 0.5%

Earnest vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US: Mid Cap Core

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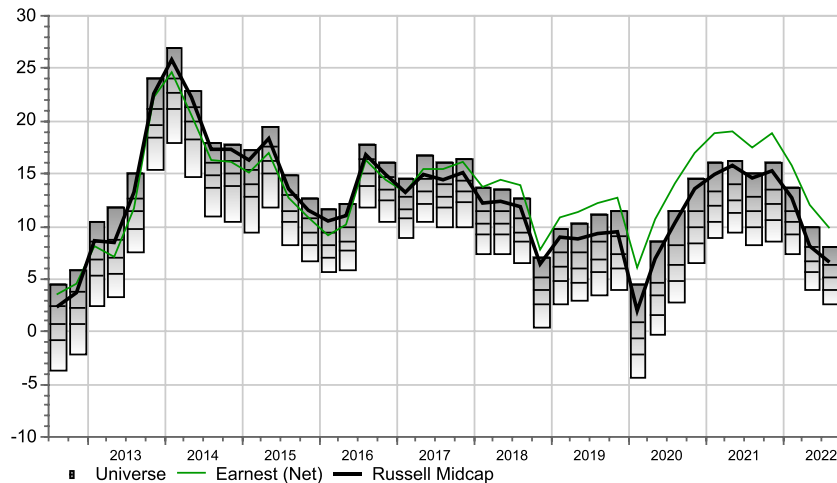
Three-Year Rolling Return Versus Benchmark

Earnest (Net), *Relative Performance Line*, *Earnest (Net) Oldest 2 Yrs*, *Earnest (Net) Recent 2 Yrs*

Rolling Returns 7/1/2007 –9/30/2022 (5 Year, 3 Month Shift)

Universe: Lipper US: Mid Cap Core

©FactSet Research Systems

Over/Under Benchmark Analysis

27	Outperform
13	Underperform
40	# Observations
68%	% Outperform

Earnest Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Albemarle Corporation	2.48	2.19	0.45
Keysight Technologies, Inc.	2.61	2.31	0.25
Darden Restaurants, Inc.	2.11	1.96	0.21
Raymond James Financial, Inc.	2.22	2.03	0.17
Reinsurance Grp of America, Inc.	2.03	1.95	0.13
TJX Companies, Inc.	1.06	1.06	0.10
Republic Services, Inc.	3.09	2.80	0.09
Cummins Inc.	1.37	1.07	0.04
D.R. Horton, Inc.	2.31	2.07	0.03
Agilent Technologies, Inc.	2.00	1.60	0.03

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Scotts Miracle-Gro Company	1.25	1.22	-0.53
Spirit AeroSystems Holdings, Inc.	0.98	0.94	-0.49
Syneos Health, Inc.	1.55	1.47	-0.48
Catalent, Inc.	1.46	1.28	-0.40
Sealed Air Corporation	1.81	1.73	-0.37
Americold Realty Trust, Inc.	1.66	1.58	-0.26
Arrow Electronics, Inc.	1.70	1.62	-0.26
Sysco Corporation	1.52	1.52	-0.25
Bio-Rad Laboratories, Inc.	1.77	1.65	-0.24
Lumentum Holdings, Inc.	1.85	1.79	-0.23

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-2.0	-4.5	-7.5	0.1	0.1	0.1
Consumer Discretionary	-5.7	7.9	-2.7	0.0	0.6	0.5
Consumer Staples	-2.1	-16.5	-6.4	0.1	-0.2	-0.1
Energy	-0.4	2.8	1.2	0.0	0.1	0.0
Financials	1.0	-0.7	-1.9	0.0	0.2	0.2
Health Care	-0.2	-16.3	-6.7	0.0	-1.0	-1.0
Industrials	7.2	-5.3	0.0	0.2	-1.1	-0.9
Information Technology	3.5	-4.6	-1.1	0.1	-0.7	-0.6
Materials	1.5	-11.1	-5.7	0.0	-0.4	-0.5
Real Estate	-1.6	-12.4	-9.2	0.1	-0.2	-0.1
Utilities	-4.4	-10.7	-5.5	0.1	-0.1	0.0
Cash	3.2	0.6	0.0	0.0	0.0	0.0
Total	0.0	-5.7	-3.4	0.5	-2.9	-2.3

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian

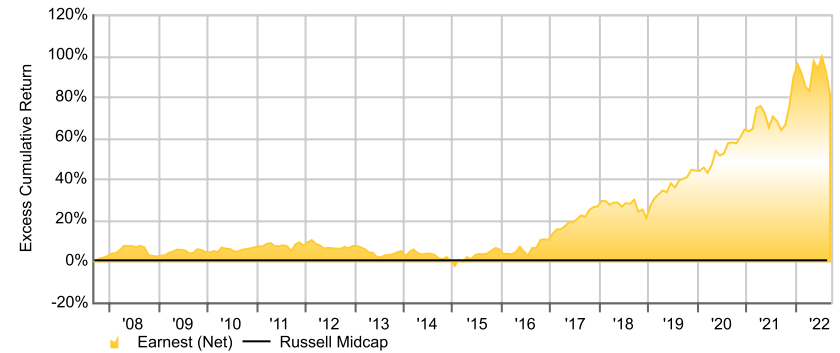# Earnest 15 Year Performance & Statistics

Investment Growth – 15 Years

Relative Cumulative Performance – 15 Years

©FactSet Research Systems

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Earnest (Net)	9.3	18.8	1.7	0.5	0.5	3.7	1.0
Russell Midcap	7.5	18.6	--	0.4	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

Northern Trust S&P 500 Portfolio Snapshot – September 30, 2022

Rolling Returns Since 10/1/1999 (Ten Year, One Month Shift)

NT S&P 500 Index (Net) — S&P 500

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Apple Inc.	6.89	1.23
Microsoft Corporation	5.73	-9.10
Alphabet Inc.	3.60	-12.16
Amazon.com, Inc.	3.31	6.39
Tesla, Inc.	2.33	18.17
Berkshire Hathaway Inc.	1.59	-2.20
UnitedHealth Group Incorporated	1.56	-1.35
Johnson & Johnson	1.42	-7.33
Exxon Mobil Corporation	1.20	2.89
Meta Platforms, Inc.	1.10	-15.86

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
NT S&P 500 Index (Net)	-4.9	-23.9	-15.5	8.2	9.3	11.7	8.0
S&P 500	-4.9	-23.9	-15.5	8.2	9.2	11.7	8.0

Regional Exposure by Domicile

- North America 100.0%

Equity Sector Exposure (GICS)

- Information Technology 26.4%
- Health Care 15.1%
- Consumer Discretionary 11.7%
- Financials 11.0%
- Communication Services 8.1%
- Industrials 7.9%
- Consumer Staples 6.9%
- Energy 4.6%
- Utilities 3.1%
- Real Estate 2.8%
- Materials 2.5%

Regional Exposure by Source of Revenue

- North America 62.4%
- Asia emrg 11.7%
- Europe dev 9.6%
- Latin America 3.0%
- Japan 2.9%
- Asia dev 2.8%
- Africa/Middle East 2.8%
- United Kingdom 2.4%
- Europe emrg 1.4%
- Australasia 1.0%
- Other 0.2%

Northern Trust S&P 500 vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US: Large Cap Core
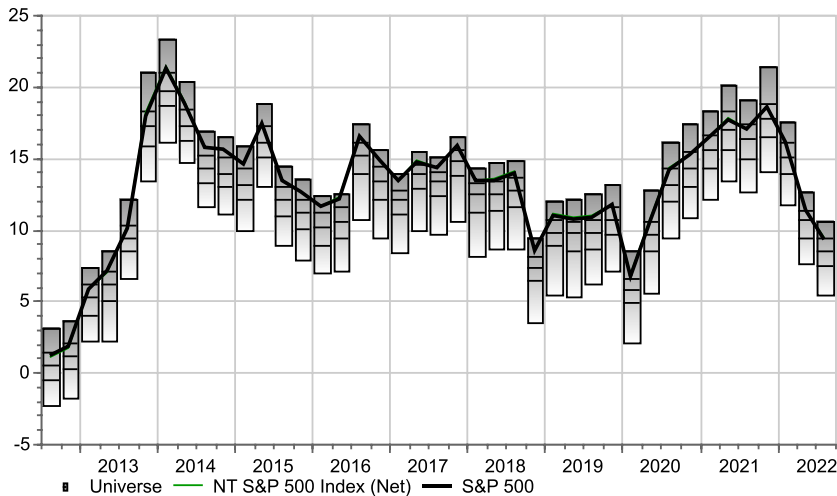

©FactSet Research Systems

Investment Growth – 15 Years

©FactSet Research Systems

Rolling Returns 7/1/2007 –9/30/2022 (5 Year, 3 Month Shift)
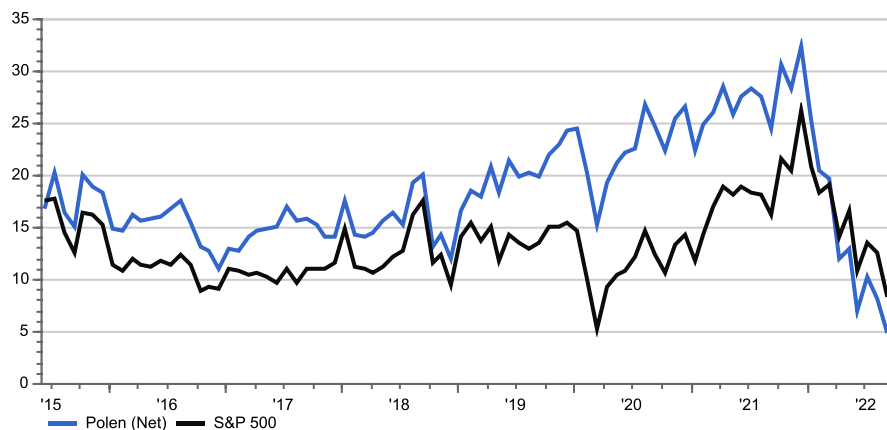
Universe: Lipper US: Large Cap Core

©FactSet Research Systems

Risk – 15 Years

	Return	Std Dev	Sharpe Ratio	Tracking Error
NT S&P 500 Index (Net)	8.0	16.1	0.5	0.2
S&P 500	8.0	16.1	0.5	--

Polen Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 7/1/2012 (Three Year, One Month Shift)

Polen (Net) — S&P 500

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Amazon.com, Inc.	9.67	6.39
Alphabet Inc.	8.49	-12.09
Microsoft Corporation	6.22	-9.10
Netflix, Inc.	5.28	34.64
Adobe Incorporated	5.21	-24.82
Meta Platforms, Inc.	5.06	-15.86
Salesforce, Inc.	4.95	-12.85
ServiceNow, Inc.	4.53	-20.59
Mastercard Incorporated	4.40	-9.75
UnitedHealth Group Incorporated	4.32	-1.35

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	Inception 7/1/2012
Polen (Net)	-5.2	-38.0	-34.8	4.6	10.4	12.6	12.9
S&P 500	-4.9	-23.9	-15.5	8.2	9.2	11.7	12.1
S&P 500 Growth	-3.9	-30.4	-21.1	9.9	11.4	13.2	13.5

Regional Exposure by Domicile

- North America 100.0%

Equity Sector Exposure (GICS)

- Information Technology 47.9%
- Communication Services 20.0%
- Consumer Discretionary 16.3%
- Health Care 15.7%

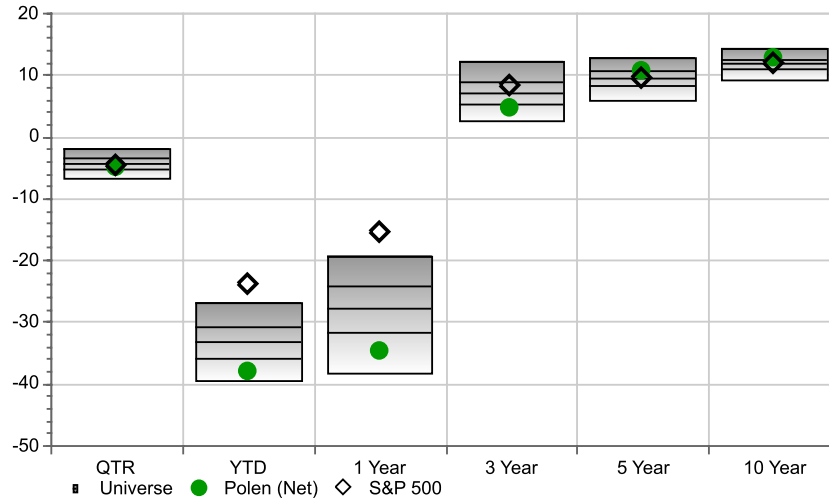## Regional Exposure by Source of Revenue

- North America 53.8%
- Europe dev 14.1%
- Asia emrg 12.0%
- Africa/Middle East 4.6%
- Latin America 3.5%
- Japan 3.1%
- United Kingdom 3.0%
- Asia dev 2.2%
- Europe emrg 2.1%
- Australasia 1.3%
- Other 0.3%
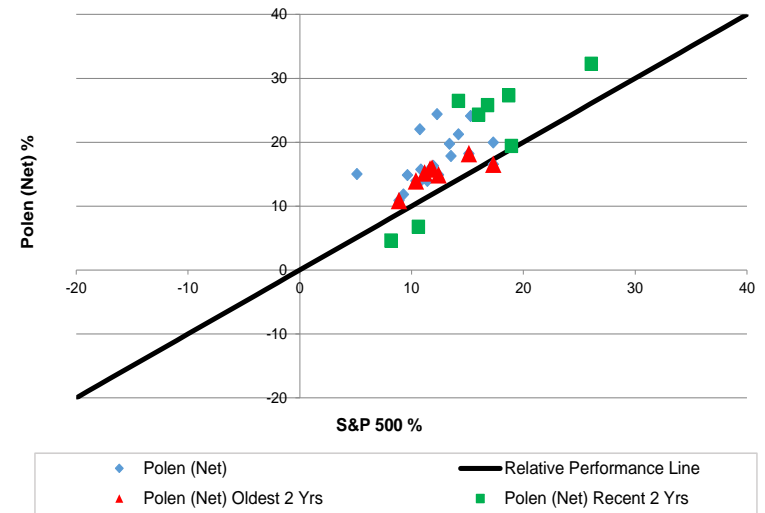
Polen vs Universe & Benchmark
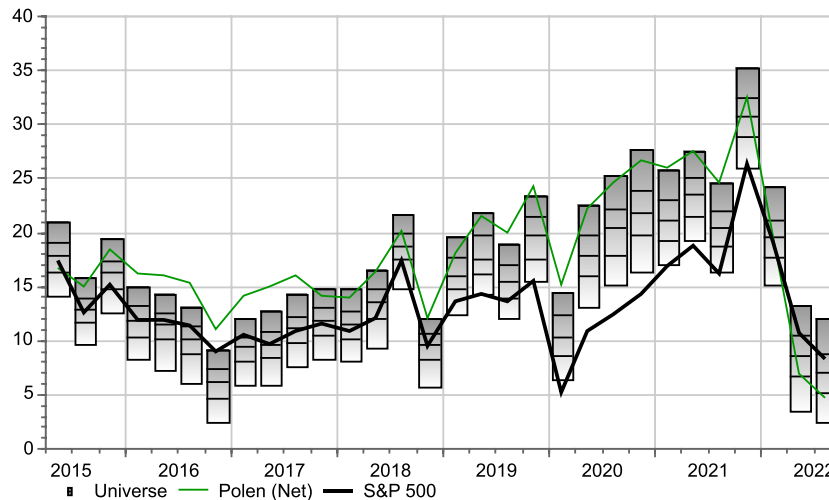
Universe: Lipper US Large Cap Growth

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Three-Year Rolling Return Versus Benchmark

Rolling Returns 7/1/2012 –9/30/2022 (3 Year, 3 Month Shift)

Universe: Lipper US Large Cap Growth

©FactSet Research Systems

Over/Under Benchmark Analysis

27	Outperform
3	Underperform
30	# Observations
90%	% Outperform

Polen Attribution Analysis – September 30, 2022

Contributors

	Avg. Weights	Relative Weights	Active Return
Netflix, Inc.	3.21	2.94	0.73
Airbnb, Inc.	3.55	3.55	0.46
PayPal Holdings, Inc.	2.90	2.61	0.42
Amazon.com, Inc.	9.91	6.70	0.41
Autodesk, Inc.	4.05	3.92	0.25
Gartner, Inc.	2.20	2.13	0.24
Intuitive Surgical, Inc.	1.27	1.05	0.06
Illumina, Inc.	1.38	1.28	0.03

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Adobe Incorporated	6.53	5.98	-1.41
ServiceNow, Inc.	3.73	3.46	-0.71
Meta Platforms, Inc.	5.42	4.31	-0.69
Alphabet Inc.	8.89	5.04	-0.58
Mastercard Incorporated	6.57	5.72	-0.53
Visa Inc.	6.27	5.27	-0.48
Salesforce, Inc.	4.42	3.92	-0.44
Abbott Laboratories	3.98	3.42	-0.34
Zoetis Inc.	2.71	2.48	-0.30
NIKE, Inc.	2.05	1.64	-0.29

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	9.0	-5.5	-12.7	-0.7	1.3	0.6
Consumer Discretionary	4.4	5.4	4.4	0.4	0.2	0.6
Consumer Staples	-6.8	0.0	-6.6	0.1	0.0	0.1
Energy	-4.5	0.0	2.4	-0.3	0.0	-0.3
Financials	-10.8	0.0	-3.1	-0.2	0.0	-0.2
Health Care	-0.1	-6.7	-5.2	-0.1	-0.2	-0.3
Industrials	-7.8	0.0	-4.8	0.0	0.0	0.0
Information Technology	21.2	-8.4	-6.2	-0.2	-1.1	-1.3
Materials	-2.5	0.0	-7.1	0.1	0.0	0.1
Real Estate	-2.9	0.0	-11.1	0.2	0.0	0.2
Utilities	-3.1	0.0	-6.0	0.0	0.0	0.0
Cash	3.9	0.6	0.6	0.3	0.0	0.3
Total	0.0	-5.2	-4.9	-0.5	0.2	-0.3

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian
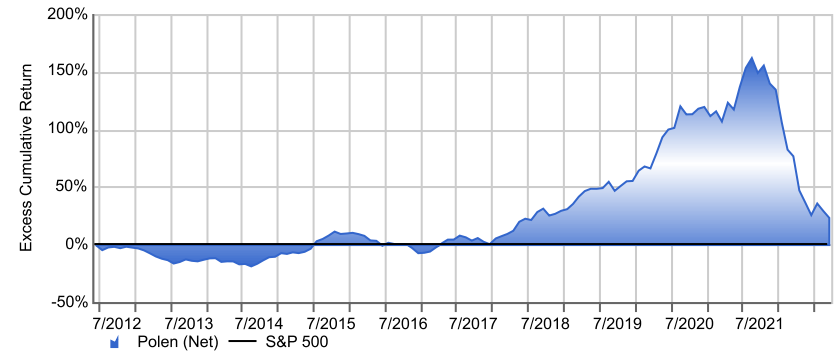
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Polen Inception Performance & Statistics

Investment Growth Since Inception 7/1/2012

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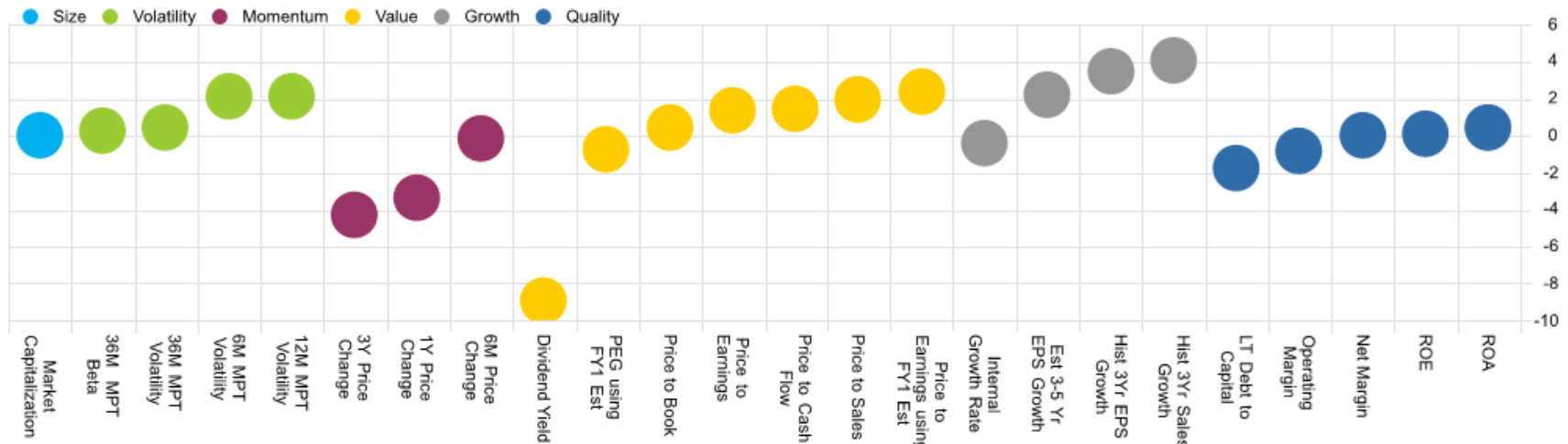## Relative Cumulative Performance Since Inception 7/1/2012

©FactSet Research Systems
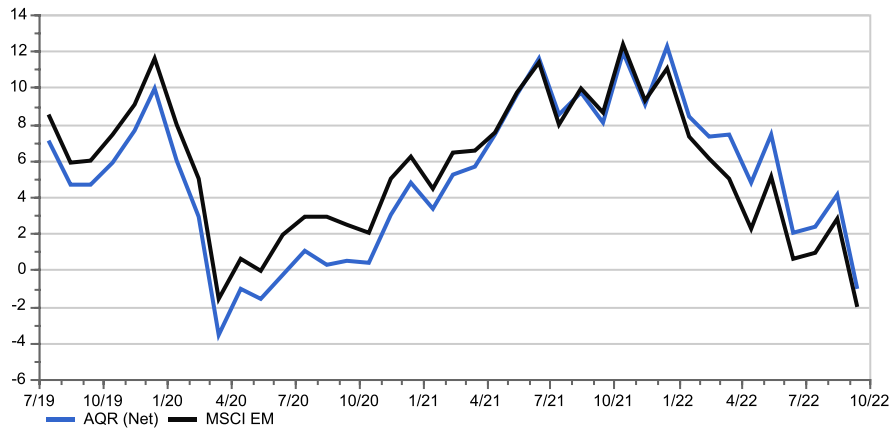
Risk Since Inception 7/1/2012

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Polen (Net)	12.9	15.8	0.6	0.8	0.1	6.2	1.0
S&P 500	12.1	14.2	--	0.8	--	--	1.0
S&P 500 Growth	13.5	15.5	--	0.8	--	--	1.1

Characteristics Tilt vs Benchmark 9/30/2022

AQR Portfolio Snapshot – September 30, 2022

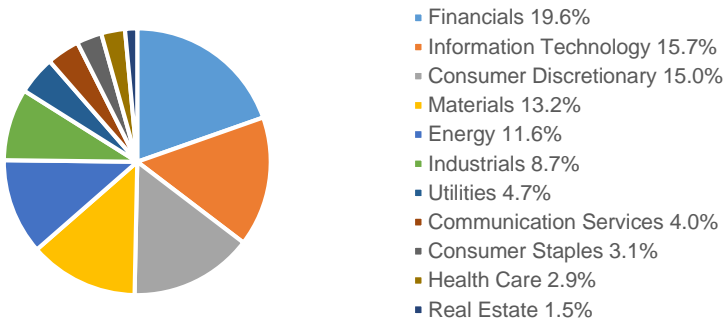## Rolling Returns Since Inception 8/1/2016 (Three Year, One Month Shift)

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Top 10 Holdings

	Portfolio Weight	Quarterly Return
Taiwan Semiconductor Mfg Co., Ltd.	5.10	-16.43
Alibaba Group Holding Ltd.	5.00	-30.36
Samsung Electronics Co., Ltd.	2.68	-14.88
Tencent Holdings Ltd.	2.28	-24.85
China Construction Bank Corporation	1.93	-13.68
Petroleo Brasileiro SA	1.81	24.08
Saudi Basic Industries Corp.	1.28	-10.80
Kia Corp.	1.22	-15.58
NTPC Limited	1.18	10.41
Oil & Natural Gas Corp. Ltd.	1.15	-16.92

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	Inception 8/1/16
AQR (Net)	-12.8	-27.6	-28.5	-1.1	-2.7	2.3
MSCI EM	-11.6	-27.2	-28.1	-2.1	-1.8	2.4

Regional Exposure by Domicile

- Asia emrg 53.4%
- Asia dev 25.9%
- Africa/Middle East 10.5%
- Latin America 9.7%
- Europe emrg 0.4%
- North America 0.1%

Equity Sector Exposure (GICS)

- Financials 19.6%
- Information Technology 15.7%
- Consumer Discretionary 15.0%
- Materials 13.2%
- Energy 11.6%
- Industrials 8.7%
- Utilities 4.7%
- Communication Services 4.0%
- Consumer Staples 3.1%
- Health Care 2.9%
- Real Estate 1.5%

Regional Exposure by Source of Revenue

- Asia emrg 53.8%
- Asia dev 11.3%
- North America 9.7%
- Africa/Middle East 8.6%
- Latin America 8.0%
- Europe dev 4.1%
- Japan 2.0%
- Europe emrg 0.9%
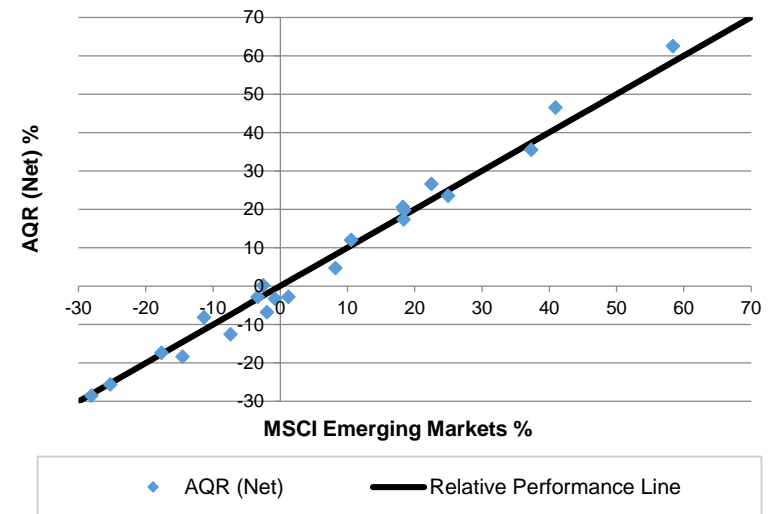- Australasia 0.8%
- United Kingdom 0.7%
- Other 0.1%

AQR vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US Emerging Markets

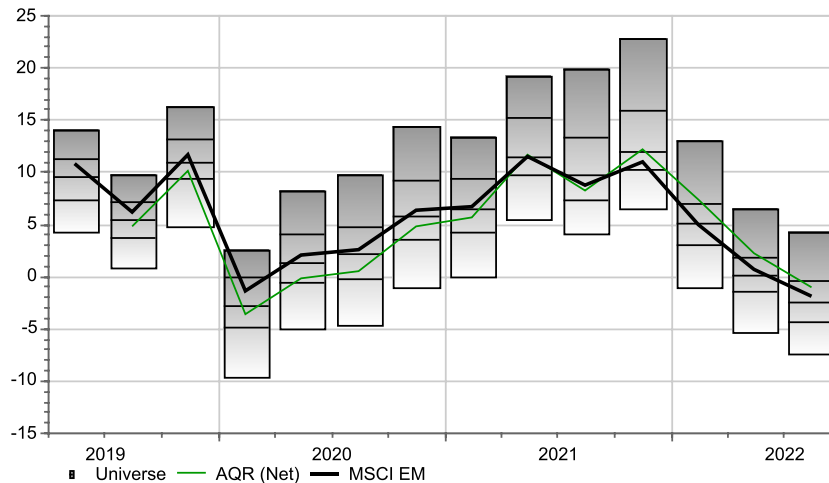Legend: ■ Universe ● AQR (Net) ◇ MSCI EM

©FactSet Research Systems

One-Year Rolling Return Versus Benchmark

Legend: ◆ AQR (Net) —— Relative Performance Line

Rolling Returns 8/1/2016 –9/30/2022 (3 Year, 3 Month Shift)

Universe: Lipper US Emerging Markets

Legend: ■ Universe —— AQR (Net) —— MSCI EM

©FactSet Research Systems

Over/Under Benchmark Analysis

10	Outperform
11	Underperform
21	# Observations
48%	% Outperform

AQR Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Tencent Holdings Ltd.	2.71	-1.36	0.34
Petroleo Brasileiro SA	1.85	1.02	0.27
Taiwan Semiconductor Mfg Co., Ltd.	4.76	-1.52	0.26
JD.com, Inc.	0.26	-0.83	0.22
BYD Company Limited	0.06	-0.50	0.19
Wuxi Biologics (Cayman) Inc.	0.30	-0.21	0.16
Ping An Insurance Group Co. China, Ltd.	0.13	-0.57	0.15
Volcan Investments Ltd.	0.93	0.90	0.15
Reliance Industries Limited	0.30	-1.23	0.13
Banco do Brasil S.A.	1.12	0.97	0.12

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Evergreen Marine Corp. (Taiwan) Ltd.	1.00	0.88	-0.29
Sinotruk Hong Kong Ltd.	0.71	0.70	-0.27
Chinasoft International Ltd.	0.64	0.60	-0.26
Great Wall Motor Co., Ltd.	0.48	0.39	-0.24
Woori Financial Group, Inc.	1.15	1.07	-0.22
COSCO SHIPPING Holdings Co., Ltd.	1.23	1.13	-0.19
Kia Corp.	1.24	0.98	-0.18
Hana Financial Group Inc.	0.84	0.70	-0.17
Alibaba Group Holding Ltd.	3.40	0.30	-0.17
Oil & Natural Gas Corp. Ltd.	1.13	1.05	-0.16

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-4.0	-16.5	-19.3	0.4	0.2	0.5
Consumer Discretionary	-0.3	-20.5	-18.7	0.0	-0.3	-0.3
Consumer Staples	-2.9	-11.2	-4.6	-0.2	-0.2	-0.4
Energy	7.0	2.7	-2.5	0.6	0.7	1.2
Financials	-3.3	-8.5	-5.2	-0.2	-0.5	-0.8
Health Care	0.0	-11.6	-13.8	0.0	0.0	0.0
Industrials	3.0	-17.1	-10.0	0.1	-0.8	-0.6
Information Technology	-3.1	-15.9	-15.4	0.0	0.0	0.0
Materials	3.8	-12.6	-7.4	0.2	-0.6	-0.5
Real Estate	-0.4	-25.1	-19.8	0.0	-0.1	-0.1
Utilities	0.2	0.0	-4.3	0.0	0.1	0.1
Total	0.0	-12.2	-11.6	0.9	-1.6	-0.7

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian
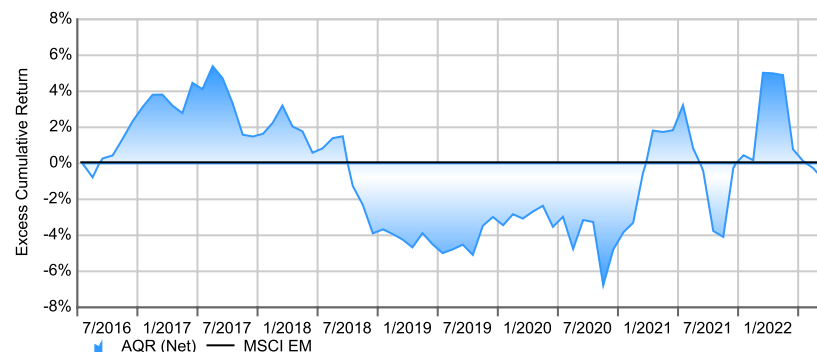
AQR Inception Performance & Statistics

Investment Growth Since Inception 8/1/2016

©FactSet Research Systems

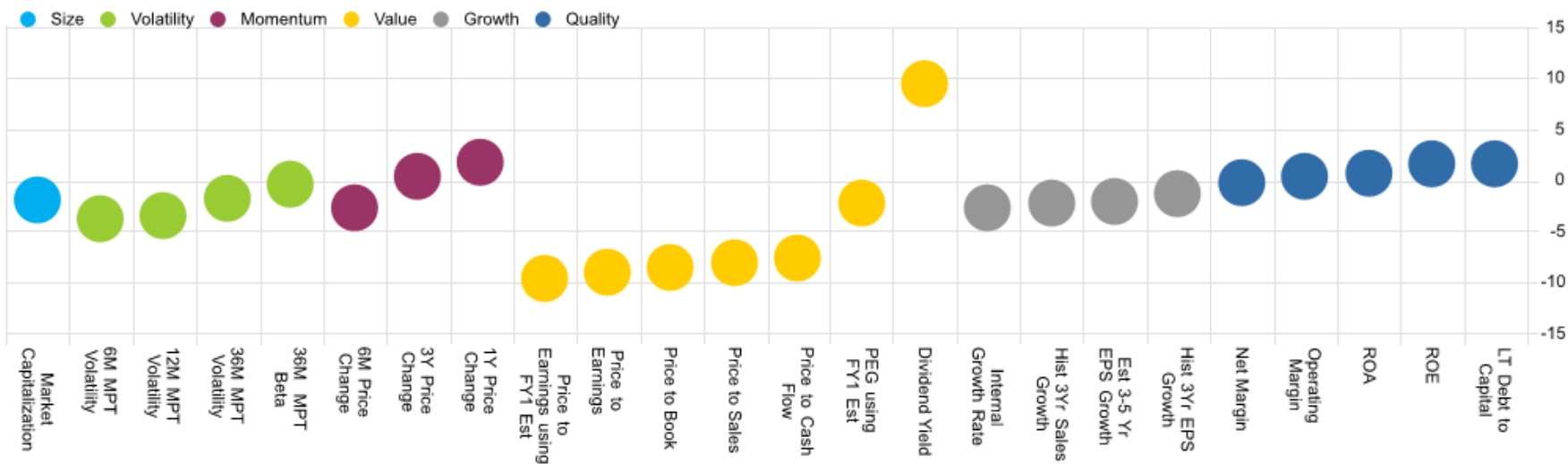## Relative Cumulative Performance Since Inception 8/1/2016

©FactSet Research Systems

Risk Since Inception 8/1/2016

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
AQR (Net)	2.3	17.1	-0.1	0.1	0.0	3.5	1.0
MSCI EM	2.4	16.4	--	0.1	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

Brandes Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 2/1/1998 (Ten Year, One Month Shift)

Legend: Brandes (Net), MSCI EAFE

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Takeda Pharmaceutical Company Limited	4.40	-5.18
Novartis AG	2.55	-9.13
Fibra Uno Administracion SA de CV	2.49	6.42
Henkel AG & Co. KGaA	2.44	-6.45
Publicis Groupe SA	2.43	2.75
UBS Group AG	2.42	-8.52
Sanofi	2.39	-23.74
SAP SE	2.36	-9.32
GSK plc	2.31	-31.84
Alibaba Group Holding Ltd.	2.22	-30.37

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
Brandes (Net)	-12.0	-23.4	-23.3	-2.5	-1.8	3.6	0.5
MSCI EAFE	-9.4	-27.1	-25.1	-1.8	-0.8	3.7	0.6
MSCI EAFE Value	-10.2	-21.1	-20.2	-2.8	-2.7	2.4	-0.6

Regional Exposure by Domicile

- Europe dev 49.3%
- United Kingdom 16.0%
- Japan 14.8%
- Latin America 10.9%
- Asia dev 4.9%
- Asia emrg 3.3%
- North America 0.9%

Equity Sector Exposure (GICS)

- Financials 20.2%
- Health Care 19.0%
- Consumer Discretionary 18.1%
- Consumer Staples 13.4%
- Energy 7.9%
- Materials 5.7%
- Communication Services 5.6%
- Industrials 3.3%
- Real Estate 2.5%
- Information Technology 2.4%
- Utilities 1.8%

Regional Exposure by Source of Revenue

- Europe dev 24.6%
- North America 22.9%
- Asia emrg 12.5%
- Latin America 11.1%
- Japan 8.9%
- United Kingdom 7.9%
- Asia dev 4.7%
- Africa/Middle East 2.9%
- Europe emrg 2.9%
- Australasia 1.2%
- Other 0.3%

MILWAUKEE ERS
Employes' Retirement System
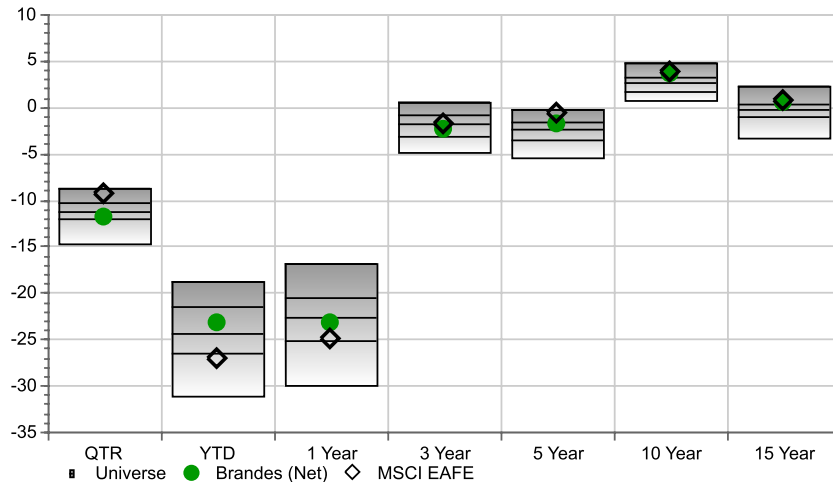
Brandes vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US Int'l Multi-Cap Value

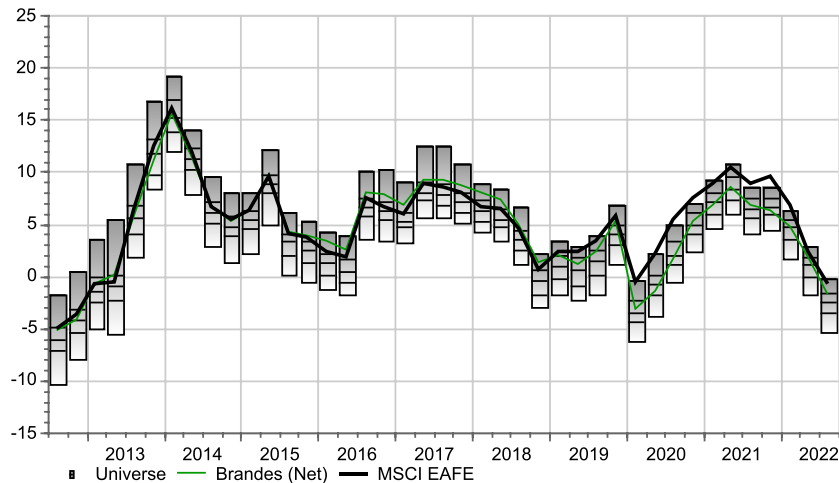Legend: ■ Universe   ● Brandes (Net)   ◇ MSCI EAFE

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

Legend:
- ◆ Brandes (Net)
- ▲ Brandes (Net) Oldest 2 Yrs
- ── Relative Performance Line
- ■ Brandes (Net) Recent 2 Yrs

Rolling Returns 7/1/2007 –9/30/2022 (5 Year, 3 Month Shift)

Universe: Lipper US Int'l Multi Cap Value

Legend: ■ Universe   — Brandes (Net)   ── MSCI EAFE

©FactSet Research Systems

Over/Under Benchmark Analysis

17	Outperform
23	Underperform
40	# Observations
43%	% Outperform

Brandes Attribution Analysis – September 30, 2022

Contributors

	Avg. Weights	Relative Weights	Active Return
Petroleo Brasileiro SA	2.21	2.21	0.46
TechnipFMC plc	1.27	1.27	0.25
Fibra Uno Administracion SA de CV	2.53	2.53	0.14
Societe BIC SA	1.07	1.07	0.13
Renault SA	0.57	0.54	0.04
Publicis Groupe SA	2.22	2.14	0.02
ENGIE SA.	1.81	1.65	0.02
Willis Towers Watson Public Ltd Co.	0.76	0.76	0.01

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Grifols, S.A.	2.26	2.23	-1.16
Alibaba Group Holding Ltd.	2.54	2.54	-0.81
GSK plc	2.76	2.14	-0.68
Credit Suisse Group AG	2.01	1.90	-0.55
Fresenius SE & Co. KGaA	1.60	1.52	-0.46
Carrefour SA	2.16	2.08	-0.45
Orange SA	2.04	1.89	-0.44
Sanofi	2.43	1.66	-0.39
J Sainsbury plc	1.77	1.74	-0.37
Koninklijke Philips N.V.	1.48	1.36	-0.37

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	4.2	-14.2	-13.8	-0.2	0.0	-0.2
Consumer Discretionary	-1.2	-15.3	-9.9	0.0	-0.7	-0.5
Consumer Staples	6.3	-13.8	-7.0	0.1	-1.1	-1.0
Energy	3.2	7.1	-5.0	0.2	0.6	1.0
Financials	2.1	-11.2	-9.6	0.0	-0.4	-0.3
Health Care	4.9	-21.9	-10.5	-0.1	-2.2	-2.3
Industrials	-10.9	-7.0	-8.3	-0.1	0.1	-0.1
Information Technology	-6.5	-9.3	-8.3	-0.1	0.0	-0.1
Materials	-1.9	-13.9	-8.8	0.0	-0.4	-0.3
Real Estate	-0.4	6.4	-13.1	0.0	0.4	0.5
Utilities	-1.7	1.2	-13.3	0.1	0.3	0.3
Cash	1.7	0.2	0.0	0.1	0.0	0.1
Total	0.0	-12.2	-9.3	0.1	-3.5	-2.9

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian
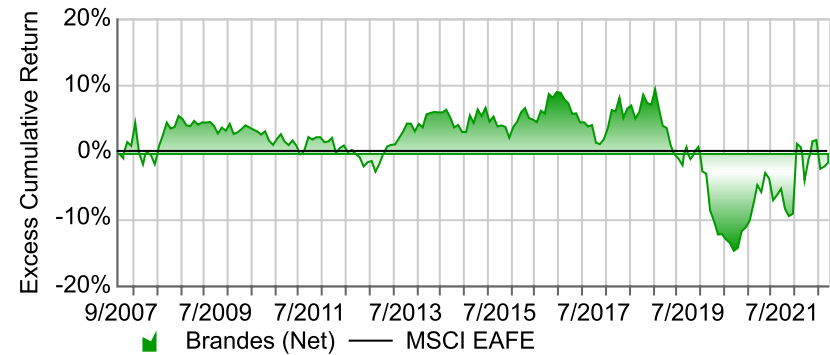
Brandes 15 Year Performance & Statistics

Investment Growth – 15 Years

©FactSet Research Systems
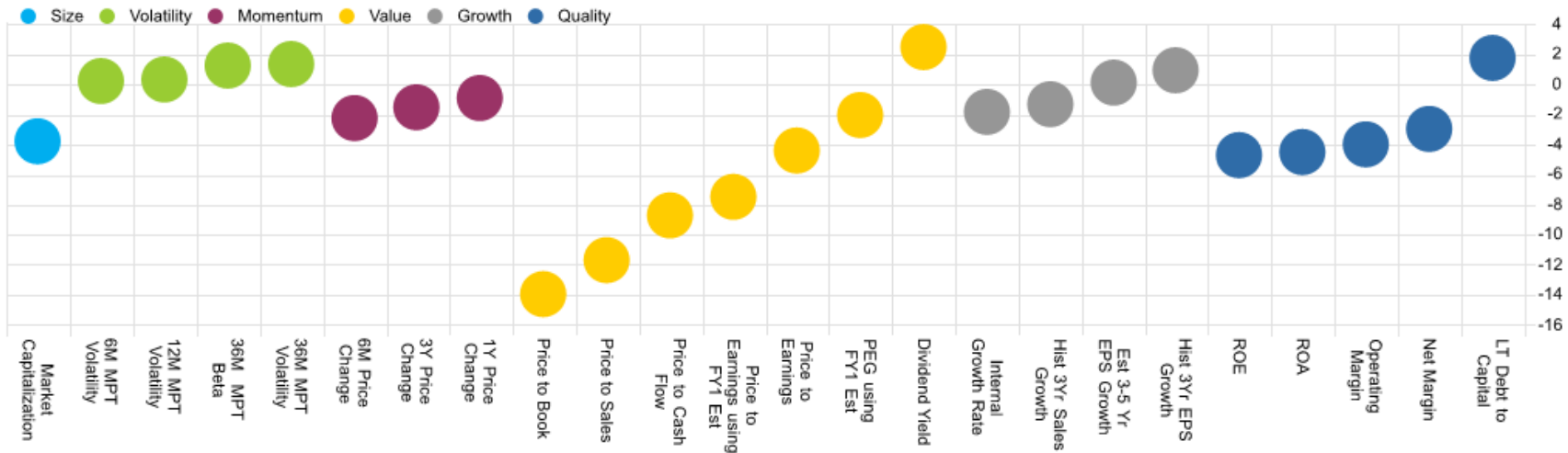
Relative Cumulative Performance – 15 Years
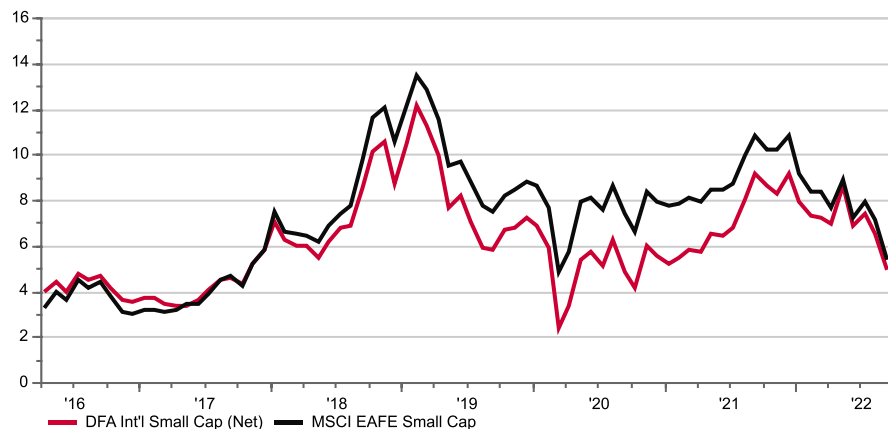

©FactSet Research Systems

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Brandes (Net)	0.5	18.4	0.0	0.0	0.0	5.5	1.0
MSCI EAFE	0.6	17.9	--	0.0	--	--	1.0
MSCI EAFE Value	-0.6	19.2	--	-0.1	--	--	1.1

Characteristics Tilt vs Benchmark 9/30/2022

DFA International Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 5/1/2006 (Ten Year, One Month Shift)

Legend: DFA Int'l Small Cap (Net) — MSCI EAFE Small Cap

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
ASR Nederland NV	0.97	-2.36
K+S Aktiengesellschaft	0.79	-22.19
Whitehaven Coal Limited	0.79	80.27
Bankinter SA	0.76	-9.42
Crescent Point Energy Corp.	0.71	-12.65
Jyske Bank A/S	0.69	5.58
Helvetia Holding AG	0.67	-20.21
Banco de Sabadell, S.A.	0.66	-16.25
Alamos Gold, Inc.	0.66	5.90
MEG Energy Corp.	0.65	-19.15

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
DFA Int'l Small Cap (Net)	-10.1	-24.3	-22.9	-0.4	-3.2	4.9	1.9
MSCI EAFE Small Cap	-9.8	-32.1	-32.1	-2.2	-1.8	5.3	1.9
MSCI World ex US Small Cap Value	-10.1	-26.4	-25.8	-1.7	-2.0	4.4	2.0

Regional Exposure by Domicile

- Europe dev 36.5%
- Japan 27.0%
- North America 13.0%
- United Kingdom 11.0%
- Australasia 7.5%
- Asia dev 3.5%
- Africa/Middle East 1.4%

Equity Sector Exposure (GICS)

- Financials 21.4%
- Industrials 20.5%
- Materials 17.1%
- Consumer Discretionary 11.7%
- Energy 10.2%
- Consumer Staples 5.0%
- Information Technology 4.0%
- Real Estate 3.8%
- Health Care 2.5%
- Communication Services 2.4%
- Utilities 1.3%

Regional Exposure by Source of Revenue

- Europe dev 27.2%
- Japan 21.4%
- North America 15.9%
- United Kingdom 8.5%
- Asia emrg 8.0%
- Australasia 5.4%
- Africa/Middle East 3.7%
- Latin America 3.5%
- Asia dev 3.2%
- Europe emrg 1.7%
- Other 1.6%

DFA International vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US: Int'l Sm/Mid Cap Value

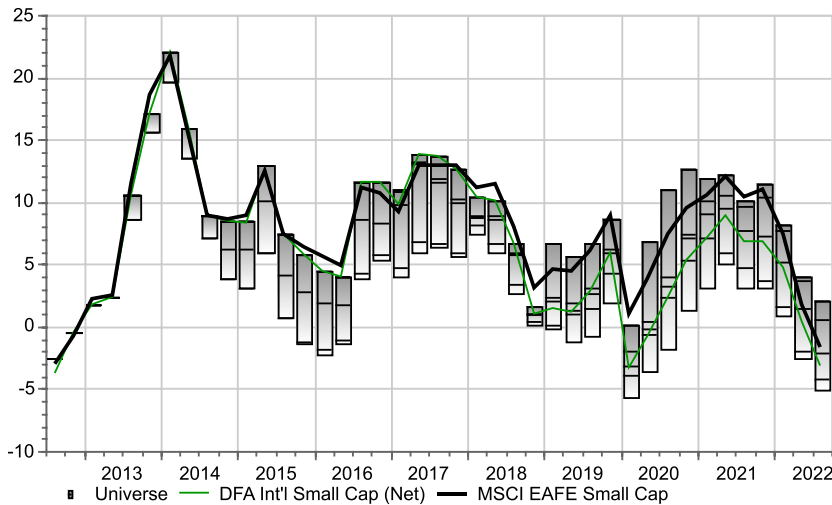Legend: Universe ■ | DFA Int'l Small Cap (Net) ● | MSCI EAFE Small Cap ◇

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

Axis: DFA Int'l SCV (Net) % vs MSCI EAFE Small Cap %

Legend:
- ◆ DFA Int'l SCV (Net)
- ▲ DFA Int'l SCV (Net) Oldest 2 Yrs
- ── Relative Performance Line
- ■ DFA Int'l SCV (Net) Recent 2 Yrs

Rolling Returns 7/1/2006 –9/30/2022 (5 Year, 3 Month Shift)

Universe: Lipper US: Int'l Sm/Mid Cap Value

Legend: Universe ■ | —— DFA Int'l Small Cap (Net) | —— MSCI EAFE Small Cap

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Over/Under Benchmark Analysis

12	Outperform
28	Underperform
40	# Observations
30%	% Outperform

DFA International Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Whitehaven Coal Limited	0.52	0.36	0.21
Euronav NV	0.48	0.38	0.09
New Hope Corporation Limited	0.17	0.11	0.06
TP ICAP Group Plc	0.16	0.11	0.06
Fomento Economico Mexicano SAB de CV	0.19	0.16	0.05
Faurecia Societe europeenne	0.00	-0.11	0.05
Siegfried Holding AG	0.45	0.33	0.04
RPS Group Plc	0.06	0.06	0.04
Direct Line Insurance Group Plc	0.01	-0.13	0.04
Alamos Gold, Inc.	0.56	0.56	0.03

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Rheinmetall AG	0.46	0.46	-0.17
Vistry Group plc	0.51	0.42	-0.14
K+S Aktiengesellschaft	0.81	0.63	-0.14
MEG Energy Corp.	0.68	0.68	-0.13
Aurubis AG	0.65	0.56	-0.12
Helvetia Holding AG	0.71	0.54	-0.10
Crescent Point Energy Corp.	0.73	0.73	-0.10
Travis Perkins plc	0.51	0.41	-0.10
SES SA	0.37	0.25	-0.10
Centerra Gold Inc.	0.27	0.27	-0.09

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-1.6	-20.8	-14.3	0.1	-0.2	-0.1
Consumer Discretionary	0.1	-11.0	-10.8	0.0	0.0	0.0
Consumer Staples	-1.2	-13.8	-11.4	0.0	-0.1	-0.1
Energy	7.2	-1.2	3.7	1.0	-0.6	0.5
Financials	10.0	-8.3	-8.8	0.1	0.0	0.2
Health Care	-4.4	-8.4	-11.5	0.1	0.1	0.1
Industrials	-1.9	-8.9	-8.8	0.0	0.0	0.0
Information Technology	-5.3	-7.8	-9.7	0.0	0.1	0.1
Materials	7.1	-9.7	-5.9	0.3	-0.7	-0.3
Real Estate	-8.2	-12.8	-13.3	0.3	-0.1	0.3
Utilities	-1.9	-17.5	-10.9	0.0	-0.1	-0.1
Total	0.0	-9.3	-9.7	1.9	-1.6	0.5

DFA International Inception Performance & Statistics

Investment Growth – 15 Years

DFA Int'l Small Cap (Net) — MSCI World ex US Small Cap Value
MSCI EAFE Small Cap

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Relative Cumulative Performance – 15 Years

DFA Int'l Small Cap (Net) — MSCI EAFE Small Cap

©FactSet Research Systems

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
DFA Int'l Small Cap (Net)	1.9	20.4	-0.4	0.1	-0.1	4.6	1.0
MSCI EAFE Small Cap	1.9	19.5	--	0.1	--	--	1.0
MSCI World ex USA Small Cap Value	2.0	19.9	--	0.1	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

Size Volatility Momentum Value Growth Quality

William Blair Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 1/1/2004 (Ten Year, One Month Shift)

William Blair (Net) — *MSCI ACWI ex US*

©FactSet Research Systems

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Zurich Insurance Group AG	1.91	-7.88
VINCI SA	1.86	-8.27
Intact Financial Corporation	1.84	1.60
Thales SA	1.67	-9.54
Linde plc	1.61	-5.83
Novo Nordisk A/S	1.57	-8.86
Compass Group PLC	1.55	-1.24
Dollarama Inc.	1.52	0.51
Canadian National Railway Company	1.50	-2.80
ICON plc	1.49	-15.19

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
William Blair (Net)	-8.0	-36.5	-34.9	1.1	1.3	5.1	2.4
MSCI ACWI ex US	-9.8	-26.2	-24.8	-1.1	-0.3	3.5	1.0
MSCI ACWI ex US Growth	-9.3	-31.6	-30.0	-1.1	0.5	4.3	1.7

Regional Exposure by Domicile

- Europe dev 39.9%
- North America 13.6%
- United Kingdom 13.5%
- Japan 10.1%
- Asia emrg 9.7%
- Asia dev 6.5%
- Australasia 2.3%
- Africa/Middle East 2.3%
- Latin America 2.0%
- Europe emrg 0.1%

Equity Sector Exposure (GICS)

- Industrials 22.8%
- Financials 20.1%
- Information Technology 16.3%
- Health Care 13.6%
- Consumer Discretionary 12.6%
- Consumer Staples 5.8%
- Materials 4.2%
- Energy 2.0%
- Utilities 1.0%
- Real Estate 0.9%
- Communication Services 0.6%

Regional Exposure by Source of Revenue

- North America 30.4%
- Europe dev 21.2%
- Asia emrg 18.0%
- Japan 7.4%
- Asia dev 5.8%
- United Kingdom 4.9%
- Latin America 4.8%
- Africa/Middle East 3.9%
- Europe emrg 1.7%
- Australasia 1.4%
- Other 0.6%

William Blair vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022
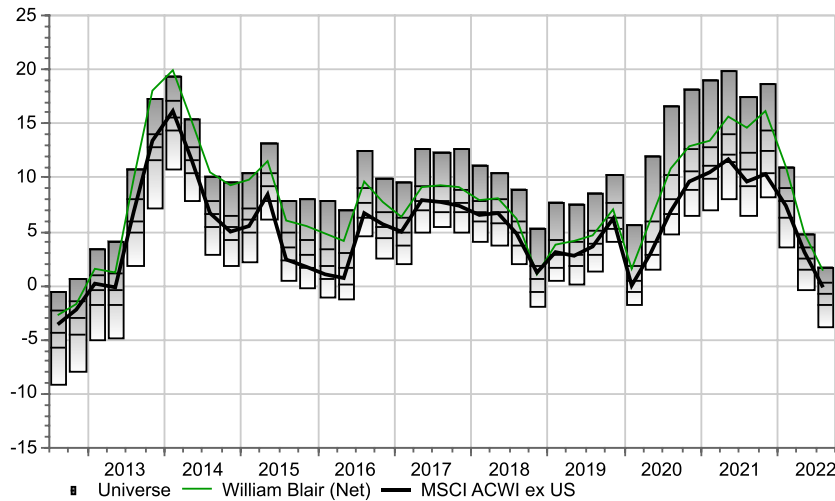
Universe: Lipper US:International Multi-Cap Growth

Legend: ▫ Universe ● William Blair (Net) ◇ MSCI ACWI ex US

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

Legend:
- ◆ William Blair (Net)
- ▲ William Blair (Net) Oldest 2 Yrs
- ── Relative Performance Line
- ■ William Blair (Net) Recent 2 Yrs

Rolling Returns 7/1/2007 –9/30/2022 (5 Year, 3 Month Shift)

Universe: Lipper US:International Multi-Cap Growth

Legend: ▫ Universe ── William Blair (Net) ── MSCI ACWI ex US

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Over/Under Benchmark Analysis

36	Outperform
4	Underperform
40	# Observations
90%	% Outperform

William Blair Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Tencent Holdings Ltd.	0.28	-0.90	0.23
Taiwan Semiconductor Mfg Co., Ltd.	1.34	-0.51	0.09
Samsung Electronics Co., Ltd.	0.60	-0.53	0.09
Ashtead Group plc	0.83	0.73	0.05
Atlassian Corporation	0.73	0.73	0.05
DBS Group Holdings Ltd	0.76	0.58	0.05
HOYA CORPORATION	0.69	0.53	0.05
PT Bank Central Asia Tbk	0.49	0.36	0.05
Tecan Group AG	0.28	0.28	0.04
Itau Unibanco Holding S.A.	0.33	0.22	0.04

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
AIA Group Limited	2.04	1.48	-0.27
MTU Aero Engines AG	1.59	1.55	-0.25
ICON plc	1.60	1.60	-0.23
Amadeus IT Group SA	1.53	1.41	-0.21
DSV A/S	1.16	1.03	-0.15
Kingspan Group Plc	0.63	0.59	-0.14
KBC Group N.V.	1.03	0.97	-0.14
SEGRO plc	0.56	0.49	-0.13
Straumann Holding AG	0.70	0.64	-0.13
Eurofins Scientific Societe Europeenne	0.62	0.57	-0.13

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-4.9	-16.1	-16.5	0.4	0.0	0.3
Consumer Discretionary	-1.7	-6.0	-13.1	0.1	0.8	0.7
Consumer Staples	-5.0	-5.2	-6.3	-0.2	0.1	-0.1
Energy	-3.2	-4.9	-6.3	-0.1	0.0	-0.1
Financials	-4.0	-7.7	-7.9	-0.1	0.0	-0.1
Health Care	4.1	-6.5	-10.9	0.0	0.6	0.6
Industrials	13.4	-7.9	-8.2	0.3	0.1	0.4
Information Technology	4.5	-8.0	-12.2	-0.1	0.6	0.6
Materials	-3.0	-7.1	-7.8	-0.1	-0.1	0.0
Real Estate	-1.4	-25.7	-14.7	0.1	-0.1	0.0
Utilities	-2.3	-17.4	-10.9	0.0	-0.1	0.0
Cash	3.6	0.6	0.0	0.2	0.0	0.3
Total	0.0	-7.4	-9.9	0.4	2.0	2.5

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian
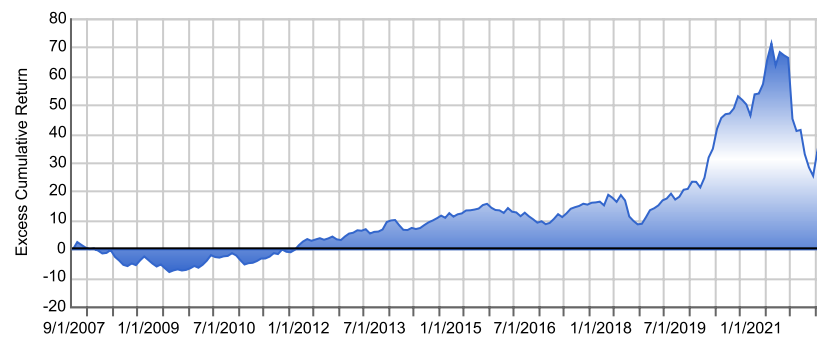
William Blair 15 Year Performance & Statistics

Investment Growth – 15 Years

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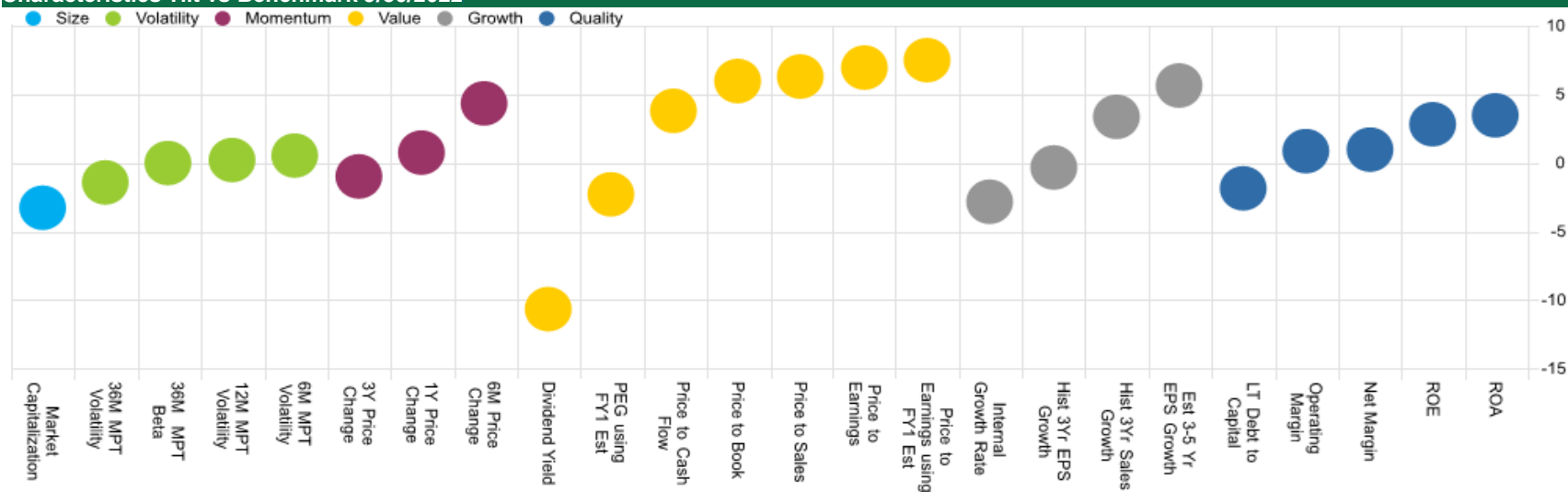
Relative Cumulative Performance – 15 Years

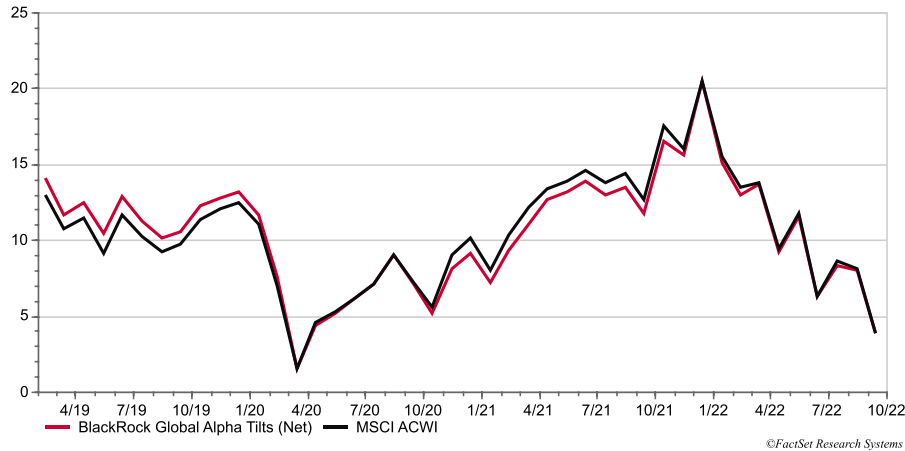*©FactSet Research Systems*

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
William Blair (Net)	2.4	18.6	1.5	0.1	0.3	5.4	1.0
MSCI ACWI ex US	1.0	18.1	--	0.0	--	--	1.0
MSCI ACWI ex US Growth	1.7	17.8	--	0.1	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

BlackRock Global Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 3/1/2016 (Three Year, One Month Shift)

Legend: BlackRock Global Alpha Tilts (Net) — MSCI ACWI

©FactSet Research Systems

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	Inception 3/1/2016
BlackRock Global Alpha Tilts (Net)	-7.5	-25.5	-20.2	3.8	4.3	8.6
MSCI ACWI	-6.8	-25.6	-20.7	3.7	4.4	8.2

Equity Sector Exposure (GICS)

- Information Technology 23.8%
- Health Care 15.9%
- Financials 11.5%
- Consumer Discretionary 11.4%
- Consumer Staples 8.1%
- Energy 6.9%
- Industrials 6.3%
- Communication Services 5.5%
- Utilities 4.0%
- Materials 3.8%
- Real Estate 2.8%

Top 10 Holdings

	Portfolio Weight	Quarterly Return
Apple Inc.	5.27	1.23
Microsoft Corporation	4.20	-9.10
Alphabet Inc.	2.18	-12.15
Amazon.com, Inc.	1.59	6.39
Johnson & Johnson	1.53	-7.33
JPMorgan Chase & Co.	1.48	-6.40
Bristol-Myers Squibb Company	1.33	-7.68
Visa Inc.	1.23	-9.60
Tesla, Inc.	1.20	18.17
General Dynamics Corporation	1.09	-4.10

Regional Exposure by Domicile

- North America 68.8%
- Europe dev 10.4%
- Japan 5.2%
- Asia emrg 4.6%
- Asia dev 3.8%
- United Kingdom 2.1%
- Australasia 2.1%
- Africa/Middle East 1.7%
- Latin America 0.9%
- Europe emrg 0.4%

Regional Exposure by Source of Revenue

- North America 48.5%
- Asia emrg 16.2%
- Europe dev 12.1%
- Japan 5.3%
- Asia dev 4.5%
- Latin America 3.7%
- Africa/Middle East 3.3%
- United Kingdom 2.3%
- Australasia 1.9%
- Europe emrg 1.8%
- Other 0.4%

BlackRock Global vs Universe & Benchmark

Universe: Lipper US:Global

Universe ● BlackRock Global Alpha Tilts (Net) ◇ MSCI ACWI

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One-Year Rolling Return Versus Benchmark

◆ BlackRock Global Alpha Tilts (Net) ━━ Relative Performance Line

Rolling Returns 3/1/2016 –9/30/2022 (3 Year, 3 Month Shift)

Universe: Lipper US Global Equity

Universe ── BlackRock Global Alpha Tilts (Net) ── MSCI ACWI

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Over/Under Benchmark Analysis

13	Outperform
10	Underperform
23	# Observations
57%	% Outperform

BlackRock Global Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Boeing Company	0.20	0.05	0.09
NVIDIA Corporation	0.42	-0.29	0.07
Costco Wholesale Corporation	0.55	0.16	0.07
Exxon Mobil Corporation	1.12	0.44	0.05
Citigroup Inc.	0.08	-0.09	0.04
ASML Holding NV	0.74	0.38	0.04
Samsung Electronics Co., Ltd.	0.22	-0.22	0.03
Raytheon Technologies Corp.	0.01	-0.23	0.03
Charter Communications, Inc.	0.01	-0.08	0.03
Cisco Systems, Inc.	0.08	-0.24	0.03

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Intel Corporation	0.93	0.68	-0.19
Adobe Incorporated	0.75	0.43	-0.16
BYD Company Limited	0.56	0.49	-0.15
Tesla, Inc.	0.89	-0.33	-0.14
British American Tobacco p.l.c.	1.05	0.90	-0.12
Alphabet Inc.	3.12	0.85	-0.11
Philip Morris International Inc.	0.83	0.57	-0.09
Canadian Natural Resources Limited	0.63	0.51	-0.09
Microsoft Corporation	4.23	0.93	-0.09
Tokyo Electron Ltd.	0.46	0.38	-0.08

Sector Attribution

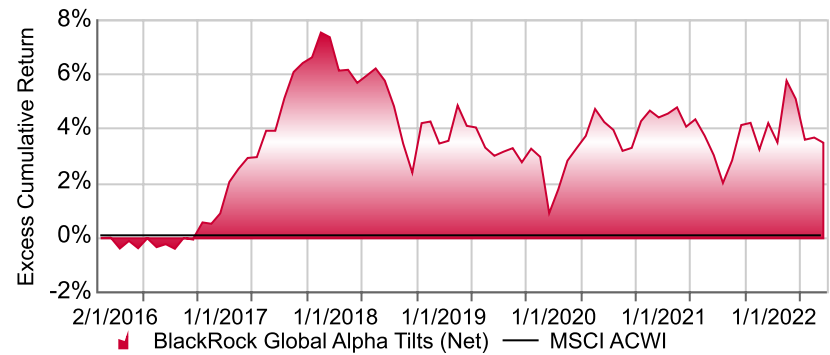|	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-0.2	-15.2	-13.6	0.0	-0.1	-0.1
Consumer Discretionary	-2.5	-5.1	-2.7	-0.1	-0.2	-0.3
Consumer Staples	0.0	-6.7	-6.5	0.0	0.1	0.0
Energy	0.7	-3.9	-1.4	0.0	-0.2	-0.1
Financials	-2.2	-5.5	-5.9	-0.1	-0.1	0.0
Health Care	2.1	-5.7	-7.0	0.0	0.1	0.2
Industrials	-0.6	-6.9	-6.0	0.0	-0.1	-0.1
Information Technology	2.5	-8.6	-7.3	-0.1	-0.3	-0.4
Materials	-0.3	-8.6	-7.6	0.0	0.0	-0.1
Real Estate	-0.4	-9.6	-12.3	0.0	0.0	0.1
Utilities	0.9	-7.8	-7.8	0.0	0.0	0.0
Total	0.0	-7.5	-6.7	-0.2	-0.9	-0.8

BlackRock Global Inception Performance & Statistics

Investment Growth Since Inception 3/1/2016

©FactSet Research Systems

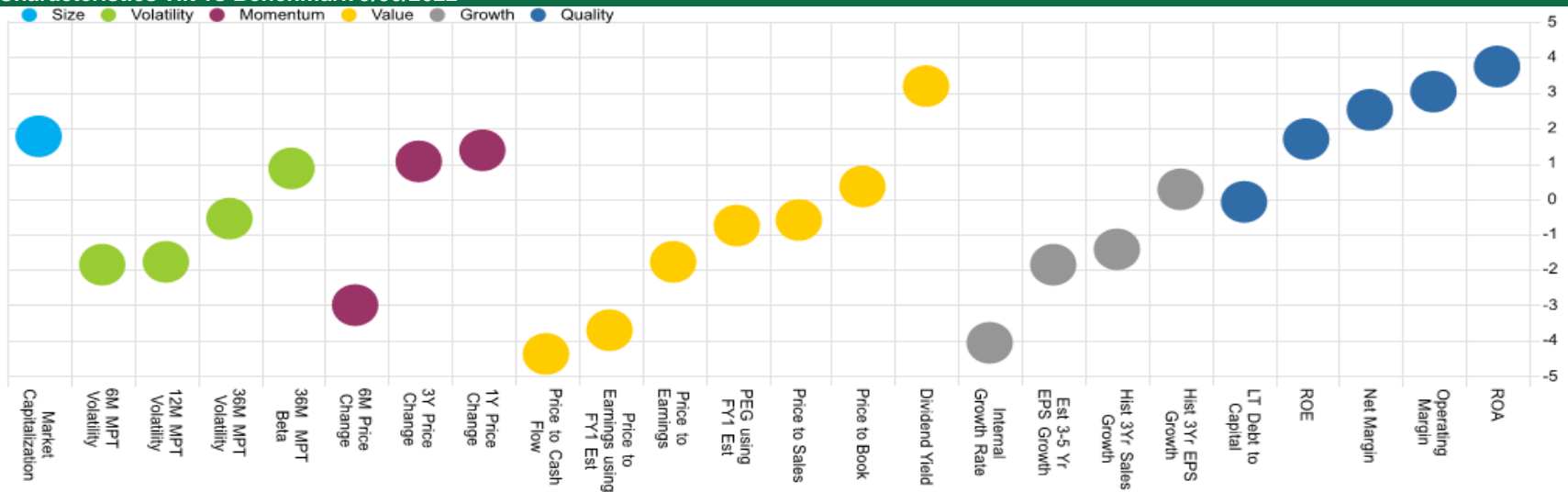## Relative Cumulative Performance Since Inception 3/1/2016

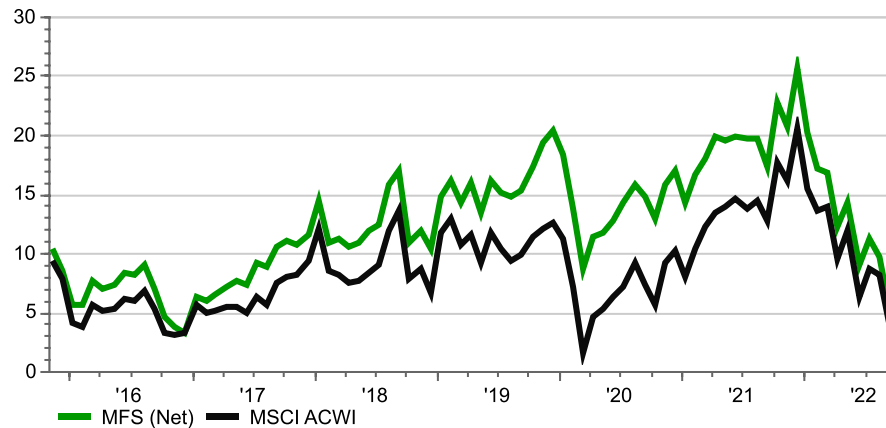©FactSet Research Systems

Risk Since Inception 3/1/2016

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
BlackRock Global Alpha Tilts (Net)	8.6	15.5	0.3	0.5	0.2	1.6	1.0
MSCI ACWI	8.2	15.3	--	0.5	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

MFS Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 12/1/2012 (Three Year, One Month Shift)

Legend: MFS (Net) — MSCI ACWI

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Top 10 Holdings

	Portfolio Weight	Quarterly Return
Alphabet Inc.	5.26	-12.22
Microsoft Corporation	4.94	-9.10
Canadian Pacific Railway Limited	2.71	-4.27
Accenture plc	2.48	-7.04
Apple Inc.	2.34	1.23
Visa Inc.	2.33	-9.60
ICON plc	2.08	-15.19
Fiserv, Inc.	2.00	5.17
Tencent Holdings Ltd.	1.95	-24.86
Electronic Arts Inc.	1.94	-4.74

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	Inception 12/1/2012
MFS (Net)	-7.8	-26.3	-20.2	5.2	8.4	10.0
MSCI ACWI	-6.8	-25.6	-20.7	3.7	4.4	7.3
MSCI ACWI Growth	-5.9	-32.2	-27.5	5.4	6.6	9.0

Regional Exposure by Domicile

- North America 71.1%
- Europe dev 12.1%
- Asia emrg 5.7%
- United Kingdom 4.7%
- Asia dev 3.3%
- Japan 2.3%
- Latin America 0.8%

Equity Sector Exposure (GICS)

- Information Technology 29.1%
- Consumer Discretionary 13.0%
- Industrials 12.9%
- Health Care 12.3%
- Consumer Staples 10.4%
- Communication Services 9.5%
- Financials 9.0%
- Materials 1.6%
- Real Estate 1.3%
- Utilities 0.9%

Regional Exposure by Source of Revenue

- North America 48.7%
- Asia emrg 17.8%
- Europe dev 12.5%
- Asia dev 4.1%
- United Kingdom 3.6%
- Latin America 3.5%
- Africa/Middle East 3.3%
- Japan 3.2%
- Europe emrg 1.6%
- Australasia 1.3%
- Other 0.3%

MILWAUKEE ERS Employes' Retirement System

MFS vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US:Global

Universe · ● MFS (Net) · ◇ MSCI ACWI

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Three-Year Rolling Return Versus Benchmark

◆ MFS (Net) — Relative Performance Line
▲ MFS (Net) Oldest 2 Yrs ■ MFS (Net) Recent 2 Yrs

Rolling Returns 12/1/2012 –9/30/2022 (3 Year, 3 Month Shift)

Universe: Lipper US Global Equity

Universe — MFS (Net) — MSCI ACWI

©FactSet Research Systems

Over/Under Benchmark Analysis

28	Outperform
0	Underperform
28	# Observations
100%	% Outperform

MFS Attribution Analysis – September 30, 2022

Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Ross Stores, Inc.	1.30	1.25	0.19
KOSE Corporation	1.23	1.22	0.15
Charles Schwab Corporation	1.41	1.24	0.13
Starbucks Corporation	1.39	1.23	0.11
Fortive Corporation	1.52	1.48	0.07
TJX Companies, Inc.	0.84	0.72	0.07
Fiserv, Inc.	1.88	1.77	0.06
Flutter Entertainment Plc	0.83	0.80	0.05
Boston Scientific Corporation	1.73	1.63	0.05
Amphenol Corporation	1.85	1.77	0.04

Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
NAVER Corp.	1.62	1.58	-0.46
Tencent Holdings Ltd.	2.07	1.61	-0.42
adidas AG	1.23	1.18	-0.40
Church & Dwight Co., Inc.	1.80	1.76	-0.40
Alibaba Group Holding Ltd.	1.61	1.26	-0.40
Alphabet Inc.	5.46	3.19	-0.38
ICON plc	2.24	2.24	-0.32
NIKE, Inc.	1.49	1.25	-0.26
Adobe Incorporated	1.06	0.74	-0.23
Cellnex Telecom SA	0.93	0.89	-0.22

Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	2.8	-14.9	-14.0	-0.3	-0.2	-0.3
Consumer Discretionary	2.0	-8.0	-2.5	0.1	-0.6	-0.7
Consumer Staples	3.2	-8.7	-6.5	0.0	-0.1	-0.3
Energy	-4.8	0.0	-0.6	-0.3	0.0	-0.3
Financials	-6.4	0.9	-5.8	-0.1	0.3	0.5
Health Care	-1.1	-3.2	-6.9	0.0	0.2	0.4
Industrials	4.3	-7.0	-6.3	0.0	-0.2	-0.1
Information Technology	6.0	-7.8	-7.5	-0.1	-0.1	-0.2
Materials	-3.4	-9.2	-7.5	0.0	-0.1	0.0
Real Estate	-1.1	-16.0	-12.3	0.1	-0.1	0.0
Utilities	-2.6	-9.1	-8.3	0.0	0.0	0.0
Cash	0.8	0.6	0.0	0.0	0.0	0.1
Total	0.0	-7.5	-6.7	-0.5	-0.8	-0.8

Returns are calculated by factset from month-end holdings, and may differ slightly from official returns reported by custodian

MFS Inception Performance & Statistics

Investment Growth Since Inception 12/1/2012

Legend: MFS (Net), MSCI ACWI Growth, MSCI ACWI

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Relative Cumulative Performance Since Inception 12/1/2012
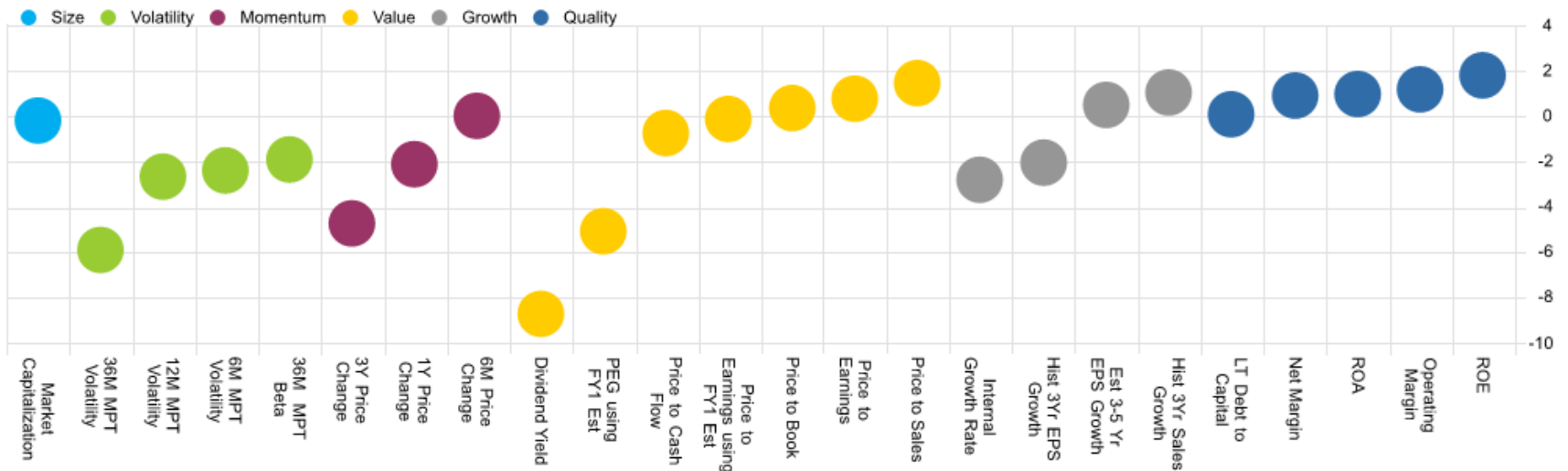

Legend: MFS (Net), MSCI ACWI

©FactSet Research Systems

Risk Since Inception 12/1/2012

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
MFS (Net)	10.0	14.1	2.6	0.7	0.8	3.2	1.0
MSCI ACWI	7.3	14.0	--	0.5	--	--	1.0
MSCI ACWI Growth	9.0	15.0	--	0.6	--	--	1.0

Characteristics Tilt vs Benchmark 9/30/2022

Legend: Size, Volatility, Momentum, Value, Growth, Quality

Loomis Sayles Portfolio Snapshot – September 30, 2022

Rolling Returns Since 10/1/1999 (Ten Year, One Month Shift)

Legend: Loomis Sayles (Net) — Bloomberg US Agg

©FactSet Research Systems

Investment Growth – 15 Years

Legend: Loomis Sayles (Net) — Bloomberg US Agg

©FactSet Research Systems

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
Loomis Sayles (Net)	-2.8	-14.7	-14.8	-1.7	1.0	2.9	5.0
Bloomberg US Agg	-4.8	-14.6	-14.6	-3.3	-0.3	0.9	2.7

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Loomis Sayles (Net)	5.0	7.7	2.2	0.6	0.3	6.5	1.1
Bloomberg US Agg	2.7	3.9	--	0.5	--	--	1.0

Relative Cumulative Performance – 15 Years

Legend: Loomis Sayles (Net) — Bloomberg US Agg

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Loomis Sayles vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022
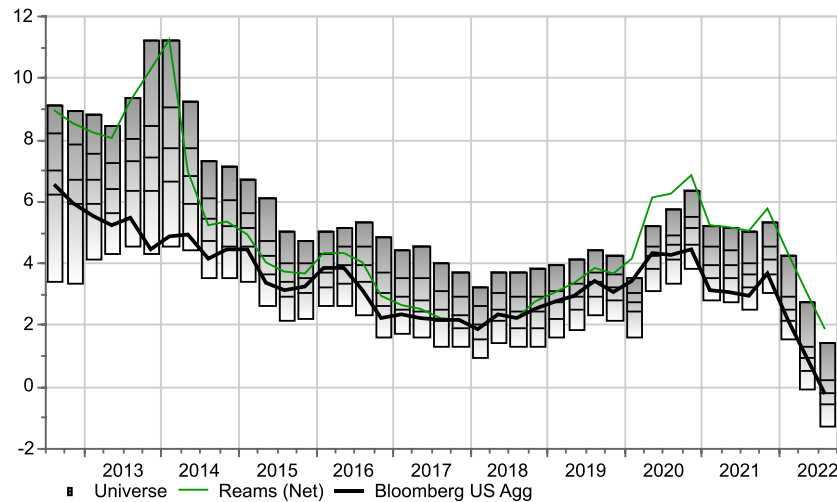
Universe: Lipper US Core Plus Bond

Legend: ▪ Universe ● Loomis Sayles (Net) ◇ Bloomberg US Agg

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Three-Year Rolling Return Versus Benchmark

Y-axis: **Loomis (Net) %**
X-axis: **Bloomberg US Agg %**

Legend:
- ◆ Loomis (Net)
- ▲ Loomis (Net) Oldest 2 Yrs
- ── Relative Performance Line
- ■ Loomis (Net) Recent 2 Yrs

Rolling Returns 7/1/2007 –9/30/2022 (5 Year, 3 Month Shift)

Universe: Lipper US:Core Plus Bond

Legend: ▪ Universe ── Loomis Sayles (Net) ── Bloomberg US Agg

©FactSet Research Systems

Over/Under Benchmark Analysis

34	Outperform
6	Underperform
40	# Observations
85%	% Outperform

Reams Portfolio Snapshot – September 30, 2022

Rolling Returns Since Inception 1/1/2001 (Ten Year, One Month Shift)

Reams (Net) — Bloomberg US Agg

©FactSet Research Systems

Investment Growth – 15 Years

Reams (Net) — Bloomberg US Agg

©FactSet Research Systems

Trailing Returns

	QTR	YTD	1 Year	3 Year	5 Year	10 Year	15 Year
Reams (Net)	-4.6	-14.4	-14.1	-0.4	1.8	2.0	4.3
Bloomberg US Aggregate	-4.8	-14.6	-14.6	-3.3	-0.3	0.9	2.7

Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Reams (Net)	4.3	6.2	1.4	0.6	0.3	4.6	1.1
Bloomberg US Aggregate	2.7	3.9	--	0.5	--	--	1.0

Relative Cumulative Performance – 15 Years

Reams (Net) — Bloomberg US Agg

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Reams vs Universe & Benchmark

Performance Relative to Peer Group as of 9/30/2022

Universe: Lipper US Core Plus Bond

Legend: ▪ Universe ● Reams (Net) ◇ Bloomberg US Agg

©FactSet Research Systems

Three-Year Rolling Return Versus Benchmark

Legend:
◆ Reams (Net) — Relative Performance Line
▲ Reams (Net) Oldest 2 Yrs ▪ Reams (Net) Recent 2 Yrs

Rolling Returns 7/1/2007 –9/30/2022 (5 Year, 3 Month Shift)

Universe: Lipper US Core Plus Bond

Legend: ▪ Universe — Reams (Net) — Bloomberg US Agg

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Over/Under Benchmark Analysis

33	Outperform
7	Underperform
40	# Observations
83%	% Outperform

Memorandum

To: CMERS Investment Committee
From: Thomas Courtright, CAIA
Date: November 10, 2022
Re: MFS Due Diligence Meeting May 11, 2022
Team: David Silber and Thomas Courtright

Background
The City of Milwaukee ERS (CMERS) hired MFS Investment Management (MFS) in December of 2012 to manage a Global Growth Equity mandate. As of September 30, 2022 MFS managed $162.2 million, or 3.1% of the Fund's assets.

Key Takeaways From the Most Recent Visit
- MFS' research analyst group is well resourced, deep in number, and provides broad coverage of global equity and fixed income sectors. Research is central to the firm's culture, and continues to be a key advantage and differentiator for the firm.
- The strategy continues to be co-managed by Jeff Constantino and Joe Skorski, who have served as co-portfolio managers on the strategy since 2008 and 2018, respectively. David Antonelli, a co-portfolio manager for the Global Growth Equity strategy in which CMERS is invested, retired from the firm in April 2021. It appears the transition is running smoothly, but Callan and staff will continue to monitor.
- ERS Staff came away from the meeting impressed with the portfolio managers and the research analysts, and believes they have the ability to implement the strategy successfully.

Firm Summary
Founded in Boston in 1924 as Massachusetts Financial Services Company, MFS created the first US mutual fund, Massachusetts Investors Trust. Boston remains the firm's headquarters and primary investment office, although the firm has research personnel stationed around the world. MFS has been a subsidiary of Sun Life Financial, Inc., a diversified Canadian financial services organization, since 1982. MFS provides global asset management services with approximately $692.6 billion in assets under management, of which $235 billion is for the firm's 614 institutional clients, with the balance belonging to retail clients. The firm's products currently include equity, fixed income, and quantitative strategies. MFS Investment Management employs 1,993 individuals, including 254 investment professionals.

The strategy has $8.5 billion in total assets under management, of which $6.1 billion is in separate accounts as of December 31, 2021. This is up from $5.4 billion and $4.0 billion, respectively, as of our last visit. CMERS was the first U.S. public fund client of the strategy when we funded the mandate in 2012 and currently the strategy has 6 public fund clients, representing $3.6 billion of assets invested with the strategy. At its current level, capacity in the strategy is not an issue, with an estimated capacity of $10 billion. Some holdings overlap with related U.S. and International Equity strategies, but MFS evaluates capacity by taking into account not only related strategies, but actually all trading at the firm. Furthermore, MFS is committed to closing strategies before capacity becomes an issue, providing CMERS comfort that our strategy would not be negatively impacted, even if the related strategies show significant asset growth.

Investment Team
Mr. Constantino and Mr. Skorski joined the strategy in 2008 and 2018, respectively, and since that time they have been successful as co-PMs. As part of MFS' objectives to create long-term continuity among its investment teams, Mr. Skorski joined Mr. Antonelli and Mr. Constantino as a third co-PM on the global growth equity strategy in May 2018. Mr. Skorski joined MFS as an equity research analyst in 2007, and was a PM on the Japan equity strategy before joining Global Growth.

In October 2019, MFS announced that Mr. Antonelli would retire from MFS in April of 2021. Since that date, the co-PM team of Mr. Constantino and Mr. Skorski continue to work well together in implementing the strategy's philosophy and process. Although ERS staff always places great scrutiny on the departure of an experienced PM, MFS telegraphed this departure well in advance. The departure of Mr. Antonelli is also mitigated by the continued strength of the MFS research analyst platform. As part of the succession plan, Mr. Antonelli had devoted a significant portion of his responsibility to mentoring Mr. Skorski during the two years prior to his retirement. Callan and staff will continue to monitor the co-PMs closely.

Mr. Constantino and Mr. Skorski have responsibilities in other products. Mr. Constantino manages two additional strategies – U.S. large cap growth equities and U.S. concentrated large growth equities, which overlap significantly with the U.S. focused portion of the global growth strategy. After working directly with Mr. Skorski on global growth two years, Mr. Constantino requested Mr. Skorski become a co-portfolio manager on the U.S. growth strategies with him as well. Even though Mr. Constantino's and Mr. Skorski's other responsibilities are for U.S. products, we are comfortable with their ability to manage a global strategy, given Mr. Constantino's experience on the global product, and Mr. Skorski's prior experience with international stocks as an analyst and PM on the Japan strategy.

We had the opportunity to meet with Mr. Constantino and we reviewed how MFS considers ESG characteristics of companies. In summary, the team has really not changed their process as it has always been focused on well managed firms that have defensible competitive advantages, allowing above average profits to compound over long periods of time. Accordingly, the sustainability aspect of a firm's earning power is a very important consideration for the investment team. Mr. Constantino explained that MFS will often actively engage management teams in order to bring awareness and ultimately a change that enhances firm sustainability. Some examples of this include carbon intensive practices in the trucking industry, airline emissions that could adversely impact future business travel or hospitality, data privacy and societal impacts of social media that could lead to increased regulatory and consumer backlash. These considerations lead the team to actively underweight names tied to social media, trucking, and global travel while adding to rails, electric vehicle suppliers, and emission light businesses. Mr. Constantino commented that the team must have strong conviction in resilient and sustainable business models as a condition for a name being in the portfolio.

Investment Philosophy and Process
MFS believes earnings growth drives stock performance over the long term, and stock prices often overact to short-term events, providing opportunities for long-term investors. Their investment process includes both a fundamental and quantitative component to identify companies with:
- Higher sustainable earnings growth rates than their industry
- Valuations that don't reflect long term growth prospects
- Improving fundamentals that drive multiple expansion

MFS employs a bottom-up investment approach that relies heavily on their global research platform consisting of 119 research analysts, which is an increase from 111 at our last visit. The research process begins with a universe of approximately 2,600 global stocks, which are screened primarily for liquidity factors, narrowing the universe of stocks to between 1,900 and 2,100. MFS equity analysts research these remaining companies as part of global sector teams. The global sector teams generally meet weekly, and those weekly meetings are also attended by portfolio managers with expertise in each specific sector. The analysts conduct their own research on companies, including developing their own financial models, visiting company management, and interviewing competitors, suppliers, and customers with the goal of identifying well-managed companies with sustainable competitive advantages able to generate strong returns. This process leads to a rating of buy, hold, or sell by the analyst for each company. The total number of buy rated stocks typically ranges from 700 to 800 names.

Portfolio managers then construct the portfolio with between 70 to 90 stocks based on the stock ratings and frequent collaboration with the equity analysts. Most of the stocks in the portfolio are buy rated, and a few may be hold rated. There are two scenarios under which a hold rated security would be included in the portfolio. The first is simply that a security may be added to the portfolio when it is buy rated, and may appreciate in price to the point where it is revised to hold. The second scenario is a bit more nuanced. MFS' analysts typically rate stocks assuming a three year holding period. Under this assumption, the stock prices of some very strong companies never quite get cheap enough to be rated a buy. However, for companies with truly compelling competitive advantages, the Global Growth strategy PMs will use a five or even ten year holding period, and with the longer holding period, those stocks make sense to be added to the portfolio, even though they are rated hold by the analyst.

During their weekly meetings, portfolio managers and analysts exchange ideas and information to ensure an analyst's "best ideas" are in the portfolio. The investment team also collaborates daily with research analysts on an informal basis via e-mail, face-to-face meetings, tele- and video-conferences, and a proprietary, web-based stock reporting and rating system.

The 119 research analysts are critical to the success of MFS' equity strategies, and could be considered to provide MFS with a competitive advantage over other firms with smaller staffs. Turnover has been reasonable with eight net additions to the analyst pool since our last visit.

Portfolio sector and country weightings are a result of the bottom-up stock process rather than a top down macroeconomic outlook. The investment team utilizes insights from MSCI Barra's risk model to ensure the strategy isn't taking any unintended bets in the portfolio at the sector and country levels. The strategy is limited to a maximum weight of 25% in emerging markets, but will typically be well below that amount. The portfolio managers often prefer to get emerging markets exposure through companies headquartered in developed markets that derive a significant portion of their revenue from emerging markets. While permitted to hedge currency, the strategy rarely, if ever, hedges. Rather, the research analysts are expected to conduct currency impact stress tests and to factor currency valuations into their earnings growth forecasts for each company.

While the portfolio managers are responsible for monitoring portfolio risk, MFS incorporates a monthly Investment Management Committee to monitor risk in all their equity strategies. MFS employs a Quantitative Risk Team using MSCI Barra to provide daily portfolio risk characteristics such as tracking error, beta, style characteristics, and risk decomposition to the portfolio management team. The Quantitative Risk Team also provides monthly and semi-annual risk assessments to the Investment Management Committee. These formal processes

are designed to ensure that portfolio managers are taking an appropriate level of risk that is disciplined and consistent with the investment philosophies of each strategy.

Trading

Nola Kopfer joined MFS as Director of Trading in March of 2019 and has implemented a number of changes to firm trading. We met with Brenda Farley, Director of Trading – Risk and Engagement, during our visit and she provided updates on changes within the department. For example, MFS traders are organized by sector now, which aligns with how the industry tends to organize itself. The traders have also each been assigned two trade associates to support work flow and assist in trades. Additionally, there is a EU based trader to focus on trades within the EU region. Execution management systems have also been added as a tool to help traders prioritize and allocate trade execution among the staff.

Execution quality and transaction cost data is reported to MFS' Trade Management Oversight Committee on a daily, monthly, and quarterly basis.

The Global Growth Equity strategy utilizes the services of MFS' Equity Trading Team. The investment team enters trade orders via Charles River for equity trades. The Charles River system was implemented for equity trading four years ago and fixed income trading transitioned onto the Charles River system last year. Charles River includes a compliance module which conducts a compliance check against a client's investment guidelines prior to order entry and execution. MFS utilizes multiple sources to find liquidity, including full-service brokers, Electronic Communication Networks (ECN's), alternative trading systems (ATS), and direct market access. The trading department also utilizes the Bloomberg execution management system as well as the Global Portfolio Modeler, an internally developed order-creation system utilized to create blocks of orders.

Turnover for the strategy has averaged approximately 24% a year over the past three years, which is consistent with MFS' stated three-to-five year time horizon when purchasing a security. According to Global Trading Analytics (GTA), CMERS's transaction cost measurement provider, MFS's equity trading results have been in the third quartile of GTA's universe on average over the past two years. Foreign exchange results rank in the second quartile on average over the same time period. GTA views these results to be within an acceptable range. Additionally, MFS has been good at keeping the explicit cost of commissions on equity trades relatively low. Staff and GTA will continue to monitor Ms. Kopfer's performance, new trading desk initiatives, and trading performance closely going forward.

Portfolio & Firm Compliance

Martin Wolin, MFS' former Chief Compliance Officer, retired from the firm in February 2022. His responsibility as CCO has been split and handed off to Rosa Licea-Mailloux, Head of Compliance Americas, and Nikki Cagan, Head of International Compliance. Ms. Licea-Mailloux and Ms. Cagan report to MFS' General Counsel, Heidi Hardin. Although replacing a CCO as experienced as Mr. Wolin is not an ideal situation, we believe that splitting the responsibility along regional divisions to two experienced professionals helps to mitigate the departure. In addition to the systems mentioned above, the MFS compliance team continually monitors the portfolio for post-trade compliance with CMERS' guidelines. This process is largely automated, and any issues are reconciled with Northern Trust on a daily basis. The compliance team will call CMERS staff within one day after discovery of an issue and work with staff to bring the portfolio back into compliance.

MFS' Internal Audit Department incorporates many of its compliance processes into its annual audit plan. All oversight for compliance-related activities reside with an executive committee.

MFS' Code of Ethics governs all personal investing for employees, officers and directors and requires them to certify quarterly that they are in compliance with the Code.

Information Technology and Disaster Recovery
MFS' centralized technology platform has three main components:
- Applied Technology: responsible for the design, development, and maintenance of applications that MFS uses to evaluate internal business functions.
- Infrastructure: responsible for implementation of core technology platforms, including risk management, project management, security architecture and networking functions.
- Enterprise Project Management Office: responsible for project planning and coordination of corporate strategic initiatives.

MFS' business recovery and continuity plan provides for continued operations of the most critical functions of the organization. The plans are reviewed and updated semi-annually. Additionally, MFS conducts periodic Disaster Recovery exercises to validate the plans. They also conduct joint tests with key service providers to ensure their ability to function during an emergency. MFS last conducted a disaster recovery exercise in September and October of 2021, and had no material issues. Prior to the pandemic, MFS had been conducting quarterly work-from-home tests, so they were well prepared for the current environment.

Proxy Voting
MFS utilizes Institutional Shareholder Services (ISS) for proxy-related services, such as vote processing and recordkeeping functions. However, voting of proxies is in accordance with MFS' Proxy Voting Policies and Procedures and overseen by MFS' Proxy Voting Committee. MFS votes proxies based on what they believe is in the interests of its clients.

Performance Summary and Conclusion
MFS' net of fee returns have outperformed its benchmark over all time periods shown, which are provided in the table below as of September 30, 2022.

	1 Year	3 Years	5 Years	Since Inception (12/1/2012)
MFS Global Growth Equity (Net)	-20.2%	5.2%	8.4%	10.0%
MSCI ACWI	*-20.7%*	*3.7%*	*4.4%*	*7.3%*

While growth investing went through several years of very strong performance in the period ending in 2021, MFS' conservative growth style lagged a bit behind some of their more aggressive peers. However, MFS' portfolio has held up much better than those peers in the recent environment that has seen the growth/value dynamic flip. This has led to nice outperformance since our inception with the strategy.

Staff continues to be impressed by the vigilant research and collaboration that co-PMs, Mr. Constantino and Mr. Skorski, exhibit while implementing the strategy. Furthermore, MFS's research analyst platform has been equally impressive and therefore these considerations mitigate the departure of David Anotnelli in 2021. ERS staff maintains confidence in MFS's ability to implement the strategy successfully for the ERS.

Memorandum

To: CMERS Investment Committee
From: Thomas Courtright, CAIA
Date: November 10, 2022
Re: William Blair Due Diligence Meeting: August 23, 2022
Team: Erich Sauer, Thomas Courtright, and Dave Walters

Background
William Blair Investment Management (Blair) has managed an International All-Cap Growth Equity strategy for the Employes' Retirement System (ERS) since December 31, 2003. As of September 30, 2022, Blair managed $238.6 million for the ERS, or 4.5% of the Fund's assets.

Key Takeaways from the Recent Meeting
- Blair has an experienced and stable investment team. The strategy continues to be co-managed by Simon Fennel and Ken McAtamney who have served as lead co-PMs since 2013 and 2017, respectively.
- Blair recently added a third co-PM on the strategy, Andy Siepker, as of January 2022. Mr. Siepker is taking a PM apprentice type role given that he still has research responsibility for large cap industrials.
- Ken McAtamney is also head of the Global Growth team and leads a PM mentoring program. While it is clear that portfolio management is Mr. McAtamney's primary focus, staff and Callan will continue to monitor other demands on Mr. McAtamney's time.
- Staff remains impressed with the PMs and the research analysts, and believes they have the ability to implement the strategy successfully.

Firm Summary
Blair was founded in 1935 as an independent, employee-owned investment firm. It remains 100% employee owned, by 189 active employee-partners. The firm has over 1,800 employees, with the investment management division having 350, 102 of whom are investment professionals. Blair's headquarters in Chicago serves as the primary office for the majority of the investment management personnel. Trading, research, and portfolio management professionals are also located in its London office. As of June 30, 2022, assets under management (AUM) at Blair totaled approximately $56.2 billion, which is a decrease from $69.7 billion at our last visit in 2020. The firm has traditionally adhered to a principle of closing strategies to new investors well before capacity limitations might become a concern. Blair closed the strategy in which the ERS is invested in June 2012 at approximately $13 billion in AUM and the strategy currently remains closed. The strategy's AUM as of June 30, 2022 is $9.7 billion, a $6.1 billion decrease since CMERS' visit in 2020. The decreases in firm and strategy AUM levels since 2020 have been primarily attributable to market movements rather than client departures.

Investment Philosophy & Process
Blair utilizes fundamental bottom-up research to make investments in quality growth companies. This quality growth philosophy is based upon Blair's belief that the market is inefficient in its attempts to distinguish between an average growth company and a quality growth company. Their view is that quality growth companies achieve a higher growth rate for a longer period of time than the market expects, which will lead to superior stock performance. Fundamental characteristics of these quality growth companies include experienced and motivated

management teams, unique business models (e.g. market leadership, distinctive products/services, unique market opportunities), and attractive financial characteristics. Valuation and conservative financing are also considerations. Blair believes that companies possessing these characteristics tend to produce better returns on capital, over a longer time horizon, with less risk.

Blair's disciplined investment process begins with screens of 9,000 investable stocks in developed and emerging markets, which are then filtered by utilizing qualitative and quantitative factors. These screens focus on criteria that Blair has identified as most important, such as return on equity, earnings quality, financial strength, earnings and revenue growth, consistency of growth, and projected future growth.

Blair's systematic research group is responsible for the models, which aid in narrowing the universe to an Eligibility List of stocks. Blair's systematic research group has found the efficacy for various factors has diminished over time. Accordingly, research analysts and the systematic group have modified how they work together, whereby the systematic research is no longer used to directly screen and determine an Eligible List of stocks for analysts to research, but rather research analysts now utilize systematic research as complementary tools to aid analysts in universe screening and in identifying candidates for research. In addition, systematic and quantitative tools are also used by analysts as a quality assurance check. The Eligibility List focuses on 2,800 to 3,000 stocks, which is a broader list of names than the 1,800 to 2,400 names that the team previously covered in 2018. The expansion is due primarily to the launch of the China A Shares and Emerging Markets Small Cap strategies, as well as adding coverage of select US stocks for the global strategies.

Stocks on the eligibility list are then researched further by the analyst team. Blair has 15 fundamental analysts and 11 research associates focusing on traditional research, which includes spending 30 - 40% of their time meeting with respective company managements. Based on these meetings, fundamental analysts can either add or delete stocks from the Eligibility List. Blair's systematic research group is currently working to develop machine learning models that will calculate an intrinsic value for every company the analysts cover. These models will potentially complement the above process in future years.

From the Eligibility List, Blair develops a Research Agenda, which identifies potential buy and sell candidates. Typically 50 to 75 candidate stocks are placed on the Research Agenda each week. The full team discusses the Research Agenda findings during the research meeting. Everyone is expected to have input, but it is ultimately up to the PMs to determine if a security makes sense for their strategy.

The portfolio is co-managed by Simon Fennel, Ken McAtamney, and Andy Siepker. Mr. Fennel and Mr. McAtamney have been on the strategy since 2013 and 2017, respectively. Both Mr. Fennel and Mr. McAtamney are also co-PMs of the International Leaders and International Leaders Concentrated strategies, while Mr. Fennel is also a co-PM on the International Small Cap Growth Strategy. Mr. McAtamney is a co-PM on the Global Leaders, Global Leaders Concentrated, Emerging Markets Leaders, and Emerging Markets Leaders Concentrated strategies. Mr. Siepker joined Blair in 2006 as a research analyst and earned partner status in recognition of his contributions. Mr. Siepker has completed the Blair PM development course and is one of the leading researchers, covering large cap industrials. He expects to continue covering industrials while performing his new co-PM duties. His promotion to co-PM in January 2022 is recognition for the performance of his research coverage and ratings, as well as how he has collaborated with others in the team. Mr. Siepker is one of the younger talented

professionals deemed to represent the next generation of leadership at William Blair. All three co-PMs are heavily involved in all aspects of strategy and portfolio decisions.

The above strategies all follow similar processes, with the difference being the number of holdings, which are highest for our International Growth strategy with more than 180 stocks, and become increasingly concentrated for the Leaders and Leaders Concentrated strategies, which target between 40 to 70 stocks and 25 to 40 stocks, respectively. Mr. McAtamney is also a co-PM for the Global Leaders Sustainability strategy, which utilizes a similar process but also selects stocks based upon ESG and sustainability rating when constructing the portfolio. Because the portfolios all share a common process, and the more concentrated portfolios are a subset of the stocks held in our portfolio, staff does not have significant concerns about the number of strategies the PMs are managing, but it is something we will continue to monitor.

Depending on the team's view of market conditions and the current economic environment, the strategy has wide latitude to implement active decisions in the portfolio, which typically result in significant capitalization, sector, or geographic overweights or underweights versus the benchmark. This is a result of Blair's research process in determining where the best opportunities reside in the market. The strategy may also be opportunistic when investing in emerging markets, up to a maximum of 35% of the portfolio or 150% of the MSCI ACWI ex-US Index weighting (whichever is less). Although currency hedging is allowed; the current PM team no longer uses currency hedging.

We spoke with Mr. McAtamney at this meeting, and he elaborated on some of the current changes being incorporated into the strategy. He reiterated that Blair thinks of companies as going through three distinct stages in the growth life cycle. Firms start at Emergent growth, where companies can grow at rates above 20%, transition to Expanding, with growth typically in the 10-15% range, and finally move to Sustained, with growth above 5%. He believes it is important for portfolio construction to have representation from each cycle in the portfolio and he commented that this might be one of the best ways to think about portfolio diversification, perhaps even more important than country or sector exposure. Currently, the portfolio composition is shifting toward more sustained growth stocks relative to emergent or expanding growth, with the goal of reducing the duration of free cash flow in holdings, such that cash flows will not be too distant into future years. It is believed that this should be relatively beneficial during a rising interest rate regime. Furthermore, he discussed how the team is using the life cycle framework to be more thoughtful about initial positions in the portfolio, which will result in a lower level of portfolio turnover, and hopefully improved investment returns. The team's daily collaboration focuses on the best stock ideas across the platform and whether such names deserve to be in a given portfolio. Notably, the team's compensation plan explicitly rewards collaboration to align these objectives.

Mr. McAtamney also described how he has been the architect of an internal PM mentoring program for individuals that have the potential to be future PMs. He meets weekly with the participants and facilitates intense group discussions about current market events. Thus far, classes last approximately 9-12 months where each participant is matched to a specific portfolio. In addition to building the next generation of leaders for the firm, Mr. McAtamney stated that the process has been thought provoking and also beneficial for him personally. He continues to be impressed with the upcoming young talent he is observing as part of this process. To ensure this program isn't an unnecessary burden, Mr. McAtamney said he leans heavily on Blair's firmwide Head of Talent Development to help design and implement the program.

Mr. McAtamney also leads the Global Investment Team, with all PMs reporting to him, but he noted how he has worked with Stephanie Braming, Head of Investment Management, to streamline his managerial responsibilities with respect to the PM team. While both the PM development program and Mr. McAtamney's role in leading the current PMs are important for the long-term success of the platform, it is also important that those obligations are balanced such that he is able to devote sufficient attention to our portfolio. We believe that balance currently exists, but Staff and Callan will continue to monitor the demands on Mr. McAtamney's time.

Trading
Trading desks for international securities are located in Chicago and London. There are ten equity traders within Investment Management, with seven individuals responsible for international trades. The investment team meets daily with the traders to discuss current portfolio holdings, potential buy ideas, and sell candidates.

Trading costs for Blair rank in the second quartile over the trailing two years, an acceptable level according to ERS' transaction cost measurement provider, Global Trading Analytics (GTA). Blair's currency (FX) trading during the trailing two years ranked in the third quartile relative to its peer universe, which is again deemed to be acceptable by GTA. Blair continues to use algorithmic trading and crossing networks on a case by case basis, which has positively impacted performance, on average. Generally, growth managers tend to trade more frequently in response to new information versus other investment styles. Since growth managers tend to not be patient traders, it is not a surprise that trading costs also tend to be higher. The strategy experienced an average turnover of 38% over the most recent two-and a half-year period, which is a slight increase from turnover levels observed at our last visit. This is consistent with some of the portfolio rotations that Mr. McAtamney mentioned above.

Portfolio Compliance
The Chief Compliance Officer, Randy Randall, is responsible for monitoring and ensuring firm compliance with ERS' investment guidelines. Mr. Randall reports to Cissi Citardi, Blair's Global Head Counsel, who also assumes interim Chief U.S. Legal Counsel responsibilities for the recently departed Robert Toner. Ms. Citardi plans to hire a Deputy General Counsel for investment management. The Compliance department consists of over 20 professionals, seven of whom are devoted to separate accounts and mutual funds. All employees receive mandatory compliance training upon joining Blair.

Blair uses Linedata Compliance as its compliance monitoring system. Linedata ensures that portfolios comply with all regulatory requirements, prospectus limitations, and investment guidelines and restrictions. Linedata's pre-trade functionality captures investment breaches before they reach the trading desk, and its post-trade functionality provides breach identification and comprehensive support of the breach resolution process.

Blair has a Code of Ethics that complies with the Investment Company Act of 1940. The Code prohibits certain types of personal transactions that are deemed to present conflicts. Blair's My Compliance Office (MCO) is used to monitor employee personal trading. MCO is an automated system that monitors pre-clearance, exceptions, reporting, and record keeping requirements of the Code of Ethics.

Information Systems and Disaster Recovery
The IT Department is centralized in Blair's Chicago headquarters. The department supports and maintains Blair's electronic communication systems, computer hardware, and software. New technology is added as needed.

Blair has discontinued use of a disaster recovery site in Oakbrook, IL, as working from home has become a primary contingency plan. Blair backups data to cloud based systems and has data centers in Franklin Park, IL, as well as the Chicago Central Business District. In the event of a disaster at the main office, Blair's staff is able to remotely access all critical systems. The firm's Business Continuity Program Office (BCPO) manages business disruption risk. The program has oversight responsibility for four key elements: 1) Emergency Response, 2) Crisis Management, 3) IT Disaster Recovery, and 4) Business Continuity. BCPO works with business teams and operational staff to develop contingency plans. BCPO conducted an IT Technology Resilience exercise in October 2021 where no material issues were identified. Blair had also invested in significant hardware upgrades as a result of the pandemic.

Blair's Risk Management group is also currently developing a number of enhancements to the firm's operational risk escalation procedures as well as phishing campaigns designed to help educate and train employees about the related threats.

Proxies
Blair votes all proxies in what they believe to be in the interest of the beneficiaries. There are voting guidelines that Blair's Proxy Administrator, ISS, must follow. The administrator votes on the most significant and frequent voting issues. Proxy votes not handled by the administrator that are unique and require more attention are handled by the Proxy Policy Committee. The Committee includes managers, portfolio managers, analysts, and compliance representatives. All proxy voting policies are reviewed annually.

Performance Summary and Conclusion
Blair's net of fee returns have outperformed its benchmark over all time periods shown, except the one-year period, which are provided in the table below as of September 30, 2022.

	1-year	3-year	5-year	10-year	Since Inception 1/1/2004
Blair International All-Cap (net)	-34.9%	1.1%	1.3%	5.1%	5.9%
MSCI ACWI ex USA	*-24.8%*	*-1.1%*	*-0.3%*	*3.5%*	*5.0%*

Blair went through a multi-year period leading up to 2021, in which the growth investing style outperformed value, and provided a significant tailwind to Blair's performance. This can still be seen in the longer-term outperformance. This dynamic reversed in 2022, and Blair has been facing a performance headwind, as value outperforms growth. The key takeaway is that the strategy is performing as expected, given the market backdrop.

Staff came away from the meeting impressed by the PMs and the research analysts. The investment team headed by the Mr. Fennel, Mr. McAtamney, and Mr. Siepker appears very capable in providing the all-cap growth equity strategy that covers the capitalization range in developed and emerging markets. We will continue to monitor Blair and the investment team as they fill the role of ERS's international all-cap equity growth manager.

Memorandum

To: CMERS Investment Committee
From: David Walters, CFA, CTP
Date: November 10, 2022
Re: Dimensional Fund Advisors Due Diligence Meeting: September 13, 2022
Team: David Silber and David Walters

Background

Dimensional Fund Advisors (DFA) was hired by the Milwaukee Employes' Retirement System (ERS) in September 1996 to manage a U.S. Small Cap Value equity strategy. ERS added additional DFA mandates in International Small Cap Value equity and U.S. Large Cap Value equity in April 2006 and November 2017, respectively. Combined, the three mandates represented 8.7% of Fund assets, approximately $459 million, as of September 30, 2022, which gives DFA the Fund's largest total allocation to a public equity manager.

Key Takeaways from the Recent Meeting

- DFA remains a strong and stable firm with a disciplined investment process. ERS Staff is confident in the ability of the firm to successfully provide our desired exposures in small cap and large cap value.
- ERS' strategies continue to perform as expected relative to the value and small cap factors. Both factors have shown periods of outperformance since our last visit, providing a modest reversal of an extended period of underperformance of these premiums.
- The firm did not share any update on plans for Chairman David Booth retiring or transitioning ownership of the firm. It is important that staff and Callan closely monitor the firm's ownership plans going forward to ensure any changes will not impact the firm's investment philosophy or process.
- Assets under management (AUM) were down across all three strategies from our last visit due primarily to market value changes with some modest effects from net investor flows. DFA reiterated that they monitor capacity closely and would close a strategy to new investors if AUM reached excessive levels. Staff and Callan will continue to monitor AUM and the capacity of each strategy.
- DFA has introduced exchange traded fund (ETF) vehicles for many of its strategies with plans to continue growing these offerings. ETFs have been a driver of asset growth for the firm in recent years as some investors favor this structure for tax efficiency among other reasons. DFA's investment team indicated that the addition of ETFs will not negatively impact investors using other vehicles within the same strategy. Staff and Callan will monitor the growth of ETF assets and potential impact on strategy capacity and performance.

Firm Summary

DFA is headquartered in Austin, TX, and has 14 additional offices around the world. Portfolio managers, traders, and researchers are mainly split between Austin, Santa Monica, Charlotte, London, and Sydney, while Dublin, Tokyo and Singapore also have a smaller number of portfolio management staff. Investment management has been the firm's sole business since 1981.

DFA is a privately-held limited partnership owned primarily by employees and directors. David Booth, the firm's Chairman, and Rex Sinquefield, a co-founder who is now retired, hold a majority interest in the firm. ERS staff has been monitoring the issue of how ownership is ultimately to be transferred from both of them. DFA has taken constructive steps to increase ownership among more employees, but the size

of these ownership stakes remains very small relative to the value of the company. DFA has consistently maintained that neither Mr. Booth nor Mr. Sinquefield have plans to sell their ownership interests in the firm in the immediate future; however, in the long term, how these two liquidate their ownership interests is something to monitor.

The executive leadership of DFA has been stable since undergoing changes in 2017, with the departure of then Co-CEO and Co-CIO Eduardo Repetto. David Butler and Gerard O'Reilly serve as Co-CEOs and are on the firm's Board of Directors. Mr. O'Reilly is also the firm's CIO. Staff has been impressed with Mr. O'Reilly during our past interactions with him. DFA believes that the Co-CEO structure ensures that the firm has strong leadership in place, even in the event of an unanticipated departure. Mr. Booth, in his role as DFA's Chairman, remains actively involved in the firm's strategic initiatives.

Assets under management at the firm increased significantly in the period from December 31, 2015 to December 31, 2017, rising from $388 billion to $577 billion. Firm AUM have been more stable since that time, at $609 billion on December 31, 2019 and $575 billion on June 30, 2022. The slight drop in firm assets as of 2022 was attributed primarily to losses in equity and fixed-income markets with some minor net outflows reported. Headcount has stabilized after a period of growth, with 1,466 employees as of June 2022, roughly equal to the 1,462 employees at the firm in December 2019.This is compared to 1,211 employees in December 2017 and 950 in December 2015. Investment professional turnover has been low over the past three years.

Investment managers typically consider institutional mandates, like ERS, to be "sticky", as institutional investors typically have a long-term perspective and avoid moving in and out of strategies based on short-term swings in performance. However, DFA noted that the retail side of their business has actually proven to be even stickier, due to the unique process they have for vetting advisors and making sure they are fully onboard with DFA's philosophy and process before being allowed to use DFA Funds. DFA introduced a new investment vehicle, exchange traded funds, in 2020 and has continued to expand their ETF offerings since. The ETF option has helped DFA maintain and attract new assets and will continue to be a strategic initiative for the firm. DFA noted that the addition of these new vehicles does not impact their ability to manage other portfolios within the same strategies. DFA's ETF platform has helped stabilize firm AUM by attracting additional assets to offset outflows from legacy formats.

As of June 30, 2022, DFA had $15.3 billion in the U.S. Small Cap Value strategy and $11.2 billion in the International Small Cap Value strategy. AUM for U.S. Large Cap Value was $28.6 billion. These numbers are lower compared to our last visit, with the largest decline in the International Small Cap Value strategy (down approximately 27% versus 12/31/2019). All three strategies remain open to new institutional and retail investors. Capacity will be an important area for the ERS to monitor, particularly in the small cap strategies ERS invests in, because small cap stocks are relatively illiquid. DFA indicated that they continually evaluate capacity and did not see any capacity problems with any of the three strategies. DFA is known for managing its trading operations well and indicates they have never had a problem meeting client redemptions. However, large client withdrawals in either of the two small cap strategies could present a challenge for DFA and the firm reserves the right to restrict client withdrawals from its institutional accounts and in practice works with clients to minimize transaction costs. It is worth noting that DFA's AUM also provides the company with an advantage because it is very difficult for other investment firms to implement a similar diversified portfolio of global small cap equity stocks in such an efficient manner.

Strategy Overview
DFA believes markets are efficient and investors will be compensated over the long run based on the level of risk they take. DFA also believes that smaller and value-oriented companies achieve higher returns over the long-term. Thus, DFA aims to construct a portfolio that is highly diversified in order to minimize security specific risk. The U.S. Small Cap Value strategy will typically hold approximately 1,000

securities, International Small Cap Value over 2,000, and U.S. Large Cap Value approximately 300. While large in absolute terms, the holding numbers are fewer than the comparable Russell value indices for the domestic strategies, because these indices tend to hold both value and core stocks, while DFA portfolios seek to hold only value securities. The number of holdings in the international portfolio is greater than the comparable MSCI small value benchmark because DFA utilizes broader guidelines for size, allowing the strategy to include firms with a smaller market cap than the benchmark includes. DFA also excludes REITs and highly regulated utilities across the three strategies, considering them a separate asset class.

DFA aims to add the majority of its outperformance by using a different methodology than the index to identify stocks, focusing both on a stock's market capitalization and its price-to-book ratio. DFA defines value as the stocks in a given universe that have the cheapest 35%, 35%, and 30% of price-to-book ratios for the U.S. Small Cap Value, International Small Cap Value, and U.S. Large Cap Value strategies, respectively. Similarly, DFA defines small cap as the stocks in a given universe that rank in the bottom 10% or 12.5% of capitalizations for the U.S. Small Cap Value and International Small Cap Value strategies, respectively. The Large Cap Value strategy, by definition, invests in large cap stocks, but DFA still places an emphasis on stocks with lower market capitalizations within the large cap universe. The portfolio construction process incorporates over 20 filters to exclude stocks such as REITS, highly regulated utilities, IPOs, and those that are in extreme distress. Finally, DFA evaluates short term data such as price momentum, asset growth, and borrowing fees in the securities lending market on a daily basis when making trading decisions. Stocks with poor scores on these metrics have lower short-term expected returns, and may be classified as temporarily ineligible for purchase. Stocks with strong price momentum have higher short-term expected returns, and may be temporarily ineligible for sale.

DFA also utilizes a profitability metric as a refinement on the above portfolio construction process. Given that the eligible universes have already been narrowed down to stocks that have desirable capitalization and cheapness rankings, DFA then applies a profitability filter that results in a higher quality bias in the portfolios. In the small cap strategies, this manifests as excluding securities with the lowest profitability. (This does not mean that the strategies are moving away from small value. The portfolios still include securities from throughout the small value spectrum, and do not go outside of the small value spectrum to attempt to find securities with higher profitability). Meanwhile, the U.S. Large Cap Value strategy does not explicitly exclude securities based on profitability, but instead uses profitability to inform the relative weights of securities in the portfolio. DFA's research shows that including the profitability factor results in a portfolio with higher expected returns. In the case of the small cap value strategies, they estimate that this enhancement to the portfolio construction process has increased expected returns for the strategies by slightly more than 40 basis points per year with the same, or slightly lower, standard deviation.

The portfolios do not have target allocations to sectors or industries and are managed without regard to a benchmark. However, as a result of the 2008 financial crisis, DFA incorporated a sector constraint equal to 10% plus or minus that sector's weight in the benchmark, which prevents significant biases from taking place in the portfolio in times of severe market dislocations. For the non-U.S. strategy, DFA defines value by looking at each country in isolation. Target country allocations are based on market capitalization weights by country, and typically include all countries in the MSCI World ex-US Index. Thus, the strategy is implemented within all developed countries at all times.

The Investment Committee of the firm has not changed since our last due diligence meeting in 2020. All members have significant portfolio management experience with DFA, and ERS staff is comfortable with the teams that are currently managing the portfolios. DFA utilizes a team approach to managing portfolios with at least three managers assigned to each of ERS' strategies. Portfolio managers are trained in multiple strategies and able to transfer between offices and portfolio teams as needed to limit the impact of any staff departures.

DFA makes a significant commitment to research and continually seeks ways to improve portfolio construction, security selection, and trading. Approximately 90% of DFA's research is conducted internally; primarily performing academic research, product development, and analyzing risk and return characteristics of asset classes and individual industry groups. Research ideas can come from the Investment Policy Committee, Portfolio Manager Teams, and Researchers.

Staff spoke with DFA's Global Head of Research, Savina Rizova, PhD. Dr. Rizova discussed the research team's continuous efforts to refine the drivers of return used in portfolio construction. She shared an example of how the research continued to refine metrics used to filter company profitability when making investment decisions after the initial implementation. She also discussed the extensive research the firm has done on the impact of intangible assets on the price-to-book ratio that is so crucial to DFA's investment philosophy. DFA's systematic approach to investing requires significant infrastructure and labor. Staff was impressed with the firm's investment in ongoing research. The firm maintains a team of more than 90 researchers globally and has developed a proprietary database of security information to support its internal research.

Trading
DFA's approach to trading is another defining feature of the firm. The majority of its U.S. trades, and an increasing percentage of its non-U.S. trades, are taken directly to market by the firm's own trading desks. DFA has a very patient and price conscious approach to trading and emphasizes being a liquidity provider as opposed to a liquidity seeker. As a liquidity provider, DFA's traders are able to add value by profiting from opportunities as they arise. The bid-ask spread can be wide for small cap stocks in particular, and DFA profits by trading directly with counterparties that are unwilling to be patient. In addition, informational trader counterparties often prefer to trade with DFA versus other firms because DFA has no informational advantage or "opinion" on a particular stock. This appears to be a competitive advantage to the DFA trading desk. DFA trades from six global offices – Austin, Santa Monica, London, Charlotte, Singapore, and Sydney.

DFA can be a patient trader because its portfolios are extremely diversified. With over 1,000 holdings in each of the two small cap value strategies and approximately 300 holdings in the U.S. Large Cap Value strategy, there is a minimal amount of security specific risk. Thus, when DFA's traders receive the daily buy and sell lists from the portfolio managers, they are given the discretion to selectively trade the names that can be traded at the most favorable price. There is not a specific time frame when trades have to be implemented and DFA would rather not trade a security than buy or sell it at an unfavorable price. Traders also have the flexibility to trade opportunistically if an exceptional trading opportunity is available. Over the past three years, portfolio turnover for the U.S. Small Cap Value, International Small Cap Value, and U.S. Large Cap strategies averaged 24%, 16%, and 10%, respectively. Actual portfolio turnover during this period is within the expected range for each of the strategies.

Compliance & Risk Management
Selwyn Notelovitz became DFA's Global Chief Compliance Officer in July 2020 and is responsible for monitoring all compliance matters at the firm. Mr. Notelovitz had served as Deputy Chief Compliance officer since joining DFA in 2012. He reports to the Directors of DFA's Mutual Fund Board for issues related to mutual funds and to the Co-CEOs for all other matters. DFA uses a customized Charles River Investment Management Solution (CRIMS), which is regarded as one of the best in the investment industry and allows the Compliance Group to monitor each portfolio for guideline compliance on a pre-settlement and post-trade basis. CRIMS allows for a daily review of portfolios to ensure they are in compliance with investment guidelines and restrictions. From an organizational standpoint, DFA has hired Pricewaterhouse Coopers LLP to conduct an annual SOC 1 test on its internal controls since 2003.

Custody Operations
DFA's custodian for the U.S. Small Cap Value commingled trust that ERS invests in is State Street Bank and Trust (SSBT), which has served in this capacity since 2013. The custodian for the International Small Cap Value equity mutual fund that ERS invests in is Citibank N.A. The U.S. Large Cap Value strategy is held in a separate account at ERS' custodian, Northern Trust. SSBT and Citibank perform reconciliations for all of the funds they administer for DFA on a daily basis and reports any exceptions to DFA's Fund Administration team.

Securities Lending
All three of the strategies that ERS is invested in participate in Securities Lending. The U.S. Small Cap Value and the International Small Cap Value strategies participate in the DFA securities lending program, while the U.S. Large Cap Value strategy participates in the program administered by ERS' custodian, Northern Trust. The value of the securities loaned for the U.S. Small Cap Value strategy and the International Small Cap Value strategies may not exceed 33 1/3% of the fund's or trust's total asset value. DFA does not take any percentage of security lending revenue and all revenue generated is received entirely by the commingled trust or fund respectively. DFA invests its cash collateral conservatively in government backed repo agreements and in the firm's unregistered money market fund.

Disaster Recovery
DFA has a set of plans covering Crisis Management, Business Continuity, and Disaster Recovery in place in case of an emergency or natural disaster. The plans are tested continuously, with 14 events and exercises conducted between June 2021 and May 2022. Plans are improved upon and refined based on the outcomes of these exercises. Trading and operations sites maintain redundant power supplies or generators to allow for continuing operations in the event of a power outage. For extended outages, the firm benefits from having portfolio management, trading, and other functions dispersed across the globe. This allows critical processes to be transferred away from offices or regions impacted by outages when necessary.

Proxies
Proxy voting is implemented by the firm's Investment Stewardship Group which is overseen by the Investment Stewardship Committee, and includes officers, directors, and other personnel. The firm also has a proxy voting policy that is approved by DFA's board of directors. The policy is reviewed at least annually to make sure the policy is being effectively implemented to cast votes that are in the best interests of clients. DFA works with Institutional Shareholder Services, which provides information on proxy materials, research on proposals, and recommendations. DFA votes the majority of proxies for the U.S. Small Cap Value and U.S. Large Cap Value strategies but only votes proxies in the International Small Cap Value strategy when the benefit of doing so outweighs the costs, which can be high depending on the individual country.

Performance Summary and Conclusion
Net of fee performance, as of September 30, 2022, for the ERS strategies managed by DFA is shown in the table on the next page. After an extended period of significant underperformance of both the value factor against growth, and smaller companies against larger companies, stock markets have experienced a modest reversal of investor preference to favor small and value-oriented companies. All three ERS strategies have benefitted from this reversal, with each portfolio outperforming its respective benchmark since the beginning of 2021.

Even with the extended underperformance of the two key factors, performance of the portfolios has tracked or exceeded the performance of the relevant small and value oriented benchmarks, pointing to the ability of the manager to implement the desired exposures and generate outperformance over time. Since outperformance from value and small cap strategies can often come unpredictably, and in rapid

fashion, it is important to evaluate these types of investments with a long-term view, while also taking into consideration the market environment in which the performance is taking place.

	1-year	3-year	5-year	10-year	Inception	Inception Date
U.S. Small Cap Value	-8.9%	10.6%	5.3%	9.8%	10.8%	9/30/96
Russell 2000 Value	*-17.7%*	*4.7%*	*2.9%*	*7.9%*	*8.6%*	
Int'l Small Cap Value	-22.9%	-0.4%	-3.2%	4.9%	3.0%	4/30/06
MSCI EAFE Small Cap	*-32.1%*	*-2.2%*	*-1.8%*	*5.3%*	*2.2%*	
MSCI World Ex-US Sm.Cap Value	*-25.8%*	*-1.7%*	*-2.0%*	*4.4%*	*2.8%*	
U.S. Large Cap Value	-11.2%	4.3%	n/a	n/a	3.5%	11/30/17
Russell 1000 Value	*-11.4%*	*4.4%*	*n/a*	*n/a*	*4.7%*	

In summary, DFA implements a very systematic and disciplined portfolio management process that maintains broad diversification while providing exposure to value stocks and smaller capitalization stocks within each of the strategies for which the ERS is invested. Overall, DFA's portfolio construction process and trading strategies are key strengths that should allow the ERS to achieve above benchmark returns in the small cap value and large cap value equity space.