



City of Milwaukee  
Employees' Retirement System

**Bernard J. Allen**  
Executive Director

**David M. Silber, CFA, CAIA**  
Chief Investment Officer

**Melody Johnson**  
Deputy Director

February 7, 2025

Mr. Jim Owczarski  
City Clerk  
Room 205, City Hall

Dear Mr. Owczarski:

Please be advised that an Investment Committee Meeting of the Annuity and Pension Board has been scheduled for **Thursday, February 13, 2025 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](http://www.cmers.com)) prior to the meeting.*

The agenda is as follows:

- I. Callan Glide Path Analysis Presentation Phase II.
- II. CMERS 4<sup>th</sup> Quarter Performance Update.
- III. Due Diligence Reports.
  - a. UBS Hedge Fund Solutions.
  - b. Mesirow Financial.
  - c. Polen Capital Management.
  - d. Earnest Partners.

Sincerely,

A handwritten signature in black ink that reads "Bernard J. Allen". The signature is written in a cursive style.

Bernard J. Allen  
Executive Director

BJA:jmw

February 13, 2025



## City of Milwaukee Employees' Retirement System

Phase II - Glide Path Analysis of  
Selected Glide Paths

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**John P. Jackson, CFA**  
Senior Vice President

**Michael Joecken**  
Senior Vice President

**Jason Ellement, FSA, CFA**  
Senior Vice President

**Adam Lozinski, CFA**  
Senior Vice President

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# Outline

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- Background
- Callan 2025 Capital Market Assumptions
- Time Horizon
- Five Glide Paths Examined
- Glide Path Analysis
  - Monte Carlo Simulation
  - \$250M Annual Contribution Cap
- Summary
  - Five Glide Paths are contrasted across the three funding policies
- Appendix
  - No Annual Contribution Cap
  - \$300M Annual Contribution Cap

# Background

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- Callan completed an asset/liability study in June 2023 which led to approval of a new asset allocation target
  - The new target was designed to meet a long-term return objective of 7.5%
- Act 12 was subsequently passed and significantly modified the funding policy of the Plan as well as closing it to new entrants
- Given significant changes from Act 12, we agreed to complete a new asset-liability study focused on de-risking approaches (Glide Paths)
  - A Glide Path changes the asset allocation over time to reduce variability between assets and liabilities as funded status improves
  - Typically reduce return seeking assets and increase cash and fixed income as the Plan approaches full funding
  - Gradually wind down illiquid assets
- Six glide paths were presented and discussed in the December 5, 2024 Board Meeting (Phase I)
  - Three funding policies were explored as well – No cap, \$250M Cap and \$350M Cap
- This Glide Path analysis is Phase II:
  - Five more Glide Paths are investigated
  - Three funding policies are explored as well – No cap, \$250M Cap and \$300M Cap

# Summary of Act 12 Changes

	Prior Framework	Act 12
Discount Rate	7.50%	6.80%
Plan Status	Open to new hires	Plan closed, effective 1.1.2024
Contribution Setting	5-year Employer Stable Contribution Policy	Contributions determined annually
Funding Policy	<ul style="list-style-type: none"> <li>Effective 1/1/2019, 25-year closed amortization of UAAL</li> <li>After 2019, annual change in UAAL amortized over a closed 15-year period</li> <li>After 2019, changes in assumptions or benefits amortized over closed 25 years</li> <li>Amortization payments increase 2.0% per year</li> </ul>	<ul style="list-style-type: none"> <li>1/1/2024 UAAL is amortized over 30 years</li> <li>Future increases in the UAAL are amortized over 10 years</li> <li>Future decreases in the UAAL are amortized over the remaining amortization period for the 1/1/2024 UAAL, or 10 years if greater.</li> <li>The UAAL payments will be calculated as level-dollar amounts.</li> </ul>
Lag	No Lag	One-year contribution lag
Actuarial Cost Method	Entry Age Normal	Entry Age Normal
Actuarial Value of Assets	5-year average	5-year average Return differential phased-in over 5 years

# Callan 2025 Capital Market Assumptions

Asset Class	Index	10-Year Expected Return *	30-Year Expected Return *	Standard Deviation
<b>Equities</b>				
Broad U.S. Equity	Russell 3000	7.35%	7.75%	17.35%
Large Cap U.S. Equity	S&P 500	7.25%	7.65%	17.00%
Small/Mid Cap U.S. Equity	Russell 2500	7.45%	7.85%	22.00%
Global ex-U.S. Equity	MSCI ACWI ex USA	7.45%	7.85%	21.25%
Developed ex-U.S. Equity	MSCI World ex USA	7.25%	7.65%	20.15%
Emerging Market Equity	MSCI Emerging Markets	7.45%	7.85%	25.65%
CMERS Public Equity	Custom Blend <sup>1</sup>	7.60%	7.95%	17.95%
<b>Fixed Income</b>				
Core U.S. Fixed	Bloomberg Aggregate	4.75%	4.90%	4.40%
TIPS	Bloomberg TIPS	4.55%	4.55%	5.40%
High Yield	Bloomberg High Yield	6.00%	6.40%	11.75%
Bank Loans	S&P/LSTA Leveraged Loan Index	6.10%	6.15%	9.90%
EMD	EMBI Global Diversified	5.35%	5.65%	10.65%
CMERS Fixed Income	Custom Blend <sup>2</sup>	5.35%	5.55%	5.40%
<b>Alternatives</b>				
Core Real Estate	NCREIF ODCE	6.25%	6.65%	14.00%
Private Equity	Cambridge Private Equity	8.50%	8.90%	27.60%
Absolute Return	Callan Hedge FoF Database	5.70%	5.90%	8.20%
Commodities	Bloomberg Commodity	3.90%	3.80%	18.05%
CMERS Liquid Real Assets	Custom Blend <sup>3</sup>	6.30%	6.50%	9.55%
<b>Cash Equivalents</b>				
	90-Day T-Bill	3.00%	3.00%	0.90%
<b>Inflation</b>				
	CPI-U	2.50%	2.35%	1.60%

\*Annualized return

<sup>1</sup> 44% Large Cap U.S. Equity / 11% Small/Mid Cap U.S. Equity / 34% Developed ex-U.S. Equity / 11% Emerging Market Equity

<sup>2</sup> 64.5% Core Fixed Income / 35.5% High Yield

<sup>3</sup> 50% Large Cap US Equity / 35% TIPS / 15% Commodities

- Capital market expectations represent passive exposure (beta only) with the exception of privately-traded asset classes
  - All return projections are net of fees

# The Recession Never Came in 2024; Now What?

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- A recession stayed away after we were sure it would show up.
  - The economy showed some signs of slowing during 2024, but GDP growth persisted, and the job market proved resilient despite some head fakes.
    - *The Federal Reserve's process of rate hikes, from elevated inflation, and spreading geopolitical turmoil barely dented the U.S. economic engine.*
    - *Job openings trended down over 2024, and monthly job gains faltered a couple of times, but November (+212,000) and December (+256,000) saw a bounce back after the hurricanes in the southeast hit in October.*
    - *Real incomes rose and real wage growth boosted consumer incomes and spending.*
    - *GDP growth hit 3% in 2Q, 3.1% in 3Q, and 2.3% for 4Q, and hit an annual rate of 2.5%, below the 2.9% notched in 2023.*
- The Fed completed its mission to raise interest rates to fight inflation and began cutting rates in September 2024.
  - Current target range of 4.25%–4.5%.
    - *Inverted yield curve remains in place, but it's been inverted since 2022.*
- Is recession still inevitable, and if so, when?
  - Strong GDP growth suggests no easing in tight labor markets; the prospect for continued inflationary pressure from the labor market is high.
    - *Getting inflation down to the Fed's stated goal of 2% will take time, and some discomfort. Squeezing out the last of excess inflation will require a period of below trend growth, a loosening of the labor market, and the pain of a rise in unemployment.*

# Projected Fixed Income Returns

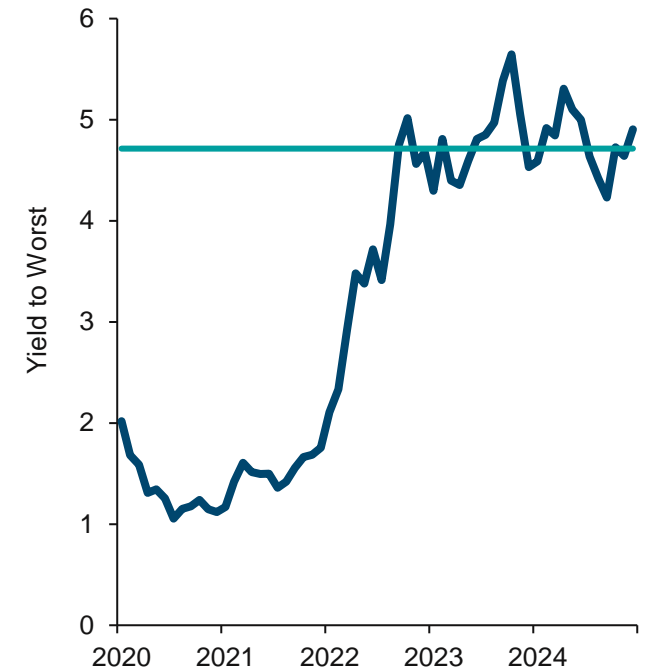
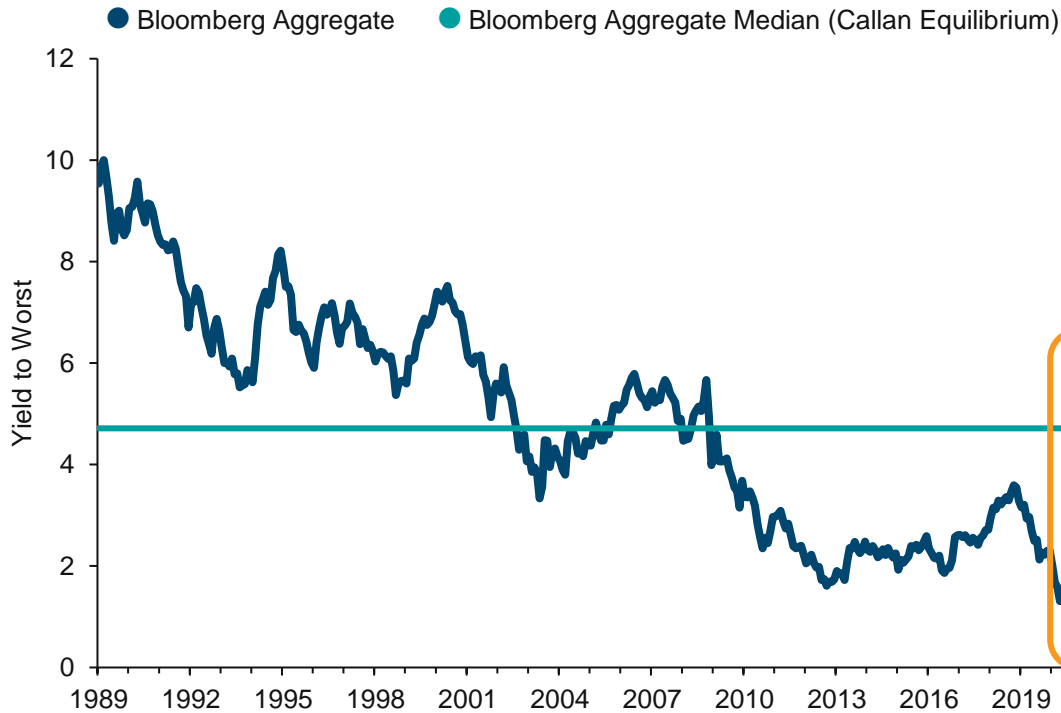
## 10-year projections

	Income Return	+	Capital Gain/Loss	+	Credit Default	+	Roll Return	=	2025 Expected Return	2024 Expected Return	Change vs. 2024
<b>Cash</b>	<b>3.00%</b>		<b>0.00%</b>		<b>0.00%</b>		<b>0.00%</b>		<b>3.00%</b>	<b>3.00%</b>	<b>0.00%</b>
<b>1-3 Year Gov/Credit</b>	<b>3.65%</b>		<b>0.10%</b>		<b>0.00%</b>		<b>0.25%</b>		<b>4.00%</b>	<b>4.25%</b>	<b>-0.25%</b>
1-3 Year Government	3.45%		0.10%		0.00%		0.25%		3.80%	4.15%	
1-3 Year Credit	4.05%		0.20%		-0.20%		0.25%		4.30%	4.65%	
<b>Intermediate Gov/Credit</b>	<b>4.25%</b>		<b>0.00%</b>		<b>-0.10%</b>		<b>0.25%</b>		<b>4.40%</b>	<b>4.75%</b>	<b>-0.35%</b>
Intermediate Gov	3.95%		0.00%		0.00%		0.25%		4.20%	4.45%	
Intermediate Credit	4.70%		0.00%		-0.20%		0.25%		4.75%	5.25%	
<b>Aggregate</b>	<b>4.60%</b>		<b>0.00%</b>		<b>-0.10%</b>		<b>0.25%</b>		<b>4.75%</b>	<b>5.25%</b>	<b>-0.50%</b>
Government	4.20%		0.10%		0.00%		0.25%		4.55%	4.85%	
Securitized	4.35%		0.30%		0.00%		0.25%		4.90%	5.35%	
Credit	5.30%		-0.30%		-0.30%		0.25%		4.95%	5.60%	
<b>Long Duration Gov/Credit</b>	<b>5.40%</b>		<b>-0.60%</b>		<b>-0.20%</b>		<b>0.60%</b>		<b>5.20%</b>	<b>6.00%</b>	<b>-0.80%</b>
Long Government	4.60%		-0.40%		0.00%		0.60%		4.80%	5.40%	
Long Credit	5.90%		-0.80%		-0.30%		0.60%		5.40%	6.30%	
<b>TIPS</b>	<b>4.30%</b>		<b>0.00%</b>		<b>0.00%</b>		<b>0.25%</b>		<b>4.55%</b>	<b>5.05%</b>	<b>-0.50%</b>
<b>Global ex-U.S. Fixed</b>	<b>2.80%</b>		<b>-0.10%</b>		<b>-0.10%</b>		<b>0.25%</b>		<b>2.85%</b>	<b>3.15%</b>	<b>-0.30%</b>
<b>High Yield</b>	<b>8.15%</b>		<b>-0.30%</b>		<b>-2.10%</b>		<b>0.25%</b>		<b>6.00%</b>	<b>6.80%</b>	<b>-0.80%</b>
<b>Emerging Markets Debt</b>	<b>7.40%</b>		<b>-0.40%</b>		<b>-1.90%</b>		<b>0.25%</b>		<b>5.35%</b>	<b>6.35%</b>	<b>-1.00%</b>
<b>Bank Loans</b>	<b>8.20%</b>		<b>-0.40%</b>		<b>-1.70%</b>		<b>0.00%</b>		<b>6.10%</b>	<b>6.55%</b>	<b>-0.45%</b>



# Drowning Out the Noise

## Historical Yield



- There has been a lot of rate volatility, but rates have been range-bound around our equilibrium.
- We have been updating our bond assumptions to drown out the short-term noise and focus more on the longer-term trends.

# Equity Forecasts

## Building block model

Index	Forecasted Dividend Yield	Net Buyback Yield	Inflation	Real Earnings Growth	Valuation Adjustment	Total Expected Return
S&P 500	1.75%	0.75%	2.50%	2.50%	-0.25%	7.25%
MSCI World ex USA	3.50%	0.00%	2.00%	1.75%	0.00%	7.25%
MSCI Emerging Markets	3.30%	-2.90%	3.25%	3.80%	0.00%	7.45%

- Our return expectations for U.S. large cap (S&P 500) and developed ex-U.S. markets (MSCI World ex-USA) are the same, but the paths to those returns are different.
- U.S. companies tend to deliver more return from earnings growth than from return of capital via dividends or buybacks.
  - Developed ex-U.S. companies have the opposite relationship.
  - Emerging market companies tend to deliver strong earnings growth, which is somewhat offset by net issuance of shares as these companies issue stock to support growth.

# U.S. Equity Market: Key Metrics

## S&P 500 valuation measures

S&P 500 Index: Forward P/E Ratio

Valuation Measure	Latest	30-year Average*	Std Dev Over- / Under-valued
Forward P/E	21.47x	16.86x	1.41
Shiller's P/E	37.04x	28.02x	1.48
Dividend yield	1.33%	1.98%	1.82
Price to book	4.47x	3.19x	1.52
Price to cash flow	16.48x	11.34x	2.17
EY minus Baa yield	-0.85%	0.69%	0.71



- Forward P/E (21.5) is about one standard deviation above its long-term average (16.9).

Source: FactSet, FRB, Refinitiv Datastream, Robert Shiller, Standard & Poor's, Thomson Reuters, J.P. Morgan Asset Management.

Price-to-earnings is price divided by consensus analyst estimates of earnings per share for the next 12 months as provided by IBES since March 1994 and by FactSet since January 2022. Average P/E and standard deviations are calculated using 30 years of history. Shiller's P/E uses trailing 10-years of inflation-adjusted earnings as reported by companies. Dividend yield is calculated as the next 12-months consensus dividend divided by most recent price. Price-to-book ratio is the price divided by book value per share. Price-to-cash flow is price divided by NTM cash flow. EY minus Baa yield is the forward earnings yield (consensus analyst estimates of EPS over the next 12 months divided by price) minus the Bloomberg US corporate Baa yield since December 2008 and interpolated using the Moody's Baa seasoned corporate bond yield for values beforehand. Std. dev. over-/under-valued is calculated using the average and standard deviation over 30 years for each measure. \*Averages and standard deviations for dividend yield and P/CF are since November 1995 due to data availability. Guide to the Markets – U.S. Data are as of December 31, 2024.

# Current Target Mix

	Target
<b>Public Equity</b>	<b>39.0%</b>
<b>Fixed Income + Cash</b>	<b>29.0%</b>
- Core	18.1%
- High Yield	10.0%
- Cash	1.0%
<b>Real Assets</b>	<b>13.0%</b>
- Liquid Real Assets	3.3%
- Private Real Estate	9.7%
<b>Private Equity</b>	<b>12.0%</b>
<b>Absolute Return</b>	<b><u>7.0%</u></b>
	100.0%

2025 Assumptions	
30-Year Expected Return	7.5%
10-Year Expected Return	7.2%
Standard Deviation	12.2%

2024 Assumptions	
30-Year Expected Return	7.6%
10-Year Expected Return	7.5%
Standard Deviation	12.2%

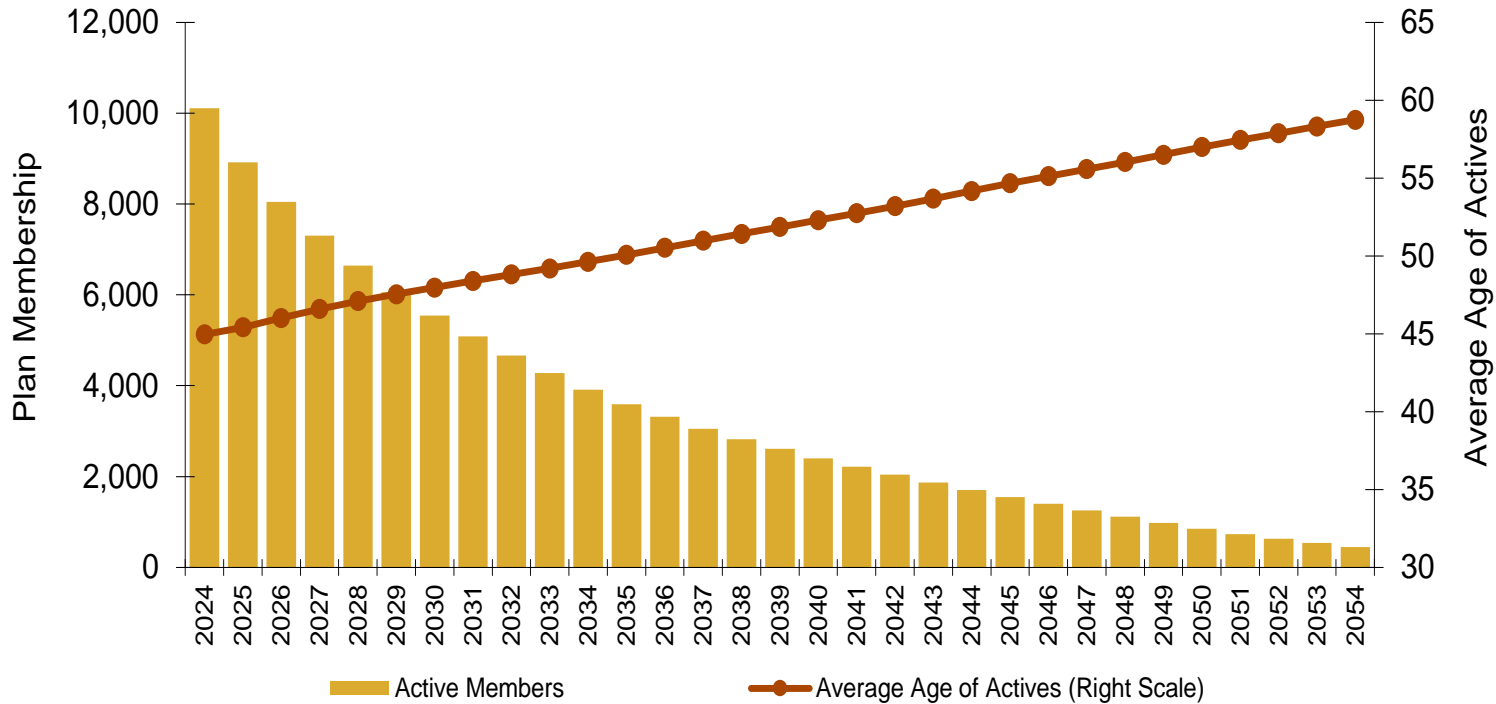
2023 Assumptions	
30-Year Expected Return	7.5%
10-Year Expected Return	7.0%
Standard Deviation	12.5%

- 10-year capital market assumptions are updated annually with (typically) modest changes from year to year
  - 30-year capital market assumptions are heavily anchored in long-term history and change even less from year to year
- The current target was adopted in 2023 with an expectation to meet the discount rate of 7.5% over 30 years
- The 30-year expected return on this mix has stayed within 10 bps over the last few years
- The 10-year expected return has ranged from 7.0% to 7.5% and is currently at 7.2%

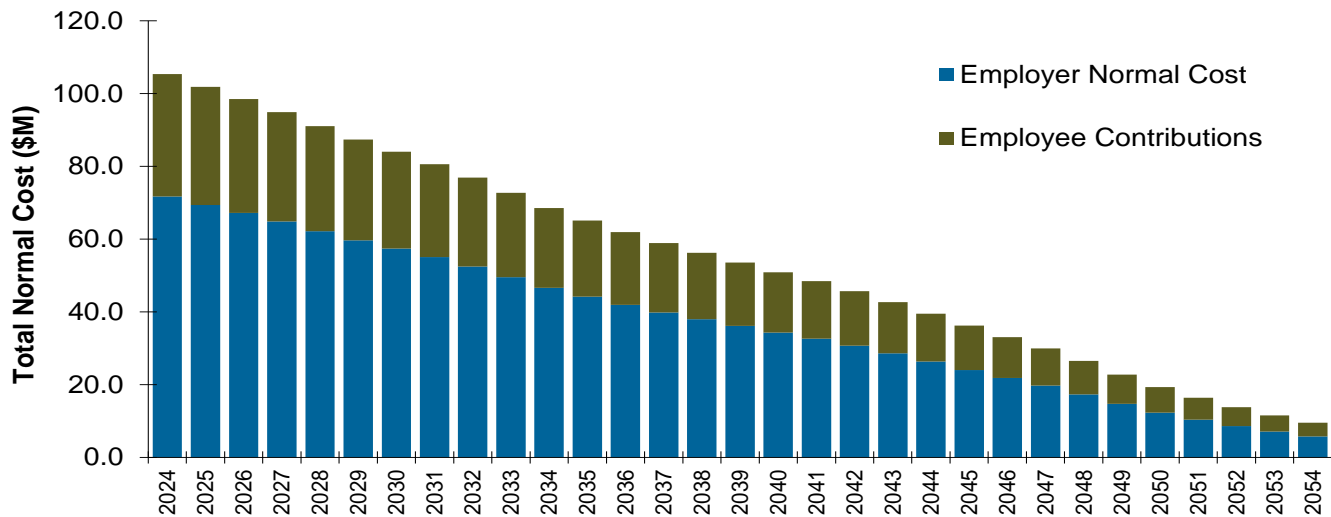


Time Horizon

# Plan is Closed

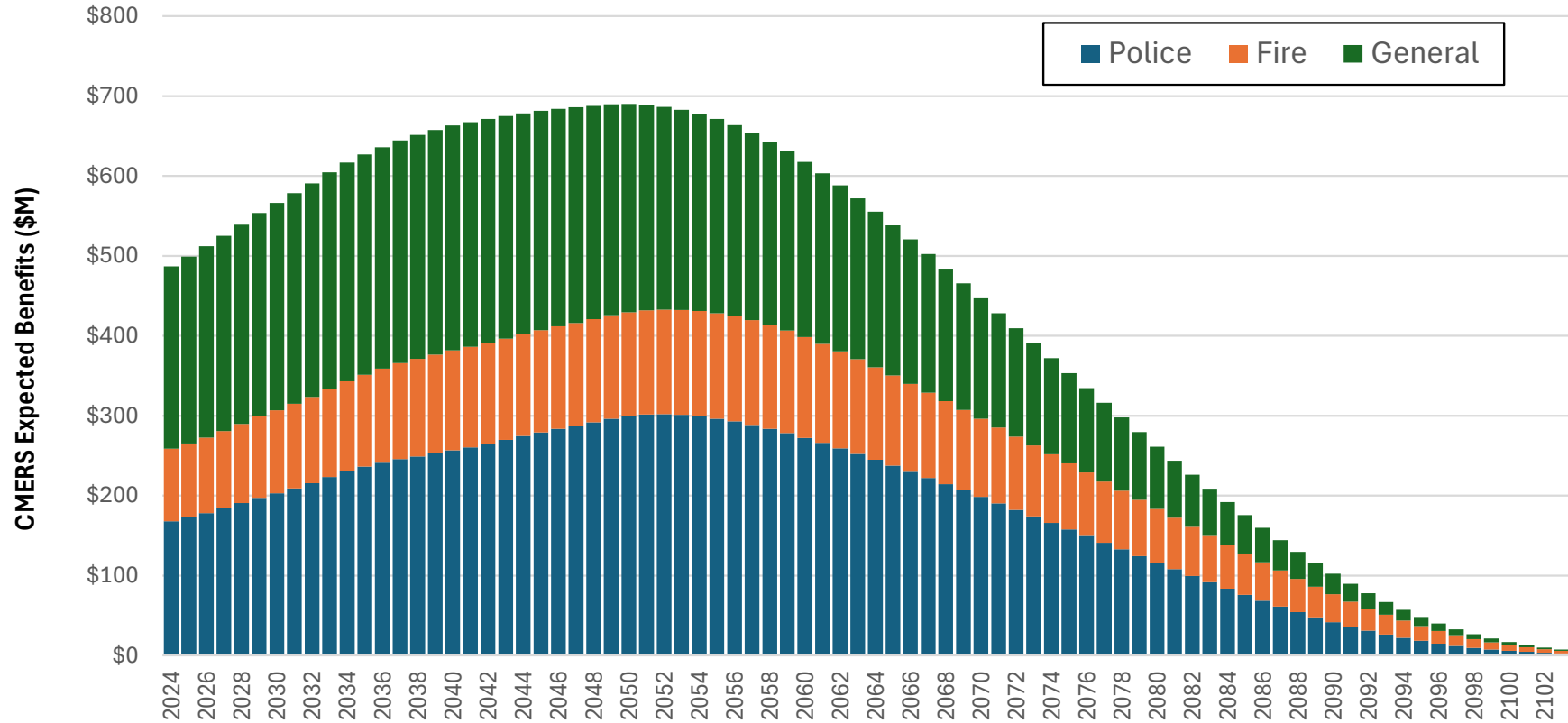


- Plan is closed to new hires
- In just 10 years, there is expected to be only 3,900 employees accruing a benefit with an average age of 50



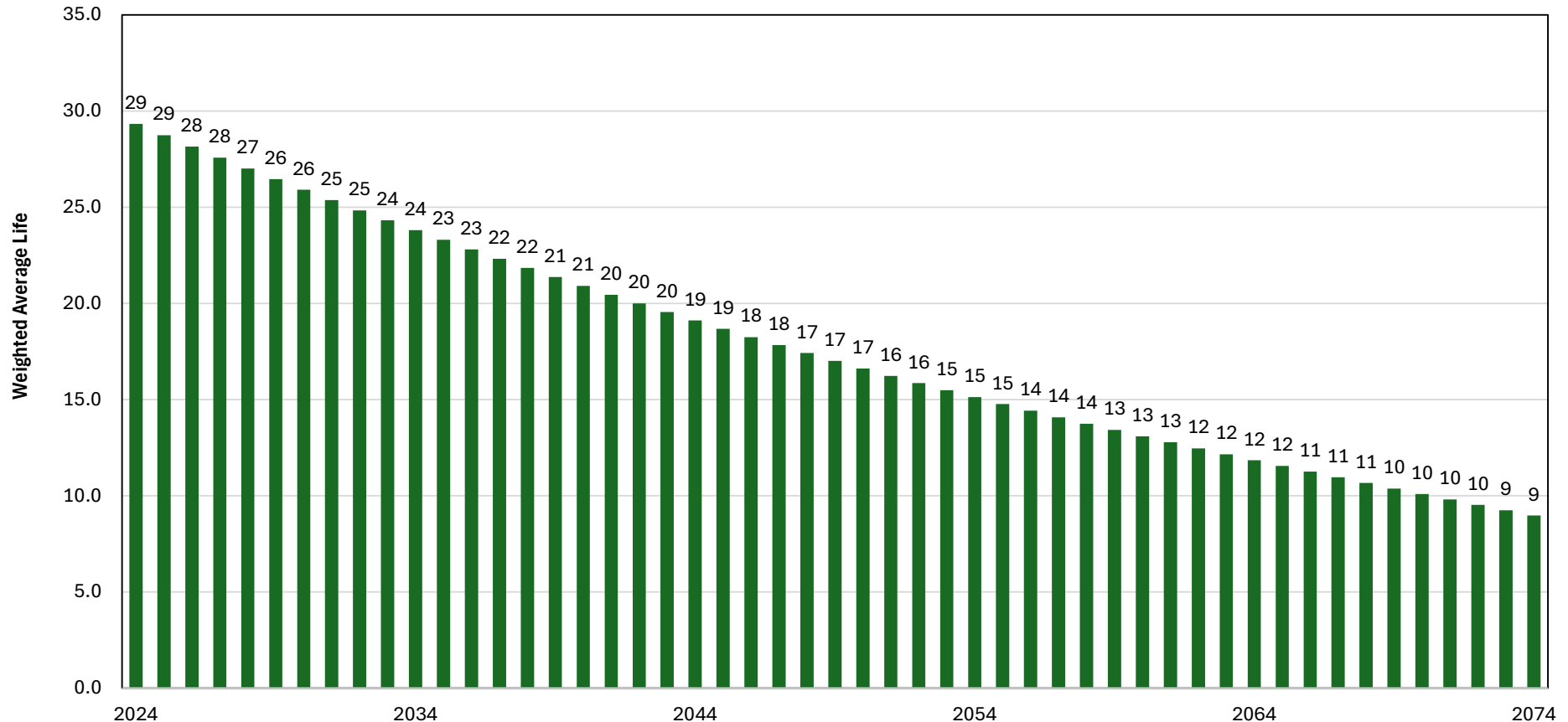
- Total Normal Cost (ongoing benefit accrual) will decrease as actives decrement from the Plan

# Expected Benefit Payments Stretch For Many Years



- Despite the Plan being closed, benefit payments are expected to increase for the next 25 years

# Time Horizon is Still Sufficiently Long to Take Investment Risk



- Weighted Average Life (WAL) is an estimate of the expected time horizon of a Plan
  - Time horizon is gradually shortening
- Time horizon is still long while the WAL > 20
  - WAL declines to 20 in 2042 (18 years from now)





Glide Paths Examined

# Glide Paths Examined

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	Funded Status Node					
	Initial	80%	85%	90%	95%	100%
<b>GlidePath A</b>	<b>Target</b>	<b>Mix 1</b>	<b>Mix 2</b>	<b>Mix 3</b>	<b>Mix 4</b>	<b>Mix 5</b>
<b>GlidePath B</b>	<b>Mix 1</b>		<b>Mix 2</b>	<b>Mix 3</b>	<b>Mix 4</b>	<b>Mix 5</b>
<b>GlidePath C</b>	<b>Mix 2</b>		<b>Mix 3</b>	<b>Mix 4</b>	<b>Mix 5</b>	
<b>GlidePath D</b>	<b>Mix 2</b>			<b>Mix 3</b>	<b>Mix 4</b>	<b>Mix 5</b>
<b>GlidePath E</b>	<b>Mix 2</b>		<b>Mix 4</b>		<b>Mix 5</b>	

- A Glide Path is a road map for future changes in asset allocation
- Glide Paths de-risk at slightly different rates
  - GP\_A initially stays at current target while other paths immediately de-risk to an alternative mix (Mix 1 or Mix 2)
  - GP\_C and GP\_E are relatively conservative since they de-risk the fastest (Mix 3 or Mix 4 by 85% funded node)
- All Glide Paths terminate at Mix 5
  - Mix 5 is reached at 95% or 100% funded

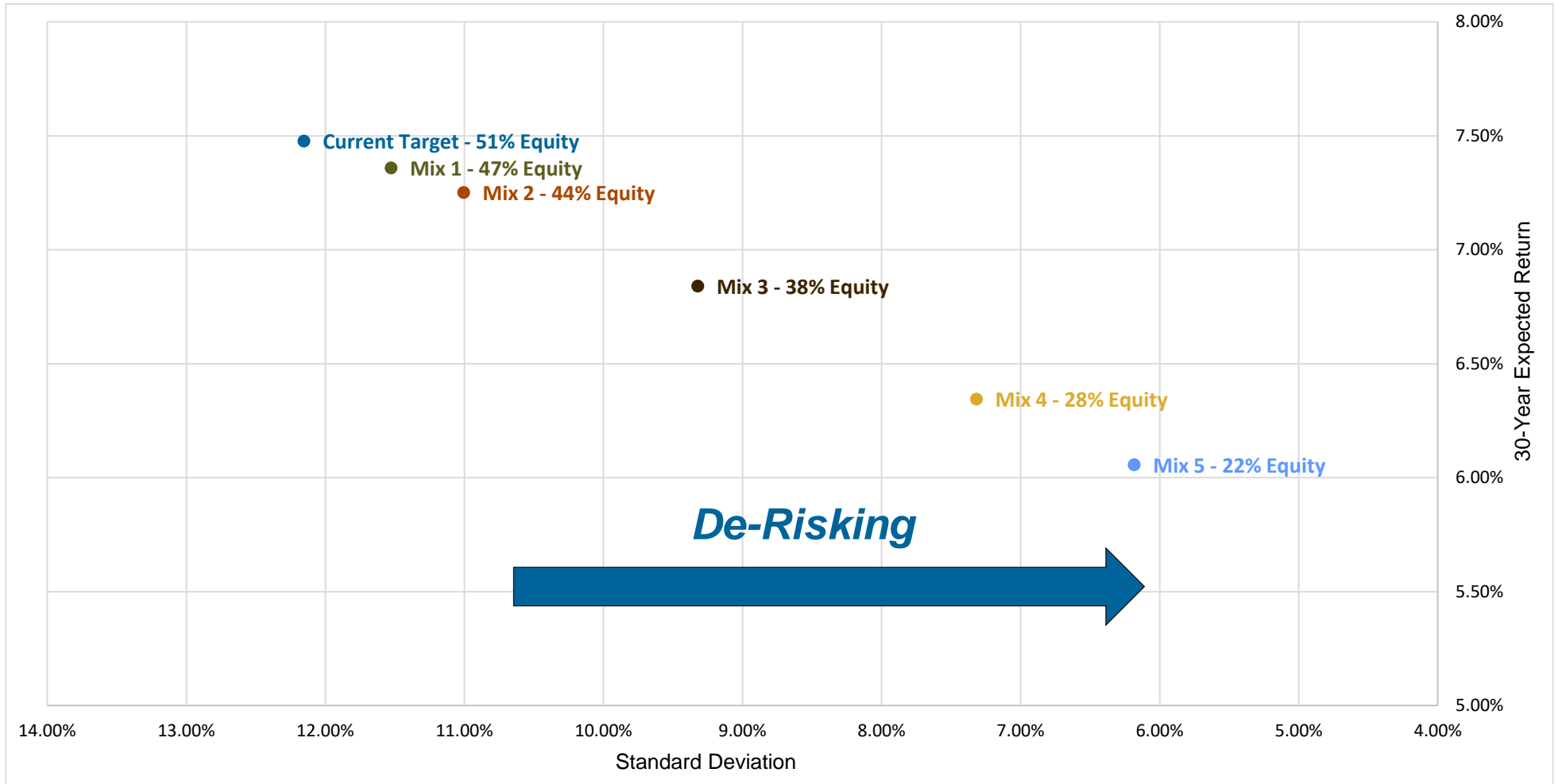
# Alternative Asset Mixes

	Target	Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
<b>Public Equity</b>	<b>39%</b>	<b>36%</b>	<b>34%</b>	<b>34%</b>	<b>28%</b>	<b>22%</b>
<b>Fixed Income + Cash</b>	<b>29%</b>	<b>32%</b>	<b>36%</b>	<b>45%</b>	<b>57%</b>	<b>66%</b>
- Core	18%	20%	23%	33%	45%	56%
- High Yield	10%	11%	12%	10%	9%	7%
- Cash	1%	1%	1%	2%	3%	3%
<b>Real Assets</b>	<b>13%</b>	<b>12%</b>	<b>11%</b>	<b>8%</b>	<b>6%</b>	<b>5%</b>
- Liquid Real Assets	3%	3%	3%	3%	2%	2%
- Private Real Estate	10%	9%	8%	5%	4%	3%
<b>Private Equity</b>	<b>12%</b>	<b>11%</b>	<b>10%</b>	<b>4%</b>	<b>0%</b>	<b>0%</b>
<b>Absolute Return</b>	<b><u>7%</u></b>	<b><u>9%</u></b>	<b><u>9%</u></b>	<b><u>9%</u></b>	<b><u>9%</u></b>	<b><u>7%</u></b>
	100%	100%	100%	100%	100%	100%
30-Year Expected Return	7.5%	7.4%	7.3%	6.8%	6.3%	6.1%
10-Year Expected Return	7.2%	7.1%	7.0%	6.6%	6.1%	5.8%
Actuarial Discount Rate *	6.8%	6.8%	6.8%	6.5%	6.0%	5.5%
Standard Deviation	12.2%	11.5%	11.0%	9.3%	7.3%	6.2%
Public & Private Equity	51%	47%	44%	38%	28%	22%
Illiquid Investments	29%	29%	27%	18%	13%	10%

\* Discount rate employed if de-risk to corresponding asset mix. Discount rate calculated as lesser of 6.8% and Callan 10-Year Expected Return

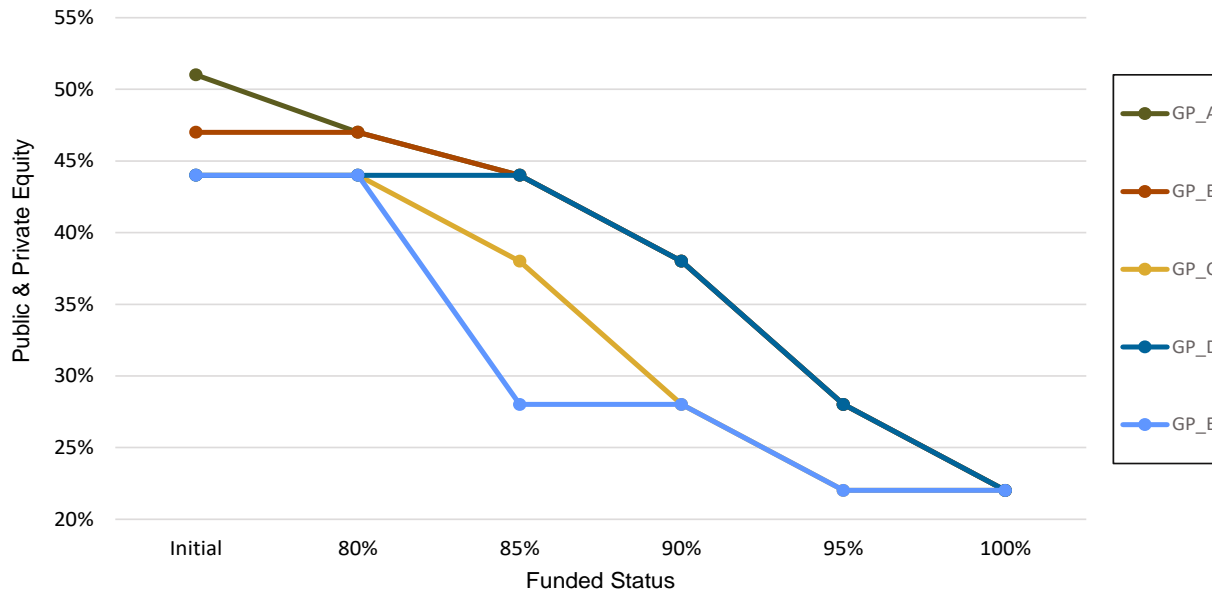
- Six future alternative asset mixes including the current target are shown above
  - Arranged by level of risk taking – standard deviation decreases as you move right
  - Private equity target decreases quickly (eliminated by Mix 4) as it takes a long time to wind down
  - Cash is slightly increased in anticipation of higher liquidity needs
- In practice, future asset mix alternatives would be reassessed and optimized based on current liquidity needs and capital market assumptions

# Alternative Mix Return vs. Risk



- Current target and alternative mixes along the Glide Paths are graphed above
  - Percentage in equity includes public and private
  - Long-term expected return ranges from 6.1% to 7.5%
  - Risk ranges from 6% to 12%

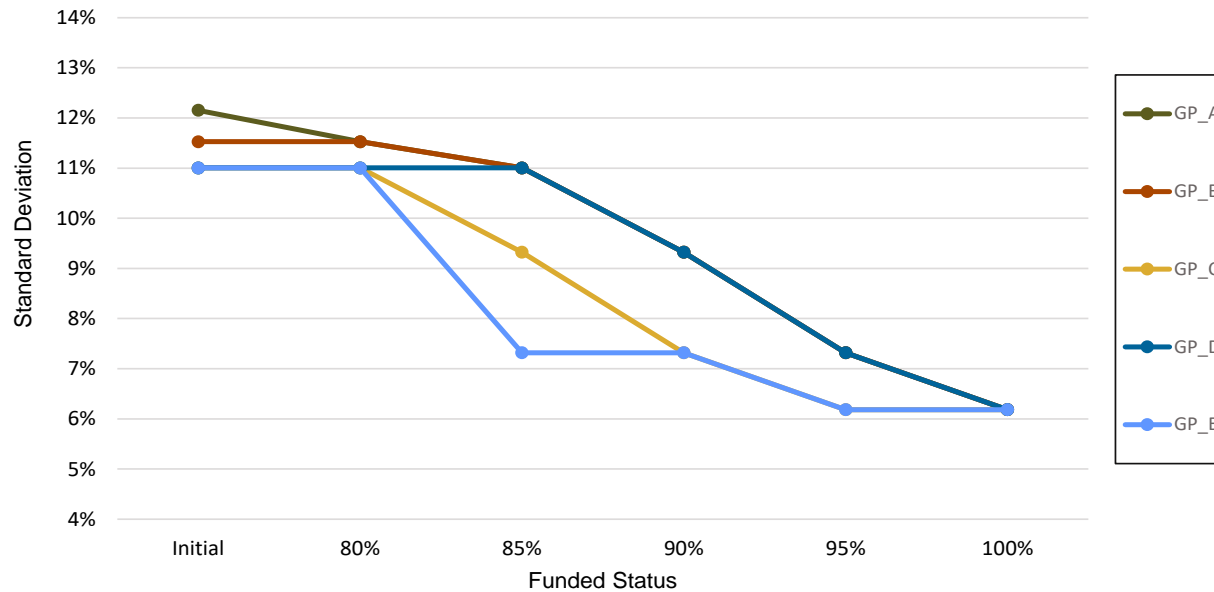
# Glide Paths: Equity Exposure



- Graph visually displays the amount of equity exposure at each funded status node
- Equity exposure is a primary driver of the level of risk

Public & Private Equity by Funded Status Node						
	Initial	80%	85%	90%	95%	100%
GP_A	51%	47%	44%	38%	28%	22%
GP_B	47%	47%	44%	38%	28%	22%
GP_C	44%	44%	38%	28%	22%	22%
GP_D	44%	44%	44%	38%	28%	22%
GP_E	44%	44%	28%	28%	22%	22%

# Glide Paths: Risk (Standard Deviation)



- Graph visually displays the risk at each funded status node

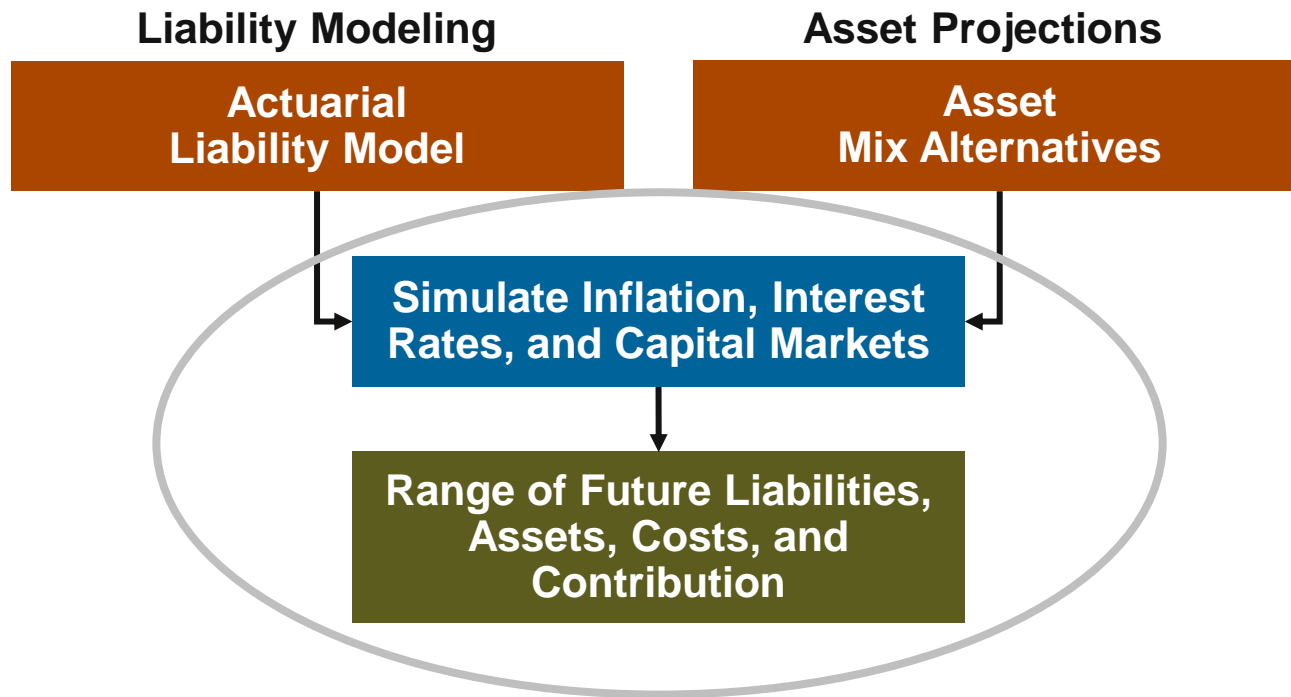
Standard Deviation by Funded Status Node						
	Initial	80%	85%	90%	95%	100%
GP_A	12%	12%	11%	9%	7%	6%
GP_B	12%	12%	11%	9%	7%	6%
GP_C	11%	11%	9%	7%	6%	6%
GP_D	11%	11%	11%	9%	7%	6%
GP_E	11%	11%	7%	7%	6%	6%



# Glide Path Analysis

# Simulate Financial Condition

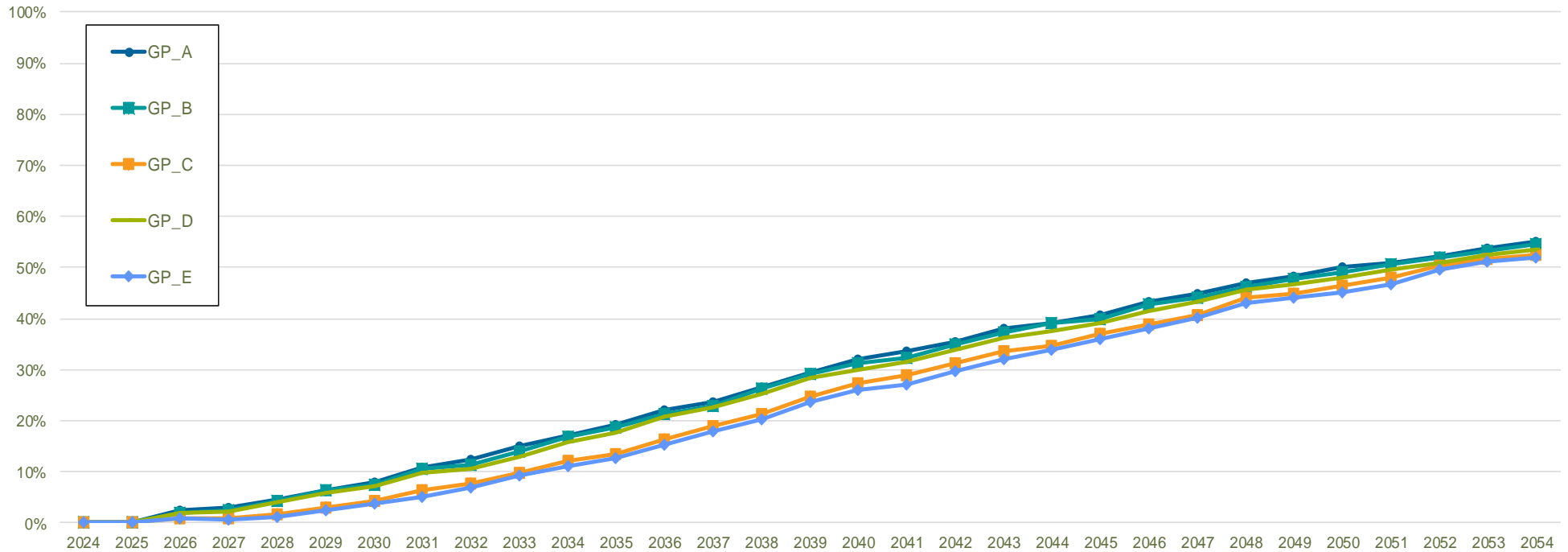
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- Generate 2,000 simulations per year, per Glide Path to capture possible future economic scenarios and their effect on the portfolio
- The simulation results are then ranked from highest to lowest to develop probability distributions



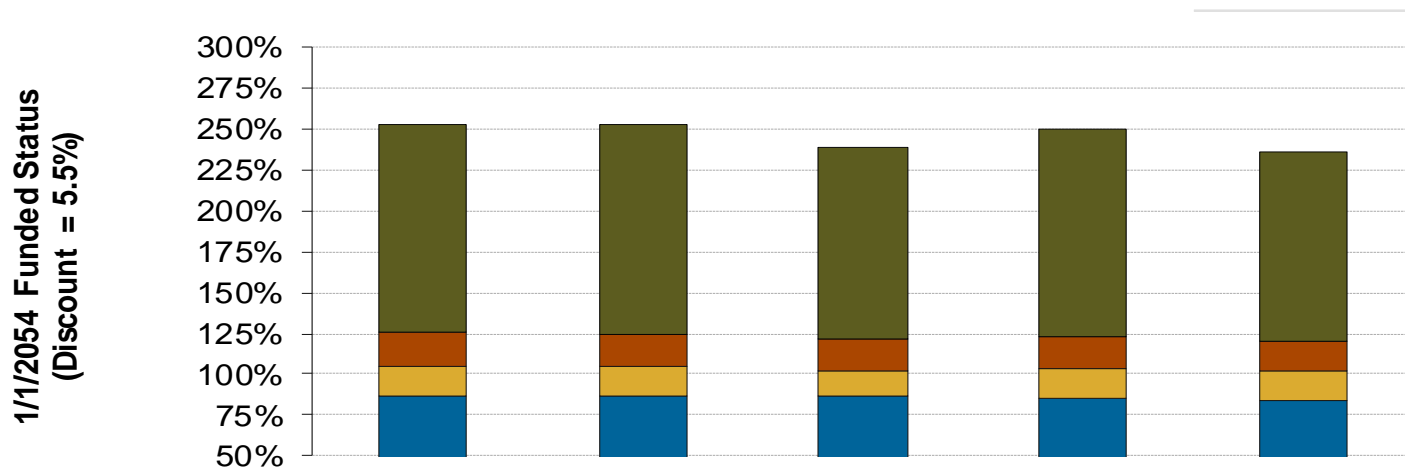
# Probability of Full Funding



	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
GP_A	0%	0%	2%	3%	5%	6%	8%	11%	12%	15%	17%	19%	22%	24%	27%	30%	32%	34%	36%	38%	39%	41%	43%	45%	47%	48%	50%	51%	52%	54%	55%
GP_B	0%	0%	2%	3%	4%	6%	7%	11%	11%	14%	17%	19%	21%	23%	26%	29%	31%	32%	35%	37%	39%	40%	43%	44%	46%	48%	49%	51%	52%	53%	54%
GP_C	0%	0%	1%	1%	2%	3%	4%	6%	8%	10%	12%	14%	16%	19%	21%	25%	27%	29%	31%	34%	35%	37%	39%	41%	44%	45%	47%	48%	50%	52%	52%
GP_D	0%	0%	2%	2%	4%	6%	7%	10%	11%	13%	16%	18%	21%	23%	25%	28%	30%	31%	34%	36%	38%	39%	42%	43%	46%	47%	48%	50%	51%	53%	53%
GP_E	0%	0%	1%	1%	1%	2%	4%	5%	7%	9%	11%	13%	15%	18%	20%	24%	26%	27%	30%	32%	34%	36%	38%	40%	43%	44%	45%	47%	50%	51%	52%

- The above chart illustrates the probability of full funding (100% funded) across the Glide Paths
  - Probability above 50% is highlighted in green
- Full funding is expected to be more than 25 years away if contributions are capped at \$250M

# 30-Year Projected Funded Status

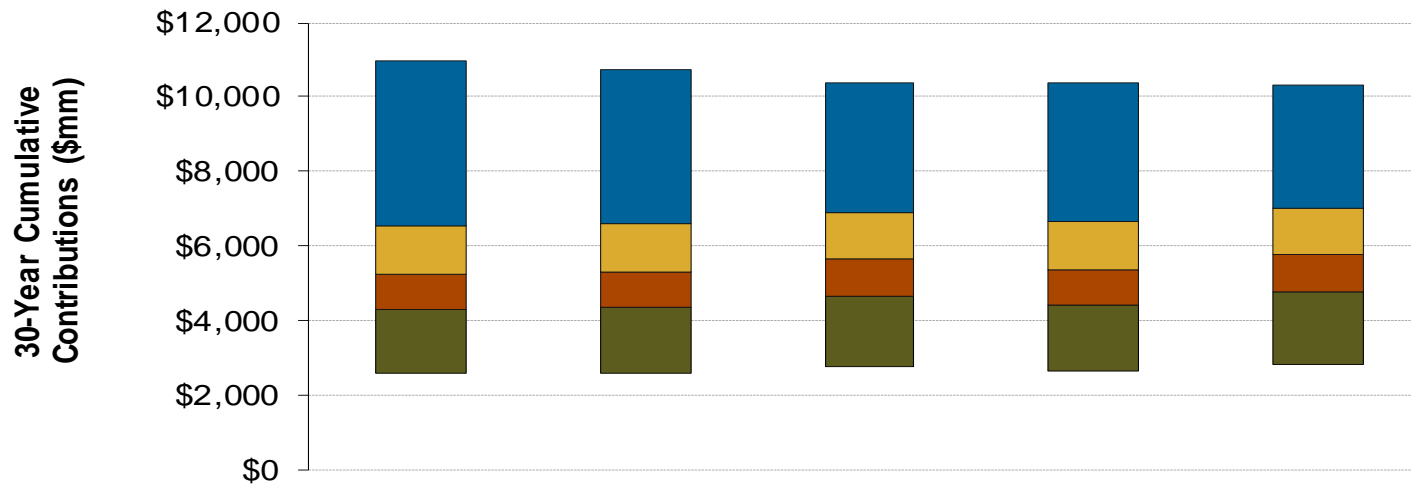


Percentile	GP_A	GP_B	GP_C	GP_D	GP_E
2.5th	253%	253%	240%	250%	236%
33rd	126%	125%	122%	123%	120%
50th	105%	104%	102%	103%	101%
67th	87%	86%	86%	85%	84%
97.5th	0%	0%	0%	0%	0%
30-Year Return	6.7%	6.6%	6.5%	6.6%	6.5%
30-Year Std Dev	10.1%	9.9%	9.4%	9.8%	9.2%
1/1/2054 Discount Rate	5.5%	5.5%	5.5%	5.5%	5.5%

← Assets run out

- The above graphic depicts 30-Year Projected Funded Status
  - Actuarial liability is discounted at 5.5% in Year 30 to enable fair comparison between Paths
- A surplus is expected across all Glide Paths (101% - 105%)
- All Glide Paths have a chance of running out of assets when contributions are capped at \$250M

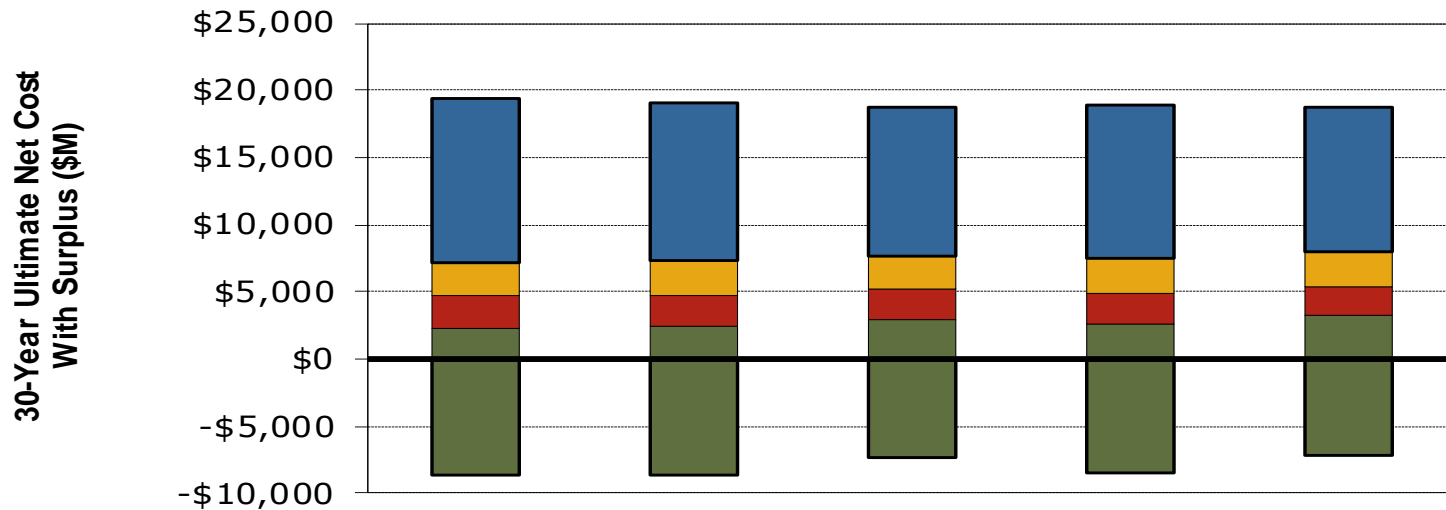
# 30-Year Cumulative Contributions



Percentile	GP_A	GP_B	GP_C	GP_D	GP_E
97.5th	\$10,980	\$10,734	\$10,384	\$10,384	\$10,323
67th	6,540	6,586	6,870	6,671	7,015
50th	5,248	5,312	5,635	5,376	5,756
33rd	4,298	4,348	4,630	4,388	4,746
2.5th	2,606	2,610	2,791	2,620	2,830
30-Year Return	6.7%	6.6%	6.5%	6.6%	6.5%
30-Year Std Dev	10.1%	9.9%	9.4%	9.8%	9.2%

- Contributions can exceed \$7.5B (\$250M x 30) when assets run out and Plan becomes pay-as-you-go
- GP\_C and GP\_E have the highest expected contribution outlay
- GP\_A and GP\_B have lower expected contributions but higher worse case (97.5<sup>th</sup> percentile) contributions
  - GP\_D falls between the other Glide Paths in expected contributions with the same worse case as GP\_C

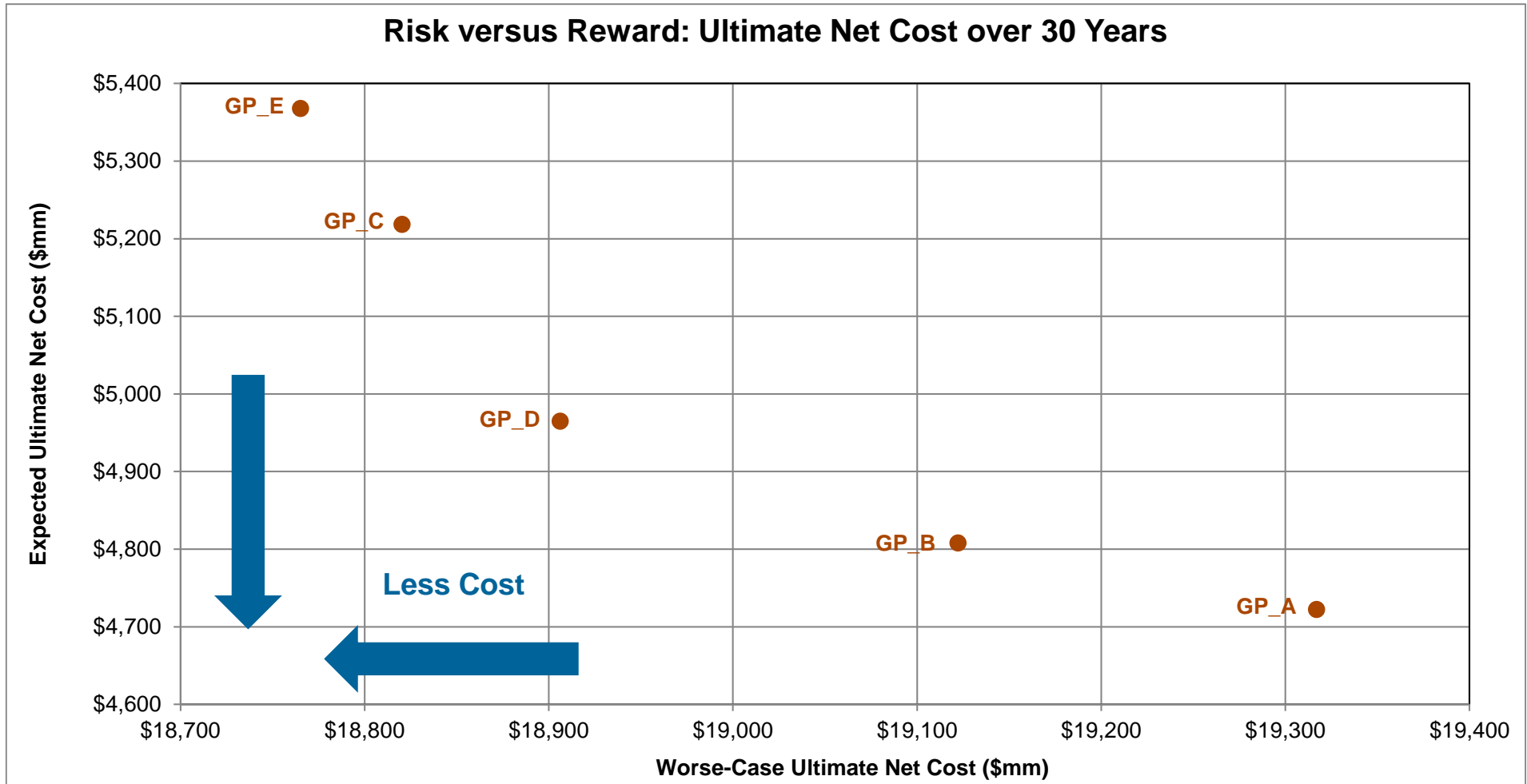
# 30-Year Ultimate Net Cost



Percentile	GP_A	GP_B	GP_C	GP_D	GP_E
97.5th	\$19,317	\$19,122	\$18,820	\$18,906	\$18,765
67th	7,231	7,331	7,636	7,462	7,958
50th	4,722	4,808	5,218	4,965	5,368
33rd	2,366	2,443	2,977	2,617	3,245
2.5th	-8,651	-8,628	-7,351	-8,435	-7,174
Expected Return	6.7%	6.6%	6.5%	6.6%	6.5%
Standard Deviation	10.1%	9.9%	9.4%	9.8%	9.2%
1/1/2054 Discount Rate	5.5%	5.5%	5.5%	5.5%	5.5%

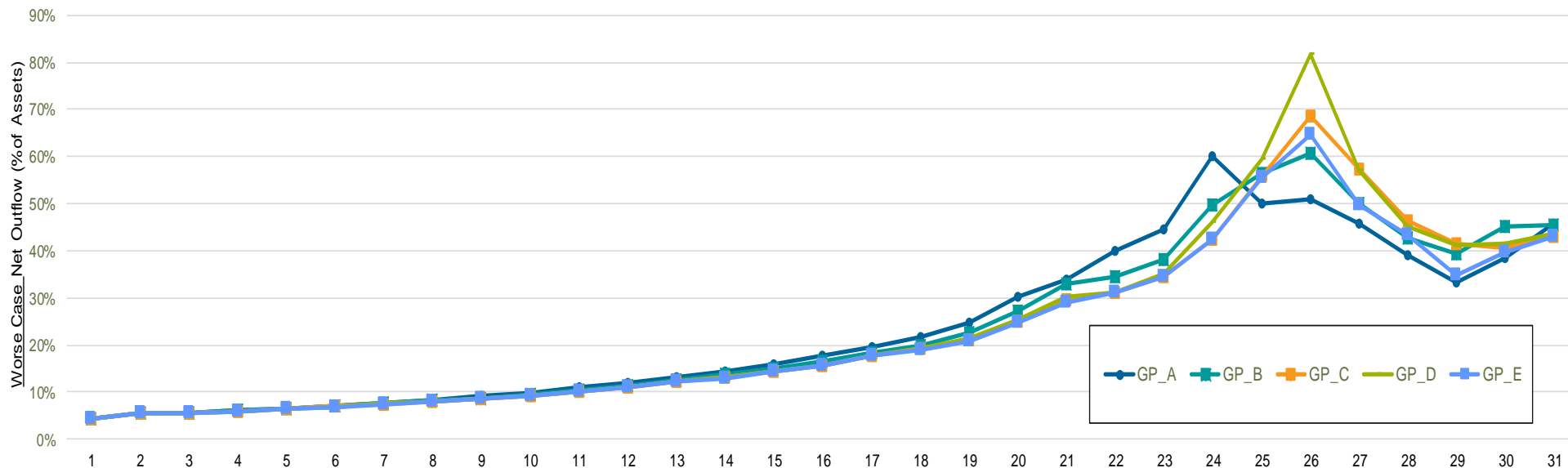
- UNC = 30-Year Cumulative Contributions + 1/1/2054 Unfunded Actuarial Liability
  - UNC captures what is expected to be paid over 30 years plus what is owed at the end of the 30-year period
- Very wide distribution of outcomes possible – from ~\$8B surplus to ~\$19B deficit
- There is a return-risk tradeoff
  - More aggressive Glide Paths have lower expected case cost but higher worse case cost

# Risk-Reward: Ultimate Net Cost



- Clear risk-reward tradeoff: lower expected case cost comes with higher worse case cost

# Worse Case Net Outflow (% of Assets)



	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
GP_A	4.2%	5.6%	5.6%	6.2%	6.6%	7.2%	7.8%	8.4%	9.1%	9.7%	10.9%	11.9%	13.2%	14.4%	15.9%	17.6%	19.6%	21.7%	24.7%	30.2%	33.9%	39.9%	44.6%	60.1%	50.1%	51.1%	45.9%	39.2%	33.3%	38.6%	45.7%
GP_B	4.2%	5.5%	5.6%	6.1%	6.5%	7.0%	7.7%	8.2%	8.8%	9.5%	10.5%	11.3%	12.7%	13.7%	15.1%	16.6%	18.3%	19.9%	22.7%	27.1%	33.1%	34.6%	38.2%	49.7%	56.5%	60.7%	49.9%	42.6%	39.2%	45.2%	45.5%
GP_C	4.2%	5.4%	5.5%	6.0%	6.4%	6.9%	7.4%	8.0%	8.5%	9.2%	10.1%	11.0%	12.2%	13.0%	14.5%	15.5%	17.7%	19.2%	21.2%	25.1%	29.8%	31.1%	34.5%	42.3%	55.7%	68.7%	57.3%	46.3%	41.5%	40.5%	43.1%
GP_D	4.2%	5.4%	5.5%	6.0%	6.4%	6.9%	7.6%	8.0%	8.6%	9.3%	10.2%	11.0%	12.2%	13.0%	14.5%	15.5%	17.7%	19.2%	21.3%	25.4%	30.1%	31.1%	35.2%	46.1%	59.6%	81.8%	56.9%	45.1%	41.3%	41.6%	43.7%
GP_E	4.2%	5.4%	5.5%	6.0%	6.4%	6.9%	7.4%	8.0%	8.5%	9.2%	10.0%	10.9%	12.2%	13.0%	14.5%	15.5%	17.7%	19.0%	20.9%	24.7%	29.2%	31.1%	34.6%	42.3%	55.6%	64.6%	49.6%	43.2%	35.0%	39.8%	43.1%

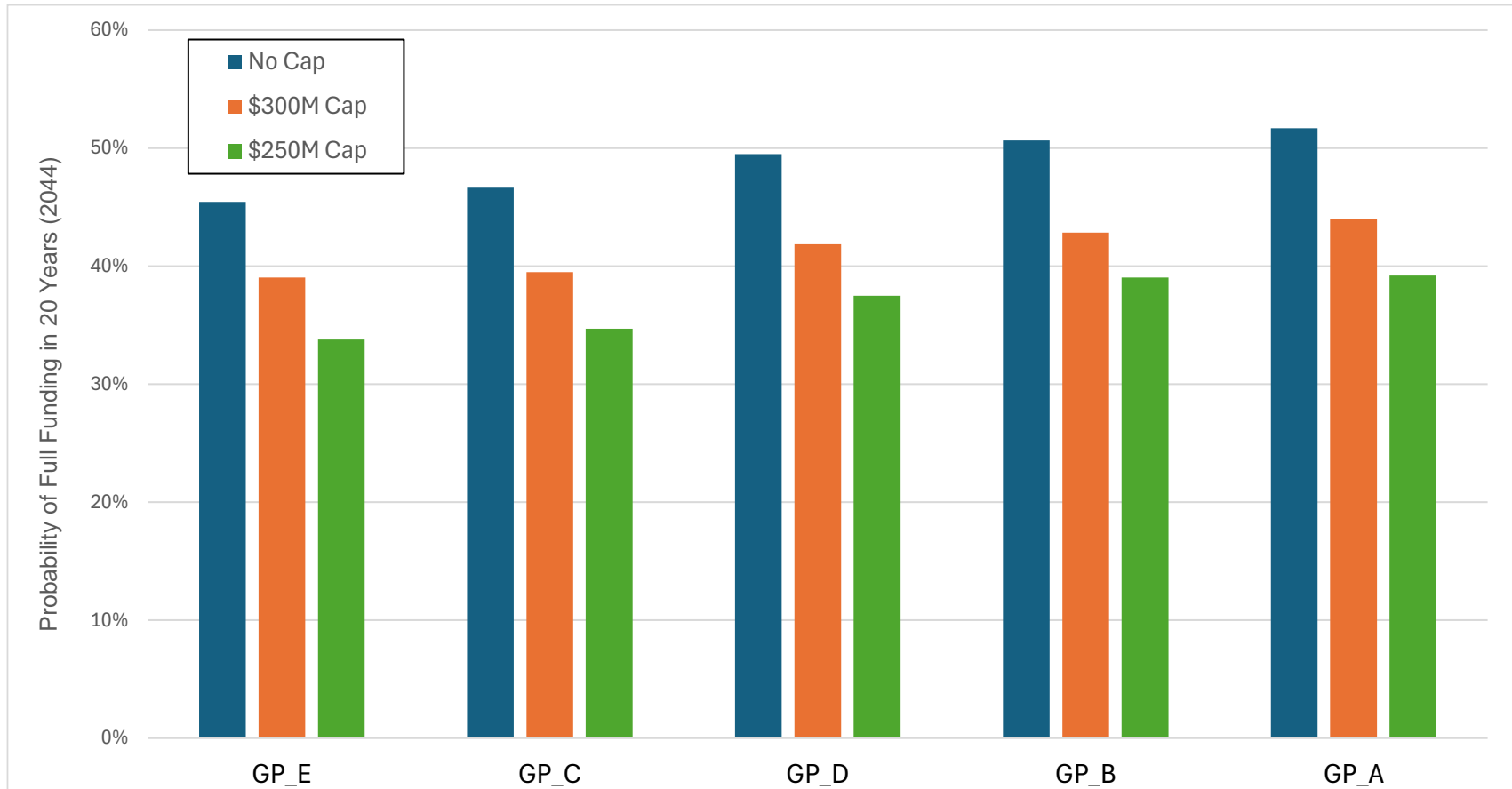
- In a worse case scenario, liquidity needs materially increase across all Glide Paths if contributions are capped

< 5%
5 - 7%
7 - 10%
> 10%



## Summary and Conclusions

# Probability of Full Funding in 2044

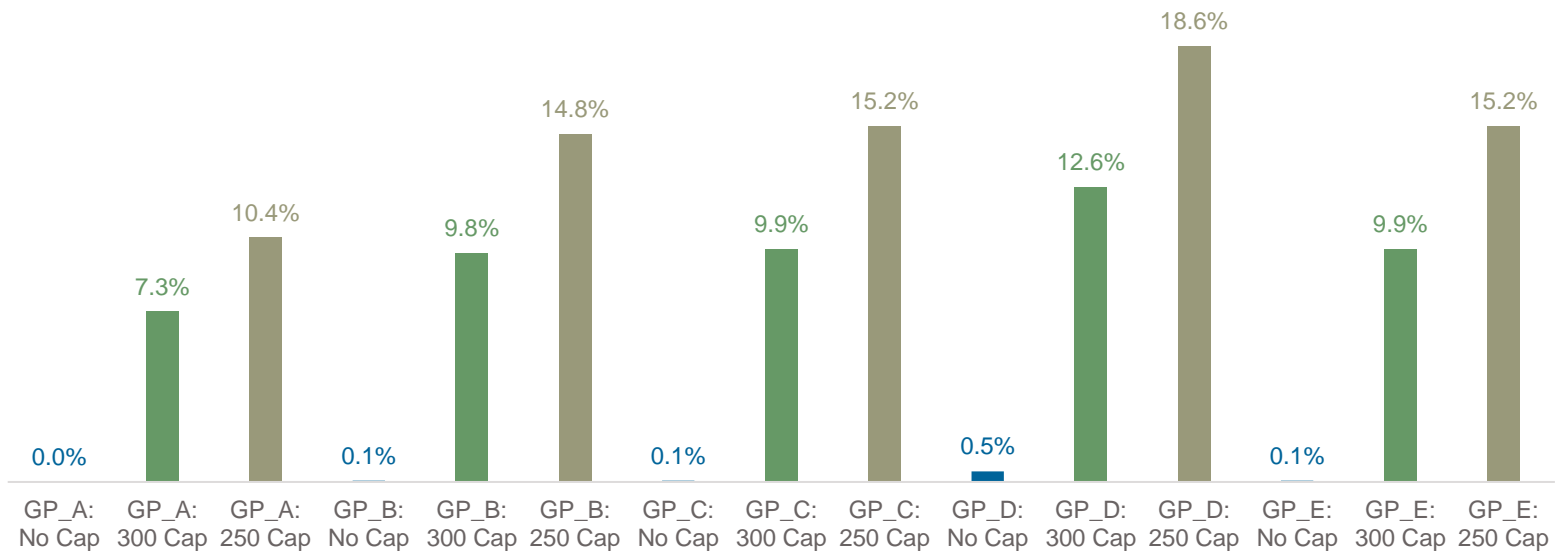


- Probability of Full Funding increases as you move from most conservative to most aggressive Glide Path
- Probability falls 6-8% if contributions are capped at \$300M
- Probability falls 12-13% if contributions are capped at \$250M



# Probability of No Derisking

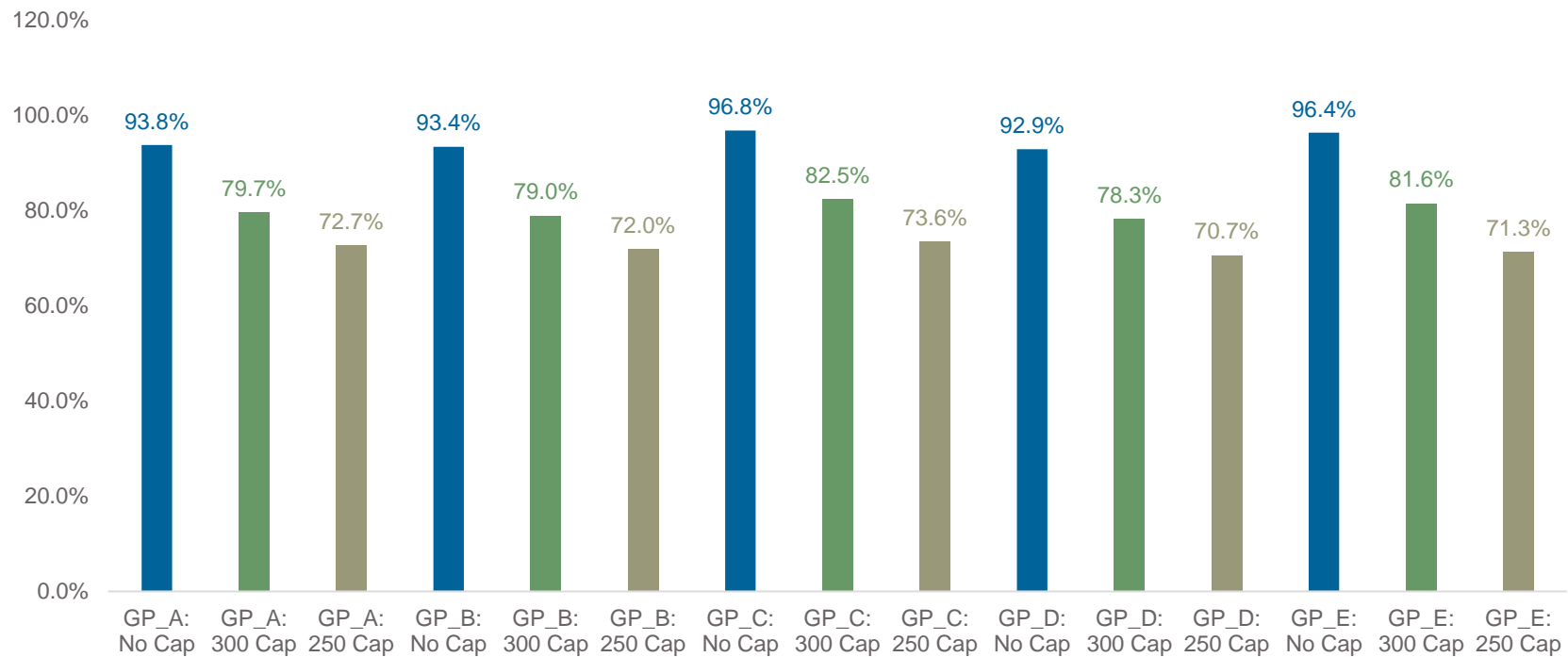
## No Derisking Through 2054



- The \$250M contribution cap (gray bars) meaningfully increases the chance that the Glide Paths never derisk
- The \$300M contribution cap (green bars) is less impactful but also increases the chance of not derisking

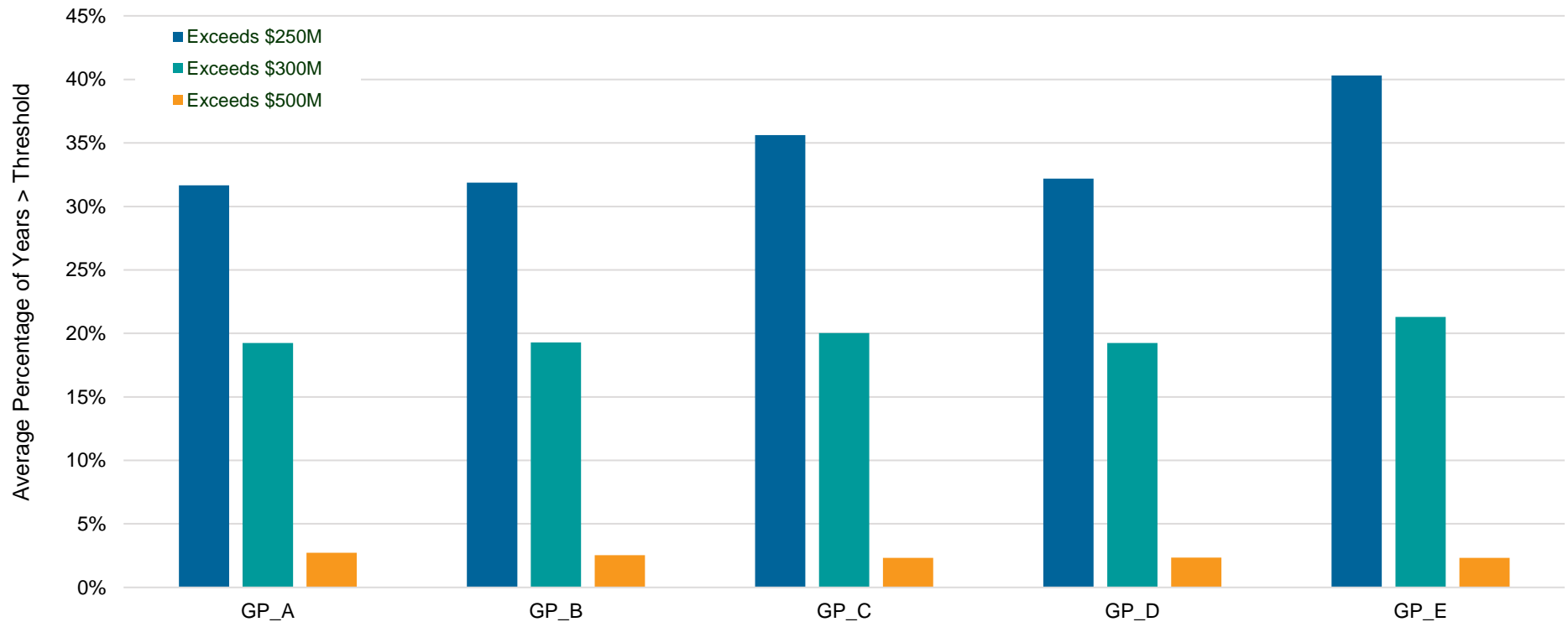
# Probability of Reaching End State by 2054

Probability of Reaching End State by 2054



- The \$250M contribution cap (gray bars) meaningfully decreases the chance that the Glide Paths reach the end state at 95% or 100% funded
- The \$300M contribution cap (green bars) is less impactful but also decreases the chance of reaching the end state

# Probability of Annual Contributions Exceeding Thresholds



- At a \$250M contribution cap, which is close to the expected case, the more conservative paths (GP\_C and GP\_E) have the highest probability of exceeding the threshold
- At \$300M and \$500M the probabilities are similar across the Glide Paths

# 30-Year Projected Funded Status

	GP_E	GP_C	GP_D	GP_B	GP_A
<b>30-Year Funded Status (No Cap)</b>					
Expected Case	116%	117%	117%	119%	119%
Worse Case	75%	75%	73%	73%	73%
<b>30-Year Funded Status (\$300M Cap)</b>					
Expected Case	107%	107%	108%	109%	110%
Worse Case	0%	0%	0%	0%	0%
<b>30-Year Funded Status (\$250M Cap)</b>					
Expected Case	101%	102%	103%	104%	105%
Worse Case	0%	0%	0%	0%	0%

- Sorted from most conservative to most aggressive Glide Path
- GP\_E and GP\_C provide some downside protection
- All Glide Paths are expected to be fully funded in 30 years
  - Without contribution cap, scenarios may be generating excessive surplus
  - Capped scenarios may run out of assets

# 30-Year Cumulative Contributions and Unfunded Liability

	GP_E	GP_C	GP_D	GP_B	GP_A
<b>30-Year Cumulative Contributions (No Cap)</b>					
Expected Case	5,842	5,747	5,523	5,482	5,424
Worse Case	11,871	11,856	11,859	11,982	12,048
<b>30-Year Cumulative Contributions (\$300M Cap)</b>					
Expected Case	5,778	5,661	5,421	5,375	5,316
Worse Case	9,333	9,333	9,473	9,535	9,932
<b>30-Year Cumulative Contributions (\$250M Cap)</b>					
Expected Case	5,756	5,635	5,376	5,312	5,248
Worse Case	10,323	10,384	10,384	10,734	10,980

	GP_E	GP_C	GP_D	GP_B	GP_A
<b>30-Year Unfunded Liability (No Cap)</b>					
Expected Case	(1,291)	(1,315)	(1,330)	(1,433)	(1,483)
Worse Case	2,070	2,087	2,236	2,237	2,238
<b>30-Year Unfunded Liability (\$300M Cap)</b>					
Expected Case	(572)	(579)	(637)	(729)	(802)
Worse Case	7,829	7,895	8,071	8,101	8,101
<b>30-Year Unfunded Liability (\$250M Cap)</b>					
Expected Case	(112)	(177)	(234)	(317)	(364)
Worse Case	8,558	8,623	8,630	8,657	8,622

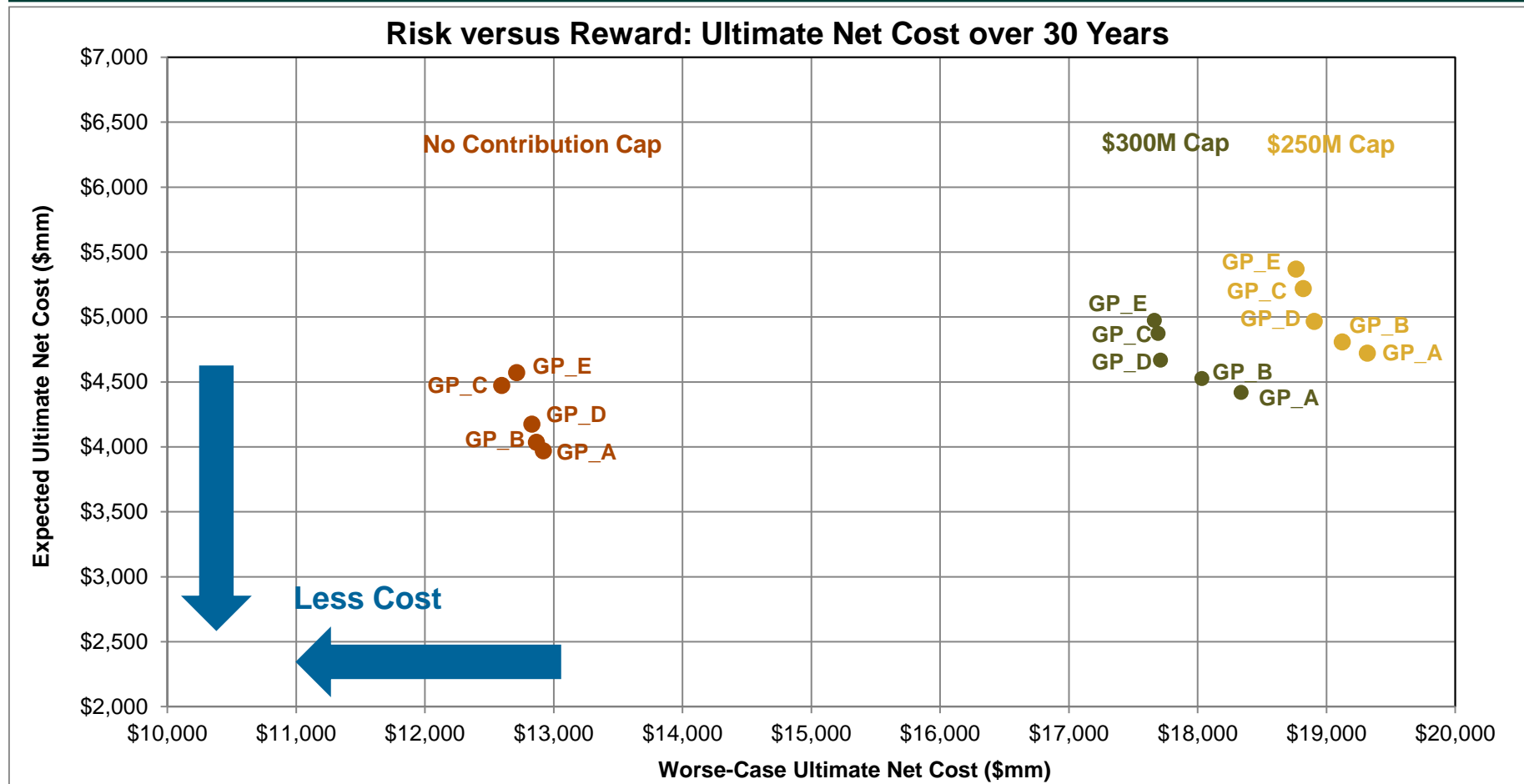
- For scenarios where contributions are capped, there is less dispersion among Glide Paths in worse case outcomes
  - The asset mix becomes less important because investment returns cannot overcome the plan deficit without sufficient contributions
- Expected contributions decrease when a cap is implemented
- However, the unfunded liability increases, leading to a **higher overall cost**
  - This is shown using Ultimate Net Cost on the following slide

## 30-Year Ultimate Net Cost (UNC)

	GP_E	GP_C	GP_D	GP_B	GP_A
<b>30-Year Ultimate Net Cost (No Cap)</b>					
Expected Case	4,572	4,472	4,175	4,036	3,968
Worse Case	12,713	12,596	12,831	12,865	12,920
<i>Chg in Expected</i>		(100)	(297)	(139)	(67)
<i>Chg in Worse Case</i>		(117)	235	34	55
<b>30-Year Ultimate Net Cost (\$300M Cap)</b>					
Expected Case	4,974	4,873	4,667	4,525	4,420
Worse Case	17,665	17,693	17,711	18,033	18,337
<i>Chg in Expected</i>		(101)	(205)	(142)	(105)
<i>Chg in Worse Case</i>		28	18	322	304
<b>30-Year Ultimate Net Cost (\$250M Cap)</b>					
Expected Case	5,368	5,218	4,965	4,808	4,722
Worse Case	18,765	18,820	18,906	19,122	19,317
<i>Chg in Expected</i>		(149)	(254)	(157)	(86)
<i>Chg in Worse Case</i>		55	86	216	195

- Expected UNC decreases as you move from most conservative to most aggressive Glide Path
- Worse case UNC increases as you move from most conservative to most aggressive Glide Path with one exception (GP\_E to GP\_C uncapped)
- UNC increases with implementation of a cap

# Risk-Reward: Ultimate Net Cost



- $UNC = 30\text{-Year Cumulative Contributions} + 1/1/2054 \text{ Unfunded Actuarial Liability}$ 
  - UNC captures what is expected to be paid over 30 years plus what is owed at the end of the 30-year period
- **Capping contributions increases expected and worse case cost**
- Faster de-risking generally leads to higher expected cost but better downside protection

# Which Glide Path Is Appropriate?

	E	C	D	B	A
Relative Descriptor	Conservative	Conservative	Moderate	Aggressive	Aggressive
Asset Allocation until 80% Funded	Mix 2 (44% Eq) Exp Ret: 7.3%	Mix 2 (44% Eq) Exp Ret: 7.3%	Mix 2 (44% Eq) Exp Ret: 7.3%	Mix 1 (47% Eq) Exp Ret: 7.4%	Target (51% Eq) Exp Ret: 7.5%
Prob Breach \$250M Cap	Highest	Highest	Similar	Similar	Similar

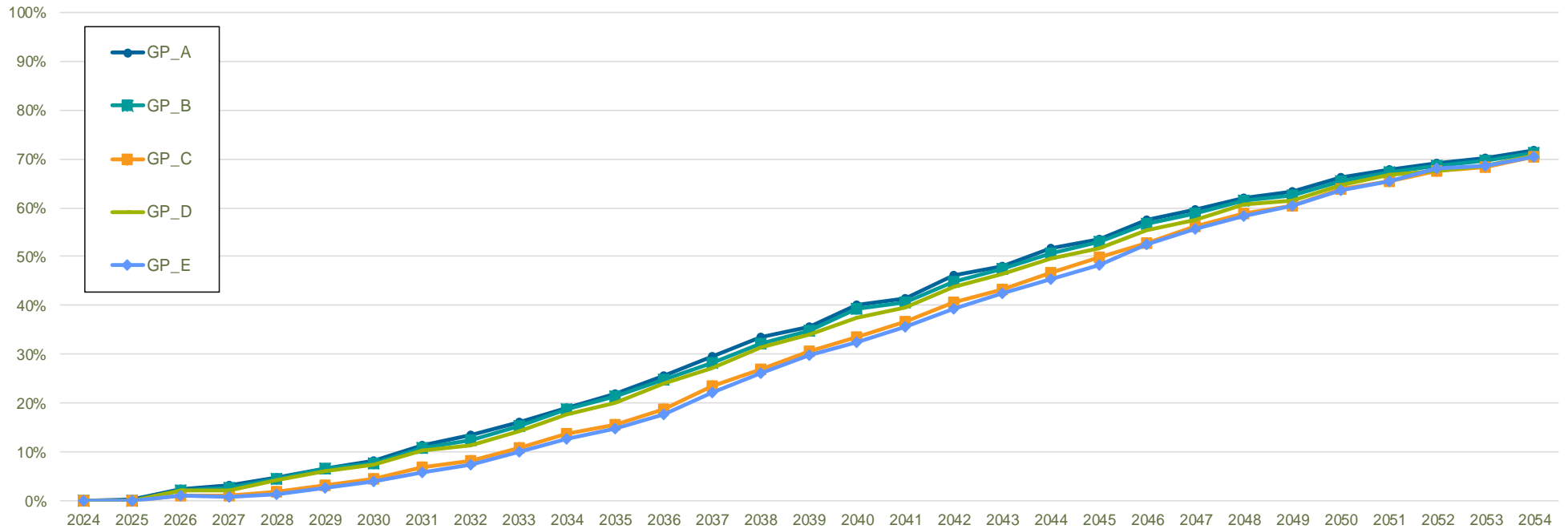
- Conservative Path – highest expected cost but offers downside protection
- Aggressive – lowest expected cost but highest worse case cost
- Probability of full funding increases as you get more aggressive
- GP\_D looks better than GP\_C and GP\_E in Ultimate Net Cost space – lower expected cost with similar worse case cost
- If a Glide Path is approved, it would be subject to assessing current conditions when a funded status threshold is breached
  - The Glide Path is not a “set it and forget it” asset allocation strategy





Appendix

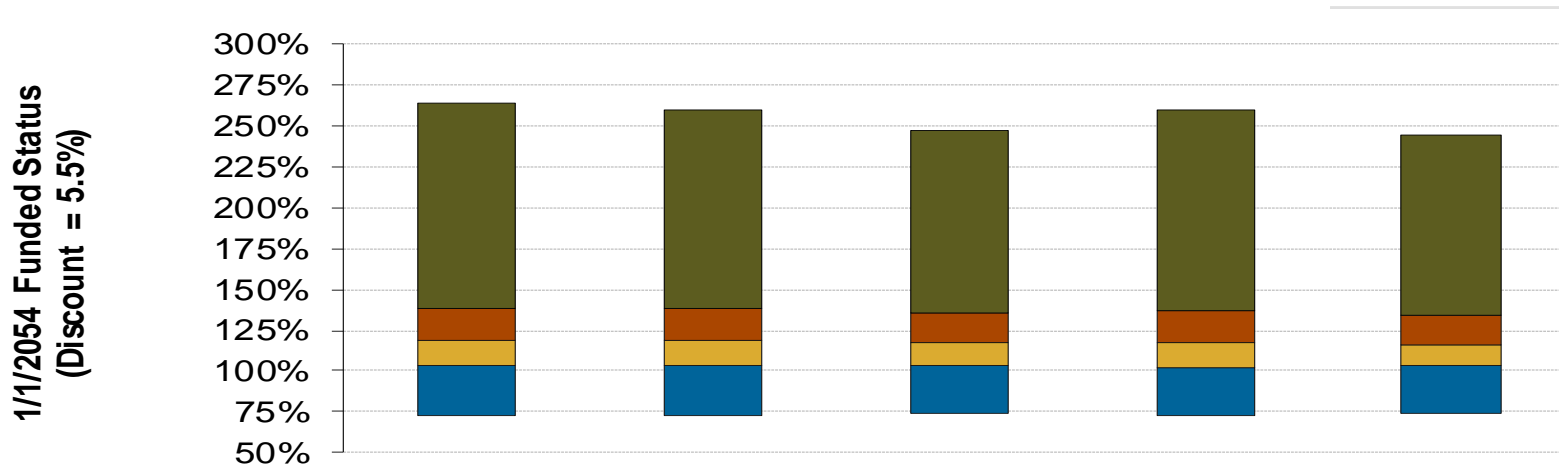
# Probability of Full Funding



	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
GP_A	0%	0%	2%	3%	5%	7%	8%	11%	13%	16%	19%	22%	26%	30%	33%	36%	40%	42%	46%	48%	52%	54%	58%	60%	62%	63%	66%	68%	69%	70%	72%
GP_B	0%	0%	2%	3%	4%	7%	8%	11%	12%	15%	19%	21%	25%	28%	32%	35%	39%	41%	45%	47%	51%	53%	57%	59%	62%	63%	65%	67%	69%	70%	71%
GP_C	0%	0%	1%	1%	2%	3%	5%	7%	8%	11%	14%	16%	19%	23%	27%	31%	33%	37%	41%	43%	47%	50%	53%	56%	59%	61%	64%	65%	68%	70%	
GP_D	0%	0%	2%	2%	4%	6%	7%	10%	11%	14%	18%	20%	24%	27%	31%	34%	38%	40%	44%	47%	50%	52%	55%	57%	61%	61%	65%	67%	68%	69%	71%
GP_E	0%	0%	1%	1%	1%	3%	4%	6%	7%	10%	13%	15%	18%	22%	26%	30%	33%	36%	39%	43%	45%	48%	53%	56%	58%	61%	64%	66%	68%	69%	71%

- The above chart illustrates the probability of full funding (100% funded) across the Glide Paths
  - Probability above 50% is highlighted in green
- Full funding is expected to be 20+ years away

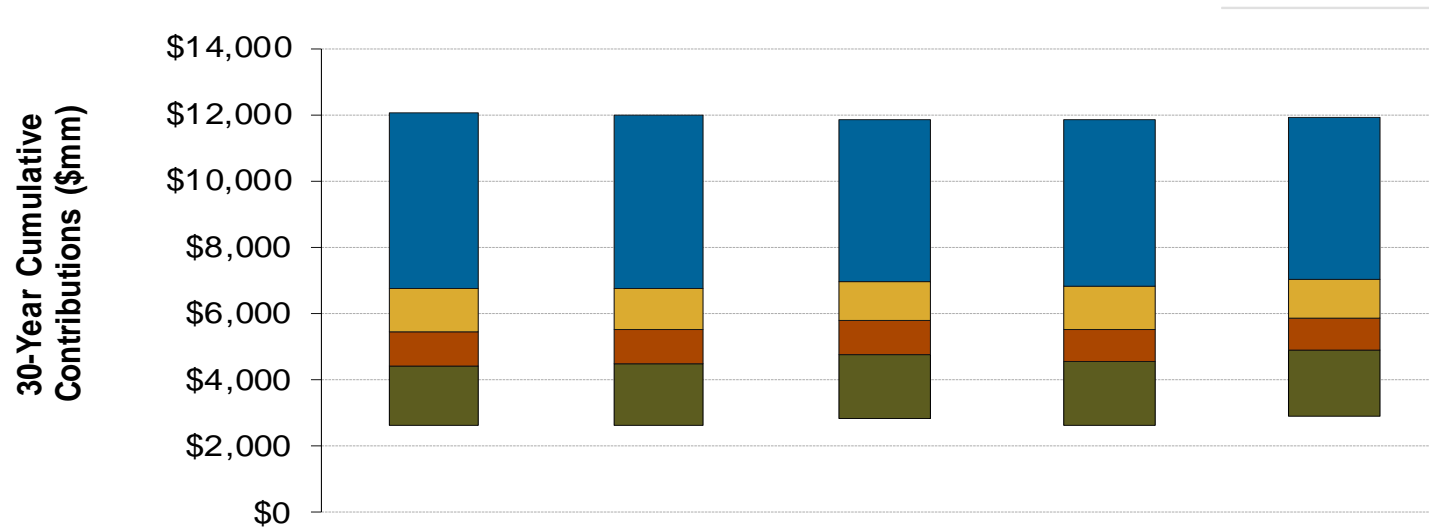
# 30-Year Projected Funded Status



Percentile	GP_A	GP_B	GP_C	GP_D	GP_E
2.5th	264%	260%	247%	260%	245%
33rd	138%	138%	135%	137%	134%
50th	119%	119%	117%	117%	116%
67th	104%	103%	103%	103%	103%
97.5th	73%	73%	75%	73%	75%
30-Year Return	6.7%	6.6%	6.5%	6.6%	6.5%
30-Year Std Dev	10.1%	9.9%	9.4%	9.8%	9.2%
1/1/2054 Discount Rate	5.5%	5.5%	5.5%	5.5%	5.5%

- The above graphic depicts 30-Year Projected Funded Status
  - Actuarial liability is discounted at 5.5% in Year 30 to enable fair comparison
- A surplus is expected across all Glide Paths (116% - 119%)
- GP\_C and GP\_E provide the most downside protection (75% vs. 73% funded)

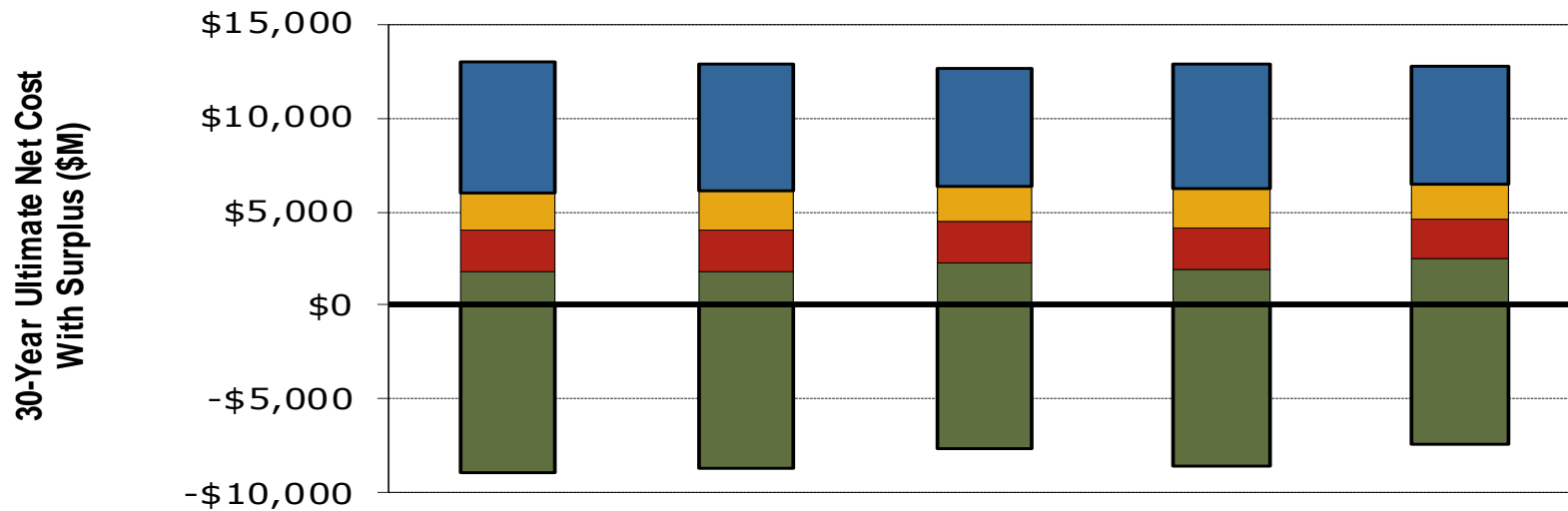
# 30-Year Cumulative Contributions



Percentile	GP_A	GP_B	GP_C	GP_D	GP_E
97.5th	\$12,048	\$11,982	\$11,856	\$11,859	\$11,871
67th	6,712	6,768	6,952	6,801	7,045
50th	5,424	5,482	5,747	5,523	5,842
33rd	4,400	4,456	4,735	4,499	4,855
2.5th	2,606	2,613	2,795	2,627	2,846
30-Year Return	6.7%	6.6%	6.5%	6.6%	6.5%
30-Year Std Dev	10.1%	9.9%	9.4%	9.8%	9.2%

- GP\_C and GP\_E have highest expected contribution outlay
- GP\_A and GP\_B have lower expected contributions but higher worse case contributions
- GP\_D falls between the other Glide Paths in expected contributions with a worse case similar to GP\_C

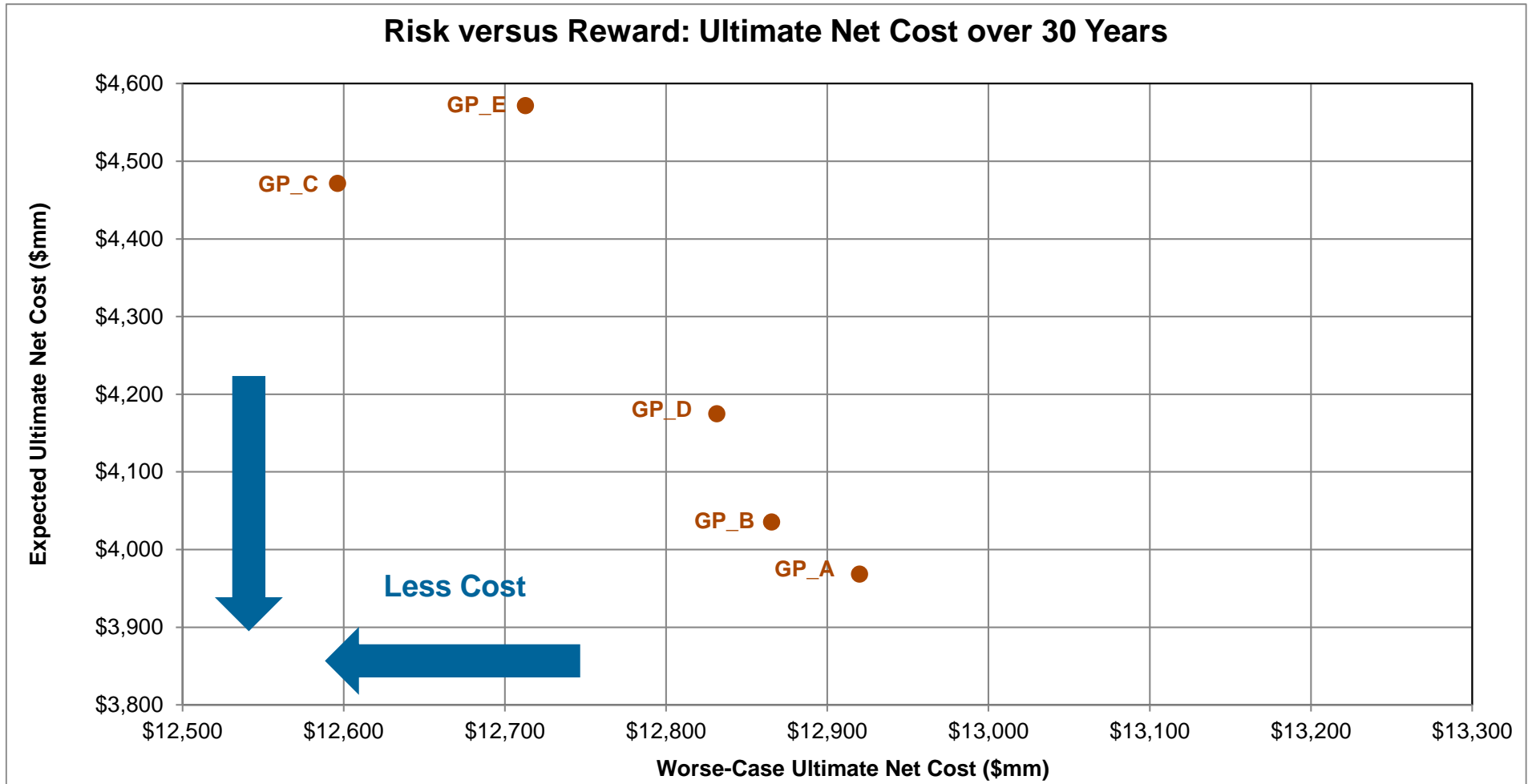
# 30-Year Ultimate Net Cost



Percentile	GP_A	GP_B	GP_C	GP_D	GP_E
97.5th	\$12,920	\$12,865	\$12,596	\$12,831	\$12,713
67th	6,045	6,113	6,366	6,225	6,486
50th	3,968	4,036	4,472	4,175	4,572
33rd	1,768	1,801	2,276	1,960	2,508
2.5th	-8,960	-8,638	-7,569	-8,568	-7,359
<b>Expected Return</b>	6.7%	6.6%	6.5%	6.6%	6.5%
<b>Standard Deviation</b>	10.1%	9.9%	9.4%	9.8%	9.2%
<b>1/1/2054 Discount Rate</b>	5.5%	5.5%	5.5%	5.5%	5.5%

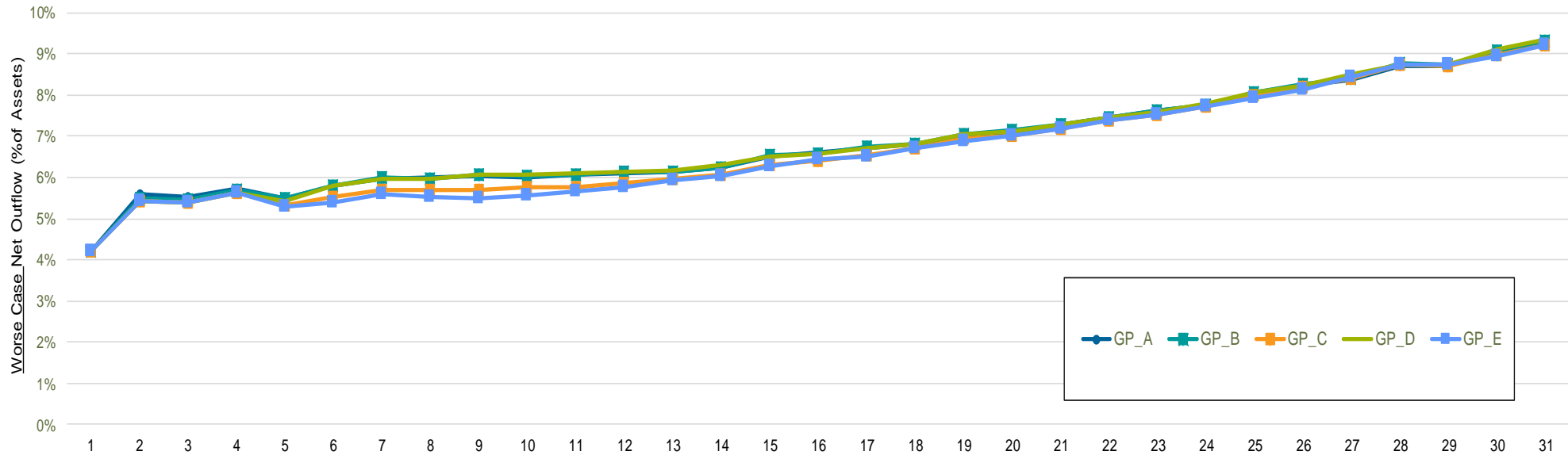
- Very wide distribution of outcomes possible – from \$9B surplus to \$13B cost
- There is a tradeoff between expected and worse case outcomes
  - More aggressive Glide Paths have lower expected case cost but higher worse case cost

# Risk-Reward: Ultimate Net Cost



- Risk-reward tradeoff: lower expected case cost comes with higher worse case cost
  - GP\_C is an exception, with a lower expected and worse case cost than GP\_E

# Worse Case Net Outflow (% of Assets)

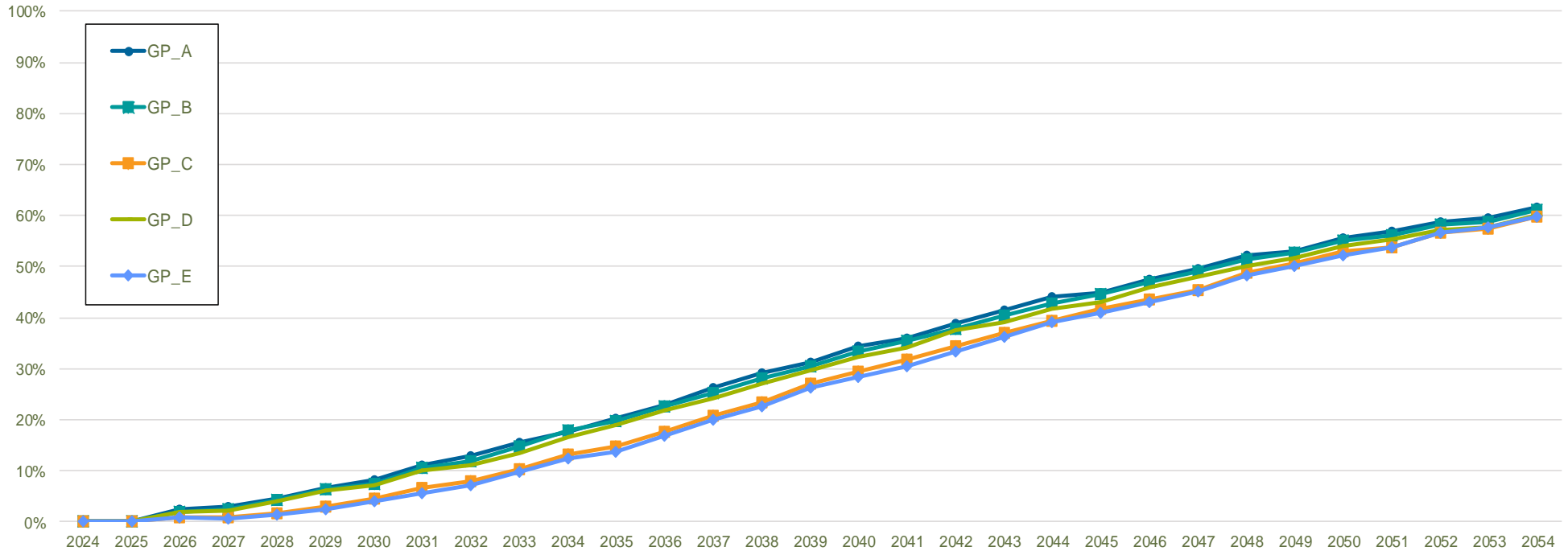


	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
GP_A	4.2%	5.6%	5.5%	5.7%	5.5%	5.8%	6.0%	6.0%	6.1%	6.0%	6.1%	6.1%	6.1%	6.2%	6.5%	6.6%	6.7%	6.8%	7.0%	7.1%	7.3%	7.5%	7.6%	7.8%	8.1%	8.2%	8.4%	8.7%	8.7%	9.0%	9.3%
GP_B	4.2%	5.5%	5.5%	5.7%	5.5%	5.8%	6.0%	6.0%	6.1%	6.0%	6.1%	6.1%	6.1%	6.2%	6.5%	6.6%	6.7%	6.8%	7.0%	7.1%	7.3%	7.5%	7.6%	7.8%	8.1%	8.3%	8.4%	8.8%	8.7%	9.1%	9.3%
GP_C	4.2%	5.4%	5.4%	5.6%	5.3%	5.5%	5.7%	5.7%	5.7%	5.8%	5.8%	5.9%	6.0%	6.1%	6.3%	6.4%	6.5%	6.7%	6.9%	7.0%	7.2%	7.4%	7.5%	7.7%	8.0%	8.2%	8.4%	8.8%	8.7%	9.0%	9.2%
GP_D	4.2%	5.4%	5.4%	5.6%	5.4%	5.8%	6.0%	6.0%	6.1%	6.1%	6.1%	6.1%	6.2%	6.3%	6.5%	6.6%	6.7%	6.8%	7.1%	7.1%	7.3%	7.5%	7.6%	7.8%	8.1%	8.2%	8.5%	8.8%	8.8%	9.1%	9.3%
GP_E	4.2%	5.4%	5.4%	5.6%	5.3%	5.4%	5.6%	5.5%	5.5%	5.6%	5.7%	5.8%	5.9%	6.1%	6.3%	6.5%	6.5%	6.7%	6.9%	7.0%	7.2%	7.4%	7.5%	7.7%	7.9%	8.1%	8.4%	8.7%	8.7%	8.9%	9.2%

- Liquidity needs gradually increase across all Glide Paths but stay under 10% per year
- Cash flow analysis assumes strict adherence to Act 12 funding policy (No Cap)

< 5%
5 - 7%
7 - 10%
> 10%

# Probability of Full Funding

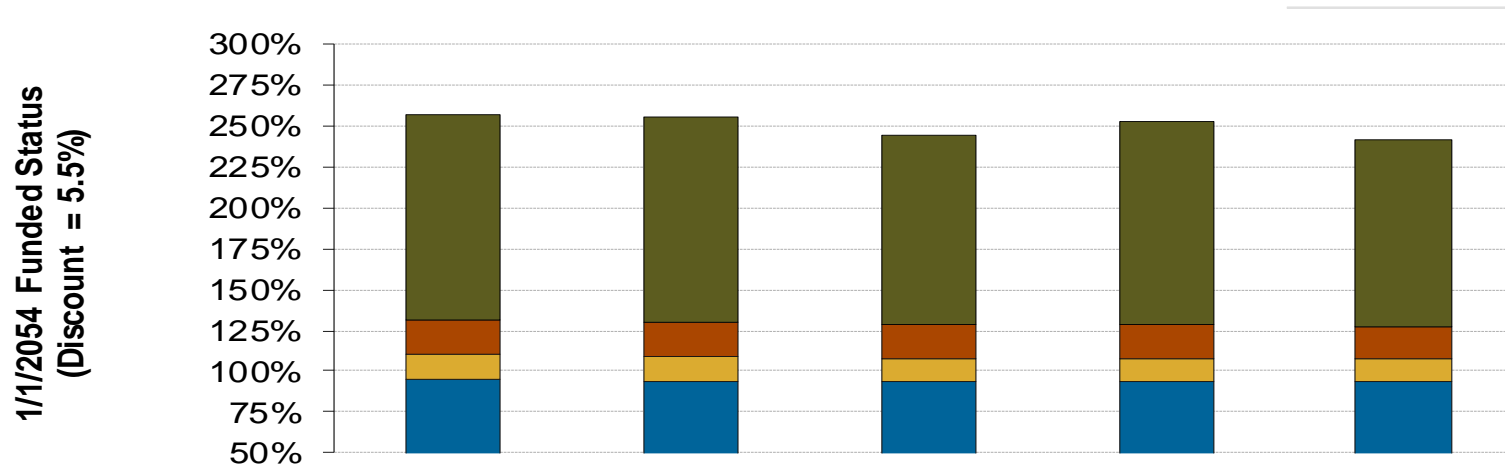


	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
GP_A	0%	0%	2%	3%	5%	7%	8%	11%	13%	16%	18%	20%	23%	26%	29%	31%	34%	36%	39%	41%	44%	45%	48%	50%	52%	53%	56%	57%	59%	59%	62%
GP_B	0%	0%	2%	3%	4%	6%	8%	11%	12%	15%	18%	20%	23%	25%	28%	30%	33%	35%	38%	40%	43%	45%	47%	49%	52%	53%	55%	56%	58%	59%	61%
GP_C	0%	0%	1%	1%	2%	3%	5%	7%	8%	10%	13%	15%	18%	21%	23%	27%	29%	32%	34%	37%	40%	42%	44%	46%	49%	51%	53%	54%	57%	57%	60%
GP_D	0%	0%	2%	2%	4%	6%	7%	10%	11%	13%	17%	19%	22%	24%	27%	30%	32%	34%	38%	39%	42%	43%	46%	48%	50%	52%	54%	55%	57%	58%	60%
GP_E	0%	0%	1%	1%	1%	2%	4%	6%	7%	10%	12%	14%	17%	20%	23%	26%	29%	31%	33%	36%	39%	41%	43%	45%	48%	50%	52%	54%	57%	58%	60%

- The above chart illustrates the probability of full funding (100% funded) across the Glide Paths
  - Probability above 50% is highlighted in green
- Full funding is expected to be more than 23 years away



# 30-Year Projected Funded Status

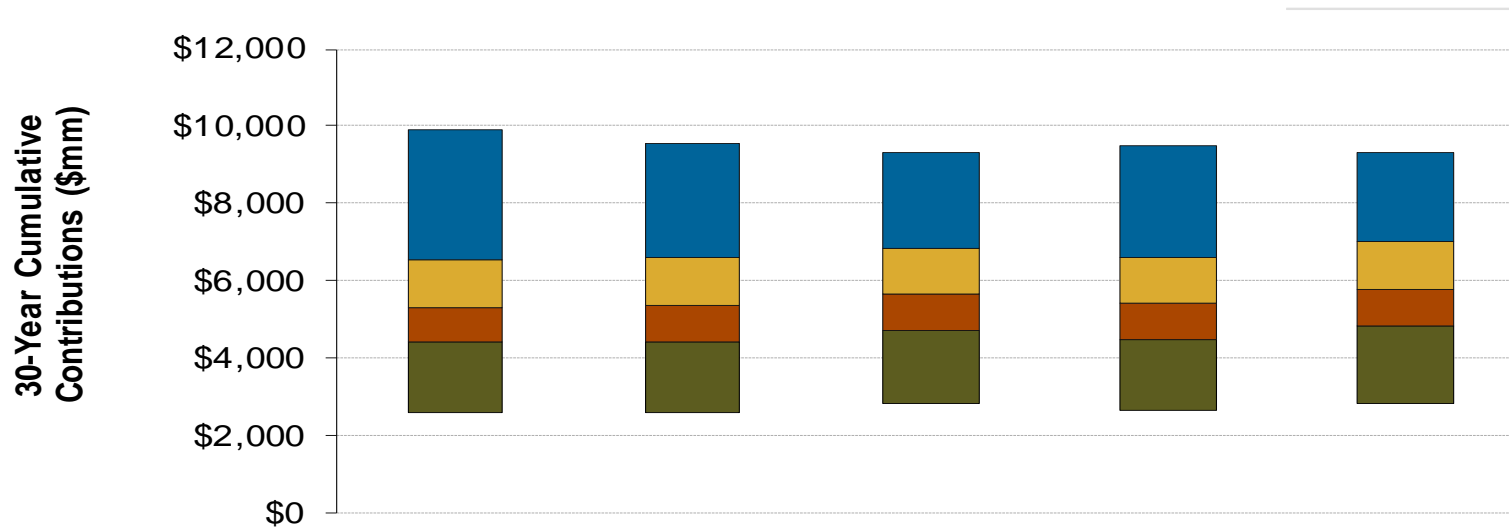


Percentile	GP_A	GP_B	GP_C	GP_D	GP_E
2.5th	257%	256%	244%	254%	242%
33rd	131%	130%	128%	129%	127%
50th	110%	109%	107%	108%	107%
67th	95%	94%	94%	94%	94%
97.5th	0%	0%	0%	0%	0%
30-Year Return	6.7%	6.6%	6.5%	6.6%	6.5%
30-Year Std Dev	10.1%	9.9%	9.4%	9.8%	9.2%
1/1/2054 Discount Rate	5.5%	5.5%	5.5%	5.5%	5.5%

← Assets run out

- The above graphic depicts 30-Year Projected Funded Status
  - Actuarial liability is discounted at 5.5% in Year 30 to enable fair comparison
- A surplus is expected across all Glide Paths (107% - 110%)
- All Glide Paths have a chance of running out of assets when contributions are capped at \$300M

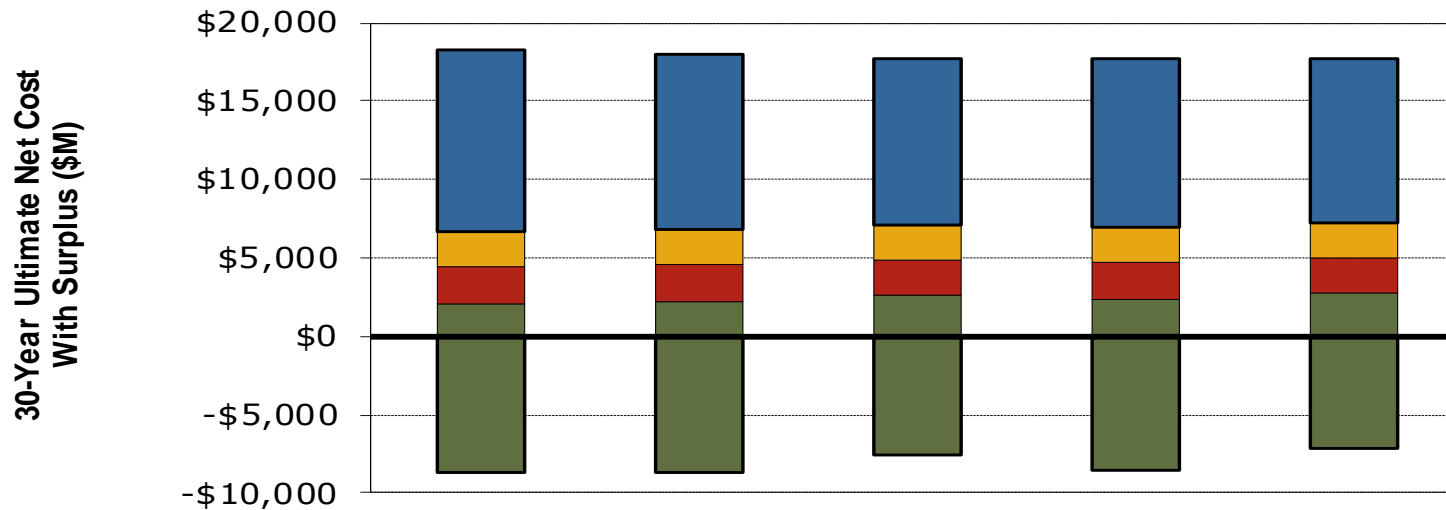
# 30-Year Cumulative Contributions



Percentile	GP_A	GP_B	GP_C	GP_D	GP_E
97.5th	\$9,932	\$9,535	\$9,333	\$9,473	\$9,333
67th	6,526	6,597	6,849	6,629	7,012
50th	5,316	5,375	5,661	5,421	5,778
33rd	4,391	4,442	4,692	4,477	4,806
2.5th	2,606	2,613	2,795	2,627	2,846
30-Year Return	6.7%	6.6%	6.5%	6.6%	6.5%
30-Year Std Dev	10.1%	9.9%	9.4%	9.8%	9.2%

- GP\_C and GP\_E have highest expected contribution outlay
- GP\_A, GP\_B, and GP\_D have lower expected contributions but higher worse case contributions
- Contributions can exceed \$9B (\$300M x 30) when assets run out and Plan becomes pay-as-you-go

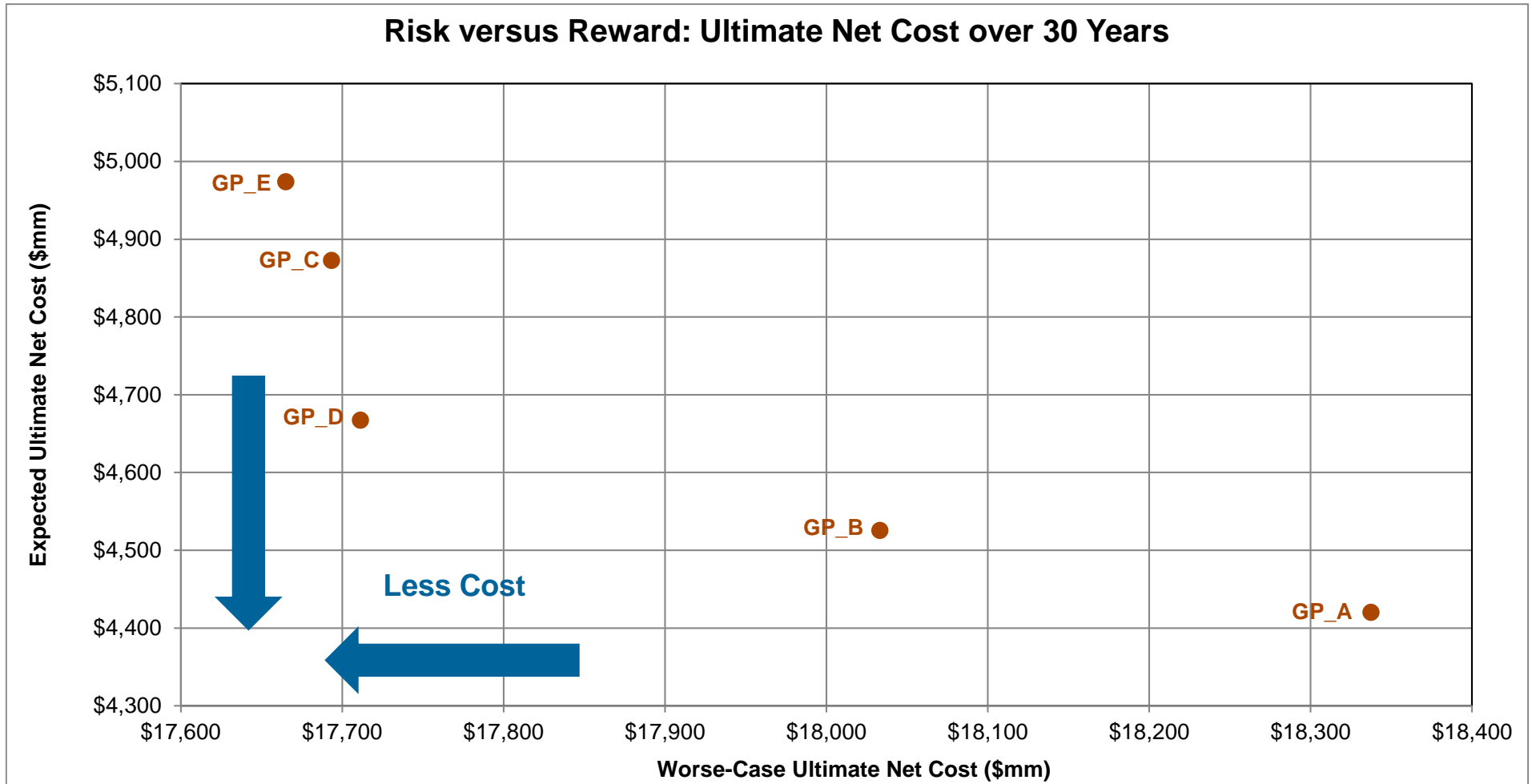
# 30-Year Ultimate Net Cost



Percentile	GP_A	GP_B	GP_C	GP_D	GP_E
97.5th	\$18,337	\$18,033	\$17,693	\$17,711	\$17,665
67th	6,722	6,858	7,093	6,985	7,166
50th	4,420	4,525	4,873	4,667	4,974
33rd	2,113	2,192	2,674	2,288	2,811
2.5th	-8,679	-8,628	-7,556	-8,503	-7,179
Expected Return	6.7%	6.6%	6.5%	6.6%	6.5%
Standard Deviation	10.1%	9.9%	9.4%	9.8%	9.2%
1/1/2054 Discount Rate	5.5%	5.5%	5.5%	5.5%	5.5%

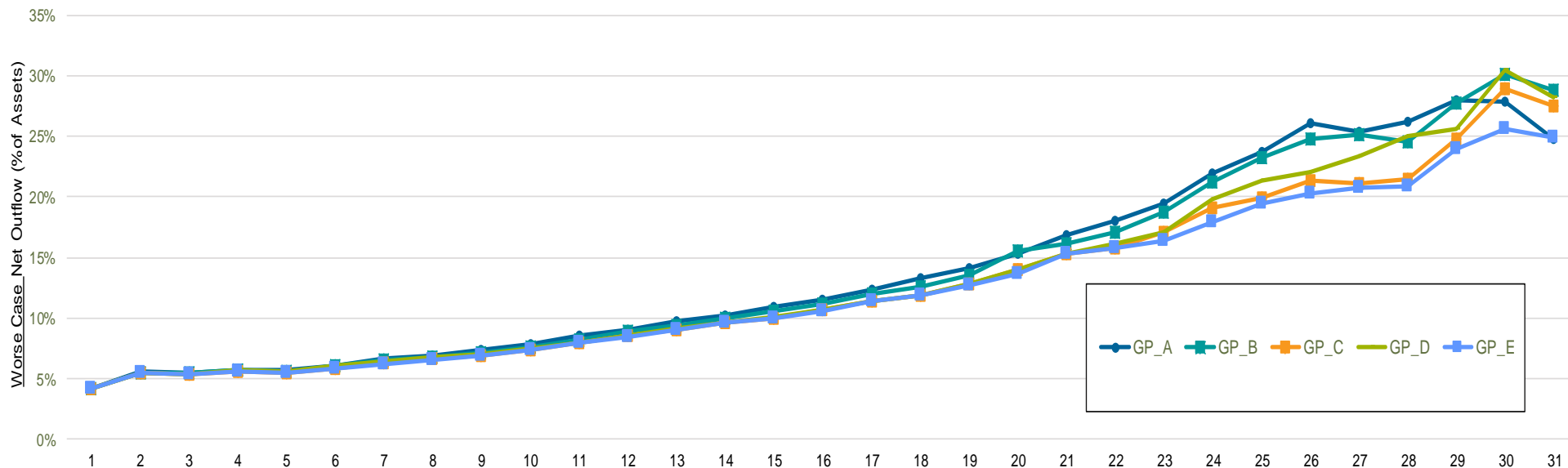
- Very wide distribution of outcomes possible – from over \$8B surplus to over \$18B cost
- There is a tradeoff between expected and worse case outcomes
  - More aggressive Glide Paths have lower expected case cost but higher worse case cost

# Risk-Reward: Ultimate Net Cost



- Clear risk-reward tradeoff: lower expected case cost comes with higher worse case cost

# Worse Case Net Outflow (% of Assets)

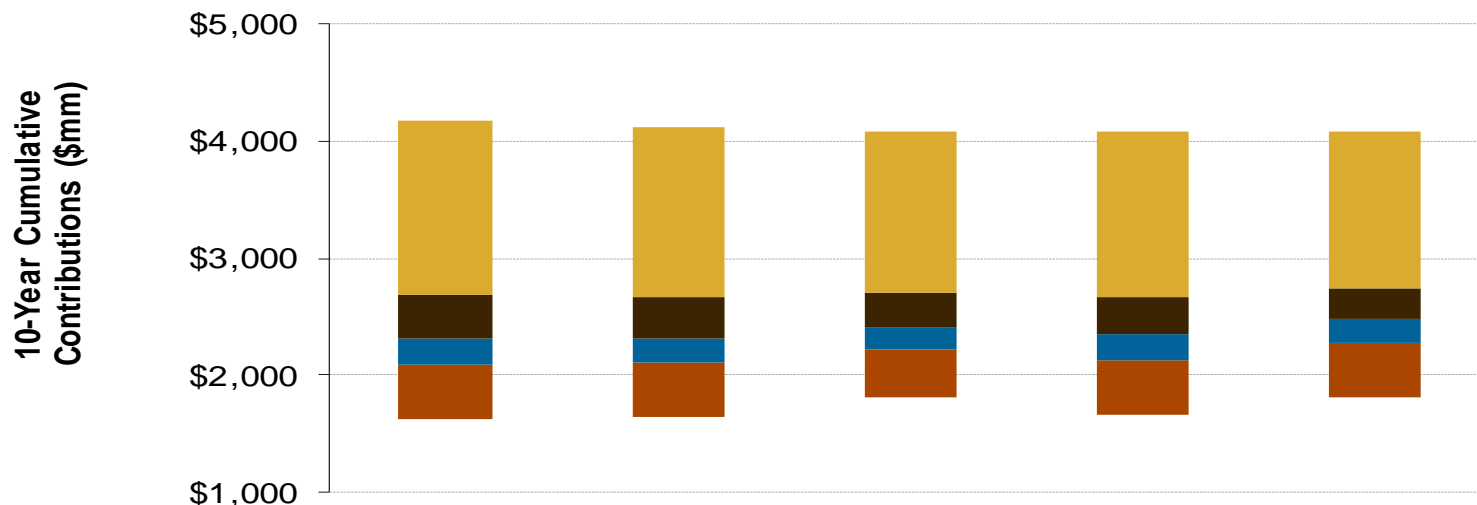


	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
GP_A	4.2%	5.6%	5.5%	5.7%	5.7%	6.1%	6.6%	6.9%	7.4%	7.8%	8.5%	9.1%	9.7%	10.2%	10.9%	11.6%	12.3%	13.3%	14.2%	15.3%	16.9%	18.0%	19.4%	22.0%	23.7%	26.1%	25.4%	26.2%	27.9%	27.9%	24.8%
GP_B	4.2%	5.5%	5.5%	5.7%	5.6%	6.0%	6.5%	6.8%	7.1%	7.6%	8.2%	8.9%	9.4%	9.9%	10.6%	11.2%	12.0%	12.6%	13.5%	15.6%	16.2%	17.1%	18.7%	21.2%	23.2%	24.7%	25.2%	24.6%	27.8%	30.2%	28.8%
GP_C	4.2%	5.4%	5.4%	5.6%	5.5%	5.9%	6.3%	6.7%	6.9%	7.4%	8.0%	8.5%	9.1%	9.7%	10.0%	10.7%	11.4%	11.9%	12.8%	14.0%	15.3%	15.8%	17.1%	19.1%	20.0%	21.4%	21.1%	21.5%	24.8%	28.9%	27.5%
GP_D	4.2%	5.4%	5.4%	5.7%	5.6%	6.1%	6.4%	6.7%	7.0%	7.4%	8.0%	8.6%	9.2%	9.7%	10.1%	10.7%	11.4%	11.9%	12.8%	14.0%	15.3%	16.1%	17.1%	19.8%	21.4%	22.1%	23.3%	25.0%	25.6%	30.5%	28.2%
GP_E	4.2%	5.4%	5.4%	5.6%	5.5%	5.9%	6.2%	6.5%	6.9%	7.4%	7.9%	8.5%	9.1%	9.7%	10.0%	10.6%	11.4%	11.8%	12.7%	13.7%	15.3%	15.8%	16.4%	17.9%	19.5%	20.3%	20.8%	20.9%	24.0%	25.6%	24.9%

- In a worse case scenario, liquidity needs materially increase across all Glide Paths if contributions are capped

< 5%
5 - 7%
7 - 10%
> 10%

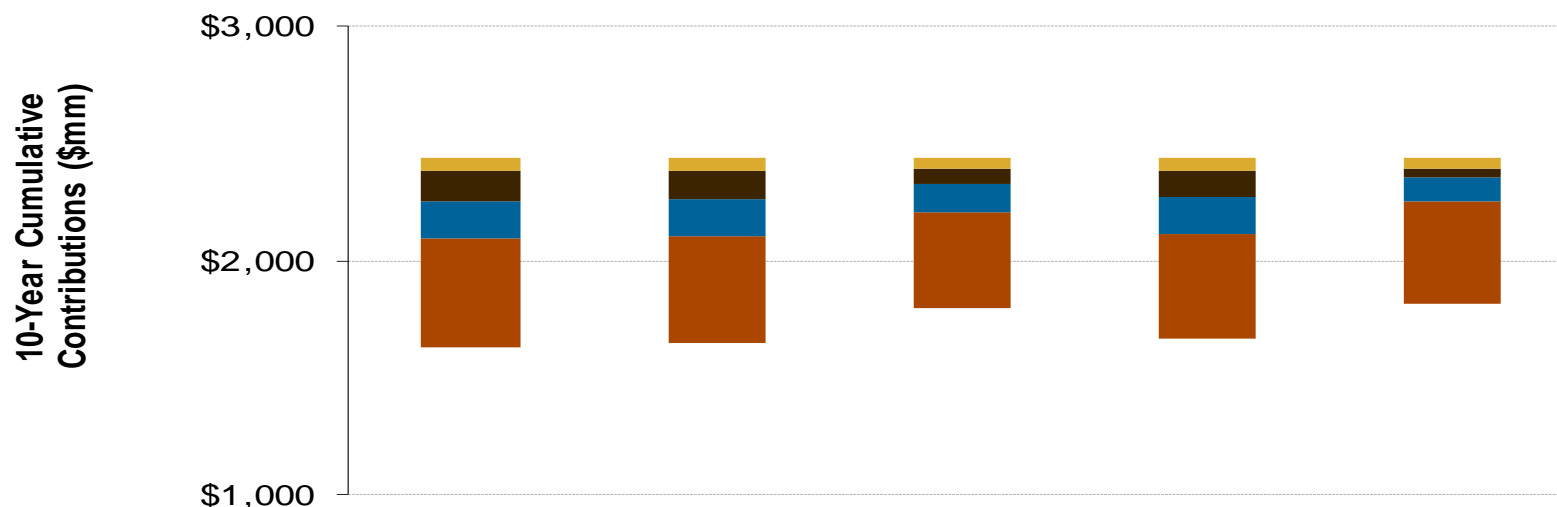
# 10-Year Cumulative Contributions



Percentile	GP_A	GP_B	GP_C	GP_D	GP_E
97.5th	\$4,177	\$4,126	\$4,077	\$4,077	\$4,077
67th	2,681	2,671	2,706	2,673	2,737
50th	2,311	2,323	2,409	2,347	2,490
33rd	2,099	2,117	2,222	2,127	2,282
2.5th	1,632	1,653	1,804	1,668	1,816
30-Year Return	6.7%	6.6%	6.5%	6.6%	6.5%
30-Year Std Dev	10.1%	9.9%	9.4%	9.8%	9.2%

- Glide Paths have similar reward-risk trade-off over next 10 years
- More conservative paths (GP\_C, GP\_E) and GP\_D have same worst case (\$4.077B)
- Expected contribution per year is \$230M – \$250M per year

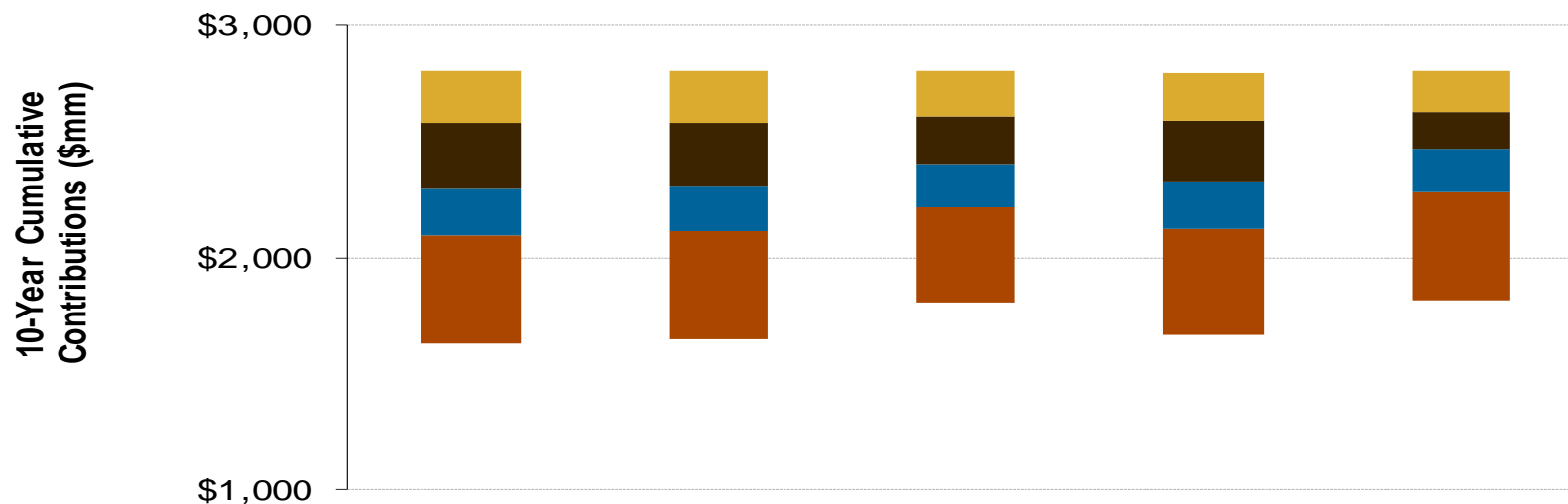
# 10-Year Cumulative Contributions



Percentile	GP_A	GP_B	GP_C	GP_D	GP_E
97.5th	\$2,438	\$2,438	\$2,438	\$2,438	\$2,438
67th	2,382	2,385	2,394	2,386	2,398
50th	2,258	2,265	2,328	2,276	2,354
33rd	2,095	2,107	2,206	2,117	2,252
2.5th	1,632	1,653	1,796	1,668	1,813
30-Year Return	6.7%	6.6%	6.5%	6.6%	6.5%
30-Year Std Dev	10.1%	9.9%	9.4%	9.8%	9.2%

- Over 10 years, the worse case scenario for contributions is the same across Glide Paths due to the contribution cap

# 10-Year Cumulative Contributions

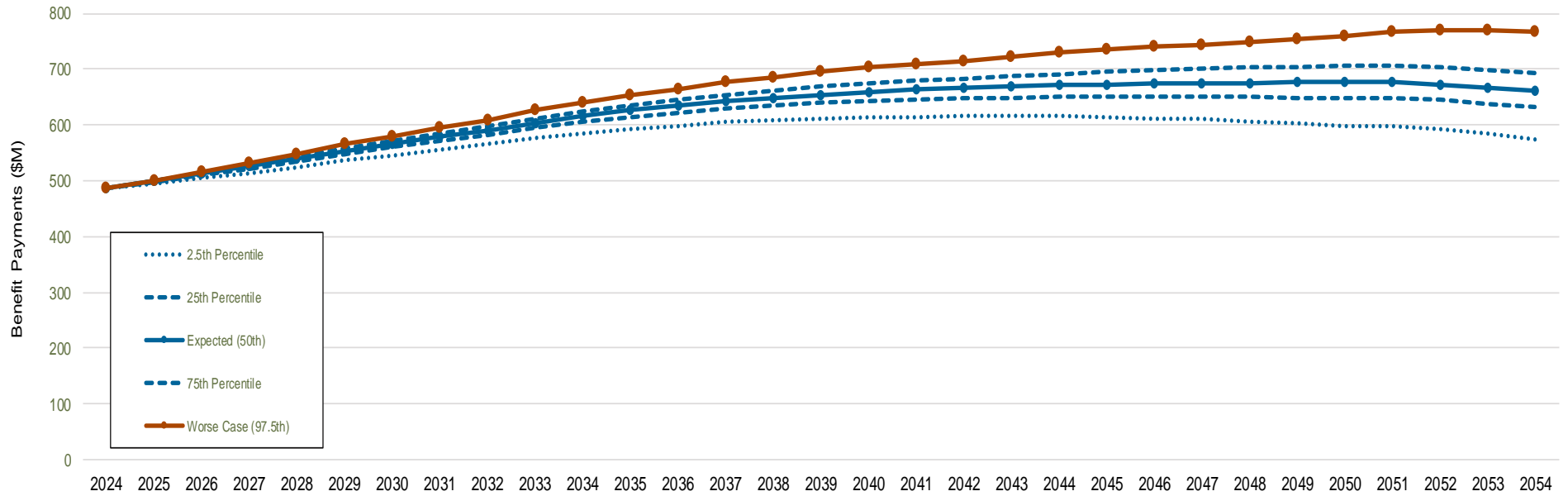


Percentile	GP_A	GP_B	GP_C	GP_D	GP_E
97.5th	\$2,803	\$2,800	\$2,801	\$2,798	\$2,801
67th	2,580	2,581	2,604	2,588	2,626
50th	2,299	2,310	2,398	2,328	2,468
33rd	2,098	2,117	2,221	2,127	2,280
2.5th	1,632	1,653	1,804	1,668	1,816
30-Year Return	6.7%	6.6%	6.5%	6.6%	6.5%
30-Year Std Dev	10.1%	9.9%	9.4%	9.8%	9.2%

- Over 10 years, the worse case scenario for contributions is similar across the Glide Paths due to the contribution cap



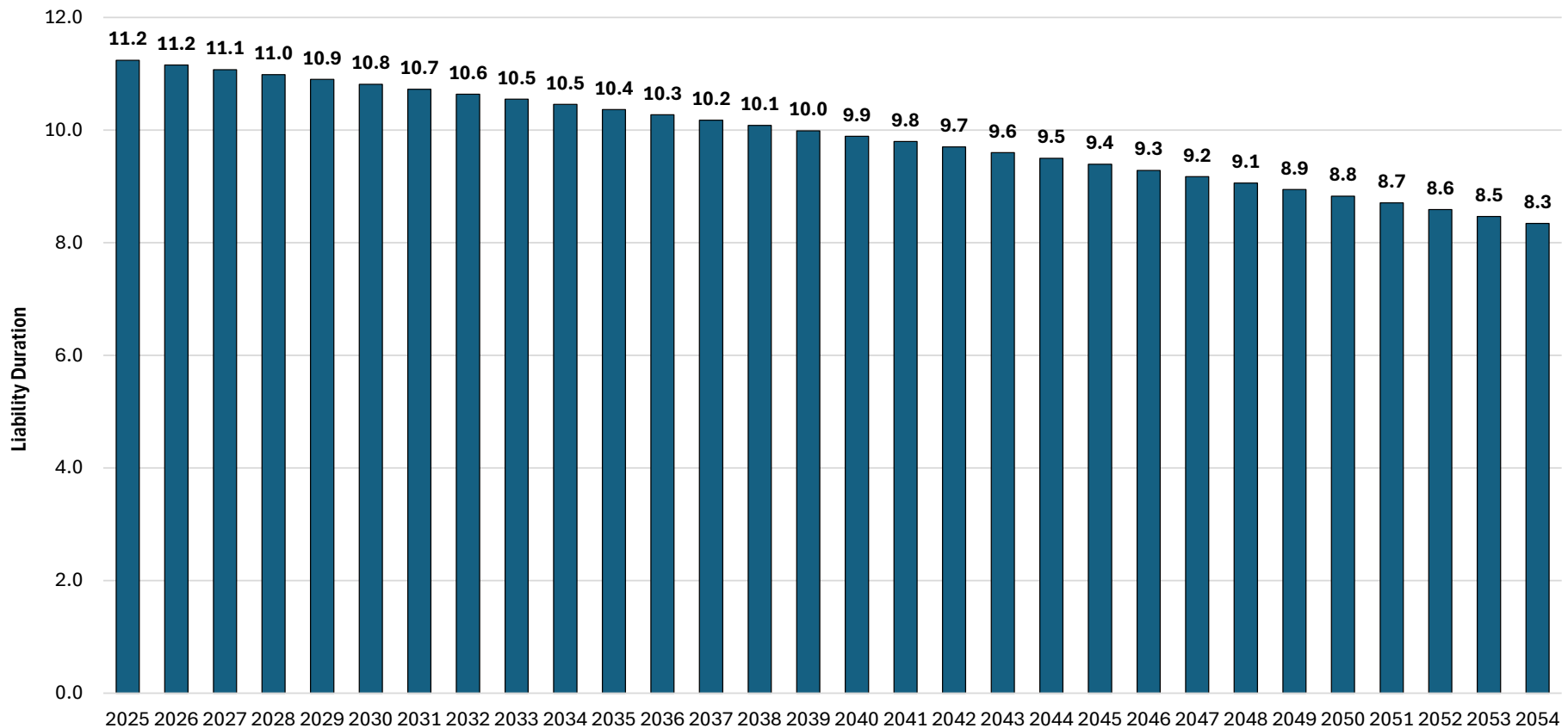
# All Mixes: Benefit Payments



	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
<b>Worse Case (97.5th)</b>	486	501	516	532	548	565	580	595	609	626	640	654	665	676	686	695	703	709	715	722	730	736	741	743	749	754	759	768	768	769	767
<b>75th Percentile</b>	486	500	514	528	543	559	572	585	598	612	625	635	645	654	661	668	675	679	683	688	691	695	698	700	702	704	706	707	703	699	694
<b>Expected (50th)</b>	486	499	512	526	540	554	566	578	590	603	616	626	634	642	649	654	659	663	666	668	671	673	675	675	675	676	677	676	672	667	661
<b>25th Percentile</b>	486	498	510	522	535	549	560	572	583	595	605	614	621	629	634	639	642	645	647	648	650	651	651	651	649	649	647	648	644	639	632
<b>2.5th Percentile</b>	486	495	504	514	525	537	546	556	565	576	585	593	599	605	609	612	613	614	616	615	616	614	612	610	606	603	599	598	591	584	575
<b>Range</b>	0	6	12	18	24	29	34	39	44	50	55	61	66	72	77	83	90	94	99	107	114	122	128	132	143	151	160	170	177	185	192

- Benefit payments vary by inflation not by de-risking alternative
- Benefit payments are expected to peak in 20 – 28 years (outlined in table)

# Liability Duration



- Liability Duration measures how sensitive the liability is to a change in the discount rate, i.e., it is the approximate percentage change in value for a 1.0% change in the discount rate
- Future de-risking to a more conservative asset allocation may result in a drop in the discount rate which will cause the liability to increase (funded status to fall)
- CMERS liability duration is long but it will gradually decline as the Plan winds down

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# **4th Quarter 2024 Performance Report**

February 13, 2025

Employees' 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 Q4 2024
Public Equity	MSCI ACWI IMI	39%	-1.2%
Fixed Income	Bloomberg U.S. Agg.	29%	-3.1%
Real Assets <sup>(1)</sup>	Blended Benchmark	13%	-1.4%
Private Equity <sup>(1)</sup>	Russell 3000 + 2%	12%	6.7%
Absolute Return	90-Day T-Bill + 3%	7%	1.8%

	Q4 2024
<b>CMERS Benchmark</b>	<b>-0.6%</b>

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

# Relative Performance Expectations

		Q4 2024		Q4 2024	Q4 2024
<b>Value Equity Bias</b>	Russell 3000 Value	-1.9%	Russell 3000 Growth	6.8%	↓↓
<b>Small Cap Equity Bias</b>	Russell 2000	0.3%	Russell 1000	2.8%	↓
<b>Fixed Income Credit</b>	Loomis Sayles (net)	-1.6%	Bloomberg US Agg.	-3.1%	↑
<b>Private Equity<sup>(1)(2)</sup></b>	CMERS PE (net)	1.7%	PE Benchmark	6.7%	↓↓

	Q4 2024
<b>CMERS Total Fund (net)</b>	<b>-1.6%</b>
<b>CMERS Benchmark</b>	<b>-0.6%</b>

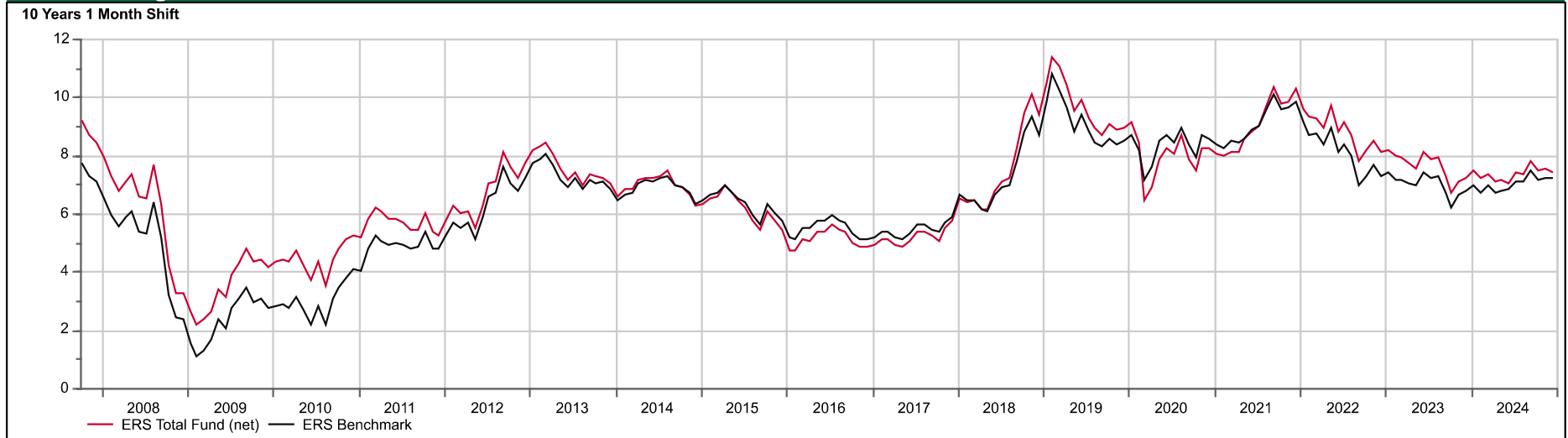
(1) Private Equity benchmark return is reported on a 1-quarter lag.

(2) All of the Fund's Q3 2024 Private Equity returns are reflected in the October-December time period.



# Total Fund Performance

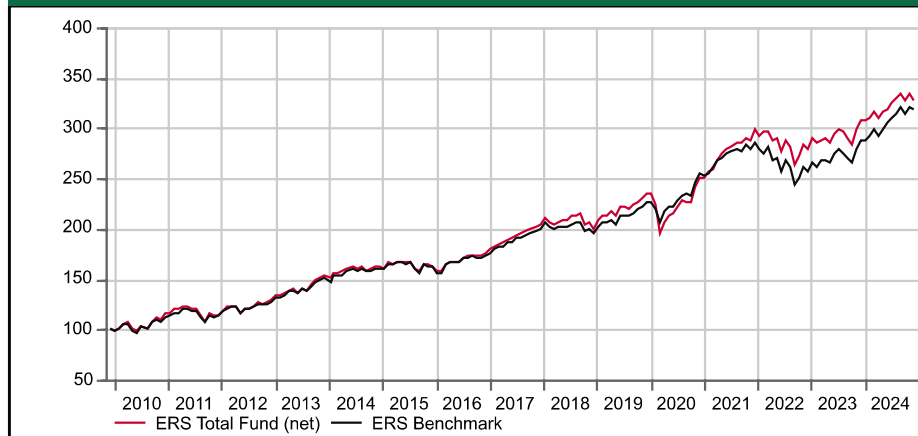
## 10 Year Rolling Returns – 11/1/1997 to 12/31/2024



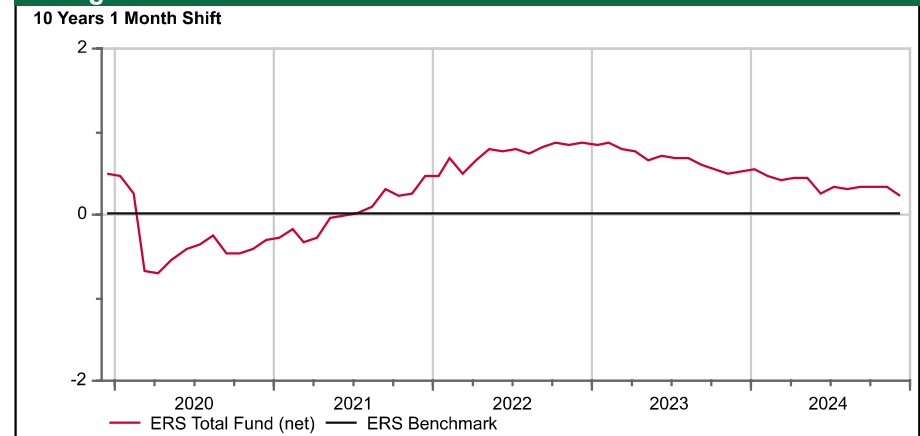
## Trailing Returns

	Annualized Return						
	QTR	1 Year	3 Year	5 Year	7 Year	10 Year	15 Year
ERS Total Fund (net)	-1.6	6.8	3.2	6.9	7.0	7.4	8.2
ERS Benchmark	-0.6	10.8	3.6	7.1	6.8	7.2	8.0

## Investment Growth – 1/1/2009 to 12/31/2024



## Rolling Excess Returns – 1/1/2009 to 12/31/2024



# ERS Fund Attribution – 4th Quarter 2024

Asset Class	Benchmark	Average Weight %	Policy Weight %	+/-	Portfolio Return	Benchmark Return	+/-	Attribution Effect(%)			Total Active Return
								Broad Category Group Allocation	Manager Selection	Style Bias	
<b>Public Equity</b>	MSCI ACWI IMI NR USD	<b>39.3</b>	<b>39.0</b>	<b>0.3</b>	<b>-3.1</b>	<b>-1.2</b>	<b>-2.0</b>	<b>0.0</b>	<b>-0.1</b>	<b>-0.7</b>	<b>-0.8</b>
<b>Fixed Income</b>	Bbg US Agg Bond TR USD	<b>29.1</b>	<b>29.0</b>	<b>0.1</b>	<b>-2.5</b>	<b>-3.1</b>	<b>0.6</b>	<b>0.0</b>	<b>0.1</b>	<b>0.0</b>	<b>0.2</b>
<b>Private Equity<sup>(2)</sup></b>	Russell 3000 (Qtr Lag) + 200bps <sup>(1)</sup>	<b>12.7</b>	<b>12.0</b>	<b>0.7</b>	<b>1.7</b>	<b>6.7</b>	<b>-4.9</b>	<b>0.0</b>	<b>-0.6</b>	<b>0.0</b>	<b>-0.6</b>
<b>Real Assets<sup>(2)</sup></b>	Real Assets Benchmark <sup>(1)</sup>	<b>11.1</b>	<b>13.0</b>	<b>-1.8</b>	<b>-0.9</b>	<b>-1.4</b>	<b>0.5</b>	<b>0.0</b>	<b>0.1</b>	<b>0.0</b>	<b>0.1</b>
<b>Absolute Return</b>	90 Day T-Bill +3%	<b>7.7</b>	<b>7.0</b>	<b>0.7</b>	<b>3.4</b>	<b>1.8</b>	<b>1.6</b>	<b>0.0</b>	<b>0.1</b>	<b>0.0</b>	<b>0.1</b>
<b>Total</b>		<b>100.0</b>	<b>100.0</b>	<b>0.0</b>	<b>-1.6</b>	<b>-0.6</b>	<b>-1.0</b>	<b>0.0</b>	<b>-0.4</b>	<b>-0.6</b>	<b>-1.0</b>

## Main Drivers of Q4 2024 Relative Performance

## Impact %

## Attribution Category

### Public Equity Style Bias

### Style Bias

Primarily U.S. Value, Small Cap, and International

**-0.67%**

### Manager Selection

Private Equity

**-0.63%**

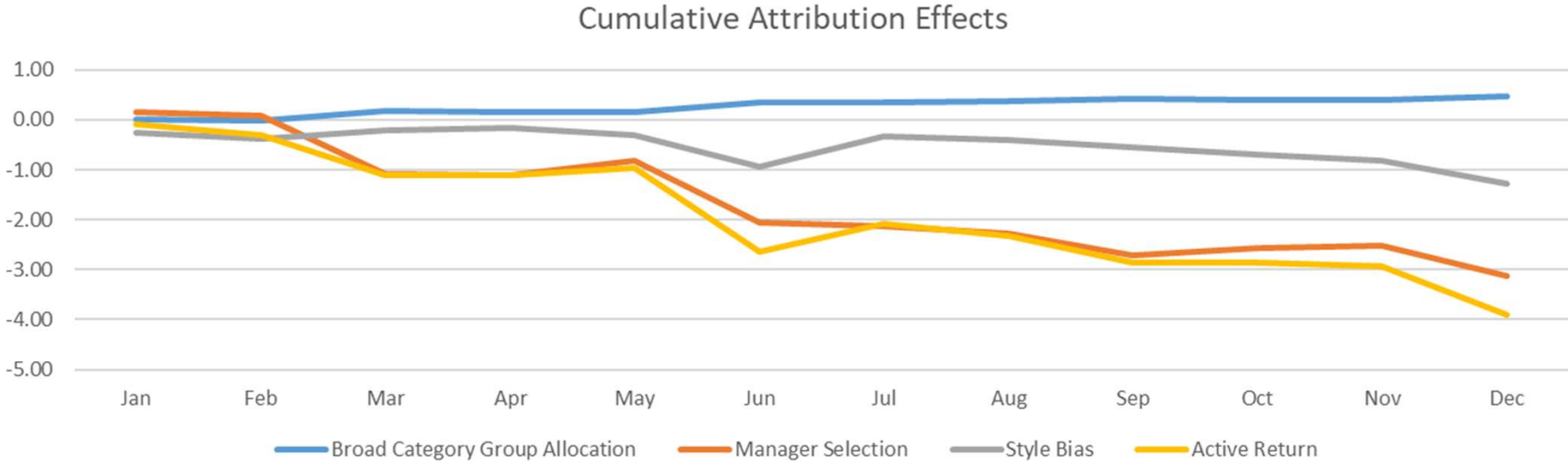
### Manager Selection

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

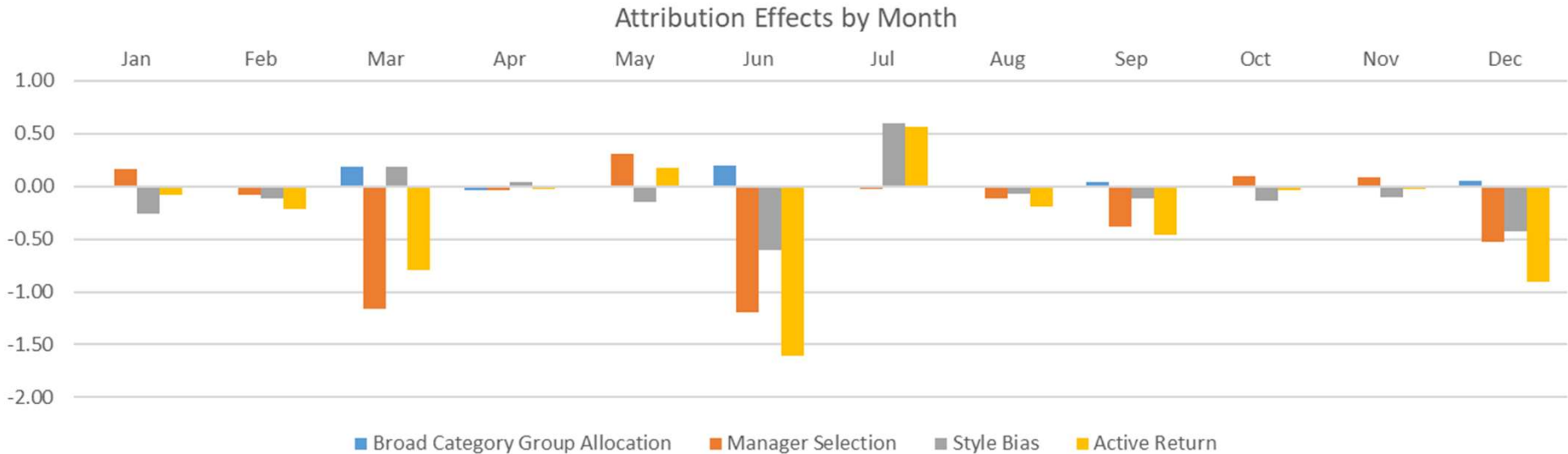
<sup>(2)</sup>All of the Fund's Q3 2024 Private Equity returns are reflected in the October-December time period. Some Real Estate returns are reported on a 1-quarter lag.

# 2024 Attribution

## Cumulative Attribution Effects



## Monthly Attribution Effects



# ERS Fund Attribution – 2024

Asset Class	Benchmark	Average Weight %	Policy Weight %	+/-	Portfolio Return	Benchmark Return	+/-	Attribution Effect(%)			Total Active Return
								Broad Category Group Allocation	Manager Selection	Style Bias	
Public Equity	MSCI ACWI IMI NR USD	39.4	39.0	0.4	11.7	16.4	-4.6	0.0	-0.3	-1.4	-1.8
Fixed Income	Bbg US Agg Bond TR USD	29.2	29.0	0.2	2.8	1.3	1.5	0.0	0.4	0.1	0.4
Private Equity <sup>(2)</sup>	Russell 3000 (Qtr Lag) + 200bps <sup>(1)</sup>	12.9	12.0	0.9	5.6	37.2	-31.6	0.2	-3.8	0.0	-3.6
Real Assets <sup>(2)</sup>	Real Assets Benchmark <sup>(1)</sup>	10.9	13.0	-2.1	-0.9	-4.9	4.0	0.3	0.4	0.0	0.8
Absolute Return	90 Day T-Bill +3%	7.6	7.0	0.6	11.6	8.2	3.4	0.0	0.2	0.1	0.2
<b>Total</b>		<b>100.0</b>	<b>100.0</b>	<b>0.0</b>	<b>6.8</b>	<b>10.8</b>	<b>-4.0</b>	<b>0.5</b>	<b>-3.1</b>	<b>-1.2</b>	<b>-4.0</b>

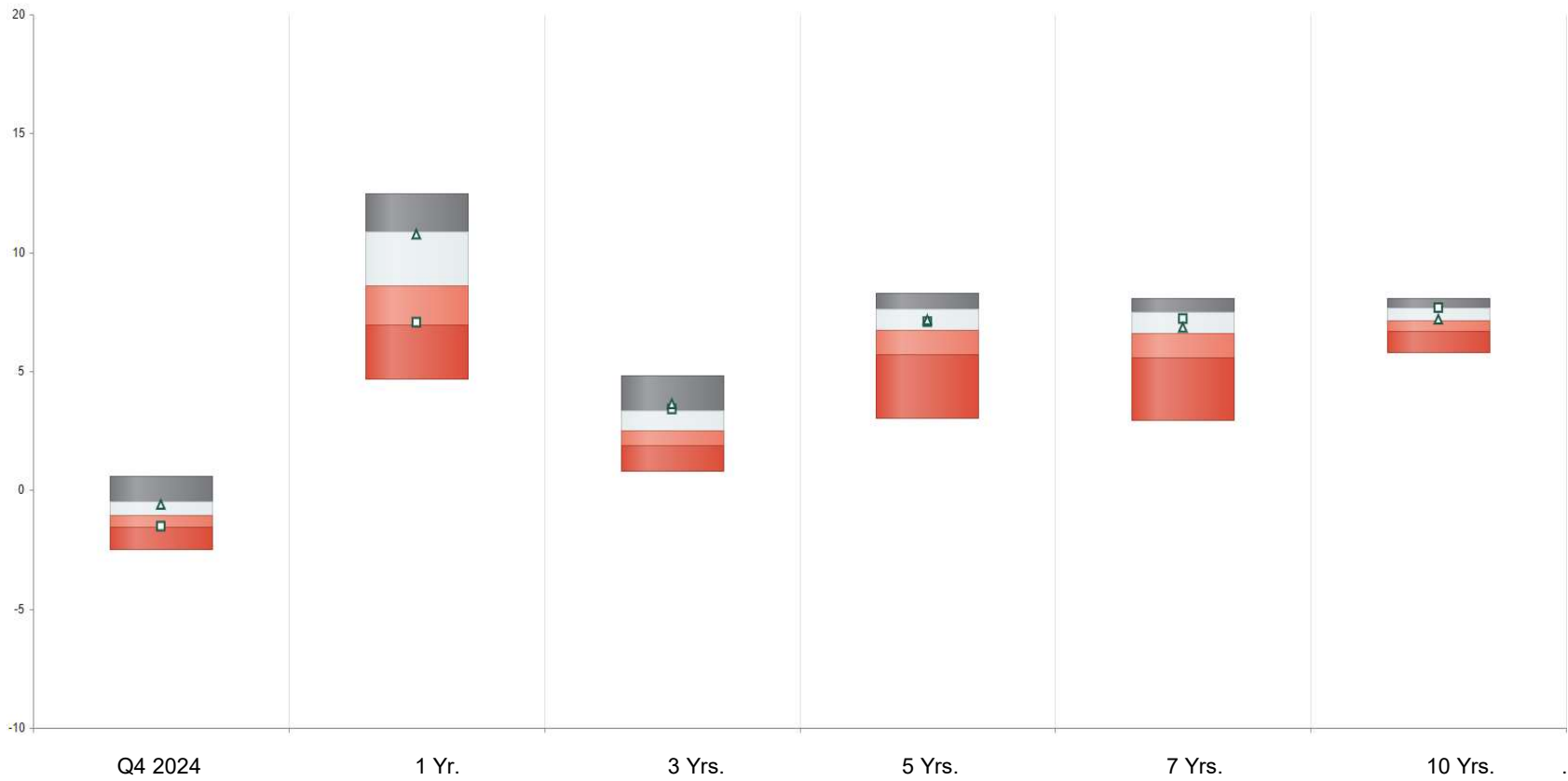
## Main Drivers of 2024 Relative Performance

	<u>Impact %</u>	<u>Attribution Category</u>
Private Equity	-3.83%	Manager Selection
Public Equity Style Bias	-1.41%	Style Bias
Primarily U.S. Value, Small Cap		
Asset Allocation	0.45%	Category Allocation
Underweight Real Assets		
Overweight Private Equity		
Manager Performance		
Loomis Sayles	0.32%	Manager Selection
Morgan Stanley	0.20%	Manager Selection

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

<sup>(2)</sup> All of the Fund's Q4 2023 - Q3 2024 Private Equity returns are reflected in the 2024 time period. Some Real Estate returns are reported on a 1-quarter lag.

# Total Fund vs Universe

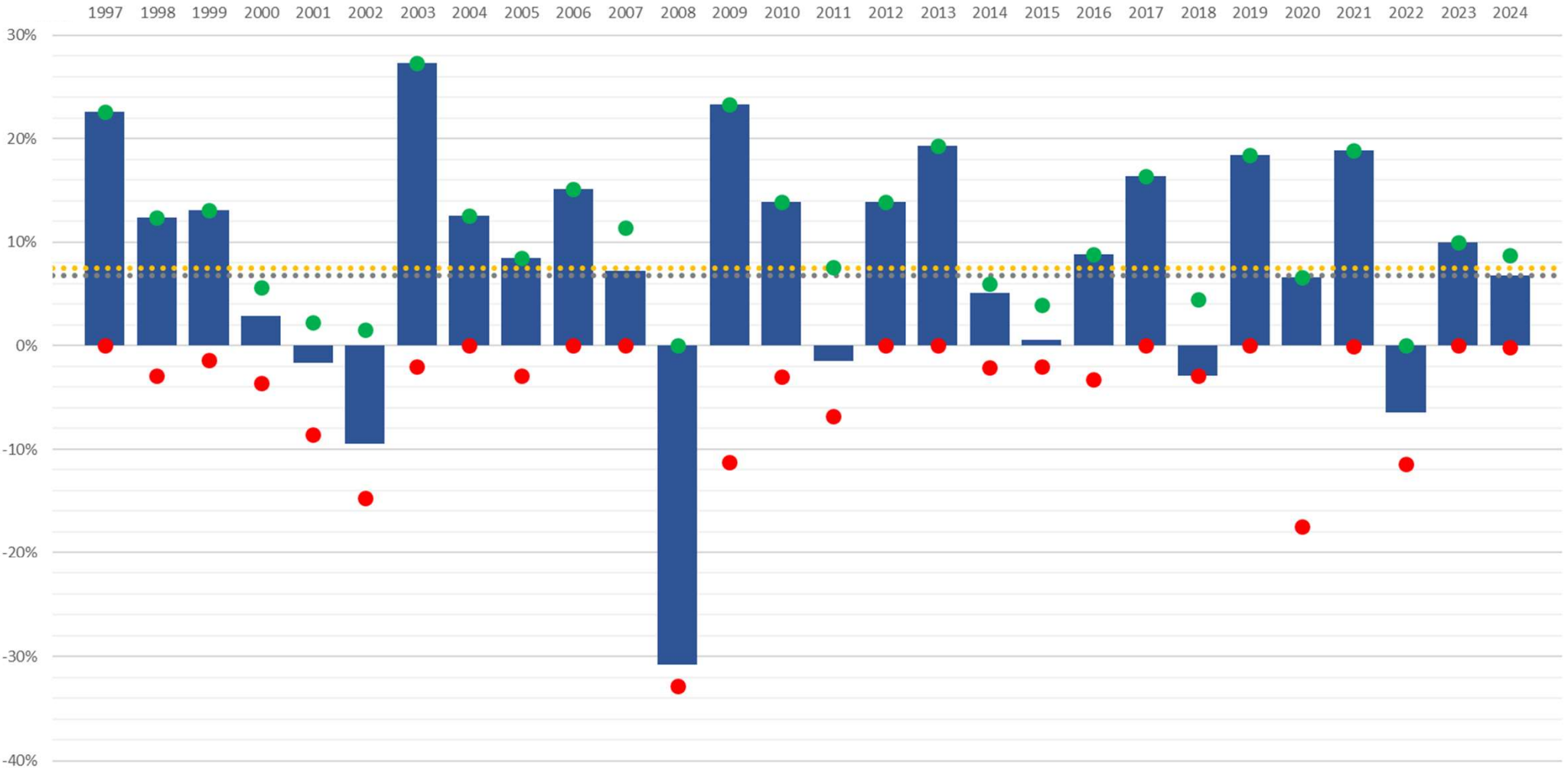


■ Account
 ▲ Index

	<b>Q4 2024</b>	<b>1 Yr.</b>	<b>3 Yrs.</b>	<b>5 Yrs.</b>	<b>7 Yrs.</b>	<b>10 Yrs.</b>
Account Return	-1.5	7.1	3.4	7.1	7.2	7.7
Percentile Rank	75	74	24	38	32	25
Index Return	-0.6	10.8	3.6	7.1	6.8	7.2
Percentile Rank	31	28	20	35	37	46
1st Quartile	-0.5	10.9	3.3	7.6	7.5	7.7
Median	-1.0	8.6	2.5	6.7	6.6	7.1
3rd Quartile	-1.6	7.0	1.9	5.7	5.6	6.7
Observations	50	49	47	45	42	29

# Annual Returns, Peaks, and Troughs

■ CMERS ● Peak ● Trough ●●●● Current Discount Rate (6.8%) ●●●●● CMERS Annualized Return (7.5%)



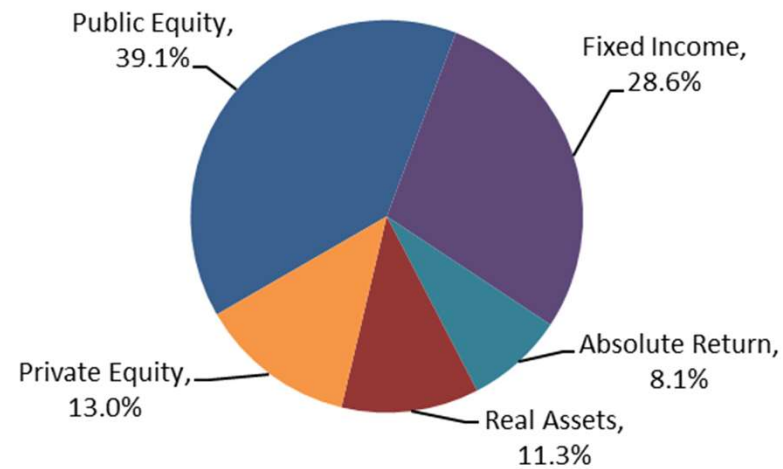
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
<b>CMERS</b>	22.7%	12.4%	13.1%	2.8%	-1.7%	-9.4%	27.3%	12.6%	8.5%	15.1%	7.2%	-30.8%	23.3%	13.9%	-1.4%	13.9%	19.3%	5.1%	0.5%	8.8%	16.4%	-2.9%	18.4%	6.6%	18.9%	-6.5%	10.0%	6.8%
<b>Peak</b>	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%	10.0%	8.7%
<b>Trough</b>	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%	0.0%	-0.1%



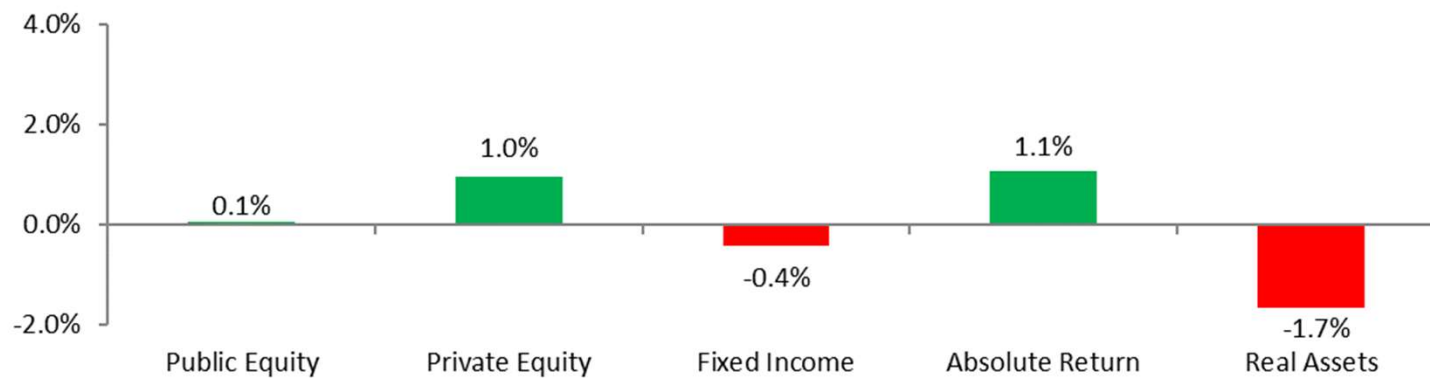
\* Returns net of fees

# Asset Allocation as of December 31, 2024

## Actual Asset Allocation\*



## Actual Asset Allocation vs. Policy Target



# 2024 Market Value Change

December 31, 2023 Market Value including City Reserve & PABF Accounts		\$ 5,797,273,012
Monthly Cash Outflows thru	<u>December 31, 2024</u>	
Retiree Payroll Expense		\$ (484,431,486)
PABF Payroll Expense		\$ (4,000)
Expenses Paid		\$ (18,938,343)
GPS Benefit Payments		\$ (7,077,839)
Sub-Total Monthly Cash Outflows		\$ (510,451,667)
Monthly Cash Inflows thru	<u>December 31, 2024</u>	
Contributions		\$ 252,510,187
PABF Contribution		\$ 4,500
Sub-Total Monthly Contributions		\$ 252,514,687
Capital Market Gain/(Loss)		<u>\$ 407,284,104</u>
Value including City Reserve & PABF Accounts as of	<u>December 31, 2024</u>	<u>\$ 5,946,620,135</u>
Less City Reserve Account <sup>1</sup>		\$ 89,448,110
Less PABF Fund <sup>2</sup>		\$ 2,464
Net Projected ERS Fund Value as of	<u>December 31, 2024</u>	<u><u>\$ 5,857,169,561</u></u>

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

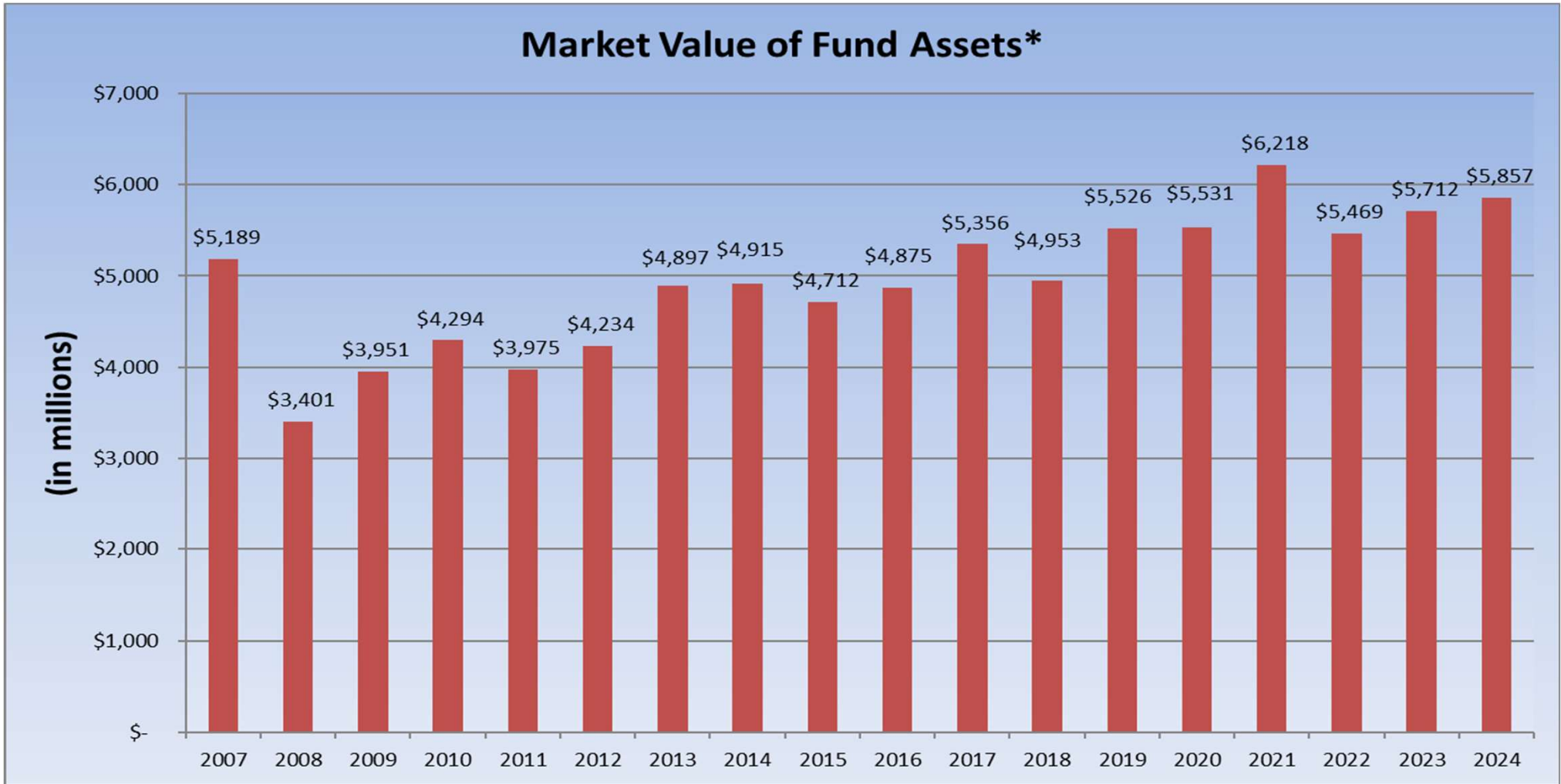
2 PABF Fund balance equals the market value currently held in the PABF account.

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



# Fund Value of Assets: 2007 – 2024

(Reflects 12/31 Fund Values)



Most recent Actuarial valuation projects benefit payments to total \$5.6 billion in next 10 years.

<b>Benefit Payments</b>	\$6.15 billion
<b>Expenses</b>	\$300 million
<b>Contributions</b>	\$1.86 billion
<b>Investment Gain</b>	\$5.3 billion

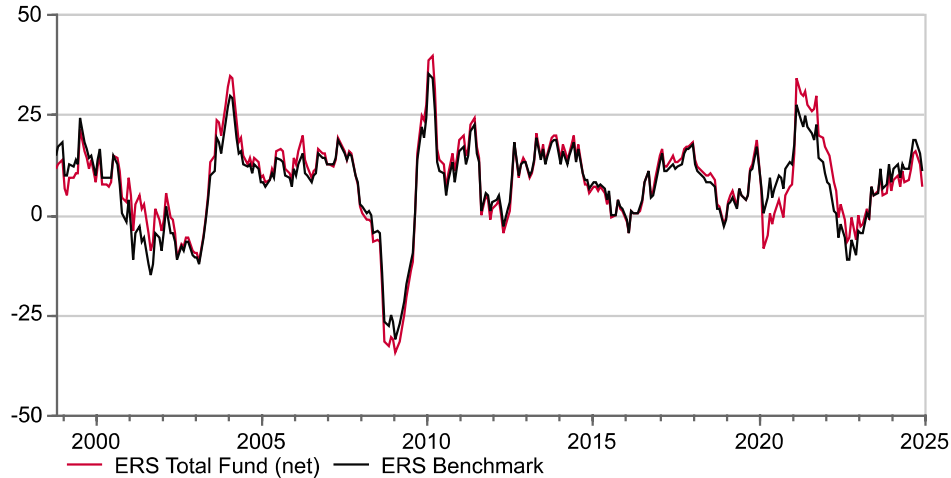
Benefit Payments, Expenses, Contributions, and Investment Gain amounts are calculated using estimates of cash flows into and out of the Fund. These amounts are not audited and may not tie to CMERS Financial Statements.

17 Year Estimates (1/1/2008 - 12/31/2024)

# Total Fund Rolling Returns as of December 31, 2024

## 1 Year Rolling Returns – 12/1/1997 to 12/31/2024

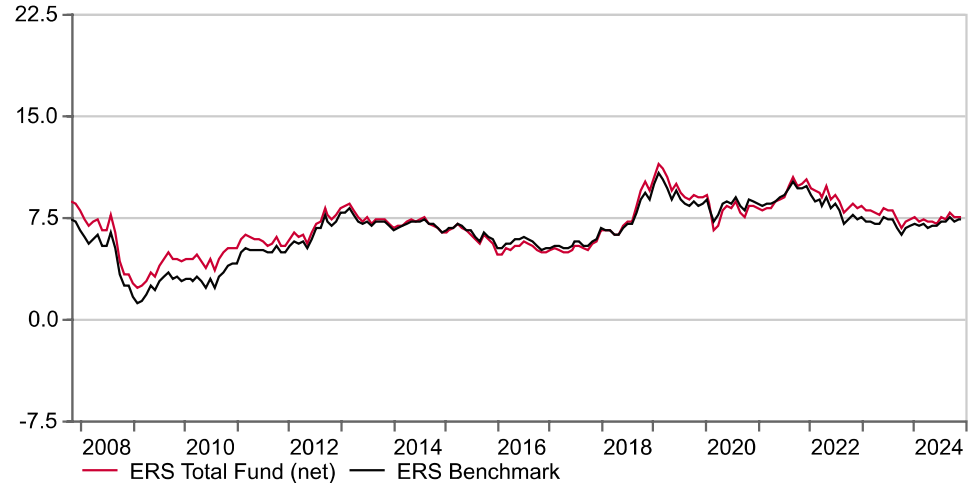
1 Year 1 Month Shift



©FactSet Research Systems

## 10 Year Rolling Returns – 12/1/1997 to 12/31/2024

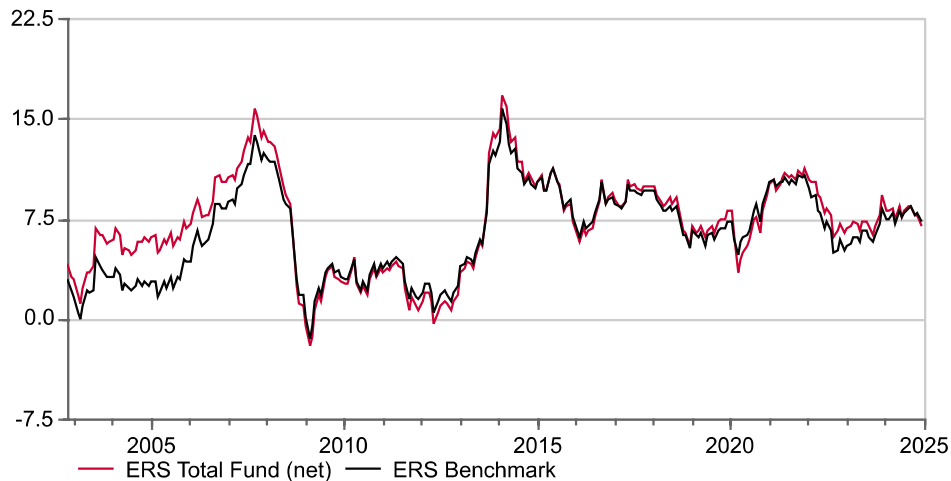
10 Years 1 Month Shift



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## 5 Year Rolling Returns – 12/1/1997 to 12/31/2024

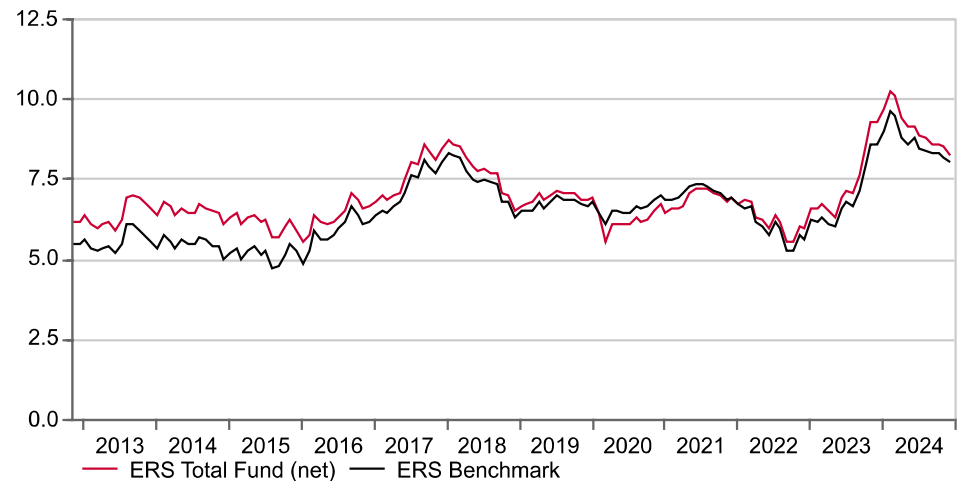
5 Years 1 Month Shift



©FactSet Research Systems

## 15 Year Rolling Returns – 12/1/1997 to 12/31/2024

15 Years 1 Month Shift

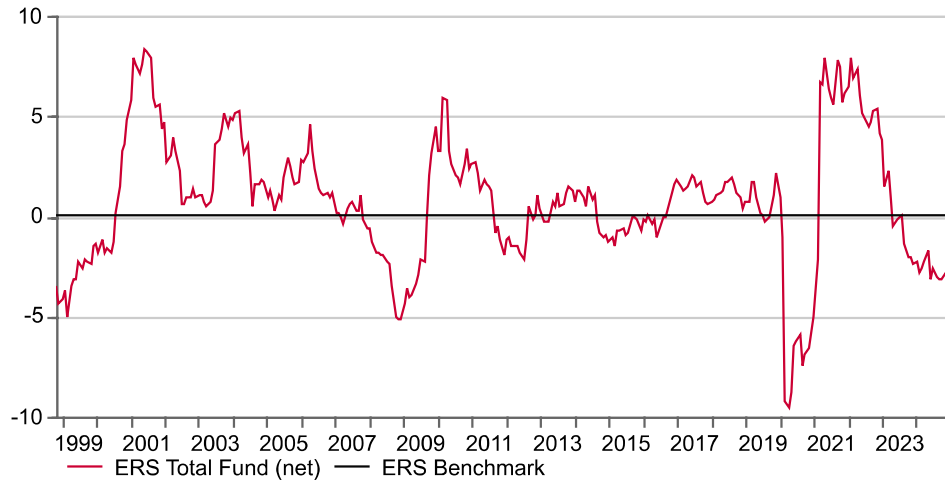


©FactSet Research Systems

# Total Fund Rolling Excess Returns as of December 31, 2024

## 1 Year Rolling Excess Returns – 12/1/1997 to 12/31/2024

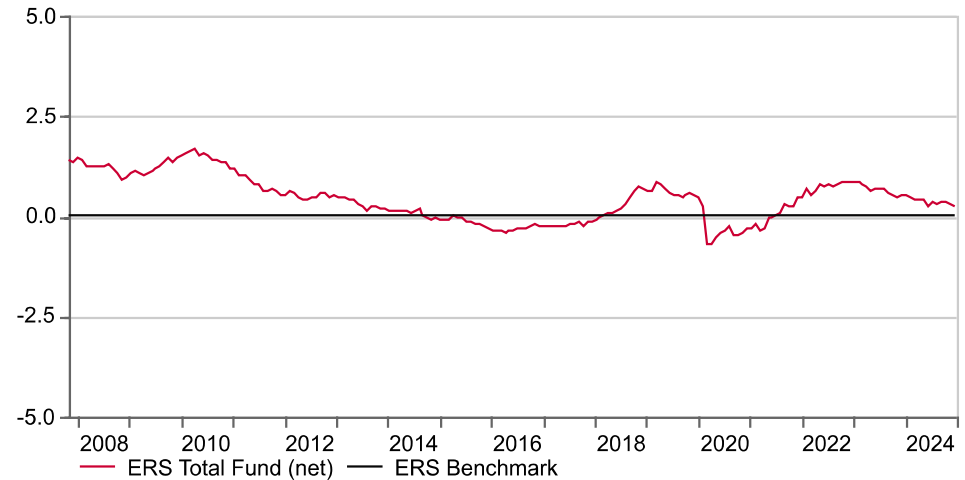
1 Year 1 Month Shift



©FactSet Research Systems

## 10 Year Rolling Excess Returns – 12/1/1997 to 12/31/2024

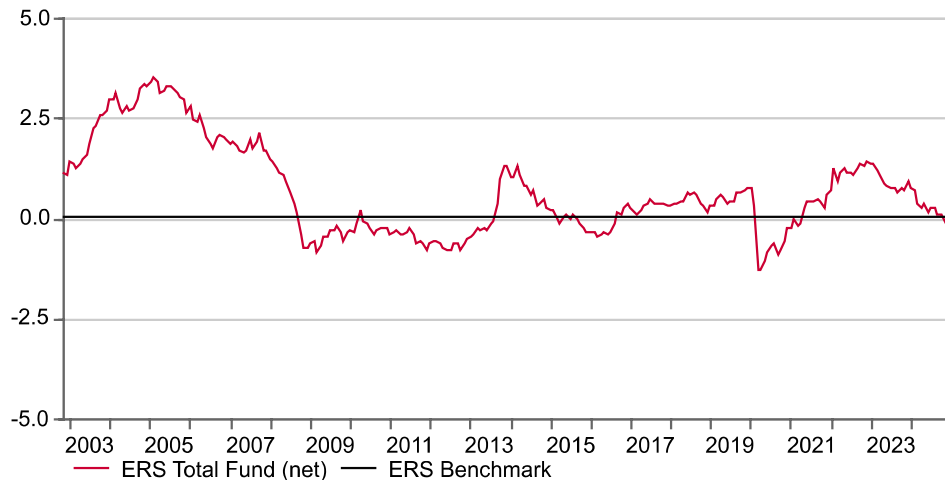
10 Years 1 Month Shift



©FactSet Research Systems

## 5 Year Rolling Excess Returns – 12/1/1997 to 12/31/2024

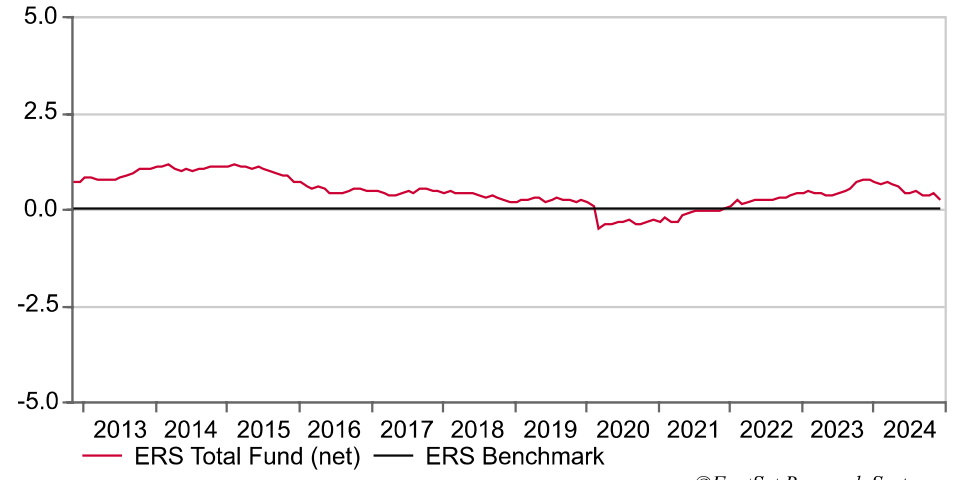
5 Years 1 Month Shift



©FactSet Research Systems

## 15 Year Rolling Excess Returns – 12/1/1997 to 12/31/2024

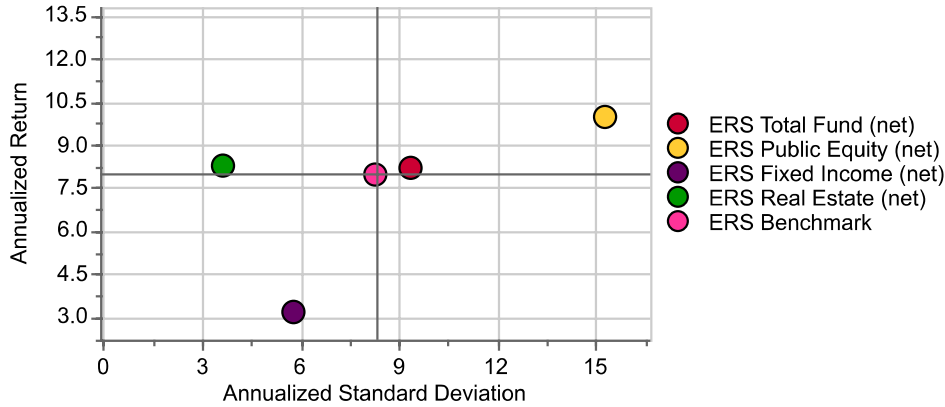
15 Years 1 Month Shift



©FactSet Research Systems

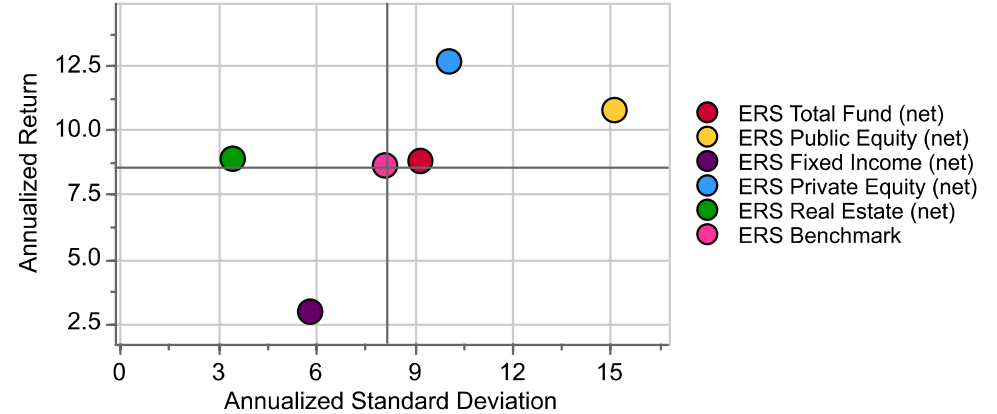
# Total Fund Statistics

## 15 Year Risk-Reward –1/1/2009 to 12/31/2024



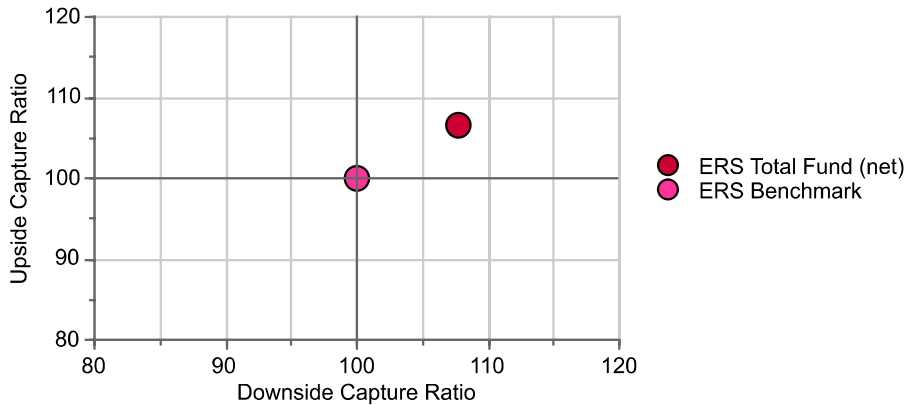
©FactSet Research Systems

## Risk-Reward Since Private Equity Inception – 7/1/2010 to 12/31/2024



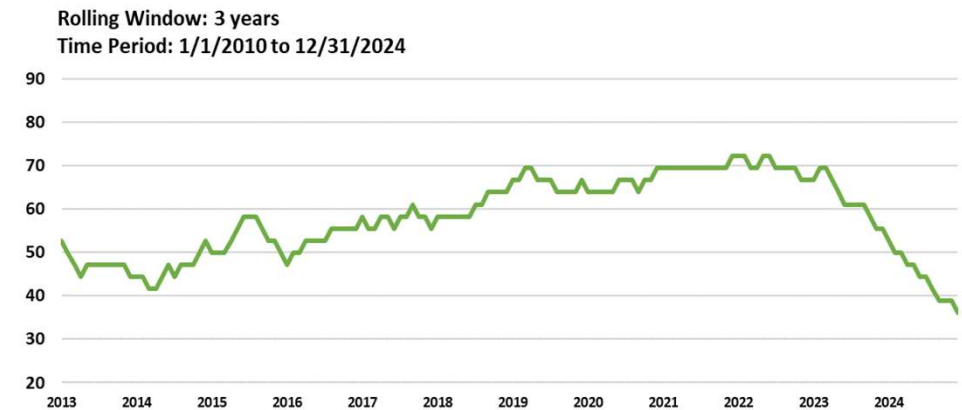
©FactSet Research Systems

## 15 Year Upside-Downside –1/1/2009 to 12/31/2024



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## Batting Average



## 15 Year Risk –1/1/2009 to 12/31/2024

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Total Fund (net)	8.2	9.3	0.0	0.8	0.0	2.7	1.1
ERS Benchmark	8.0	8.3	0.0	0.8	--	--	1.0

## Risk – 7/1/2013 to 12/31/2024

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
ERS Total Fund (net)	8.0	8.7	0.0	0.7	0.0	2.9	1.1
ERS Benchmark	7.8	7.7	0.0	0.8	--	--	1.0



\* Real Estate returns calculated by Northern Trust

# Notable CMERS Manager Events

Manager	Event	Date
Morgan Stanley	Announced that Laurel Durkay will join the Prime Property Fund team as Chief Investment Officer. Ms. Durkay is replacing Josh Meyerberg, who left the firm in mid-2024. Ms. Durkay brings 23 years of real estate investing experience, most recently as Head of Global Listed Real Assets at Morgan Stanley. Scott Brown remains in place as Head of Prime Property Fund, and Staff expects no change in philosophy or process.	January, 2025

# Public Equity

# Public Equity Performance

## 10 Year Rolling Returns – 7/1/2000 to 12/31/2024



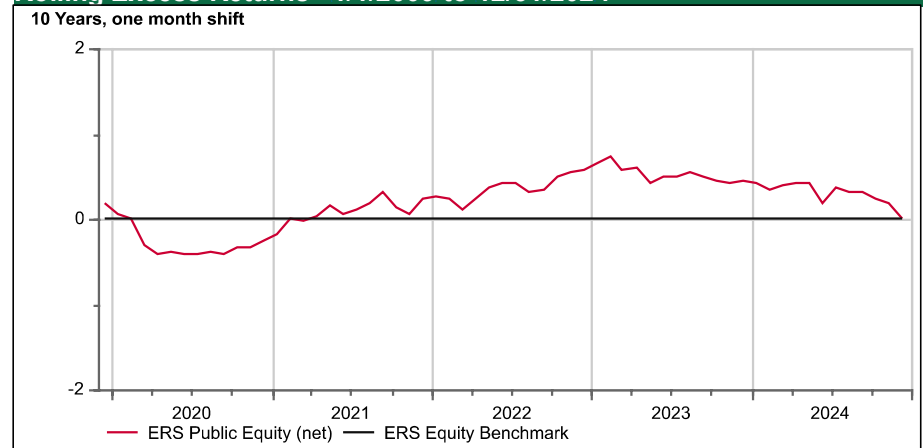
## Trailing Returns

	Annualized Return						
	QTR	1 Year	3 Year	5 Year	7 Year	10 Year	15 Year
ERS Public Equity (Gross)	-3.0	12.1	4.8	9.8	9.1	9.6	10.3
ERS Public Equity (Net)	-3.1	11.7	4.4	9.5	8.7	9.2	9.9
ERS Public Equity Benchmark	-1.2	16.4	4.9	9.7	8.8	9.2	9.9
MSCI AC World IMI	-1.2	16.4	4.9	9.7	8.8	9.0	9.2

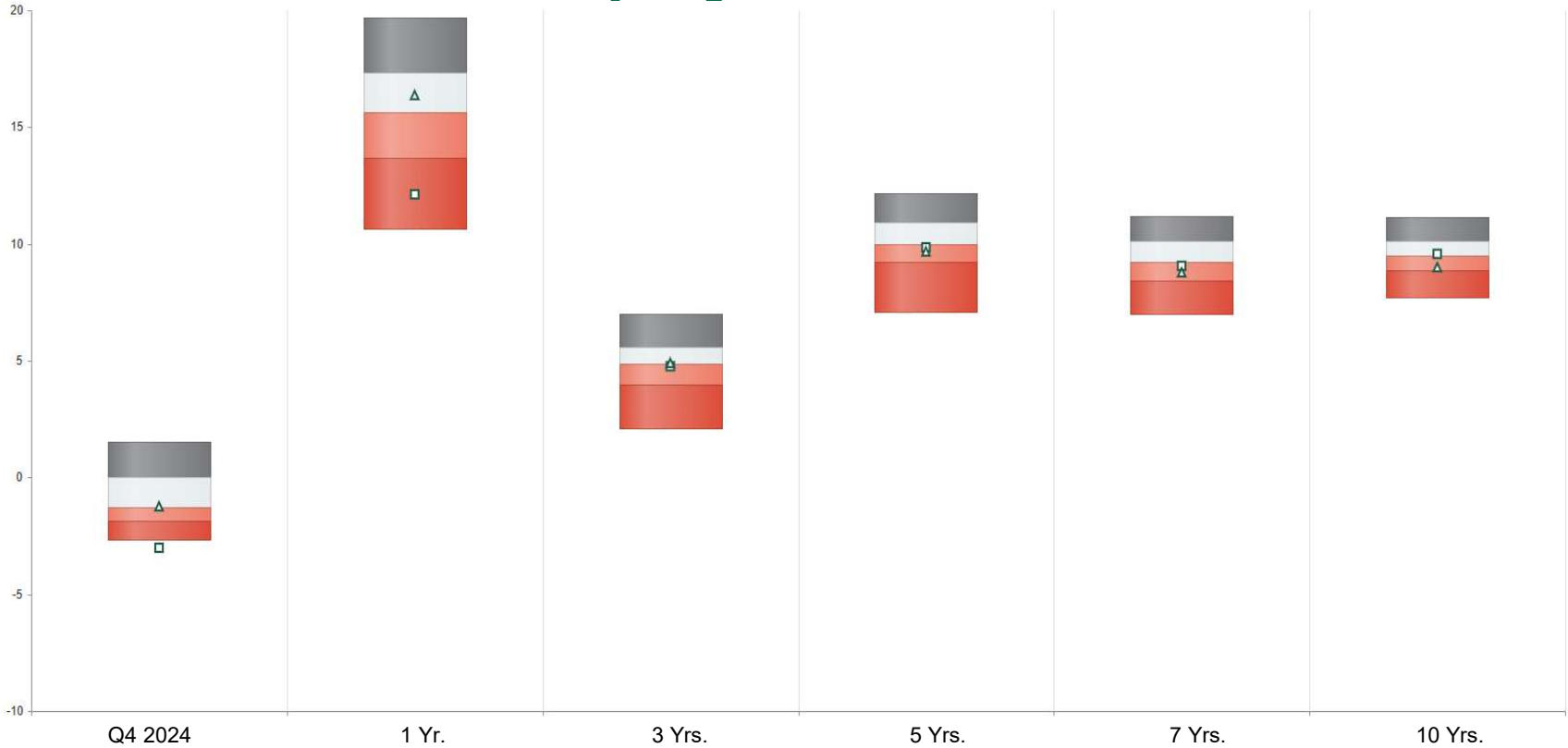
## Investment Growth – 1/1/2009 to 12/31/2024



## Rolling Excess Returns – 1/1/2009 to 12/31/2024



# Public Equity vs Universe



□ Account    ▲ Index

	<b>Q4 2024</b>	<b>1 Yr.</b>	<b>3 Yrs.</b>	<b>5 Yrs.</b>	<b>7 Yrs.</b>	<b>10 Yrs.</b>
Account Return	-3.0	12.1	4.8	9.8	9.1	9.6
Percentile Rank	94	84	55	54	59	42
Index Return	-1.2	16.4	4.9	9.7	8.8	9.2
Percentile Rank	49	39	47	60	67	3rd Quartile
1st Quartile	0.0	17.3	5.6	10.9	10.1	10.1
Median	-1.3	15.6	4.9	10.0	9.3	9.5
3rd Quartile	-1.9	13.7	4.0	9.2	8.4	8.9
Observations	122	122	122	121	120	112

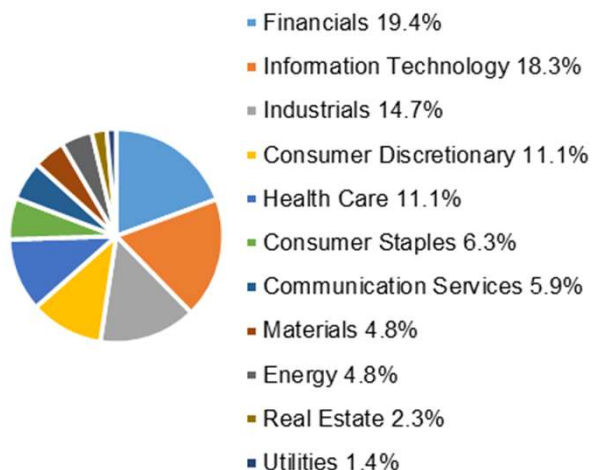


\* Returns gross of fees

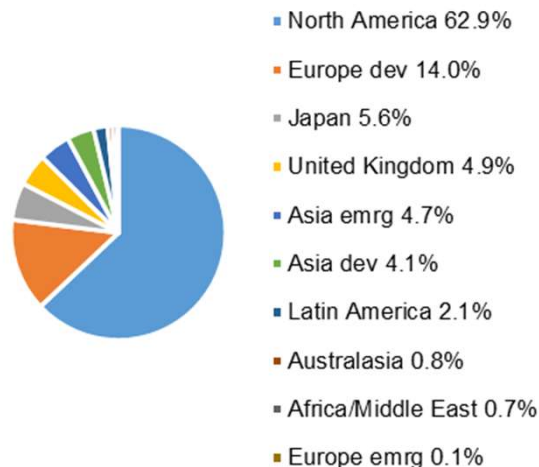


# Public Equity Portfolio Snapshot

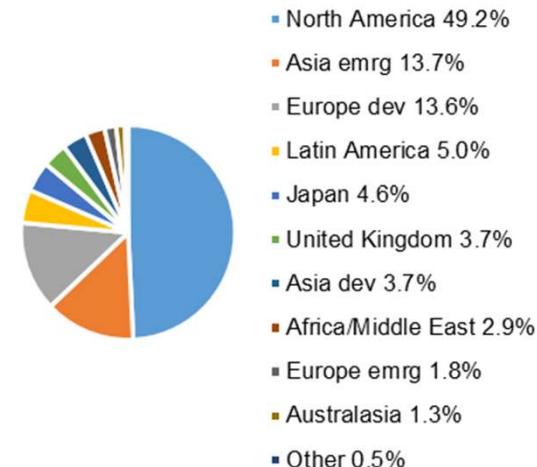
## Equity Sector Exposure (GICS)



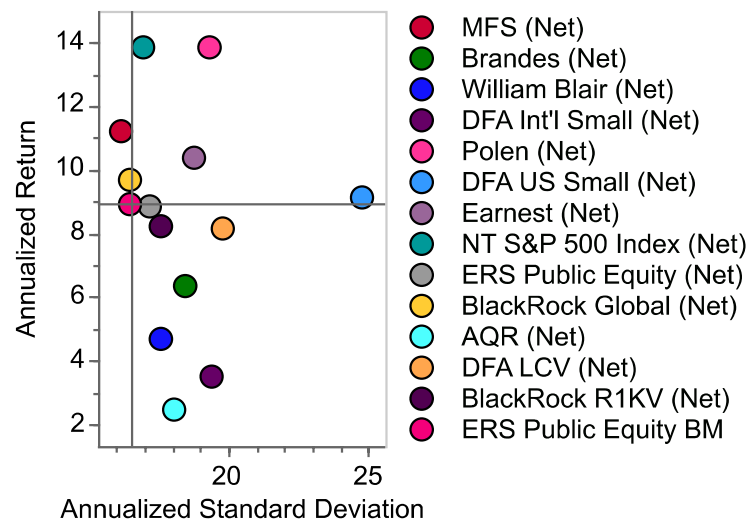
## Regional Exposure by Domicile



## Regional Exposure by Source of Revenue



## Risk – Reward – 12/1/2017 to 12/31/2024



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## Top 10 Holdings

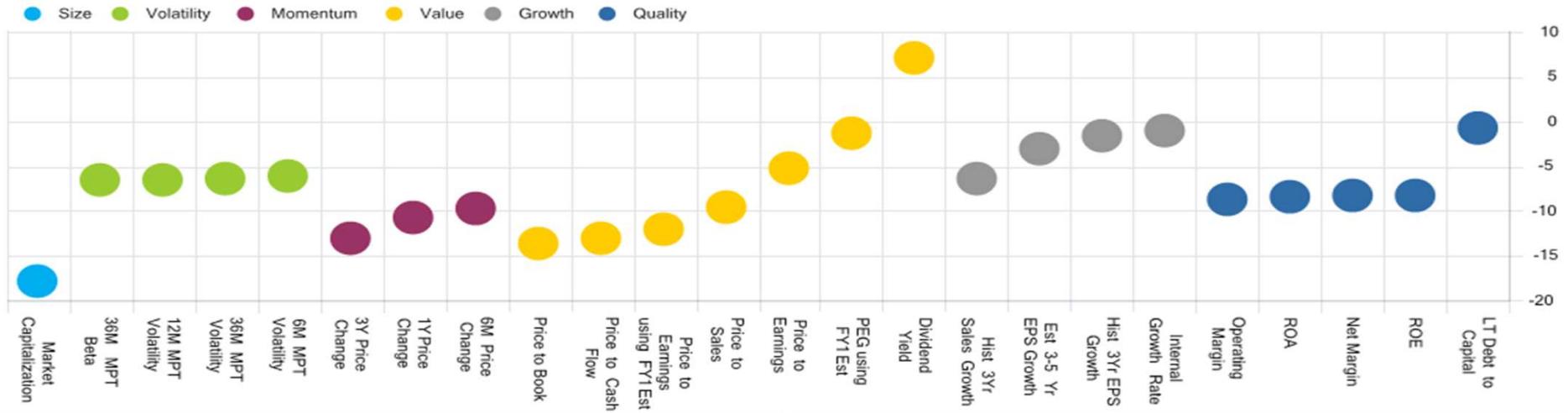
Portfolio Date 12/31/24	Weight %	Return %
Microsoft Corporation	2.3	-1.9
Apple Inc.	1.9	7.6
NVIDIA Corporation	1.6	10.6
Taiwan Semi Mfg. Co.	1.5	11.2
Amazon.com, Inc.	1.3	17.7
Alphabet Inc.	1.2	14.1
Visa Inc.	0.9	15.2
JPMorgan Chase & Co.	0.8	14.3
Accenture plc	0.7	-0.1
Berkshire Hathaway Inc.	0.7	-1.5

## Top 10 Managers

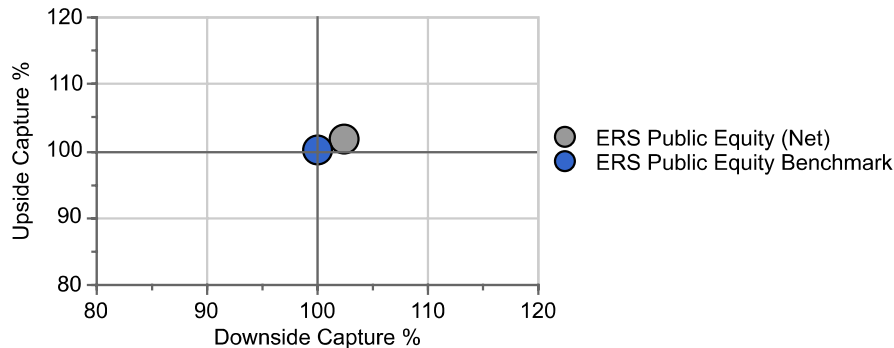
Portfolio Date 12/31/24	Weight %
Brandes Int'l Value	13.1
BlackRock Global Core	11.0
William Blair Int'l Growth	9.8
MFS Global Growth	9.1
NTQA S&P 500 Index Core	9.0
DFA US Small Cap Value	8.7
BlackRock R1000 Value Index	8.6
Earnest Mid Cap Core	7.7
DFA Int'l Small Cap Value	7.0
DFA US Large Cap Value	6.3

# Public Equity Statistics

## Characteristics Tilt vs MSCI ACWI IMI 12/31/2024

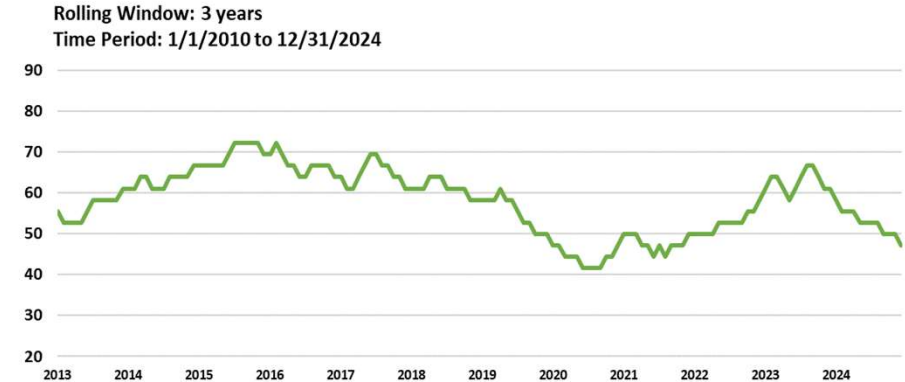


## 15 Year Upside-Downside –1/1/2009 to 12/31/2024



©FactSet Research Systems

## Batting Average



## 15 Year Risk –1/1/2009 to 12/31/2024

	Annualized Return	Standard Deviation	Sharpe Alpha	Information Ratio	Tracking Error	Beta
ERS Public Equity (Net)	9.9	15.3	0.0	0.6	1.9	1.0
ERS Public Equity Benchmark	9.9	14.7	0.0	0.6	--	1.0

## Risk – 7/1/2013 to 12/31/2024

	Annualized Return	Standard Deviation	Sharpe Alpha	Information Ratio	Tracking Error	Beta
ERS Public Equity (Net)	10.0	14.9	0.0	0.6	1.9	1.0
ERS Public Equity Benchmark	9.9	14.4	0.0	0.6	--	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 December 31, 2024

	Price/ Earnings	P/E using FY2 Est	Price/ Book	Price/ CF	Dividend Yield	Est. 3-5 yr. EPS Growth
ERS Public Equity	17.3	14.1	1.8	9.3	2.1	13.2
MSCI AC World IMI	19.7	16.6	2.3	11.8	1.8	13.4

Domestic Managers	Price/ Earnings	P/E using FY2 Est	Price/ Book	Price/ CF	Dividend Yield
BlackRock R1000 Value Index	18.6	15.8	2.5	11.8	2.1
DFA Large Value	15.8	13.3	2.2	9.4	2.1
DFA Small Value	12.5	10.8	1.1	6.2	1.8
Earnest Mid Core	18.9	15.4	2.5	11.6	1.4
NT S&P 500 Index	25.4	20.4	3.4	16.6	1.3
Polen Large Growth	34.3	26.8	7.1	26.7	0.5

Global & International Managers	Price/ Earnings	P/E using FY2 Est	Price/ Book	Price/ CF	Dividend Yield
AQR Emerging Markets Core	11.3	9.4	1.6	6.2	3.7
BlackRock Global Core	19.7	15.8	2.3	11.5	1.9
Brandes Int'l Value	13.6	10.1	1.1	5.4	3.9
DFA Int'l Small Value	10.0	9.0	0.8	4.9	3.6
MFS Global Growth	28.8	21.9	4.1	19.3	1.2
William Blair Int'l Growth	22.8	18.5	3.5	18.0	1.4

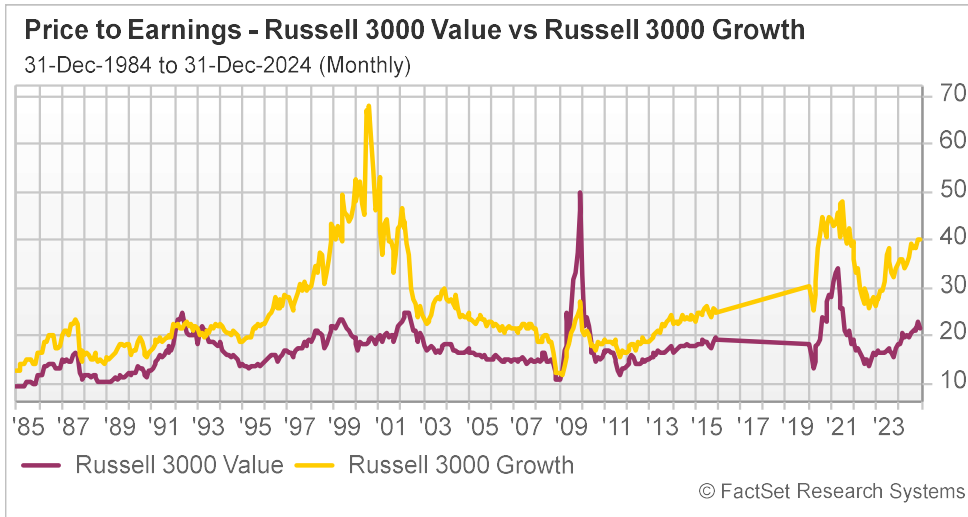
\*"Price/Earnings" and "P/E using FY2 Est" values exclude companies with negative earnings from calculations.

# P/E Ratio Comparisons in the U.S. Since 1980 - As of December 31, 2024

Value vs. Growth



Large vs. Small



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

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

# Relative Investment Performance – Active Equity Managers

## As of December 31, 2024

### Outperforming Equity Managers

	4th Qtr	1 Year	3 Year	5 Year	7 Year	10 Year
Polen <i>S&amp;P 500</i>	4.5% 2.0%	15.6% 9.4%	-0.2% 9.2%	10.7% 3.8%	14.0% 0.2%	14.0% 0.9%
DFA International <i>MSCI EAFE Small Cap</i>	-6.5% 1.9%	7.9% 6.1%	4.6% 7.9%	6.0% 3.7%	3.1% 1.1%	6.0% 0.4%
AQR <i>MSCI EM</i>	-6.9% 1.1%	6.6% 0.9%	-0.1% 1.8%	3.2% 1.5%	2.0% 0.6%	N/A
William Blair <i>MSCI ACWI ex US</i>	-6.4% 1.1%	3.4% 2.7%	-5.2% 6.6%	4.6% 0.0%	4.5% 0.5%	5.8% 0.5%
DFA U.S. Small Value <i>Russell 2000 Value</i>	-0.2% 0.9%	7.2% 0.9%	8.2% 6.3%	13.0% 5.7%	9.3% 3.2%	9.2% 2.1%
DFA U.S. Large Value <i>Russell 1000 Value</i>	-1.9% 0.1%	13.6% 0.7%	6.6% 0.9%	8.6% 0.0%	7.6% 0.8%	N/A
Blackrock Global Alpha Tilts <i>MSCI ACWI</i>	-0.9% 0.1%	18.5% 1.0%	6.6% 1.2%	10.8% 0.8%	9.3% 0.1%	N/A
ERS Public Equity <i>ERS Equity Benchmark</i>	-3.1% 1.9%	11.7% 4.7%	4.4% 0.5%	9.5% 0.2%	8.7% 0.1%	9.2% 0.0%

Relative outperformance in blue

Relative underperformance in red

\*Returns net of fees

# Relative Investment Performance – Active Equity Managers

## As of December 31, 2024

### Underperforming Equity Managers

	4th Qtr	1 Year	3 Year	5 Year	7 Year	10 Year
<b>Earnest</b> <i>Russell Midcap</i>	-3.0% 3.6%	7.6% 7.7%	2.1% 1.7%	10.1% 0.1%	10.4% 0.7%	11.3% 1.7%
<b>MFS</b> <i>MSCI ACWI</i>	-3.2% 2.2%	11.4% 6.1%	3.1% 2.3%	9.7% 0.4%	11.0% 1.8%	11.2% 2.0%
<b>Brandes</b> <i>MSCI EAFE</i>	-9.4% 1.3%	6.7% 2.9%	9.0% 7.4%	7.7% 3.0%	6.1% 2.0%	6.4% 1.2%
<b>ERS Public Equity</b> <i>ERS Equity Benchmark</i>	-3.1% 1.9%	11.7% 4.7%	4.4% 0.5%	9.5% 0.2%	8.7% 0.1%	9.2% 0.0%

Relative outperformance in blue

Relative underperformance in red

\*Returns net of fees

# Relative Investment Performance – Passive Equity Managers & Other

## As of December 31, 2024

### Passive Equity Managers

	4th Qtr	1 Year	3 Year	5 Year	7 Year	10 Year
Northern Trust S&P 500 Index <i>S&amp;P 500</i>	2.4%	25.0%	8.9%	14.5%	13.8%	13.1%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
BlackRock Russell 1000 Value Index <i>Russell 1000 Value</i>	-2.0%	14.4%	5.6%	8.7%	8.5%	N/A
	0.0%	0.0%	0.0%	0.0%	0.1%	

### Real Assets Manager

	4th Qtr	1 Year	3 Year	5 Year	7 Year	10 Year
Principal Diversified Real Assets <i>Blended Benchmark</i>	-5.4%	3.3%	0.1%	4.2%	3.9%	N/A
	0.1%	0.9%	0.9%	0.1%	0.1%	

Relative outperformance in blue

Relative underperformance in red

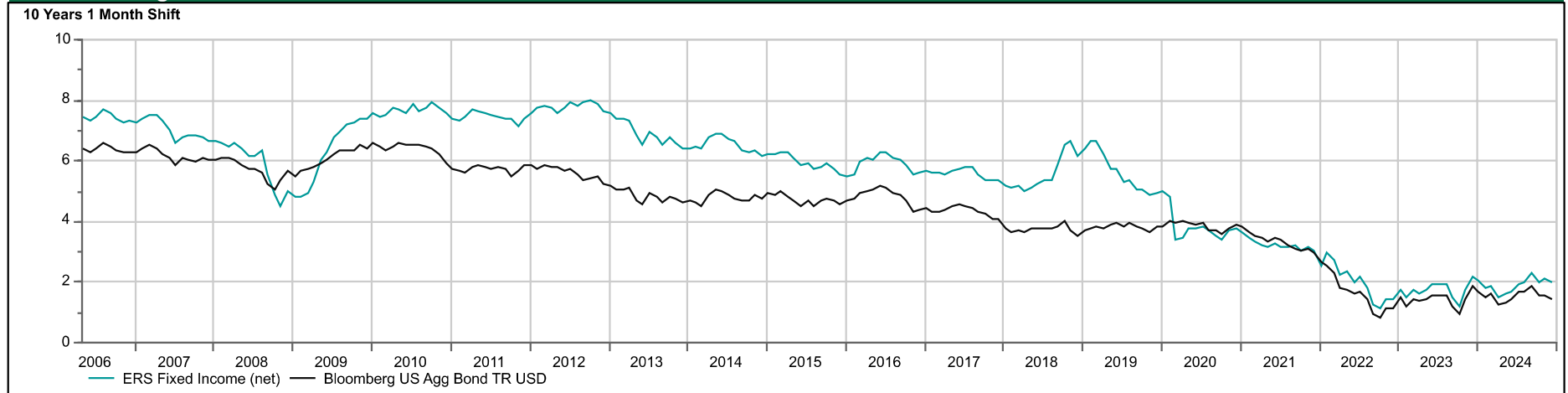
\*Returns net of fees

# Fixed Income



# Fixed Income Performance

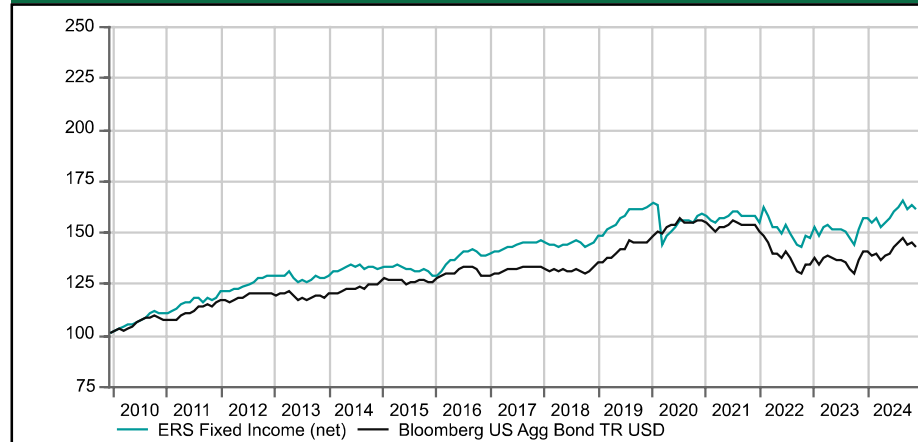
## 10 Year Rolling Returns – 6/1/1996 to 12/31/2024



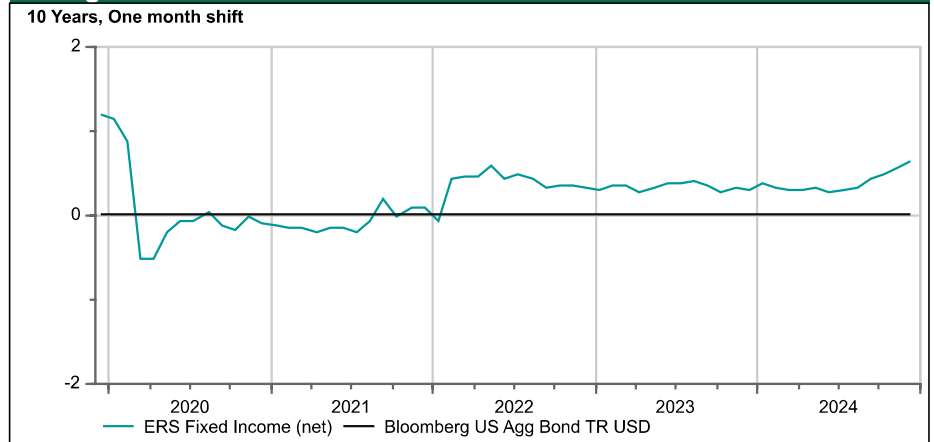
## Trailing Returns

	Annualized Return						
	QTR	1 Year	3 Year	5 Year	7 Year	10 Year	15 Year
Total Fixed Income (Gross)	-2.6	2.5	0.6	-0.1	1.5	2.1	3.3
Total Fixed Income (Net)	-2.6	2.5	0.5	-0.2	1.4	2.0	3.2
Bloomberg US Aggregate	-3.1	1.3	-2.4	-0.3	1.0	1.3	2.4

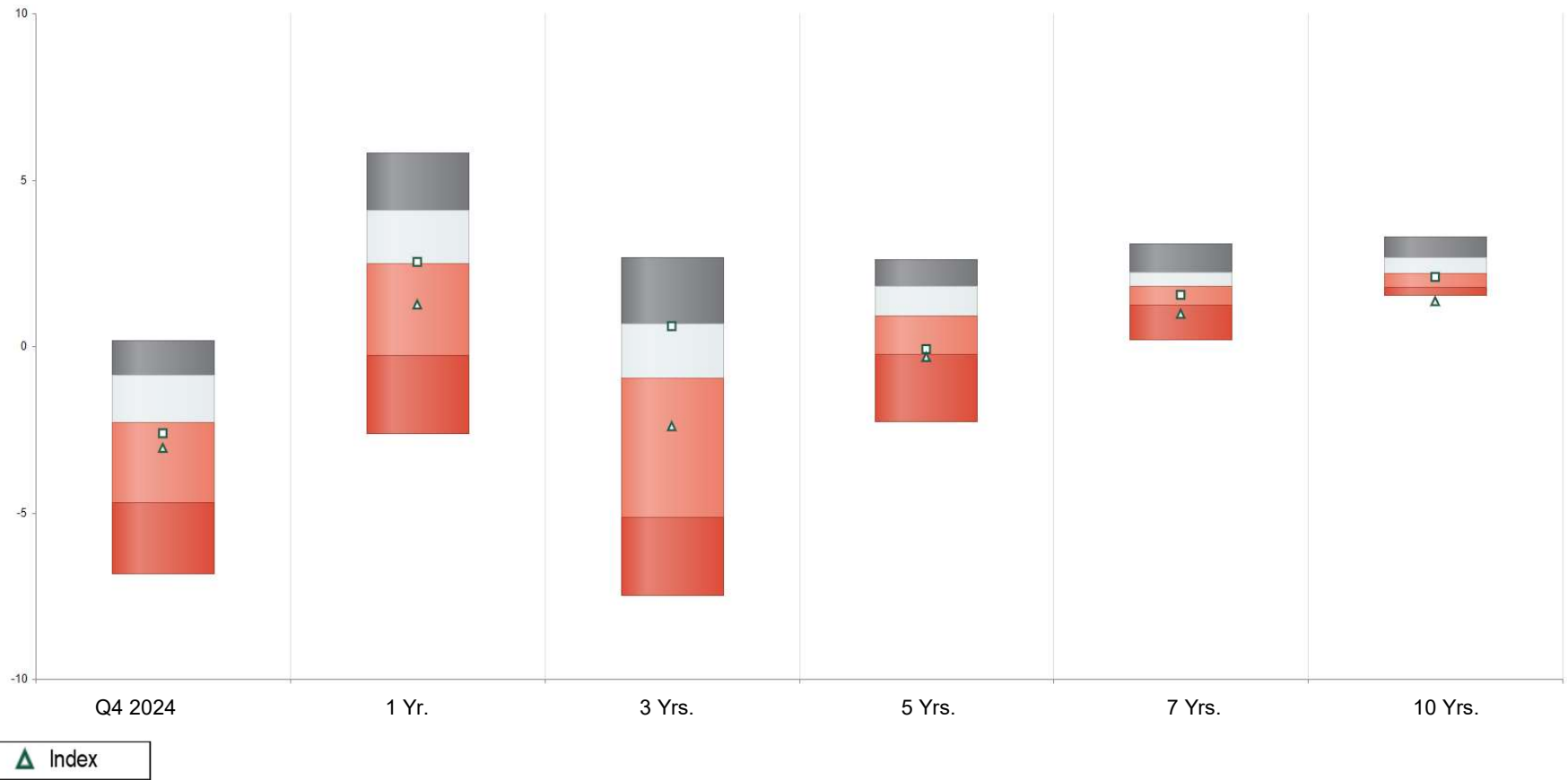
## Investment Growth – 1/1/2009 to 12/31/2024



## Rolling Excess Return – 1/1/2009 to 12/31/2024



# Fixed Income vs Universe



	<b>Q4 2024</b>	<b>1 Yr.</b>	<b>3 Yrs.</b>	<b>5 Yrs.</b>	<b>7 Yrs.</b>	<b>10 Yrs.</b>
Account Return	-2.6	2.5	0.6	-0.1	1.5	2.1
Percentile Rank	56	49	27	73	65	56
Index Return	-3.1	1.3	-2.4	-0.3	1.0	1.3
Percentile Rank	64	68	71	76	85	92
1st Quartile	-0.9	4.1	0.7	1.8	2.2	2.7
Median	-2.3	2.5	-0.9	0.9	1.8	2.2
3rd Quartile	-4.7	-0.3	-5.1	-0.3	1.2	1.8
Observations	88	87	88	88	88	86

# Relative Investment Performance – Fixed Income Managers

## As of December 31, 2024

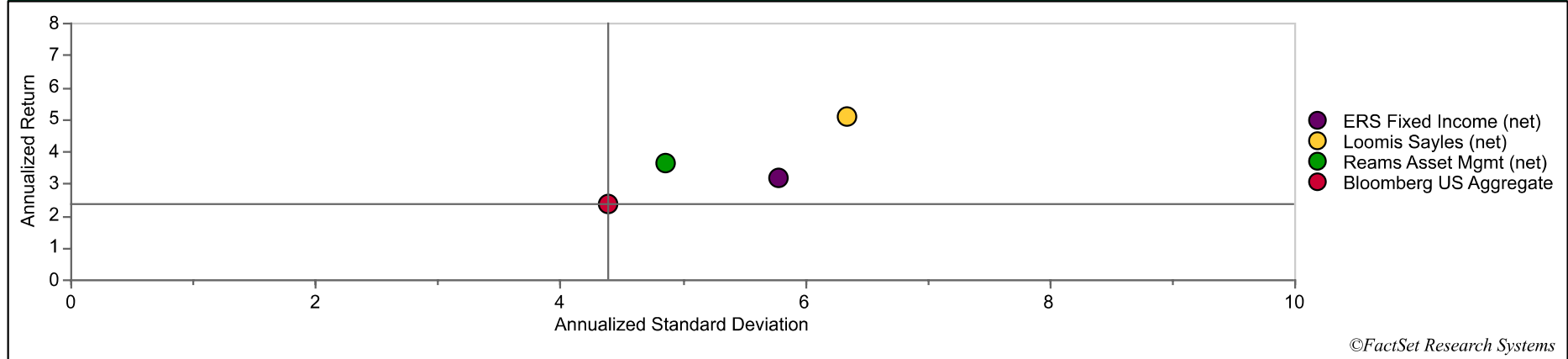
	4th Qtr	1 Year	3 Year	5 Year	7 Year	10 Year
Loomis Sayles	-1.6%	5.1%	-0.1%	1.8%	2.9%	3.5%
<i>Bloomberg U.S. Agg.</i>	1.4%	3.9%	2.4%	2.1%	1.9%	2.1%
Reams	-3.0%	1.7%	-1.4%	2.1%	2.9%	2.8%
<i>Bloomberg U.S. Agg.</i>	0.0%	0.5%	1.1%	2.4%	2.0%	1.5%
BlackRock Index	-3.1%	0.8%	-2.7%	N/A	N/A	N/A
<i>Bloomberg U.S. Government</i>	0.0%	0.1%	0.1%			
ERS Fixed Income	-2.6%	2.5%	0.5%	-0.2%	1.4%	2.0%
<i>Bloomberg U.S. Agg.</i>	0.4%	1.2%	2.9%	0.1%	0.4%	0.6%

Relative outperformance in blue
Relative underperformance in red

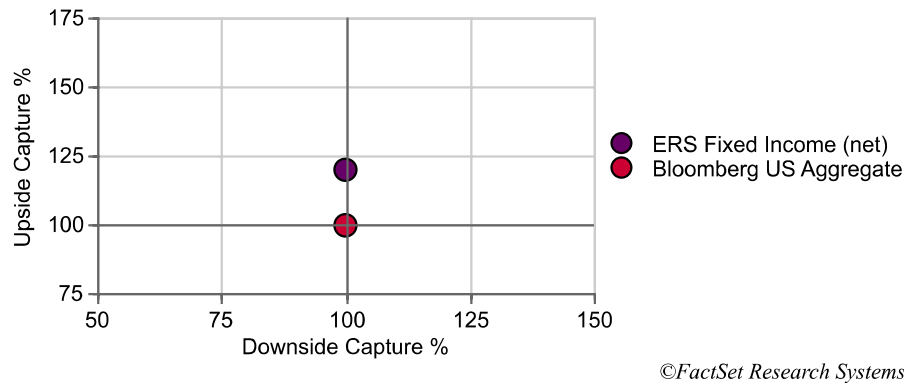
\*Returns net of fees

# Fixed Income Statistics

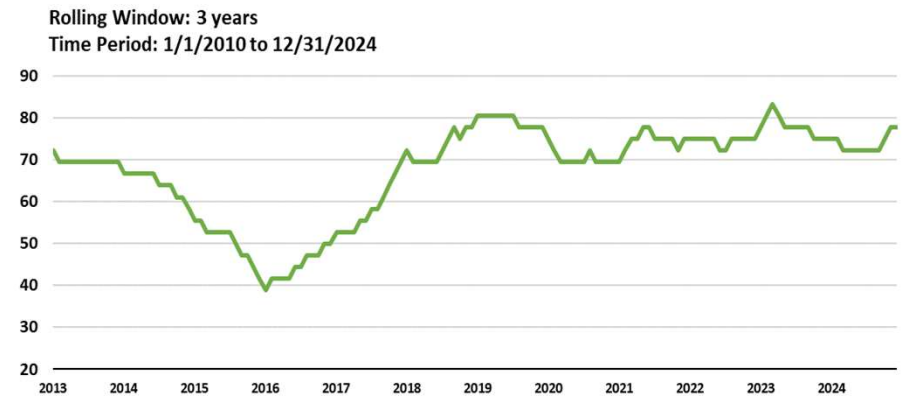
## Risk – Reward –1/1/2009 to 12/31/2024



## 15 Year Upside-Downside –1/1/2009 to 12/31/2024



## Batting Average



## 15 Year Risk –1/1/2009 to 12/31/2024

## Risk – 7/1/2013 to 12/31/2024

	Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta		Annualized Return	Standard Deviation	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Total Fixed Income (Net)	3.2	5.8	0.1	0.3	0.1	3.9	1.0	Total Fixed Income (Net)	2.2	6.3	0.0	0.1	0.0	4.2	1.0
Bloomberg US Aggregate	2.4	4.4	0.0	0.3	--	--	1.0	Bloomberg US Aggregate	1.7	4.8	0.0	0.0	--	--	1.0

# Absolute Return

## Relative Investment Performance – Absolute Return Managers

### As of December 31, 2024

	4th Qtr	1 Year	3 Year	5 Year	7 Year	10 Year
<b>UBS A&amp;Q</b>	3.0%	10.6%	8.8%	9.3%	8.4%	6.9%
<i>1 Year Libor / SOFR + 4%</i>	0.9%	1.3%	1.0%	2.5%	1.5%	0.5%
<b>Aptitude</b>	4.1%	13.2%	N/A	N/A	N/A	N/A
<i>1 Year Libor / SOFR + 4%</i>	1.9%	3.8%				
<b>ERS Absolute Return</b>	3.4%	11.6%	13.8%	6.5%	6.6%	6.2%
<i>3 Month T-Bill + 3%</i>	1.6%	3.4%	6.6%	0.9%	1.1%	1.3%

Relative outperformance in blue

Relative underperformance in red

#### Risk Adjusted Returns (06/30/14 - 12/31/24)

	Return	Std Dev	Sharpe Ratio	Max Drawdown
ERS Public Equity (net)	8.6%	15.3%	0.5	-25.3%
ERS Fixed Income (net)	1.8%	6.5%	0.0	-13.6%
ERS Absolute Return (net)	6.2%	9.0%	0.5	-27.1%

\*Returns net of fees

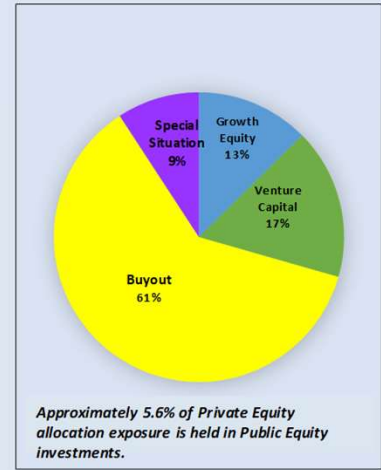
# Private Equity

# Milwaukee ERS Private Equity Portfolio as of September 30, 2024

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

Partnership	Vintage Year	Committed	Invested Capital*	Uncalled Commitments*	Distributions*	NAV	NAV Change	IRR*	TVPI*	DPI*	RVPI*
Abbott 2010	2010	35,000,000	34,650,405	349,595	54,820,026	15,496,013	(283,643)	13.72%	2.03	1.58	0.45
Abbott 2011	2011	55,000,000	54,730,191	269,809	85,895,322	32,104,766	(136,924)	15.29%	2.16	1.57	0.59
Abbott 2012	2012	40,000,000	39,600,000	400,000	57,503,662	29,410,400	33,419	15.87%	2.19	1.45	0.74
Abbott 2013	2013	35,000,000	34,650,000	350,000	49,197,586	29,684,881	85,545	17.22%	2.28	1.42	0.86
Abbott 2014	2014	35,000,000	34,300,000	700,000	45,681,982	33,243,845	(19,475)	17.33%	2.30	1.33	0.97
Abbott 2015	2015	25,000,000	25,050,000	-	25,125,000	28,752,078	566,207	17.57%	2.15	1.00	1.15
Abbott 2016	2016	20,000,000	19,717,500	282,500	14,237,500	26,461,756	583,931	18.67%	2.06	0.72	1.34
Abbott 2018	2018	20,000,000	19,315,000	685,000	4,325,000	25,490,037	827,326	15.14%	1.54	0.22	1.32
Abbott 2019	2019	20,000,000	18,270,000	1,730,000	3,140,000	23,121,181	649,223	15.61%	1.44	0.17	1.27
Abbott 2020	2020	40,000,000	28,130,000	11,870,000	2,360,000	31,348,332	723,998	9.25%	1.20	0.08	1.11
Abbott 2021	2021	20,000,000	9,674,749	10,325,251	-	10,801,803	224,886	5.23%	1.12	0.00	1.12
Abbott 2022	2022	35,000,000	12,377,547	22,622,453	-	12,377,546	237,076	0.00%	1.00	0.00	1.00
Abbott 2023	2023	30,000,000	3,318,750	26,681,250	-	3,648,375	216,965	11.68%	1.10	0.00	1.10
Abbott 2024	2024	40,000,000	3,600,000	36,400,000	-	3,733,509	165,340	-	1.04	0.00	1.04
Mesirow V	2008	75,000,000	71,846,194	3,153,806	138,823,045	32,643,804	402,015	16.09%	2.39	1.93	0.45
Mesirow VI	2013	60,000,000	54,120,000	5,880,000	83,316,748	57,059,175	1,163,754	19.21%	2.59	1.54	1.05
Mesirow VII	2017	100,000,000	85,014,499	14,985,501	21,198,942	128,981,180	2,929,829	14.65%	1.77	0.25	1.52
Mesirow VIII	2020	120,000,000	71,400,000	48,600,000	-	77,296,820	1,503,259	13.58%	1.08	0.00	1.08
Mesirow IX	2024	120,000,000	-	120,000,000	-	(227,788)	(227,788)	-	-	-	-
Neuberger Berman III	2013	30,000,000	31,978,099	-	41,883,661	6,982,362	207,292	16.24%	1.53	1.31	0.22
Neuberger Berman IV	2017	25,000,000	25,498,659	-	22,021,762	16,978,340	86,809	18.36%	1.53	0.86	0.67
Neuberger Berman V	2021	100,000,000	48,375,000	51,625,000	14,699,360	51,565,094	826,801	-	1.37	0.30	1.07
Private Advisors VI	2014	30,000,000	34,747,823	-	46,434,199	18,719,291	(8,594)	18.30%	1.88	1.34	0.54
Private Advisors VII	2016	15,000,000	18,794,968	-	19,325,639	13,191,258	370,940	16.92%	1.73	1.03	0.70
Private Advisors VIII	2018	15,000,000	17,255,573	-	9,755,062	20,554,057	134,571	21.29%	1.76	0.57	1.19
Private Advisors IX	2019	35,000,000	38,996,830	-	17,574,289	38,605,751	1,035,258	21.49%	1.44	0.45	0.99
Private Advisors X	2022	30,000,000	11,307,399	18,692,601	2,626,972	14,307,297	208,400	19.80%	1.50	0.23	1.27
<b>Total ERS</b>		<b>1,205,000,000</b>	<b>846,719,187</b>	<b>375,602,766</b>	<b>759,945,756</b>	<b>782,331,163</b>	<b>12,506,419</b>	<b>16.40%</b>	<b>1.82</b>	<b>0.90</b>	<b>0.92</b>
% of ERS Fund				6.4%		13.3%					

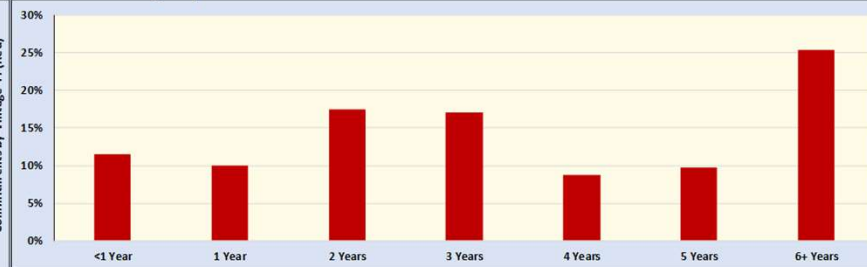
## Sub-Asset Class Breakdown



## Vintage Year\*\*

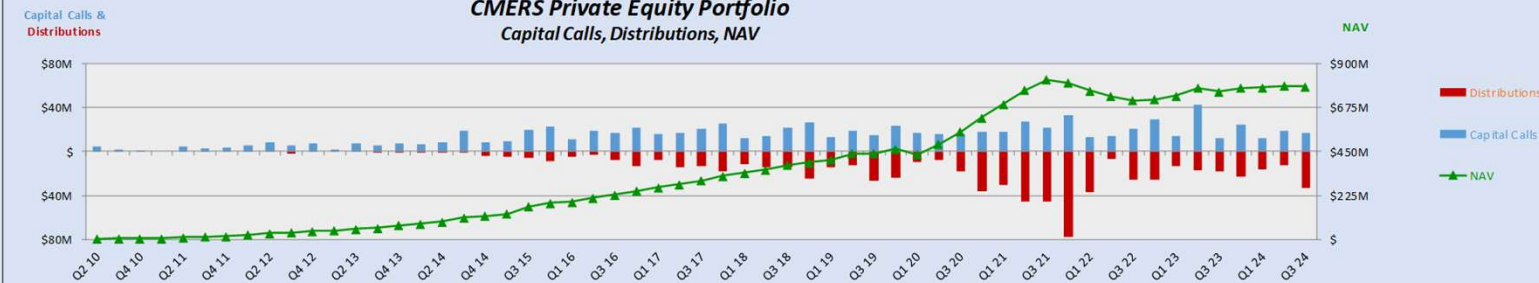


## Age of Investment\*\*\*



## CMERS Private Equity Portfolio

Capital Calls, Distributions, NAV



## NAV by Vintage Year



\* Invested capital, uncalled commitments, IRR calculations, 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." It is calculated as the sum of NAV & Distributions, divided by Invested Capital. DPI stands for "Distributed to Paid in Capital" (Distributions/Invested Capital). RVPI stands for "Residual Value to Paid in Capital" (NAV/Invested 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.

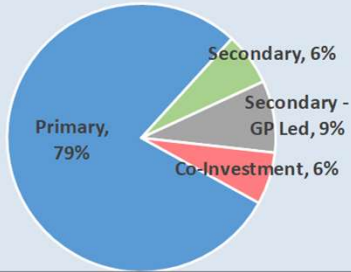


# Private Equity Continued

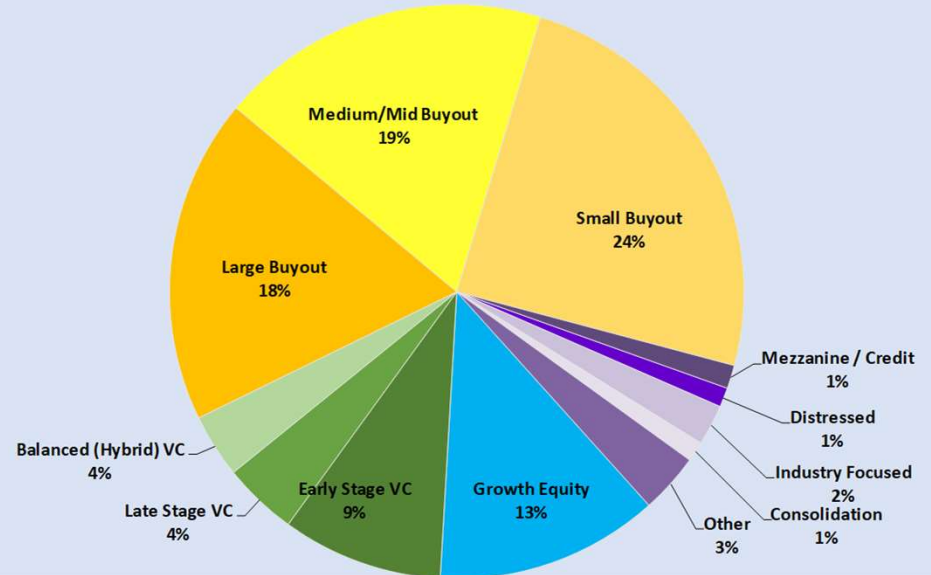
Total Managers	255*
Number of Partnerships	688*
Number of Portfolio Companies	6,500*

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

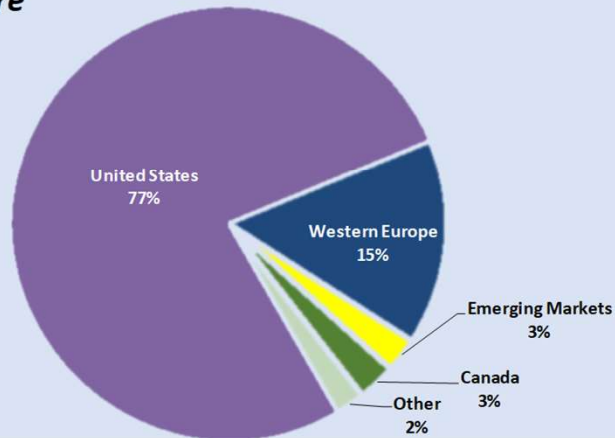
## Transaction Type



## Strategy Exposure



## Geographic Exposure



## Industry Exposure



# Performance Update

# Performance Update

Estimated ERS Total Fund Market Value is \$6.16 billion as of February 6, 2025

Period	ERS Fund*	Benchmark
January (Estimate)	1.7%	1.6%
February MTD (Estimate)	0.4%	0.5%
YTD Through February 6, 2025 (Estimate)	2.2%	2.1%

\*Returns Net of Fees

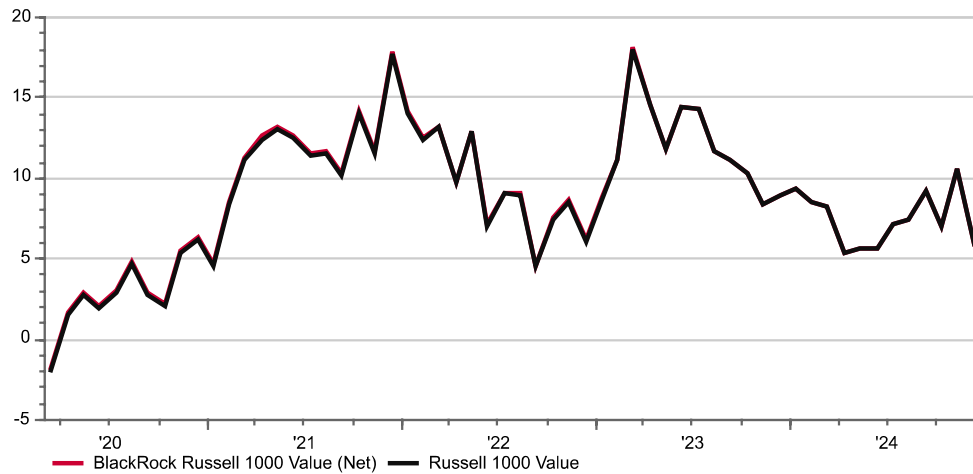
# Appendix

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# BlackRock Russell 1000 Value Portfolio Snapshot – December 31, 2024

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



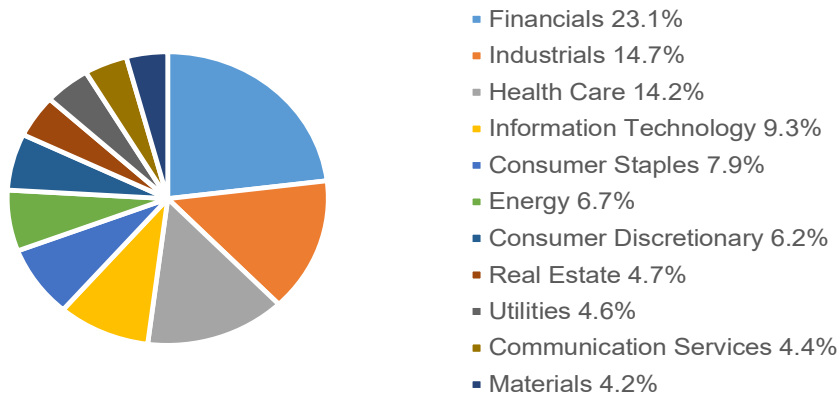
## Top 10 Holdings

	Portfolio Weight	Quarterly Return
Berkshire Hathaway Inc.	3.38	-1.52
JPMorgan Chase & Co.	2.74	14.32
Exxon Mobil Corporation	1.97	-7.46
UnitedHealth Group Incorporated	1.77	-13.12
Walmart Inc.	1.60	12.15
Johnson & Johnson	1.42	-10.05
Procter & Gamble Company	1.25	-2.61
Bank of America Corporation	1.19	11.42
Chevron Corporation	1.02	-0.66
Cisco Systems, Inc.	0.96	12.05

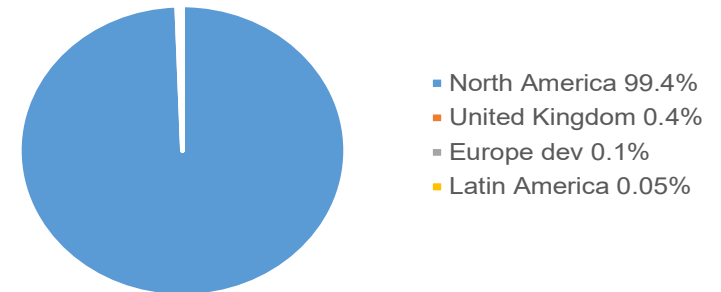
## Trailing Returns

	QTR	1 Year	3 Year	5 Year	Inception 4/1/2017
BlackRock R1000 Value (Net)	-2.0	14.4	5.6	8.7	9.0
Russell 1000 Value	-2.0	14.4	5.6	8.7	8.9

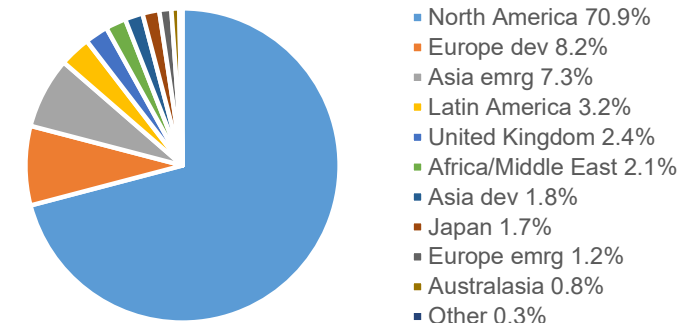
## Equity Sector Exposure (GICS)



## Regional Exposure by Domicile



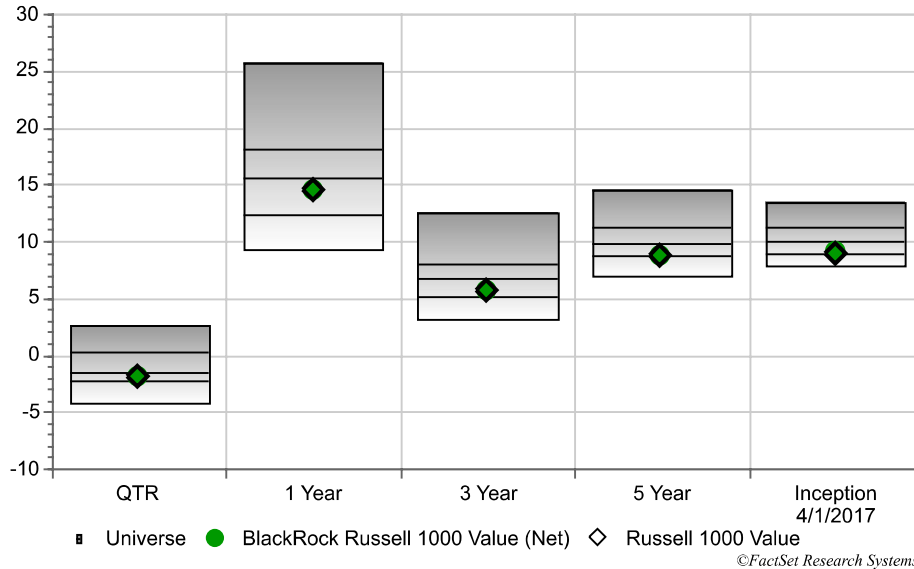
## Regional Exposure by Source of Revenue



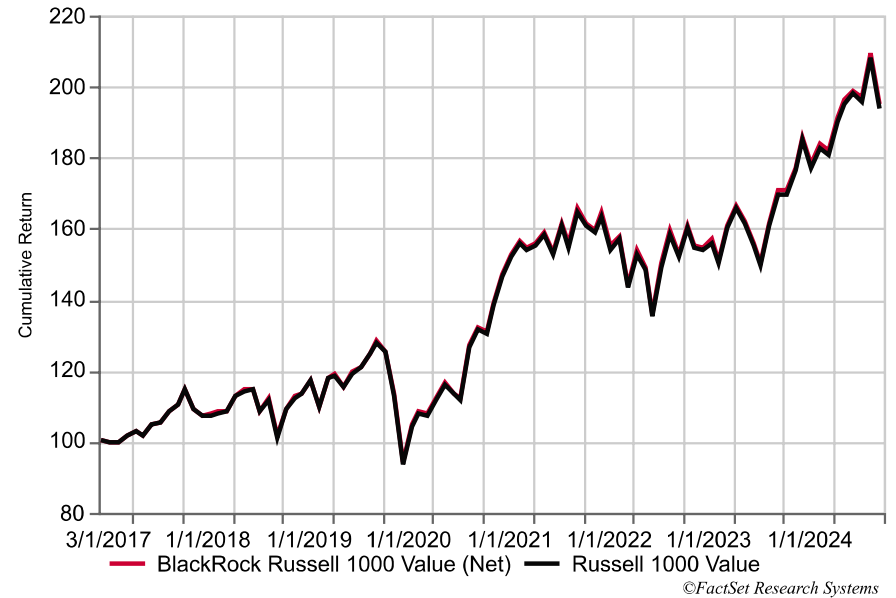
# BlackRock Russell 1000 Value vs Universe & Benchmark

## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US:Large-Cap Value

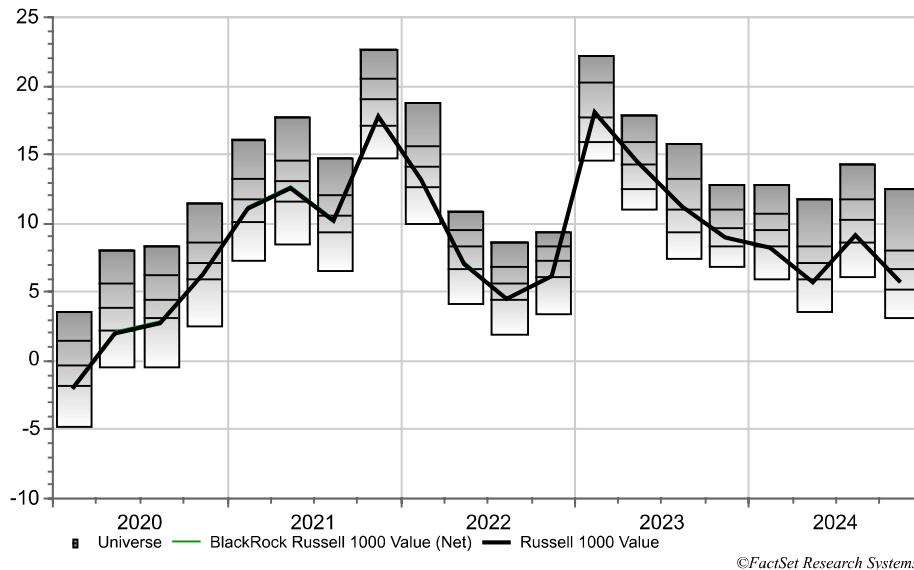


## Investment Growth Since Inception 4/1/2017



## Rolling Returns 4/1/2017 – 12/31/2024 (3 Year, 3 Month Shift)

Universe: Lipper US:Large-Cap Value

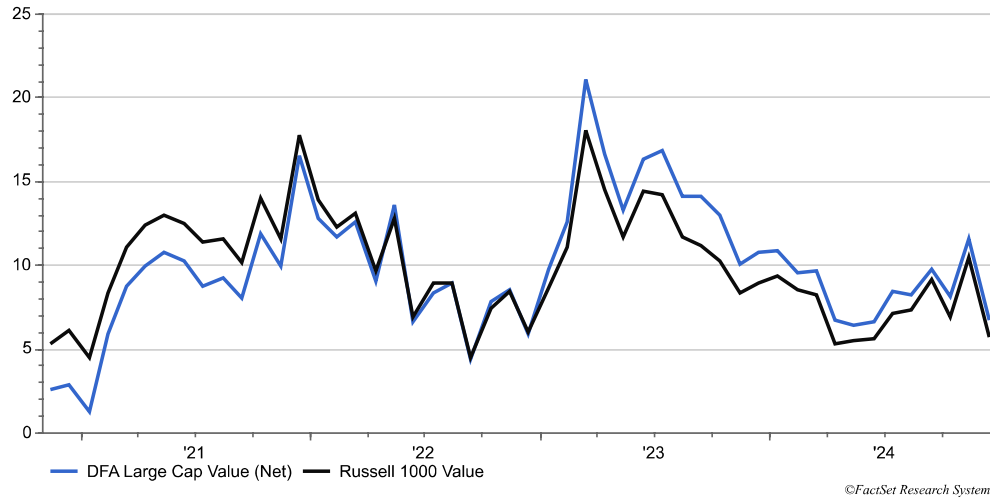


## Risk Since Inception 4/1/2017

	Return	Std Dev	Sharpe Ratio	Tracking Error
BlackRock R1000 Value (Net)	9.0	16.7	0.4	0.0
Russell 1000 Value	8.9	16.7	0.4	--

# DFA LCV Portfolio Snapshot – December 31, 2024

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



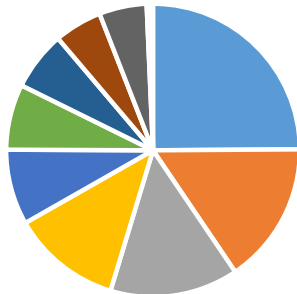
## Top 10 Holdings

	Portfolio Weight	Quarterly Return
JPMorgan Chase & Co.	5.03	14.32
Exxon Mobil Corporation	3.62	-7.46
Berkshire Hathaway Inc.	2.10	-1.52
Chevron Corporation	2.00	-0.66
Cisco Systems, Inc.	1.71	12.05
UnitedHealth Group Incorporated	1.56	-13.12
Johnson & Johnson	1.34	-10.05
Verizon Communications Inc.	1.31	-9.52
AT&T Inc.	1.22	4.77
Wells Fargo & Company	1.19	24.99

## Trailing Returns

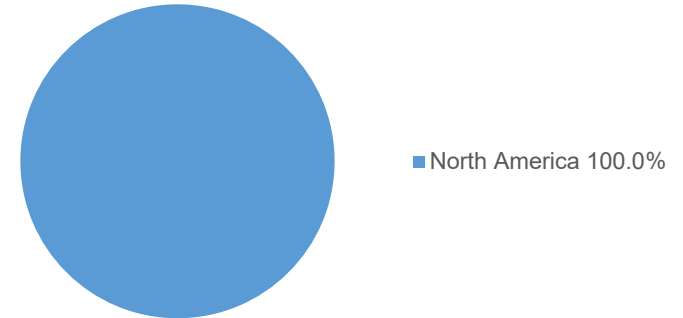
	QTR	1 Year	3 Year	5 Year	Inception 12/1/2017
DFA US Large Value	-1.9	13.6	6.6	8.6	8.0
Russell 1000 Value	-2.0	14.4	5.6	8.7	8.5

## Equity Sector Exposure (GICS)

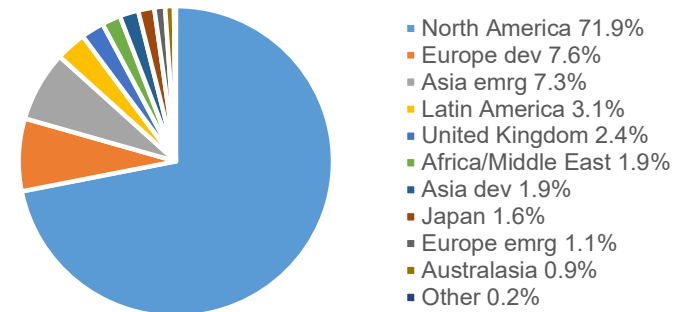


- Financials 24.9%
- Industrials 15.7%
- Health Care 14.2%
- Energy 12.1%
- Information Technology 8.3%
- Materials 7.2%
- Communication Services 6.5%
- Consumer Staples 5.3%
- Consumer Discretionary 5.2%
- Real Estate 0.4%
- Utilities 0.2%

## Regional Exposure by Domicile



## Regional Exposure by Source of Revenue

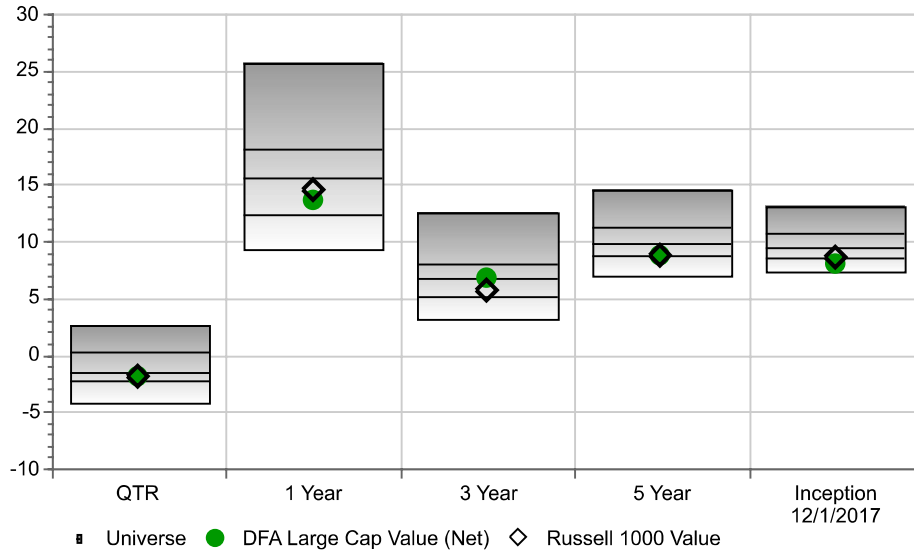




# DFA LCV vs Universe & Benchmark

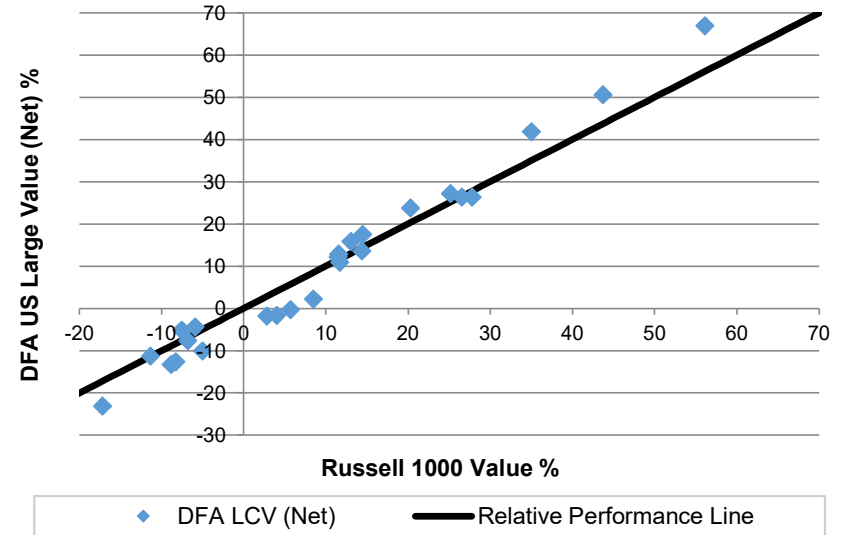
## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US Large Cap Value



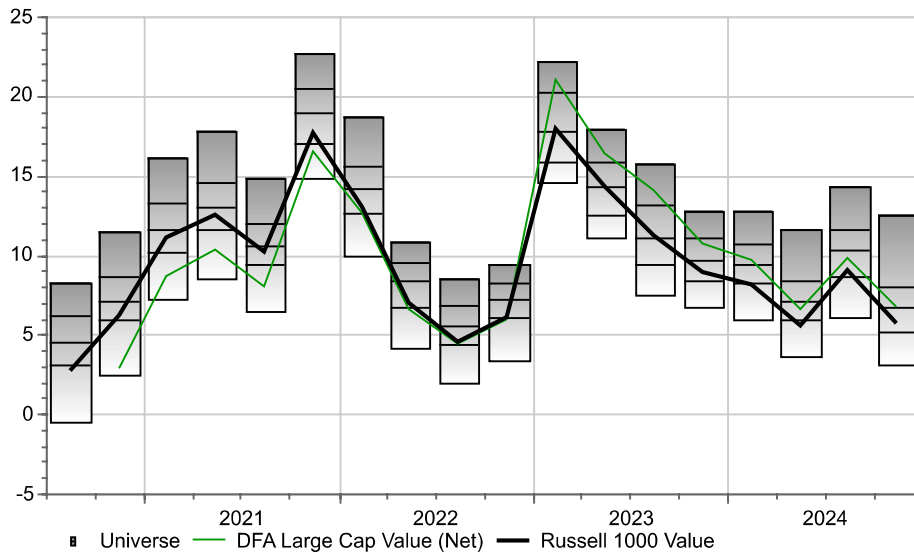
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## One-Year Rolling Return Versus Benchmark



## Rolling Returns 12/1/2017 – 12/31/2024 (3 Year, 3 Month Shift)

Universe: Lipper US Large Cap Value



©FactSet Research Systems

### Over/Under Benchmark Analysis

<b>12</b>	Outperform
<b>13</b>	Underperform
<b>25</b>	# Observations
<b>48%</b>	% Outperform

## DFA LCV Attribution Analysis – December 31, 2024

### Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
JPMorgan Chase & Co.	4.84	2.28	0.28
Salesforce, Inc.	0.89	0.72	0.14
UnitedHealth Group Incorporated	1.13	-0.84	0.11
Discover Financial Services	0.52	0.36	0.07
General Motors Company	0.67	0.44	0.07
Cisco Systems, Inc.	1.49	0.61	0.06
General Electric Company	0.08	-0.53	0.06
Delta Air Lines, Inc.	0.51	0.37	0.06
Raymond James Financial, Inc.	0.37	0.26	0.06
Wells Fargo & Company	1.11	0.21	0.05

### Top 10 Leading Detractors

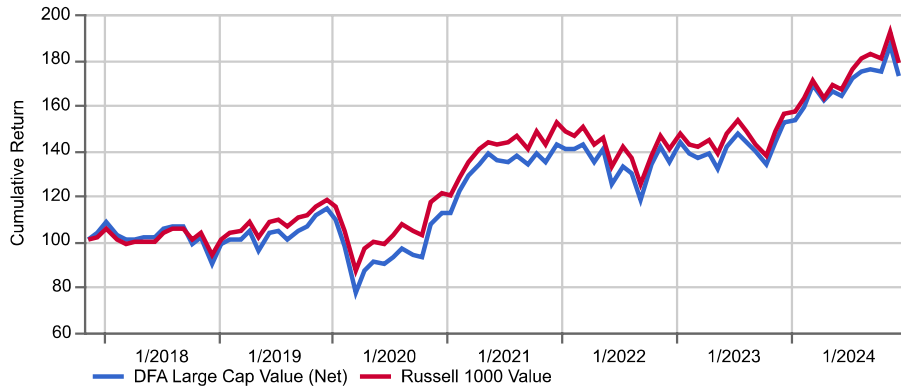
	Avg. Weights	Relative Weights	Active Return
Walmart Inc.	0.00	-1.44	-0.16
Elevance Health, Inc.	0.77	0.43	-0.15
Exxon Mobil Corporation	3.91	1.84	-0.14
Dow Inc.	0.56	0.42	-0.12
Cigna Group	0.78	0.45	-0.09
Lennar Corporation	0.49	0.32	-0.09
PulteGroup, Inc.	0.46	0.35	-0.09
Nucor Corporation	0.50	0.36	-0.08
LyondellBasell Industries N.V.	0.45	0.35	-0.08
Builders FirstSource, Inc.	0.36	0.28	-0.08

### Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	2.2	0.5	2.1	0.1	-0.1	0.0
Consumer Discretionary	-0.9	-6.3	-2.8	0.0	-0.2	-0.2
Consumer Staples	-2.8	-7.6	-2.9	0.0	-0.2	-0.2
Energy	5.5	-2.5	-1.8	0.0	-0.1	-0.1
Financials	2.0	8.2	7.0	0.2	0.3	0.5
Health Care	-1.3	-10.7	-10.5	0.1	0.0	0.1
Industrials	1.0	-1.4	-2.3	0.0	0.1	0.1
Information Technology	-0.8	0.2	-0.5	0.0	0.1	0.0
Materials	3.3	-13.2	-11.6	-0.3	-0.1	-0.5
Real Estate	-4.3	1.3	-7.0	0.2	0.0	0.3
Utilities	-4.4	8.6	-6.1	0.2	0.0	0.2
Cash	0.4	1.1	1.1	0.0	0.0	0.0
<b>Total</b>	<b>0.0</b>	<b>-1.9</b>	<b>-2.1</b>	<b>0.5</b>	<b>-0.3</b>	<b>0.2</b>

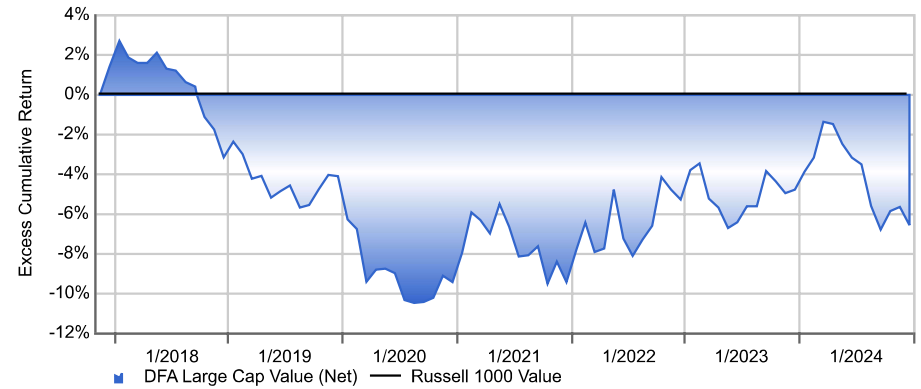
# DFA LCV Inception Performance & Statistics

## Investment Growth Since Inception 12/1/2017



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

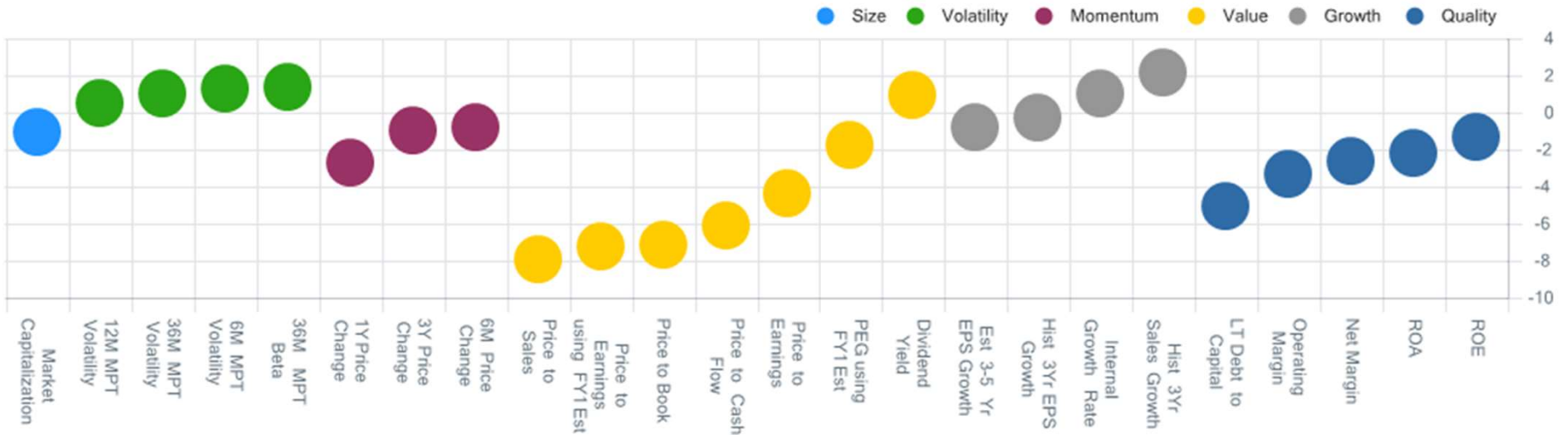


©FactSet Research Systems

## Risk Since Inception 12/1/2017

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
DFA US Large Value	8.0	19.8	-1.0	0.3	-0.2	3.7	1.1
Russell 1000 Value	8.5	17.4	--	0.4	--	--	1.0

## Characteristics Tilt vs Benchmark 12/31/2024



# DFA US SCV Portfolio Snapshot

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



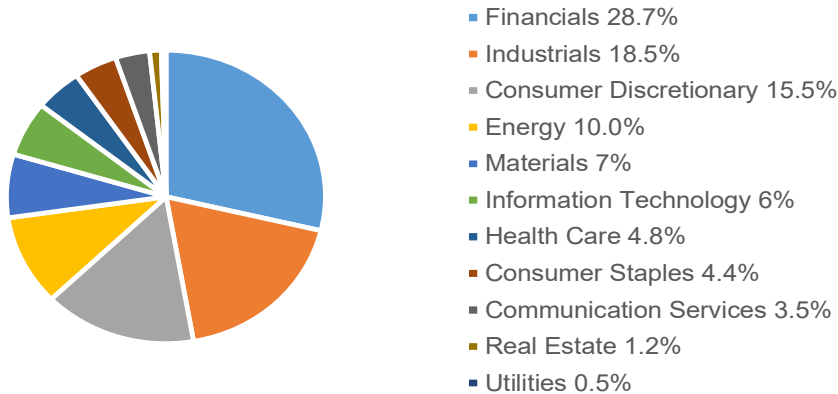
## Top 10 Holdings

	Portfolio Weight	Quarterly Return
Antero Resources Corporation	0.73	22.34
Taylor Morrison Home Corporation	0.68	-12.88
United States Steel Corporation	0.64	-3.67
Jackson Financial Inc.	0.64	-3.78
Lithia Motors, Inc.	0.60	12.68
Old National Bancorp	0.59	17.10
Assured Guaranty Ltd.	0.57	13.57
Amkor Technology, Inc.	0.57	-14.45
MGIC Investment Corporation	0.57	-6.92
Element Solutions Inc	0.57	-6.08

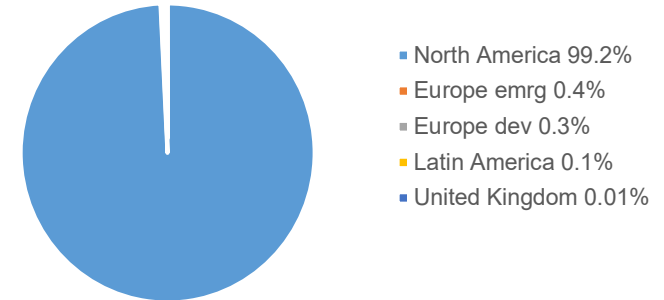
## Trailing Returns

	QTR	1 Year	3 Year	5 Year	10 Year	15 Year
DFA Small Cap Value (Net)	-0.2	7.2	8.2	13.0	9.2	11.9
Russell 2000 Value	-1.1	8.1	1.9	7.3	7.1	9.5

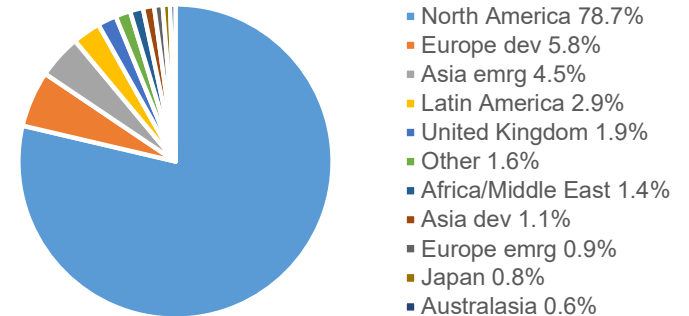
## Equity Sector Exposure (GICS)



## Regional Exposure by Domicile



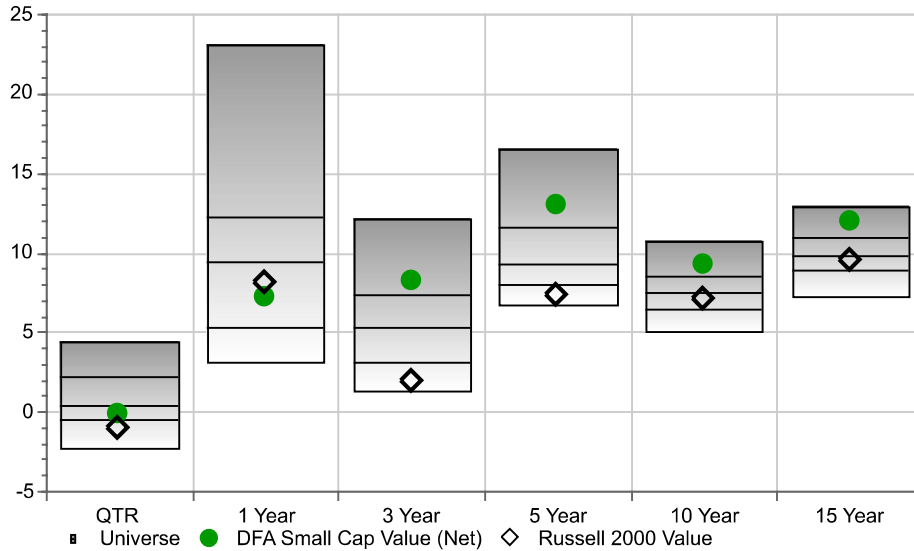
## Regional Exposure by Revenue Source



# DFA US SCV vs Universe & Benchmark

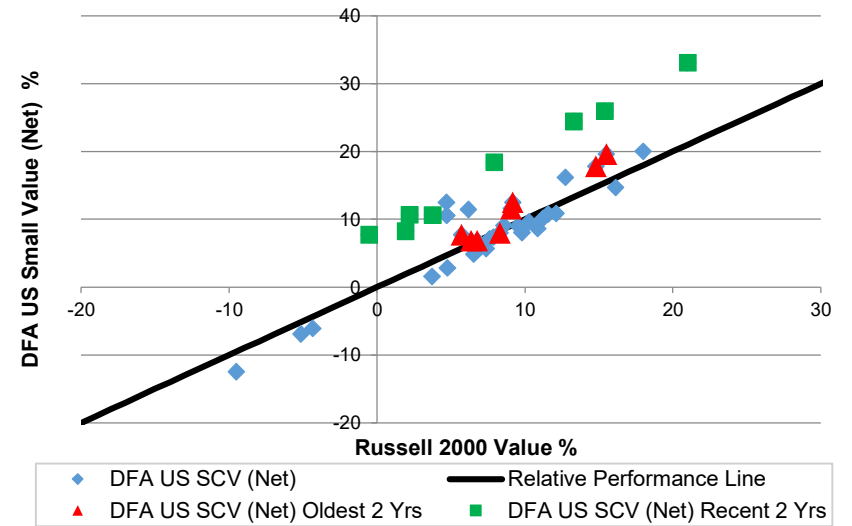
## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US Small Cap Value



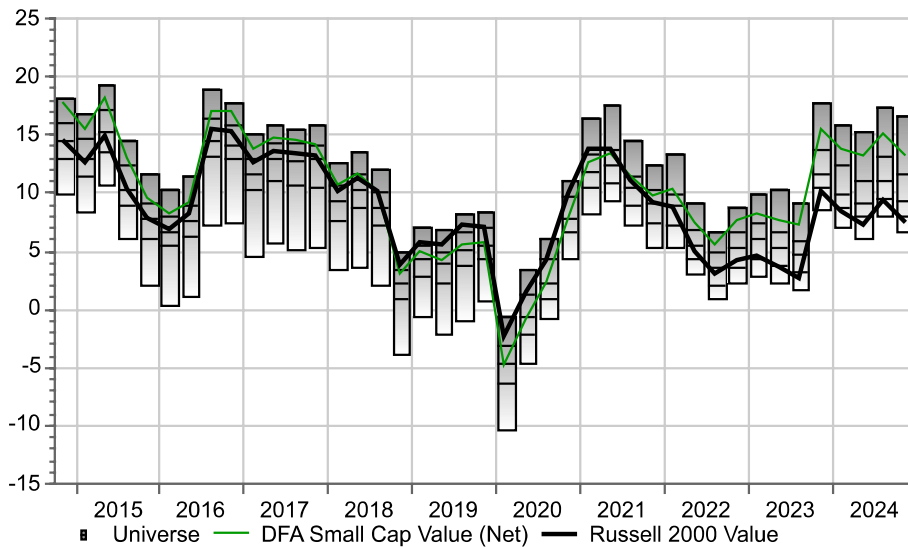
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## Three-Year Rolling Return Versus Benchmark



## Rolling Returns 7/1/2008 – 12/31/2024 (5 Year, 3 Month Shift)

Universe: Lipper US Small Cap Value



©FactSet Research Systems

## Over/Under Benchmark Analysis

<b>21</b>	Outperform
<b>19</b>	Underperform
<b>40</b>	# Observations
<b>53%</b>	% Outperform

## DFA US SCV Attribution Analysis – December 31, 2024

### Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Alaska Air Group, Inc.	0.41	0.41	0.16
DT Midstream, Inc	0.44	0.44	0.13
BILL Holdings, Inc.	0.21	0.21	0.10
Telephone and Data Systems, Inc.	0.72	0.51	0.10
Antero Resources Corporation	0.42	0.42	0.10
First Horizon Corporation	0.38	0.38	0.10
Sunrun Inc.	0.07	-0.17	0.10
Comstock Resources, Inc.	0.26	0.18	0.10
Urban Outfitters, Inc.	0.37	0.23	0.09
MDU Resources Group, Inc.	0.31	0.31	0.09

### Top 10 Leading Detractors

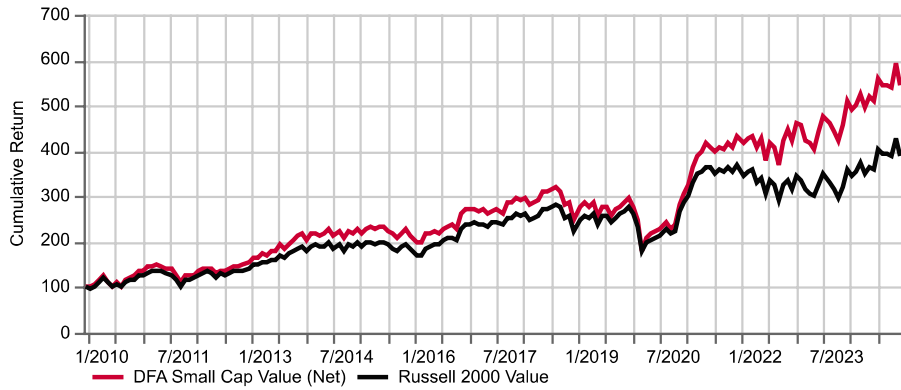
	Avg. Weights	Relative Weights	Active Return
Arcadium Lithium Plc	0.01	-0.35	-0.19
Mohawk Industries, Inc.	0.55	0.55	-0.16
RIGETTI COMPUTING, INC.	0.00	-0.02	-0.14
GEO Group, Inc.	0.00	-0.17	-0.13
Cleveland-Cliffs Inc.	0.41	0.41	-0.11
Summit Materials, Inc.	0.00	-0.41	-0.10
Amkor Technology, Inc.	0.60	0.60	-0.10
DENTSPLY SIRONA Inc.	0.29	0.29	-0.10
Huntsman Corporation	0.34	0.34	-0.09
Harley-Davidson, Inc.	0.33	0.33	-0.08

### Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	0.1	3.1	-3.9	0.0	0.2	0.2
Consumer Discretionary	6.3	-6.4	-7.3	-0.4	0.1	-0.3
Consumer Staples	2.2	-2.0	6.5	0.2	-0.4	-0.2
Energy	3.6	1.2	-0.8	0.0	0.2	0.2
Financials	-0.3	5.2	3.2	0.0	0.5	0.5
Health Care	-5.0	-2.2	-7.1	0.3	0.2	0.5
Industrials	5.3	0.2	0.3	0.1	0.0	0.1
Information Technology	0.1	0.8	9.4	0.0	-0.5	-0.5
Materials	2.1	-8.5	-4.4	-0.1	-0.3	-0.4
Real Estate	-9.7	-8.6	-5.7	0.5	0.0	0.4
Utilities	-4.7	10.4	-4.6	0.2	0.1	0.3
<b>Total</b>	<b>0.0</b>	<b>-0.2</b>	<b>-1.1</b>	<b>0.7</b>	<b>0.2</b>	<b>0.9</b>

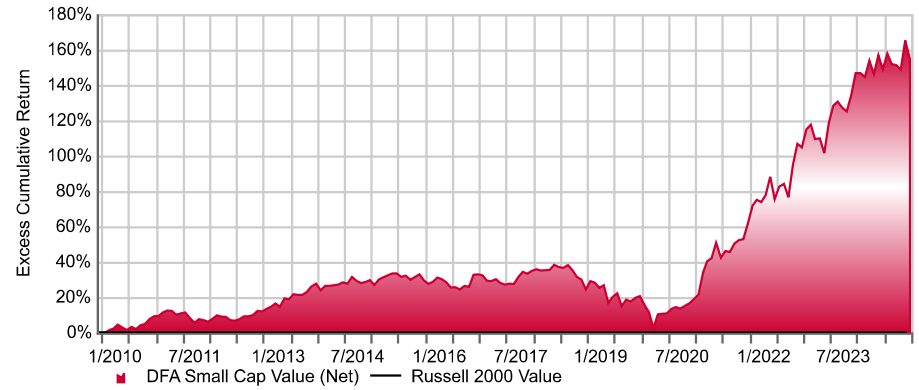
# DFA US SCV 15 Year Performance & Statistics

## Investment Growth – 15 Years



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## Relative Cumulative Performance – 15 Years

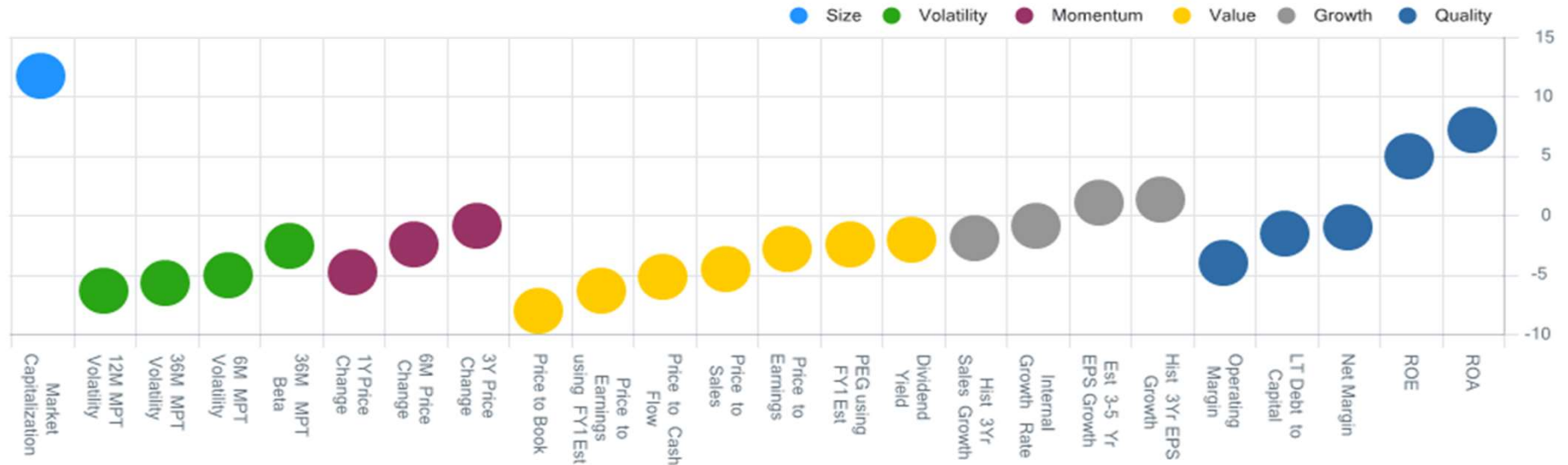


©FactSet Research Systems

## Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
DFA Small Cap Value (Net)	11.9	21.4	2.0	0.5	0.7	3.7	1.1
Russell 2000 Value	9.5	20.1	--	0.4	--	--	1.0

## Characteristics Tilt vs Benchmark 12/31/2024



# Earnest Portfolio Snapshot – December 31, 2024

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



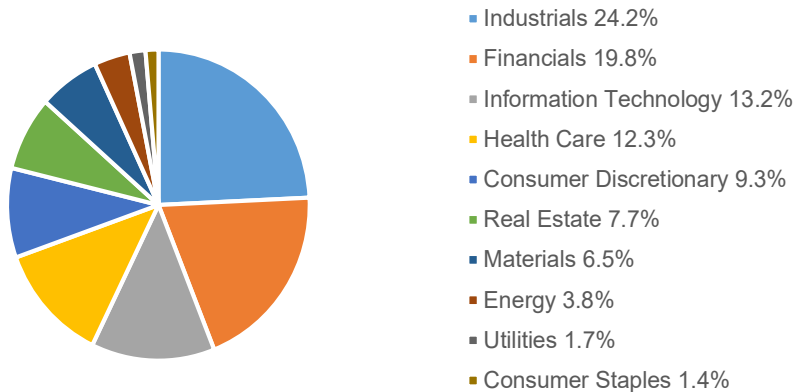
## Top 10 Holdings

	Portfolio Weight	Quarterly Return
CBRE Group, Inc.	3.26	5.47
Republic Services, Inc.	2.95	0.46
Progressive Corporation	2.72	-5.54
Raymond James Financial, Inc.	2.60	27.23
Reinsurance Group of America, Inc.	2.47	-1.56
Masco Corporation	2.47	-13.23
Stifel Financial Corp.	2.40	13.42
Darden Restaurants, Inc.	2.39	14.74
Intercontinental Exchange, Inc.	2.25	-6.96
ANSYS, Inc.	2.24	5.87

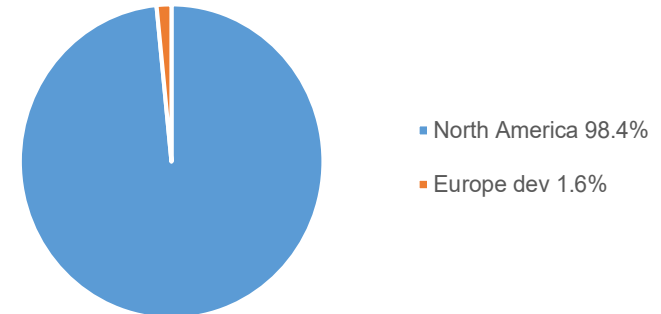
## Trailing Returns

	QTR	1 Year	3 Year	5 Year	10 Year	15 Year
Earnest (Net)	-3.0	7.6	2.1	10.1	11.3	12.8
Russell Midcap	0.6	15.3	3.8	9.9	9.6	12.1

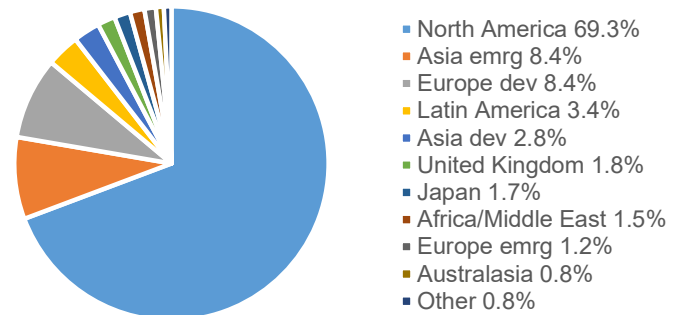
## Equity Sector Exposure (GICS)



## Regional Exposure by Domicile



## Regional Exposure by Source of Revenue

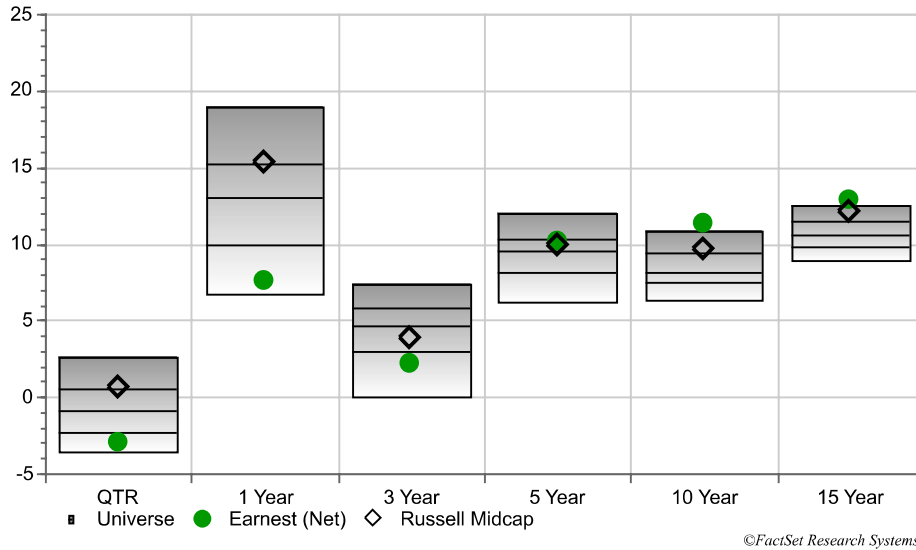




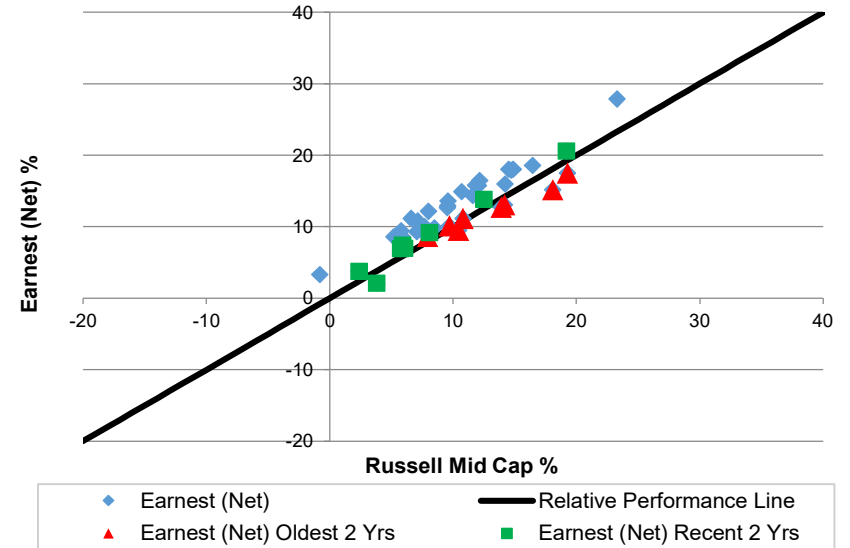
# Earnest vs Universe & Benchmark

## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US: Mid Cap Core

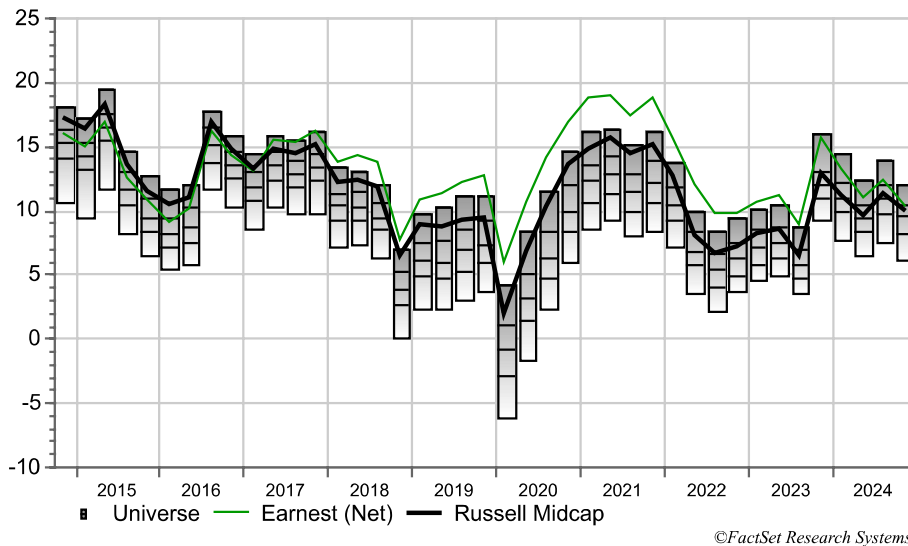


## Three-Year Rolling Return Versus Benchmark



## Rolling Returns 7/1/2008 – 12/31/2024 (5 Year, 3 Month Shift)

Universe: Lipper US: Mid Cap Core



## Over/Under Benchmark Analysis

**34** Outperform  
**6** Underperform  
**40** # Observations  
**85%** % Outperform

# Earnest Attribution Analysis – December 31, 2024

## Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Raymond James Financial, Inc.	2.37	2.14	0.48
Snap-on Incorporated	1.91	1.77	0.27
Stifel Financial Corp.	2.28	2.20	0.26
Darden Restaurants, Inc.	2.06	1.89	0.26
Houlihan Lokey, Inc.	2.53	2.45	0.22
GATX Corporation	1.42	1.42	0.22
CBRE Group, Inc.	3.16	2.82	0.14
Ulta Beauty, Inc.	1.37	1.22	0.14
Air Lease Corporation	1.96	1.92	0.12
Global Payments Inc.	1.52	1.29	0.11

## Top 10 Leading Detractors

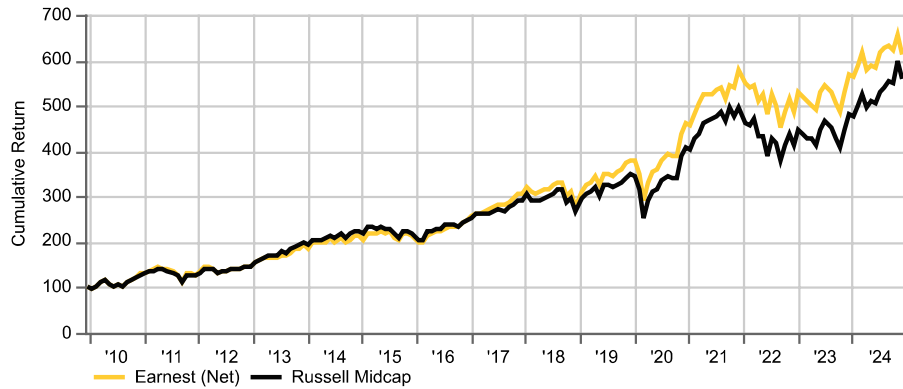
	Avg. Weights	Relative Weights	Active Return
Palantir Technologies Inc.	0.00	-0.81	-0.62
D.R. Horton, Inc.	2.53	2.09	-0.59
AppLovin Corporation	0.00	-0.46	-0.41
Scotts Miracle-Gro Company	1.66	1.63	-0.37
Masco Corporation	2.67	2.52	-0.34
Sensata Technologies Holding PLC	1.34	1.30	-0.31
Americold Realty Trust, Inc.	1.21	1.15	-0.29
Applied Materials, Inc.	1.33	1.33	-0.27
Eastman Chemical Company	1.56	1.46	-0.27
Centene Corporation	1.59	1.30	-0.24

## Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-3.5	0.0	7.1	-0.2	0.0	-0.2
Consumer Discretionary	-2.4	-2.6	-1.0	0.0	-0.1	-0.1
Consumer Staples	-3.6	-1.6	-3.4	0.2	0.0	0.2
Energy	-1.5	-0.4	10.3	-0.1	-0.4	-0.5
Financials	3.9	3.7	7.8	0.3	-0.8	-0.5
Health Care	2.1	-8.5	-7.6	-0.2	-0.1	-0.3
Industrials	6.1	-0.7	-1.1	-0.1	0.1	0.0
Information Technology	-0.1	-6.7	9.4	0.0	-2.1	-2.1
Materials	1.2	-11.2	-10.5	-0.1	0.0	-0.2
Real Estate	-0.5	-6.4	-6.9	0.0	0.0	0.1
Utilities	-4.1	-1.6	-1.9	0.1	0.0	0.1
Cash	2.3	1.1	0.0	0.0	0.0	0.0
Total	0.0	-2.9	0.6	-0.2	-3.4	-3.5

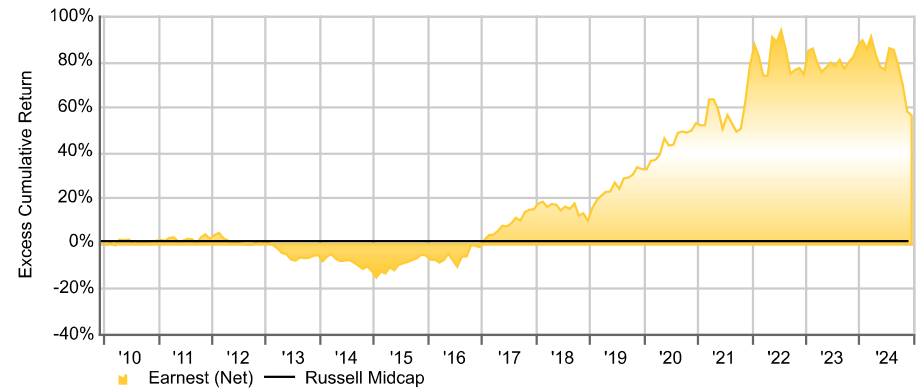
# Earnest 15 Year Performance & Statistics

## Investment Growth – 15 Years



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## Relative Cumulative Performance – 15 Years

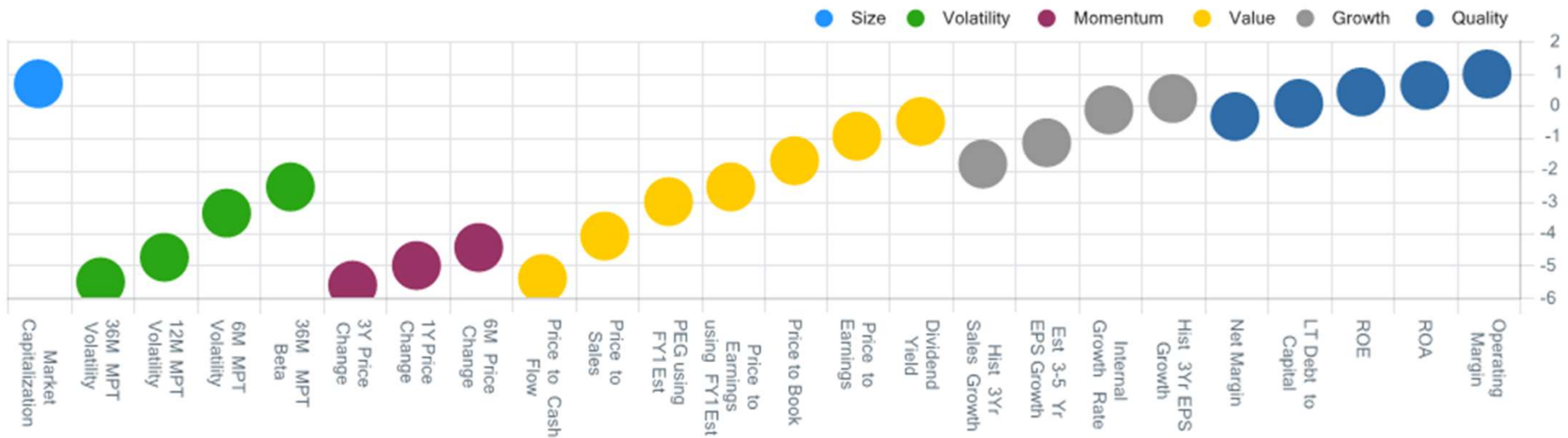


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## Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Earnest (Net)	12.8	16.6	1.0	0.7	0.2	3.5	1.0
Russell Midcap	12.1	16.7	--	0.7	--	--	1.0

## Characteristics Tilt vs Benchmark 12/31/2024



# Northern Trust S&P 500 Portfolio Snapshot – December 31, 2024

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



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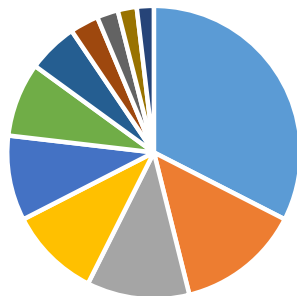
## Top 10 Holdings

	Portfolio Weight	Quarterly Return
Apple Inc.	7.53	7.59
NVIDIA Corporation	6.55	10.59
Microsoft Corporation	6.24	-1.85
Amazon.com, Inc.	4.08	17.74
Alphabet Inc.	4.01	14.15
Meta Platforms, Inc.	2.54	2.37
Tesla, Inc.	2.24	54.36
Broadcom Inc.	2.15	34.74
Berkshire Hathaway Inc.	1.65	-1.52
JPMorgan Chase & Co.	1.10	14.32

## Trailing Returns

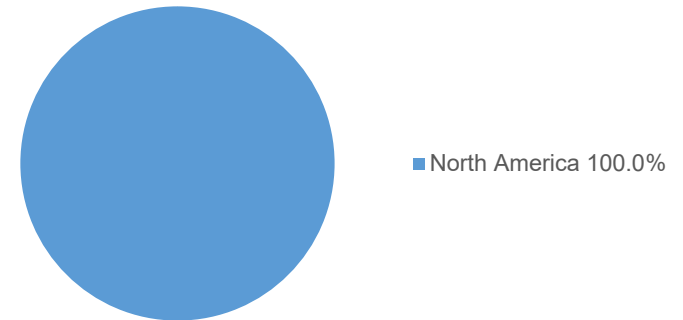
	QTR	1 Year	3 Year	5 Year	10 Year	15 Year
NT S&P 500 Index (Net)	2.4	25.0	8.9	14.5	13.1	13.9
S&P 500	2.4	25.0	8.9	14.5	13.1	13.9

## Equity Sector Exposure (GICS)

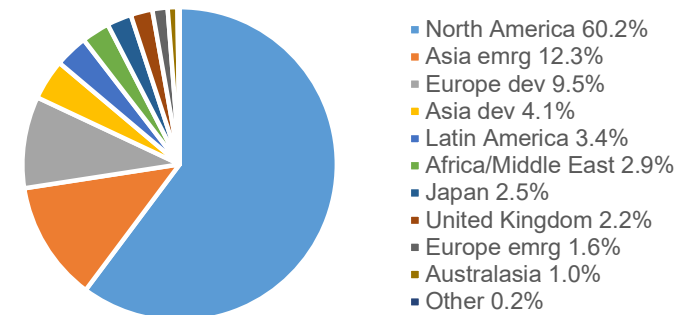


- Information Technology 32.5%
- Financials 13.6%
- Consumer Discretionary 11.3%
- Health Care 10.1%
- Communication Services 9.4%
- Industrials 8.2%
- Consumer Staples 5.5%
- Energy 3.2%
- Utilities 2.3%
- Real Estate 2.1%
- Materials 1.9%

## Regional Exposure by Domicile



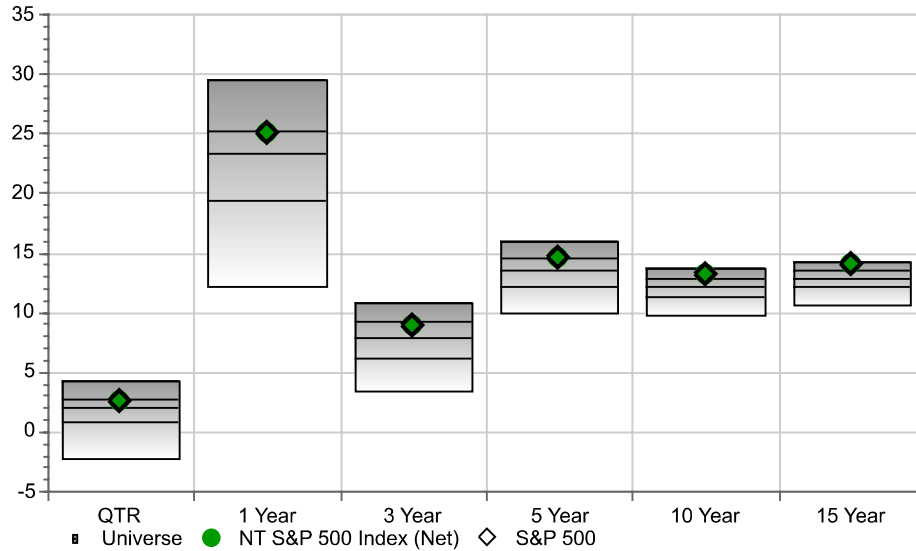
## Regional Exposure by Source of Revenue



# Northern Trust S&P 500 vs Universe & Benchmark

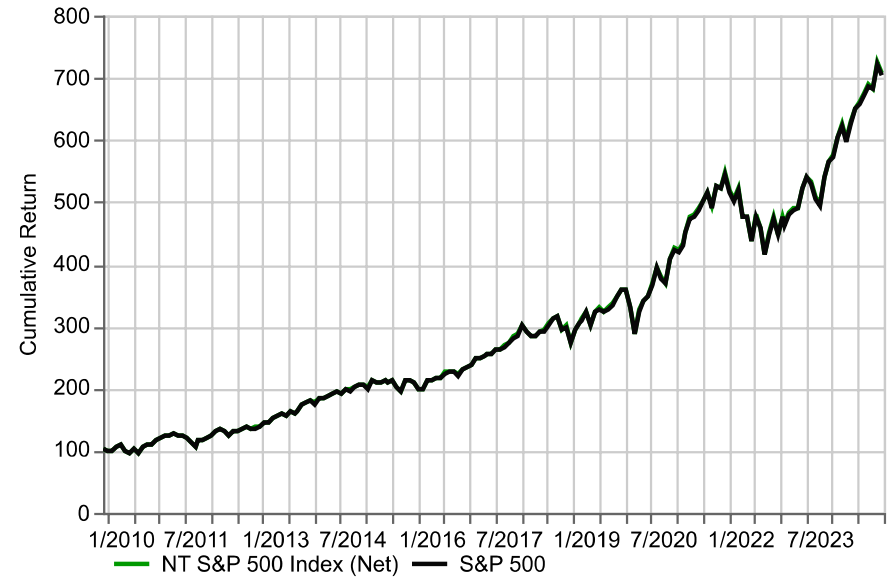
## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US: Large Cap Core



©FactSet Research Systems

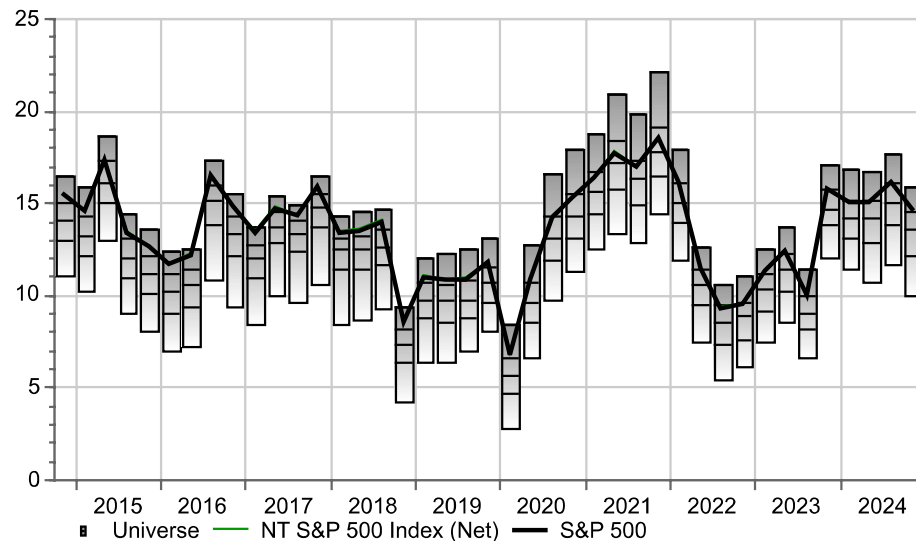
## Investment Growth – 15 Years



©FactSet Research Systems

## Rolling Returns 7/1/2008 – 12/31/2024 (5 Year, 3 Month Shift)

Universe: Lipper US: Large Cap Core



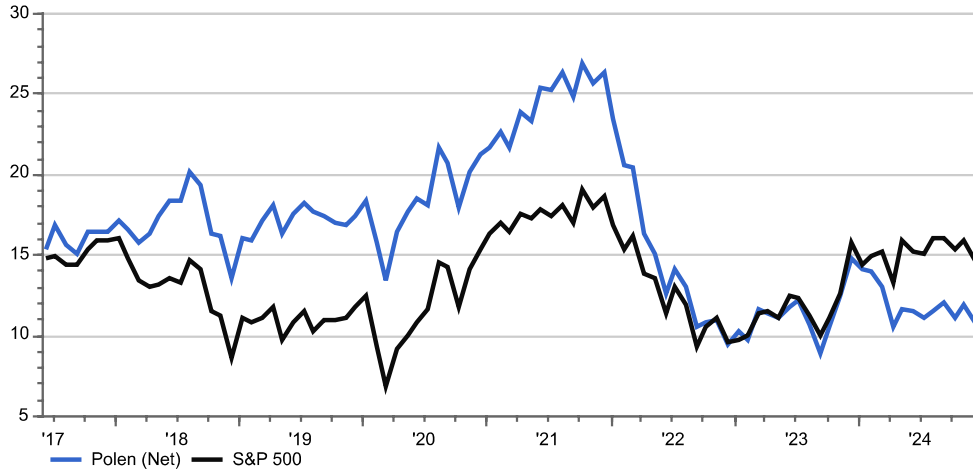
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## Risk – 15 Years

	Return	Std Dev	Sharpe Ratio	Tracking Error
NT S&P 500 Index (Net)	13.9	14.5	0.9	0.0
S&P 500	13.9	14.5	0.9	--

# Polen Portfolio Snapshot – December 31, 2024

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



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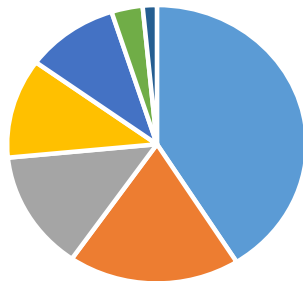
## Top 10 Holdings

	Portfolio Weight	Quarterly Return
Amazon.com, Inc.	9.60	17.74
Microsoft Corporation	7.55	-1.85
Alphabet Inc.	6.43	14.03
Visa Inc.	5.77	15.16
Oracle Corporation	5.31	-1.97
Mastercard Incorporated	5.05	6.78
ServiceNow, Inc.	4.90	18.53
Shopify Inc.	4.85	32.68
Apple Inc.	4.76	7.59
Netflix, Inc.	4.75	20.96

## Trailing Returns

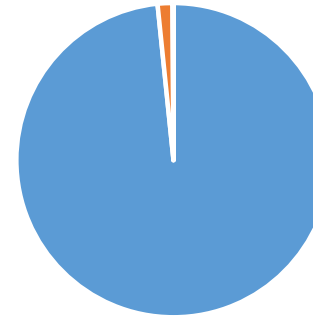
	QTR	1 Year	3 Year	5 Year	10 Year	Inception 7/1/2012
Polen (Net)	4.5	15.6	-0.2	10.7	14.0	14.7
S&P 500	2.4	25.0	8.9	14.5	13.1	14.5
S&P 500 Growth	6.2	36.1	7.7	17.1	15.3	16.3

## Equity Sector Exposure (GICS)



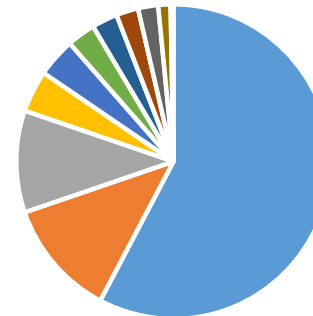
- Information Technology 40.8%
- Health Care 18.4%
- Consumer Discretionary 13.7%
- Communication Services 11.5%
- Financials 10.0%
- Industrials 3.4%
- Real Estate 1.5%

## Regional Exposure by Domicile



- North America 98.4%
- Europe dev 1.5%
- Africa/Middle East 0.1%
- Latin America 0.02%
- Europe emrg 0.01%

## Regional Exposure by Source of Revenue

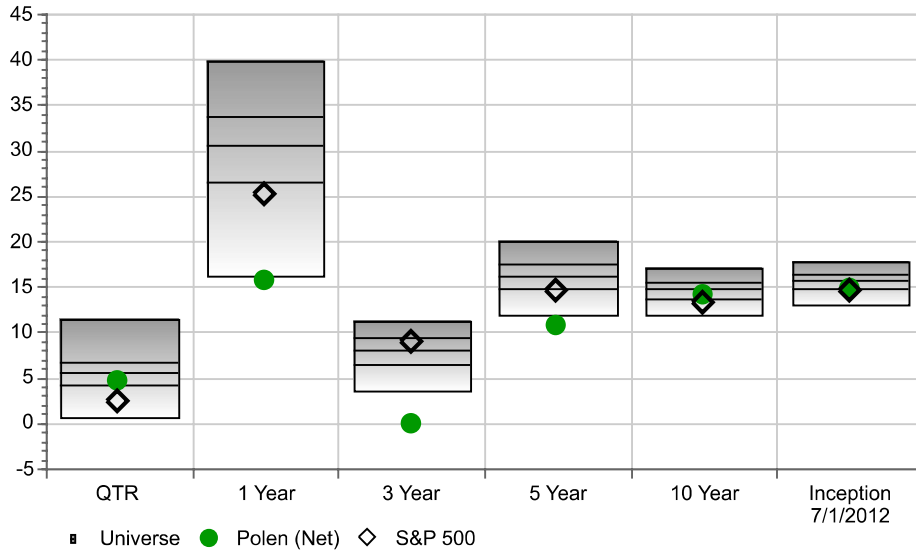


- North America 57.7%
- Europe dev 12.1%
- Asia emrg 10.5%
- Africa/Middle East 4.3%
- Latin America 4.0%
- United Kingdom 3.0%
- Japan 2.6%
- Europe emrg 2.3%
- Asia dev 2.1%
- Australasia 1.2%
- Other 0.3%

# Polen vs Universe & Benchmark

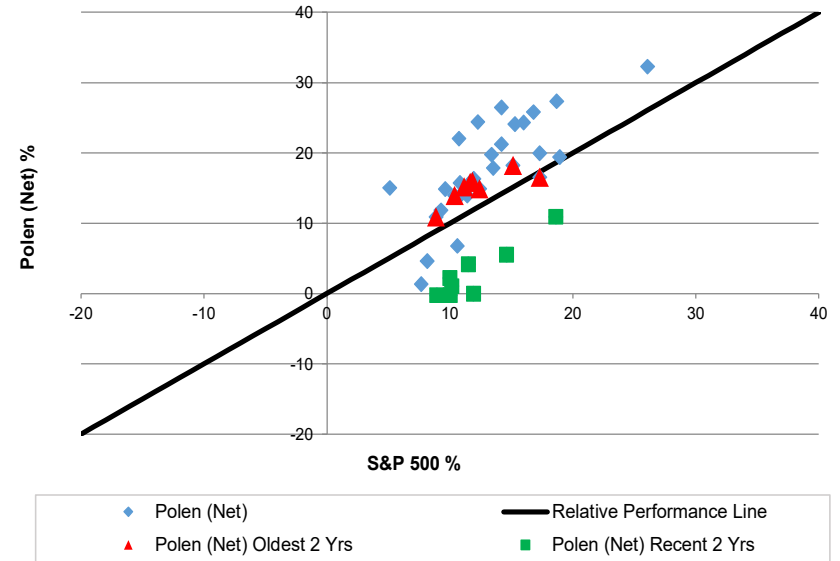
## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US Large Cap Growth



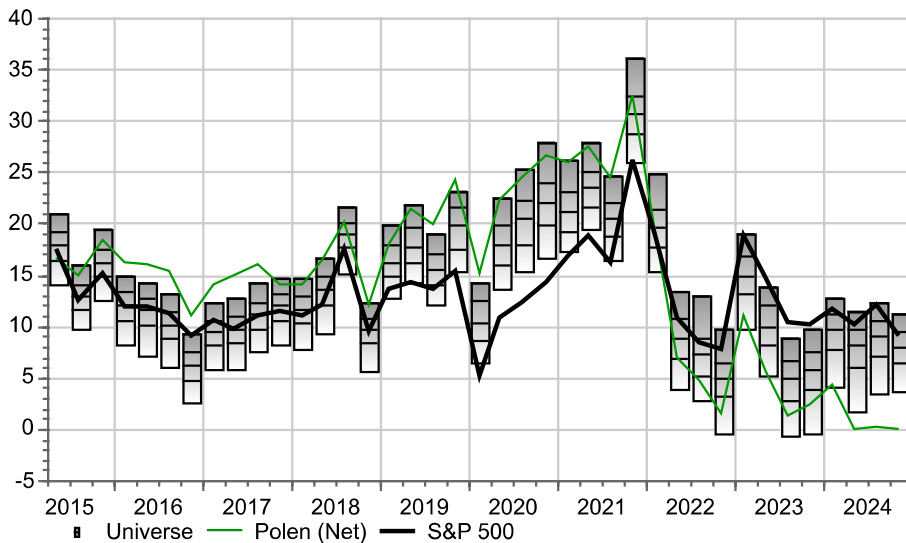
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## Three-Year Rolling Return Versus Benchmark



## Rolling Returns 7/1/2012 – 12/31/2024 (3 Year, 3 Month Shift)

Universe: Lipper US Large Cap Growth



©FactSet Research Systems

### Over/Under Benchmark Analysis

<b>27</b>	Outperform
<b>12</b>	Underperform
<b>39</b>	# Observations
<b>69%</b>	% Outperform

# Polen Attribution Analysis – December 31, 2024

## Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Shopify Inc.	4.33	4.33	1.30
Amazon.com, Inc.	9.48	5.82	0.98
ServiceNow, Inc.	5.51	5.11	0.98
Netflix, Inc.	4.36	3.68	0.89
Paycom Software, Inc.	1.83	1.81	0.40
Alphabet Inc.	6.03	2.37	0.30
Mastercard Incorporated	5.12	4.27	0.29
Workday, Inc.	2.87	2.87	0.15
Airbnb, Inc.	3.30	3.18	0.13
MSCI Inc.	3.63	3.54	0.11

## Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Tesla, Inc.	0.00	-1.60	-0.78
Thermo Fisher Scientific Inc.	4.38	3.94	-0.72
NVIDIA Corporation	0.00	-6.51	-0.67
Zoetis Inc.	3.42	3.25	-0.59
Adobe Inc.	4.39	3.94	-0.55
Novo Nordisk A/S	2.01	2.01	-0.54
Broadcom Inc.	0.00	-1.59	-0.54
Oracle Corporation	4.79	4.23	-0.20
Apple Inc.	4.62	-2.52	-0.19
JPMorgan Chase & Co.	0.00	-1.31	-0.18

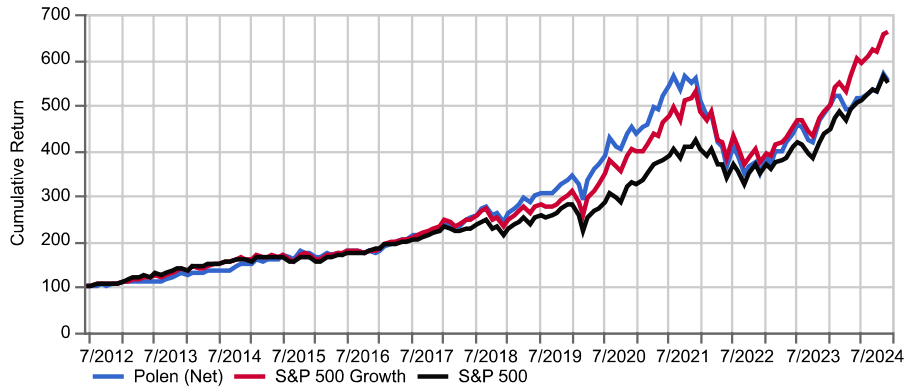
## Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	1.5	18.7	8.9	0.1	1.0	1.0
Consumer Discretionary	2.5	14.1	14.2	0.3	0.0	0.3
Consumer Staples	-5.8	0.0	-3.3	0.3	0.0	0.3
Energy	-3.4	0.0	-2.4	0.2	0.0	0.2
Financials	1.0	9.0	7.1	0.1	0.2	0.3
Health Care	7.2	-12.6	-10.3	-0.9	-0.3	-1.4
Industrials	-6.7	23.2	-2.2	0.3	0.4	0.7
Information Technology	8.6	4.2	4.9	0.2	-0.3	0.0
Materials	-2.2	0.0	-12.4	0.3	0.0	0.3
Real Estate	-1.4	-1.6	-7.9	0.1	0.0	0.1
Utilities	-2.5	0.0	-5.5	0.2	0.0	0.2
Cash	1.2	1.1	1.1	0.0	0.0	0.0
Total	0.0	4.5	2.4	1.2	1.0	2.1

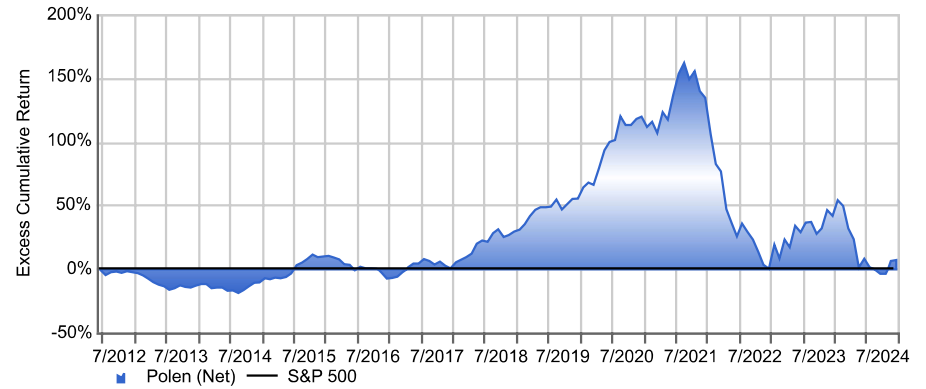


# Polen Inception Performance & Statistics

## Investment Growth Since Inception 7/1/2012



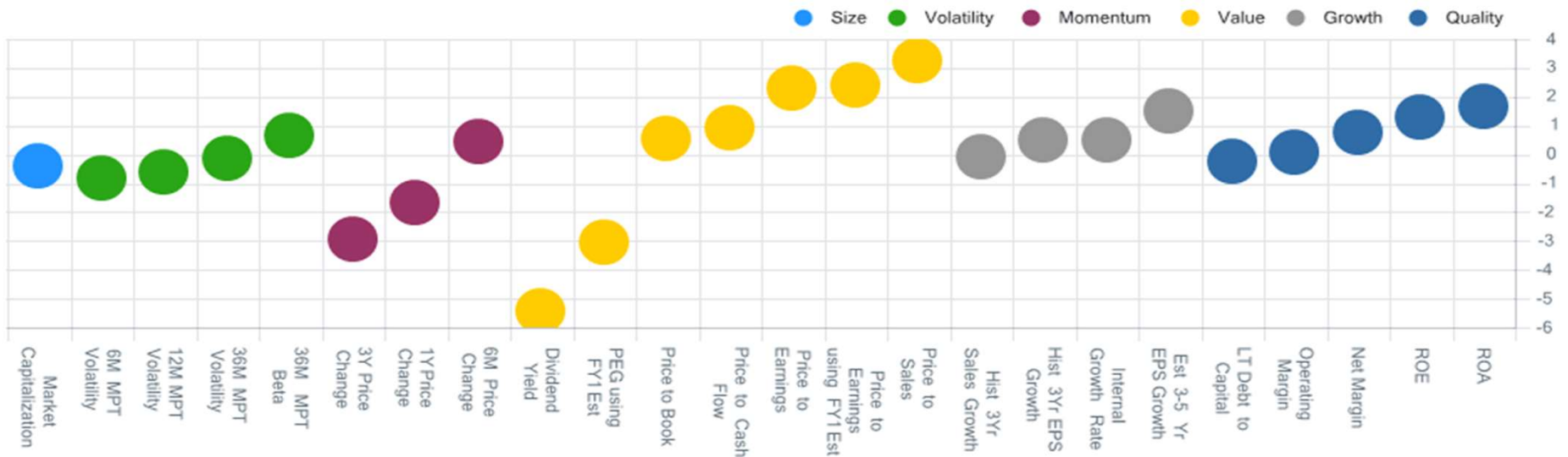
## Relative Cumulative Performance Since Inception 7/1/2012



## Risk Since Inception 7/1/2012

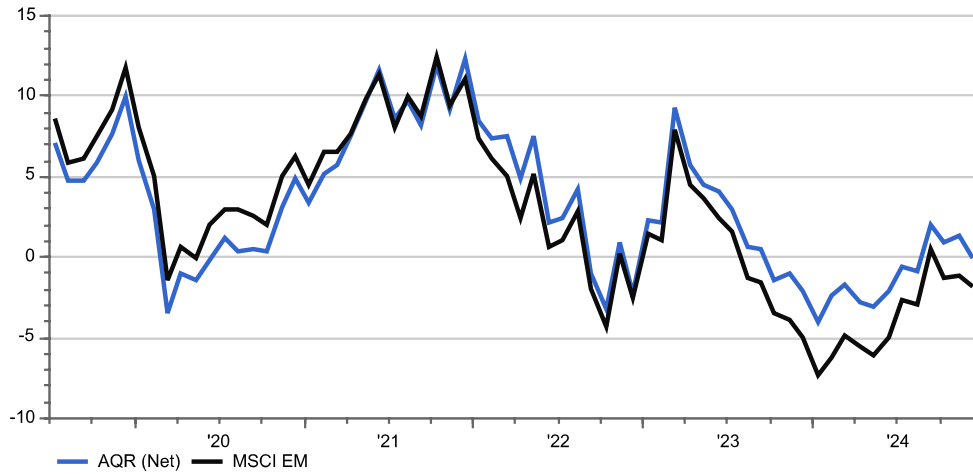
	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Polen (Net)	14.7	16.0	0.0	0.8	0.0	6.7	1.0
S&P 500	14.5	14.1	--	0.9	--	--	1.0
S&P 500 Growth	16.3	15.3	--	1.0	--	--	1.0

## Characteristics Tilt vs Benchmark 12/31/2024



# AQR Portfolio Snapshot – December 31, 2024

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



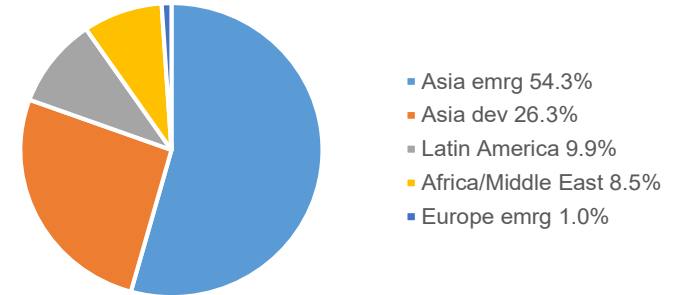
## Top 10 Holdings

	Portfolio Weight	Quarterly Return
Taiwan Semi. Mfg. Co. Ltd.	11.46	14.12
Tencent Holdings Limited	3.26	-4.58
China Construction Bank Corporation	2.26	12.94
Infosys Limited	2.08	-5.65
MediaTek Inc.	2.06	21.12
JD.com, Inc.	1.43	-11.89
Lenovo Group Limited	1.43	8.24
Cathay Financial Holdings Co., Ltd.	1.42	5.44
Realtek Semiconductor Corp	1.41	18.73
TATA Consultancy Services Limited	1.25	-12.04

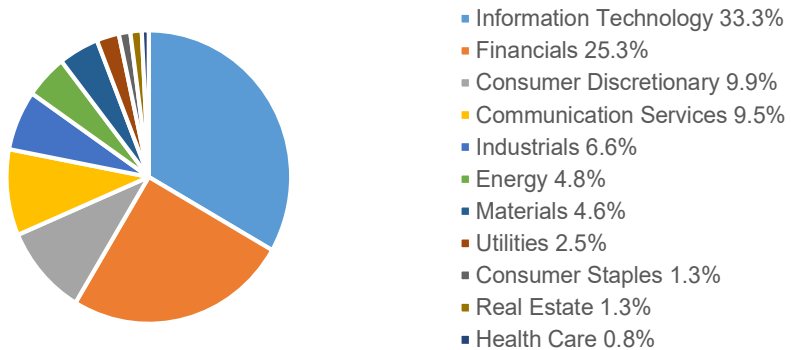
## Trailing Returns

	QTR	1 Year	3 Year	5 Year	Inception 8/1/16
AQR (Net)	-6.9	6.6	-0.1	3.2	5.6
MSCI EM	-8.0	7.5	-1.9	1.7	5.0

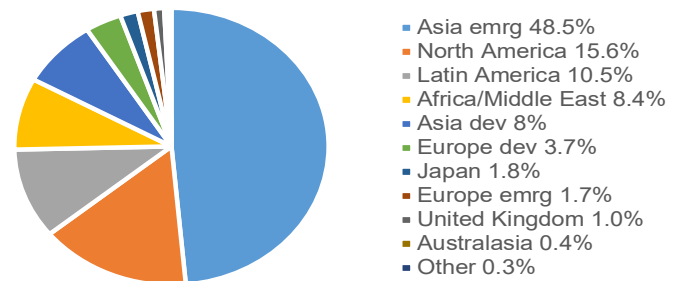
## Regional Exposure by Domicile



## Equity Sector Exposure (GICS)



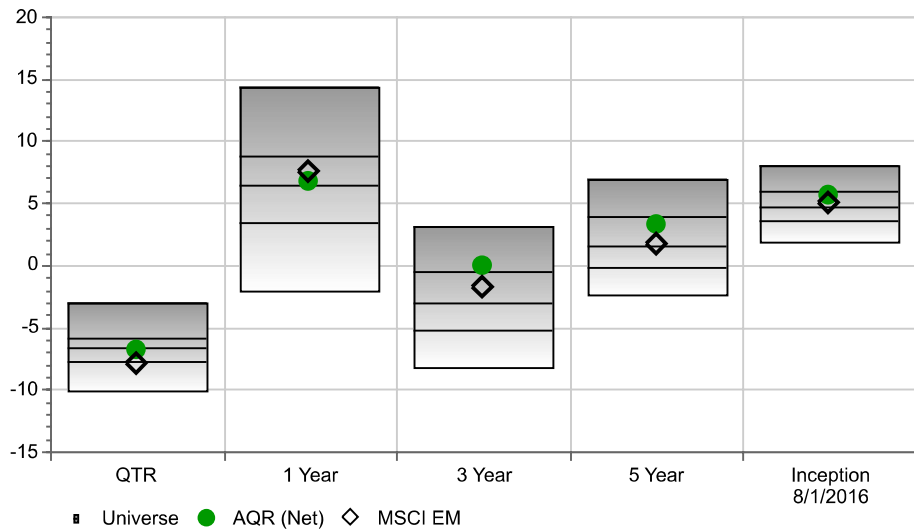
## Regional Exposure by Source of Revenue



# AQR vs Universe & Benchmark

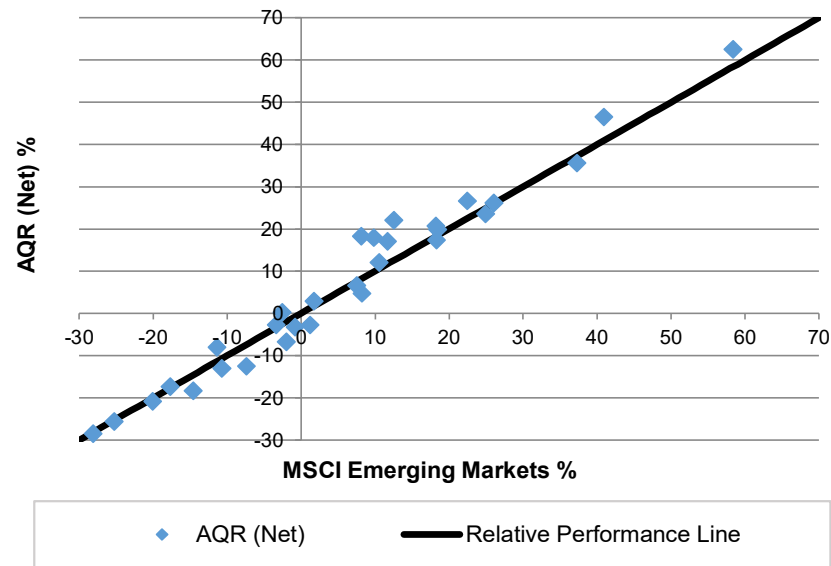
## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US Emerging Markets



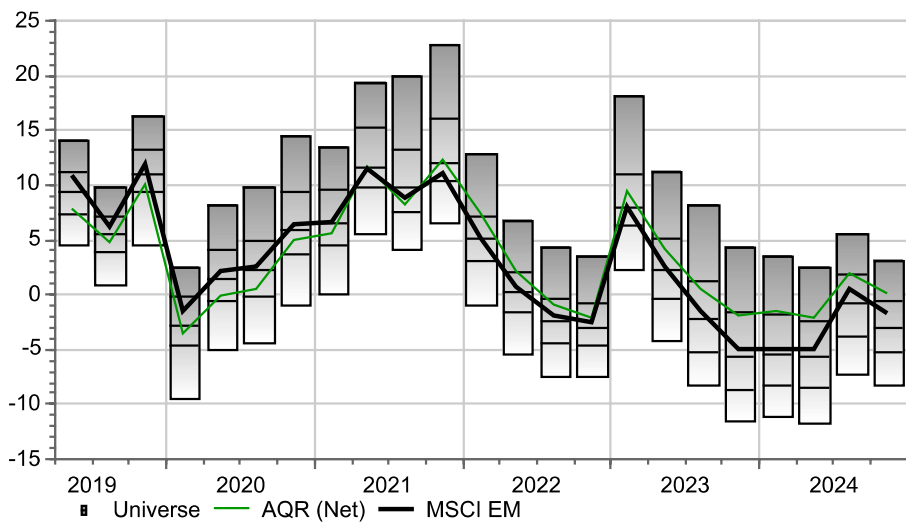
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## One-Year Rolling Return Versus Benchmark



## Rolling Returns 8/1/2016 – 12/31/2024 (3 Year, 3 Month Shift)

Universe: Lipper US Emerging Markets



©FactSet Research Systems

### Over/Under Benchmark Analysis

16 Outperform  
 14 Underperform  
 30 # Observations  
 53% % Outperform

## AQR Attribution Analysis – December 31, 2024

### Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Alibaba Group Holding Limited	0.71	-1.74	0.51
Taiwan Semi. Mfg. Co. Ltd.	6.26	-3.35	0.48
Samsung Electronics Co., Ltd.	0.99	-1.95	0.48
Reliance Industries Limited	0.24	-1.00	0.25
Petroleo Brasileiro S.A	1.99	1.30	0.23
PDD Holdings Inc.	0.60	-0.42	0.22
Realtek Semiconductor Corp	0.76	0.67	0.21
China Construction Bank Corporation	1.43	0.51	0.19
PT Alamtri Resources Indonesia Tbk	0.44	0.40	0.18
MediaTek Inc.	0.92	0.18	0.17

### Top 10 Leading Detractors

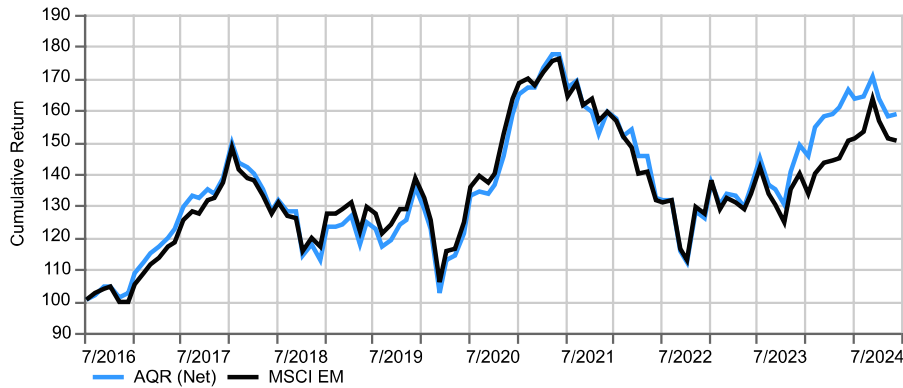
	Avg. Weights	Relative Weights	Active Return
Telefonica S.A.	1.03	-1.01	-0.58
Banco do Brasil S.A.	1.88	1.78	-0.38
Itau Unibanco Holding S.A.	1.54	1.17	-0.34
Vale S.A.	1.70	1.24	-0.30
Sasol Limited	0.58	0.54	-0.23
Indian Oil Corp. Ltd.	0.56	0.50	-0.23
Oil & Natural Gas Corp. Ltd.	0.68	0.55	-0.17
Woori Financial Group Inc.	0.56	0.47	-0.15
CEMEX, S.A.B. de C.V.	0.47	0.37	-0.15
Vedanta Incorporated	0.87	0.78	-0.14

### Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	1.9	-15.0	-8.4	0.1	-0.6	-0.9
Consumer Discretionary	-7.0	-9.7	-15.1	0.6	-0.1	0.5
Consumer Staples	-0.5	3.9	-13.8	0.3	1.0	1.0
Energy	5.7	-9.2	-14.3	-0.2	1.3	0.7
Financials	8.7	-6.4	-4.9	0.4	-0.2	-0.4
Health Care	-2.9	-0.1	-11.7	0.1	0.1	0.2
Industrials	-1.0	10.0	-9.9	-0.1	0.7	0.7
Information Technology	-6.4	7.2	0.7	0.4	0.3	0.9
Materials	2.9	-21.9	-19.1	-0.3	-0.2	-0.6
Real Estate	0.0	4.4	-6.7	0.0	0.3	0.3
Utilities	-1.4	-4.8	-13.9	0.1	0.0	0.2
Total	0.0	-5.4	-8.0	1.4	2.5	2.6

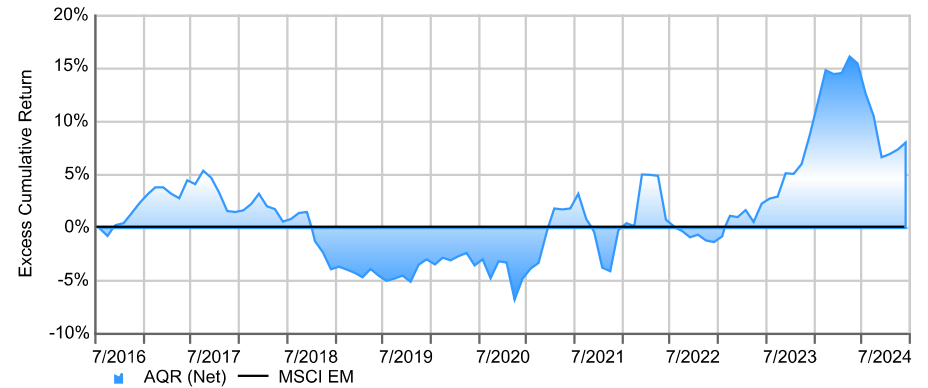
# AQR Inception Performance & Statistics

## Investment Growth Since Inception 8/1/2016



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

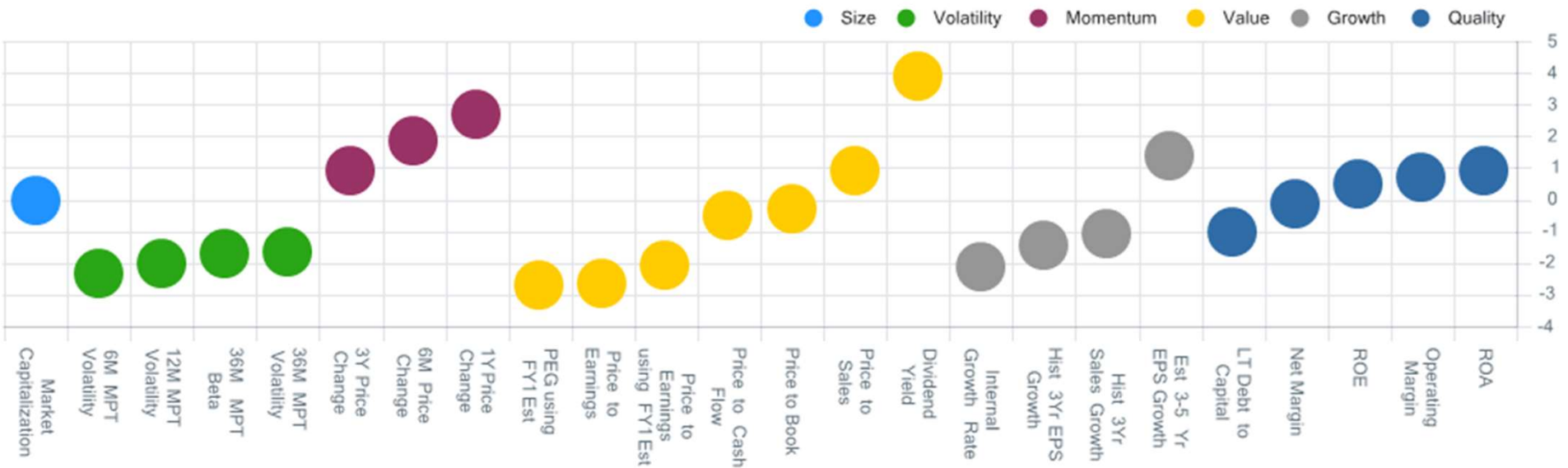


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## Risk Since Inception 8/1/2016

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
AQR (Net)	5.6	17.0	0.7	0.2	0.2	3.6	1.0
MSCI EM	5.0	16.6	--	0.2	--	--	1.0

## Characteristics Tilt vs Benchmark 12/31/2024



# Brandes Portfolio Snapshot – December 31, 2024

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



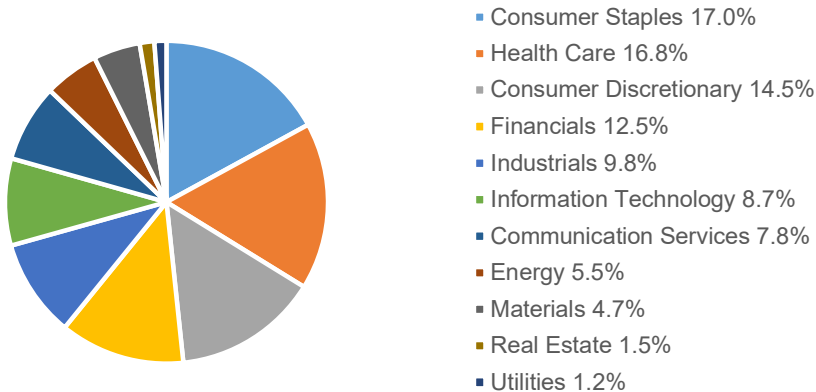
## Top 10 Holdings

	Portfolio Weight	Quarterly Return
Takeda Pharmaceutical Company Limited	3.03	-7.25
Alibaba Group Holding Limited	2.80	-25.10
Heineken Holding N.V.	2.46	-20.83
Sanofi	2.45	-15.48
GSK plc	2.27	-16.17
Samsung Electronics Co., Ltd.	2.25	-22.28
Embraer S.A.	2.21	3.26
UBS Group AG	2.21	-0.95
WPP plc	2.20	3.09
BNP Paribas SA	2.09	-10.73

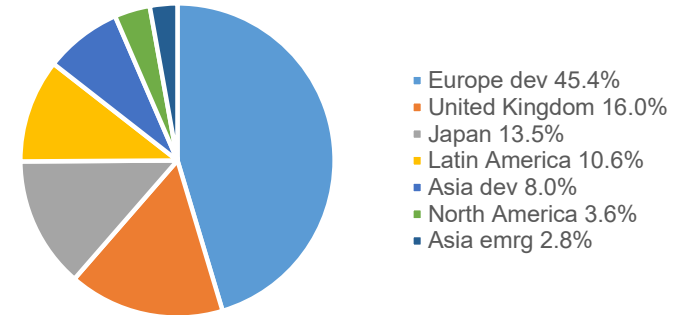
## Trailing Returns

	QTR	1 Year	3 Year	5 Year	10 Year	15 Year
Brandes (Net)	-9.4	6.7	9.0	7.7	6.4	6.0
MSCI EAFE	-8.1	3.8	1.6	4.7	5.2	5.2
MSCI EAFE Value	-7.1	5.7	5.9	5.1	4.3	4.3

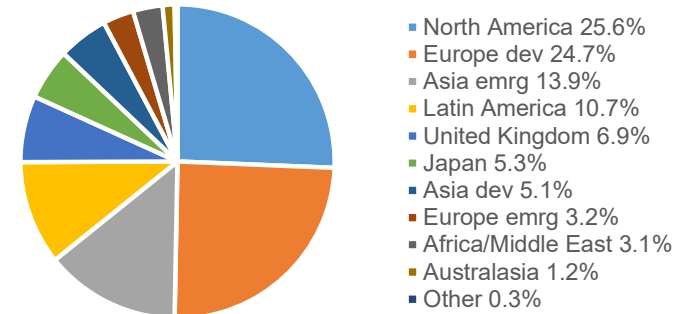
## Equity Sector Exposure (GICS)



## Regional Exposure by Domicile



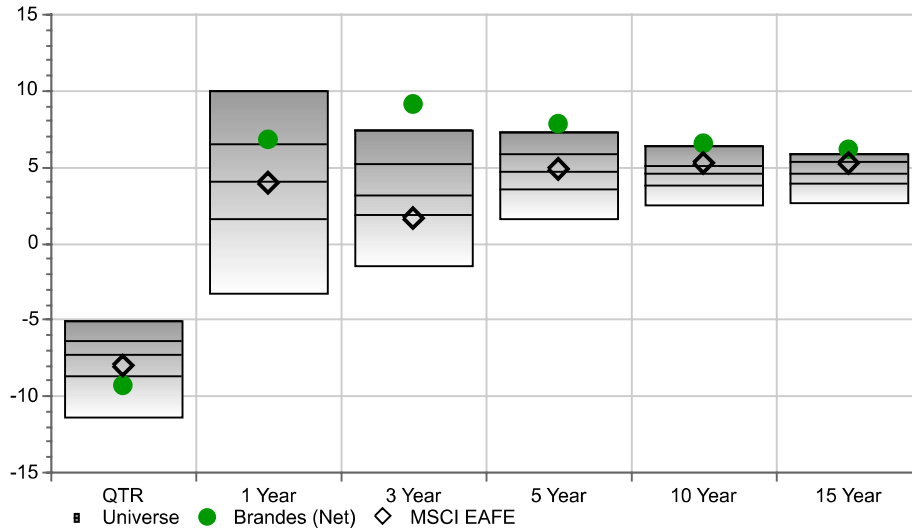
## Regional Exposure by Source of Revenue



# Brandes vs Universe & Benchmark

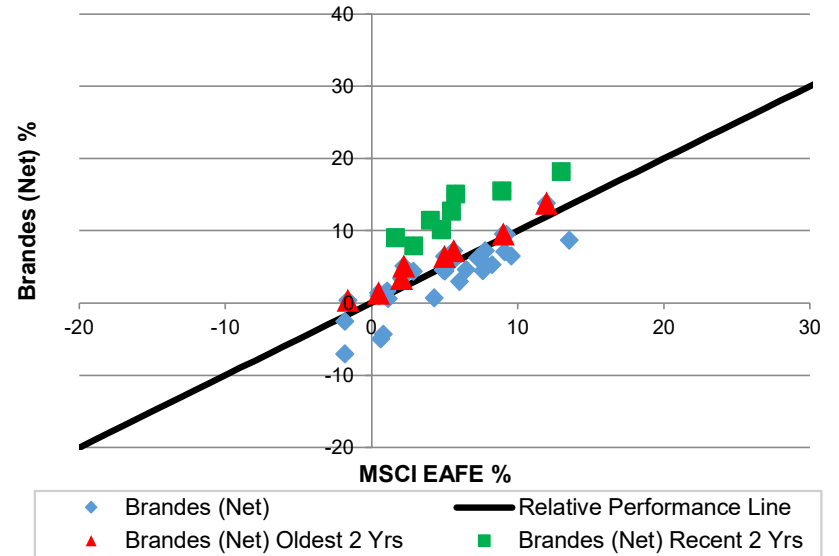
## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US Int'l Multi-Cap Value



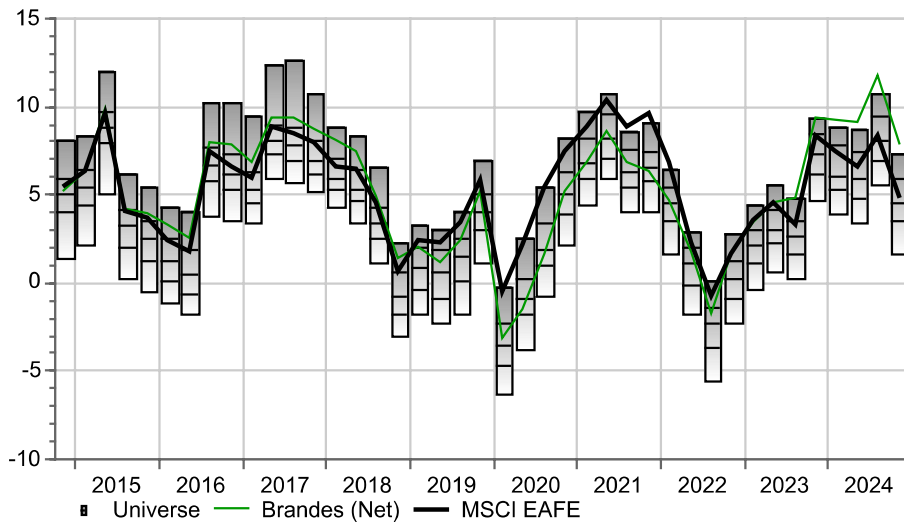
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## Three-Year Rolling Return Versus Benchmark



## Rolling Returns 7/1/2008 – 12/31/2024 (5 Year, 3 Month Shift)

Universe: Lipper US Int'l Multi Cap Value



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### Over/Under Benchmark Analysis

22	Outperform
18	Underperform
40	# Observations
55%	% Outperform

# Brandes Attribution Analysis – December 31, 2024

## Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
CAE Inc.	1.15	1.15	0.39
Heidelberg Materials AG	1.60	1.51	0.22
Erste Group Bank AG	1.80	1.69	0.21
Imperial Brands PLC	0.66	0.52	0.12
Barclays PLC	1.30	1.02	0.12
Nissan Motor Co., Ltd.	0.90	0.86	0.08
Taiwan Semi. Mfg. Co. Ltd.	0.79	0.79	0.08
Embraer S.A.	2.06	2.06	0.07
WPP plc	2.14	2.08	0.06
Mitsubishi UFJ Financial Group, Inc.	0.90	0.17	0.05

## Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Alibaba Group Holding Limited	3.25	3.25	-0.91
Anheuser-Busch InBev SA/NV	3.20	2.88	-0.72
Samsung Electronics Co., Ltd.	2.19	2.19	-0.52
Heineken Holding N.V.	2.43	2.24	-0.49
Swatch Group AG	2.20	2.16	-0.39
Kingfisher plc	1.27	1.23	-0.37
Carrefour SA	2.05	1.99	-0.35
Grifols, S.A.	1.66	1.64	-0.33
Koninklijke Philips N.V.	1.25	1.11	-0.31
Smith & Nephew plc	1.69	1.62	-0.30

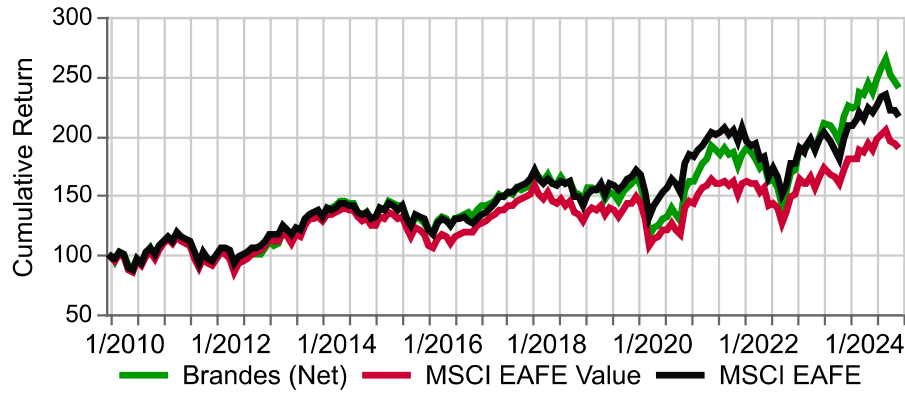
## Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	3.1	-7.3	-4.4	0.1	-0.2	-0.1
Consumer Discretionary	3.3	-14.4	-4.3	0.1	-1.7	-1.3
Consumer Staples	9.8	-11.6	-12.6	-0.5	0.1	-0.3
Energy	1.6	-8.0	-8.2	0.0	0.1	0.0
Financials	-8.7	0.8	-2.3	-0.5	0.4	-0.1
Health Care	3.1	-15.0	-14.1	-0.2	-0.1	-0.3
Industrials	-7.6	-2.3	-6.3	-0.1	0.4	0.2
Information Technology	-0.4	-8.7	-7.2	0.0	-0.2	-0.1
Materials	-2.8	1.8	-17.8	0.3	0.7	1.0
Real Estate	-0.9	-12.9	-13.4	0.1	0.0	0.1
Utilities	-2.2	-8.4	-12.8	0.1	0.1	0.2
Cash	1.8	1.1	0.0	0.0	0.0	0.2
Total	0.0	-8.7	-8.1	-0.6	-0.6	-0.6



# Brades 15 Year Performance & Statistics

## Investment Growth – 15 Years



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## Relative Cumulative Performance – 15 Years

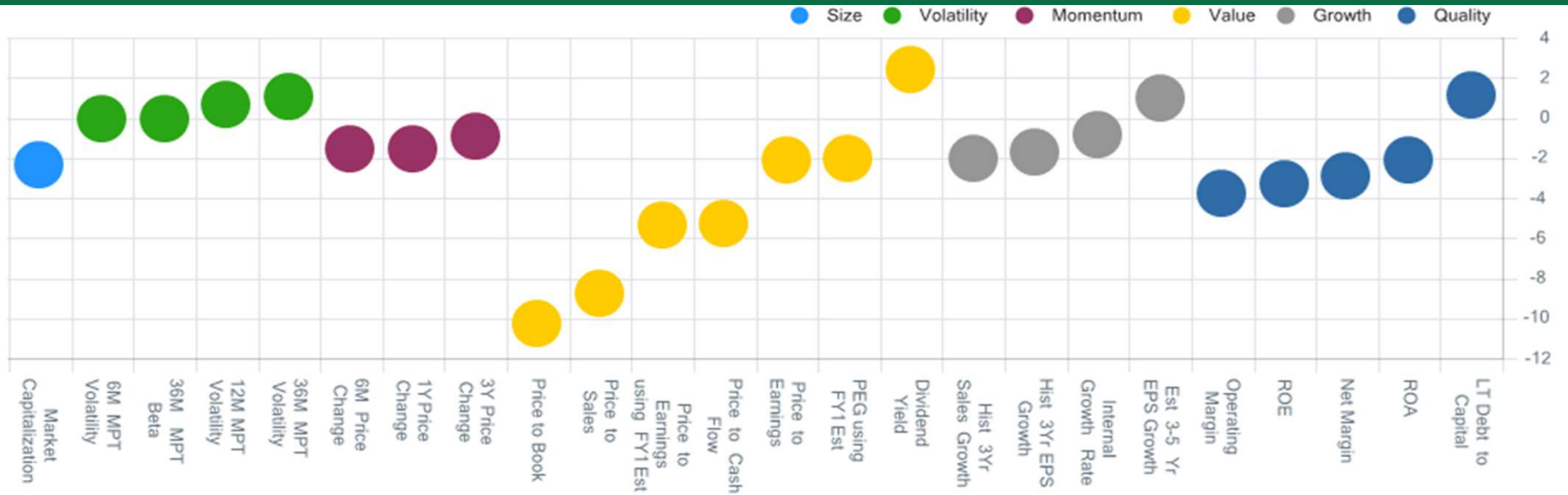


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## Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Brades (Net)	6.0	16.7	0.8	0.3	0.1	5.3	1.0
MSCI EAFE	5.2	15.7	--	0.3	--	--	1.0
MSCI EAFE Value	4.3	16.7	--	0.2	--	--	1.0

## Characteristics Tilt vs Benchmark 12/31/2024



# DFA International Portfolio Snapshot

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



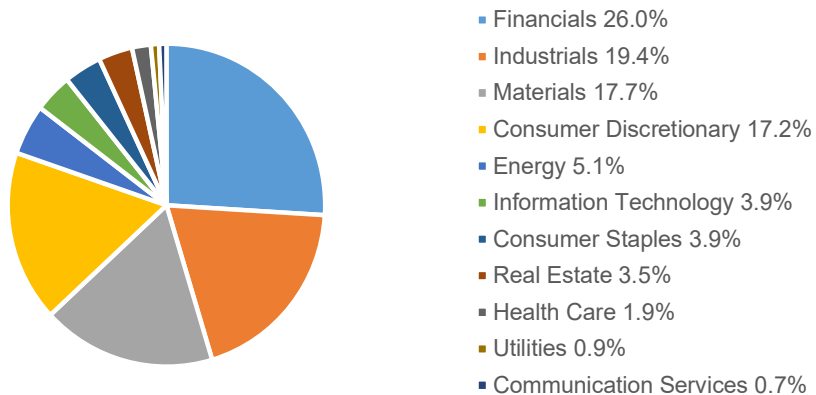
## Top 10 Holdings

	Portfolio Weight	Quarterly Return
Banco de Sabadell, S.A.	1.56	-10.85
Alamos Gold Inc	0.98	-5.44
Helvetia Holding AG	0.95	1.46
BPER Banca S.p.A.	0.92	8.53
Celestica Inc.	0.81	66.63
Marks and Spencer Group PLC	0.74	-1.95
Canadian Western Bank	0.73	8.67
Jyske Bank A/S	0.68	-9.23
Sydbank A/S	0.68	1.16
Swiss Prime Site AG	0.67	-1.31

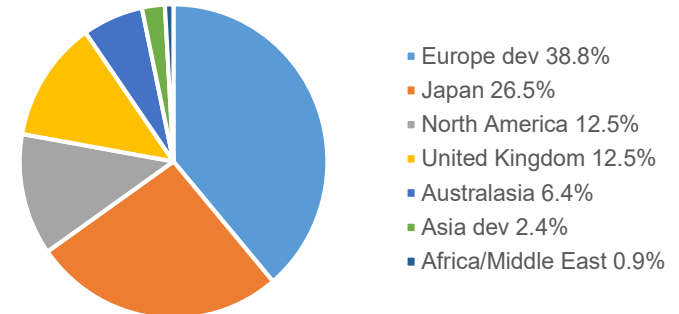
## Trailing Returns

	QTR	1 Year	3 Year	5 Year	10 Year	15 Year
DFA Int'l Small Cap (Net)	-6.5	7.9	4.6	6.0	6.0	6.8
MSCI EAFE Small Cap	-8.4	1.8	-3.2	2.3	5.5	6.4
MSCI World ex US Small Cap Value	-8.1	3.0	0.5	3.4	5.1	6.0

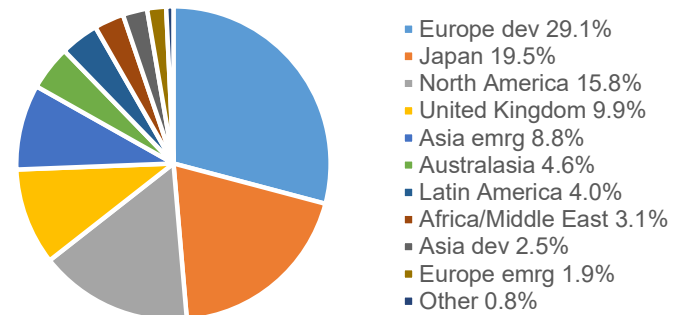
## Equity Sector Exposure (GICS)



## Regional Exposure by Domicile



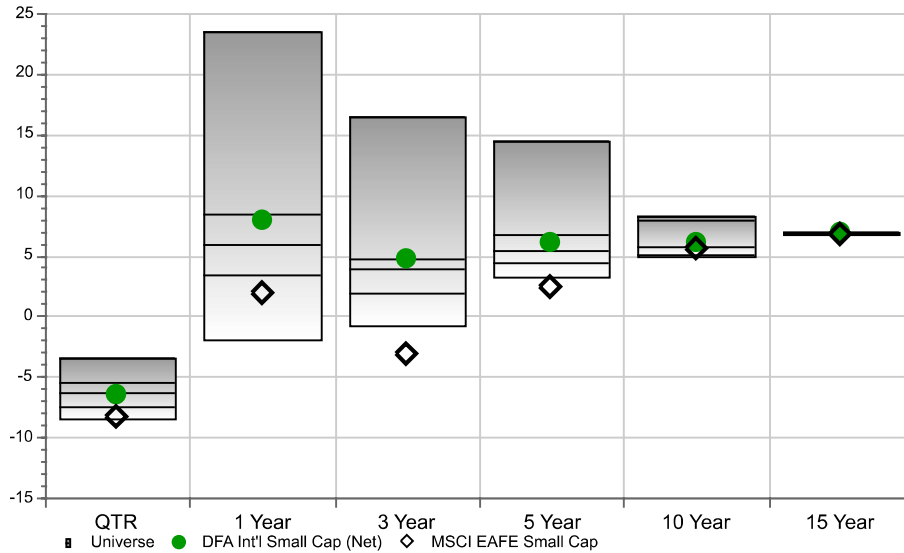
## Regional Exposure by Revenue Source



# DFA International vs Universe & Benchmark

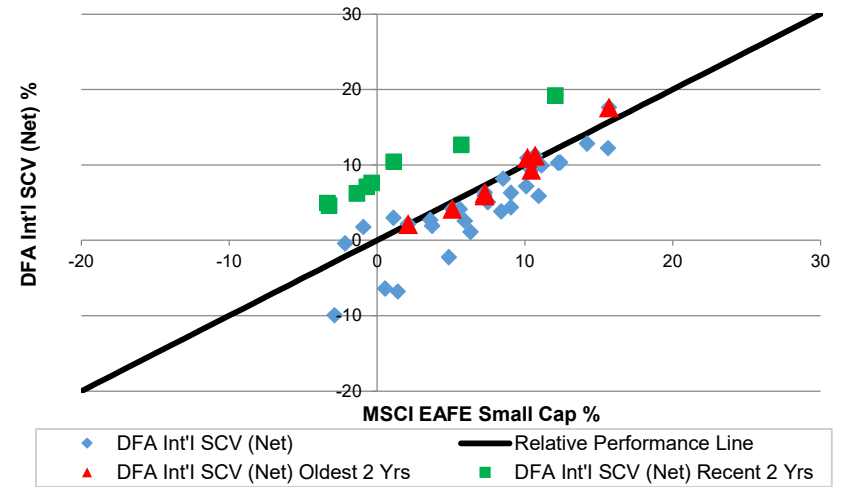
## Performance Relative to Peer Group as of 12/31/2024

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



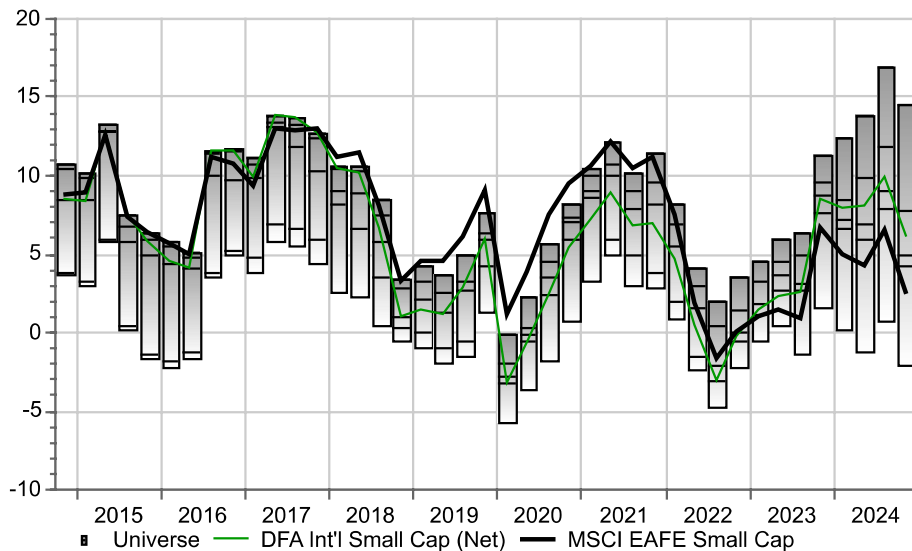
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## Three-Year Rolling Return Versus Benchmark



## Rolling Returns 7/1/2008 – 12/31/2024 (5 Year, 3 Month Shift)

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



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## Over/Under Benchmark Analysis

<b>15</b>	Outperform
<b>25</b>	Underperform
<b>40</b>	# Observations
<b>38%</b>	% Outperform

# DFA International Attribution Analysis – December 31, 2024

## Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Celestica Inc.	0.71	0.71	0.43
Furukawa Electric Co., Ltd.	0.31	0.23	0.14
Spar Nord Bank A/S	0.33	0.28	0.14
Leonardo SpA	0.56	0.56	0.12
Banco BPM S.p.A.	0.48	0.48	0.12
BPER Banca S.p.A.	0.88	0.74	0.09
Banca Monte dei Paschi di Siena SpA	0.53	0.31	0.07
Makino Milling Machine Co., Ltd.	0.13	0.09	0.06
Bank of Georgia Group PLC	0.41	0.34	0.06
Banca Popolare di Sondrio SPA	0.57	0.47	0.05

## Top 10 Leading Detractors

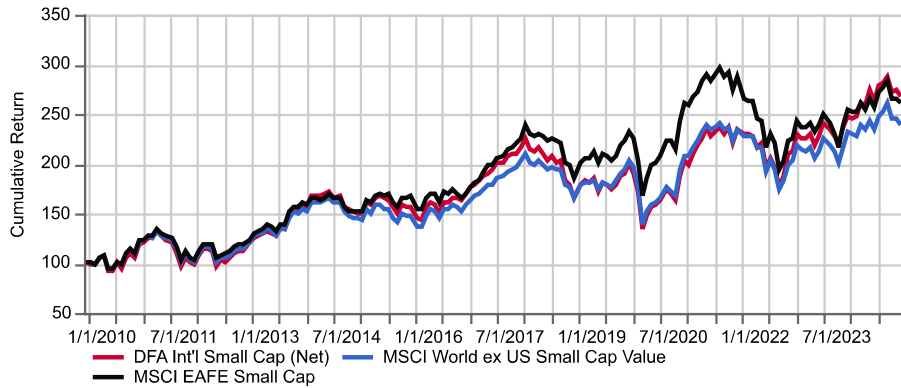
	Avg. Weights	Relative Weights	Active Return
Vistry Group plc	0.63	0.48	-0.39
Banco de Sabadell, S.A.	1.61	1.61	-0.14
Bellway p.l.c.	0.69	0.53	-0.14
Adecco Group AG	0.42	0.42	-0.13
Siegfried Holding AG	0.68	0.48	-0.10
Persimmon Plc	0.26	0.26	-0.09
Sandfire Resources Limited	0.48	0.36	-0.09
Kemira Oyj	0.53	0.44	-0.09
voestalpine AG	0.28	0.25	-0.08
Veren Inc.	0.50	0.50	-0.08

## Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-0.3	-19.4	-6.5	0.0	-0.1	-0.1
Consumer Discretionary	0.9	-12.0	-6.9	0.0	-1.0	-0.9
Consumer Staples	-2.0	-8.8	-11.2	0.1	0.1	0.2
Energy	3.7	-2.4	-9.2	0.0	0.2	0.3
Financials	12.5	0.9	-0.4	0.9	0.2	1.3
Health Care	-3.8	-12.9	-10.8	0.1	-0.1	0.1
Industrials	-3.8	-5.8	-8.7	0.0	0.6	0.6
Information Technology	-6.1	5.9	-6.3	-0.1	0.4	0.3
Materials	9.0	-11.8	-11.9	-0.3	-0.2	-0.3
Real Estate	-7.9	-6.7	-13.7	0.5	0.2	0.7
Utilities	-2.1	-8.6	-9.9	0.0	0.0	0.0
Total	0.0	-6.3	-8.3	1.3	0.4	2.1

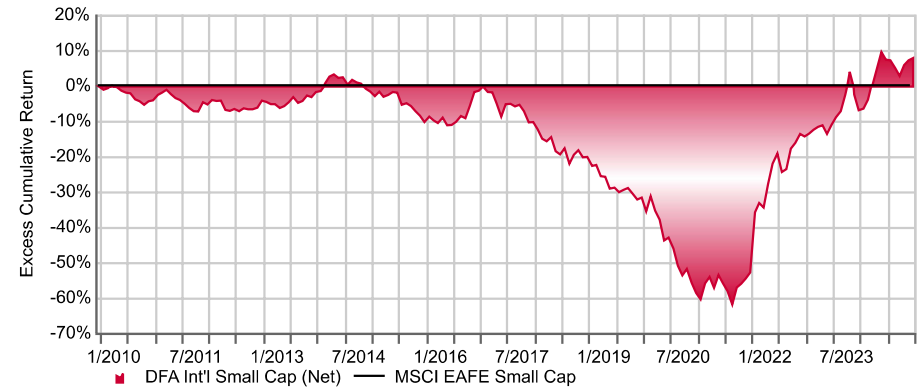
# DFA International Inception Performance & Statistics

## Investment Growth – 15 Years



©FactSet Research Systems

## Relative Cumulative Performance – 15 Years

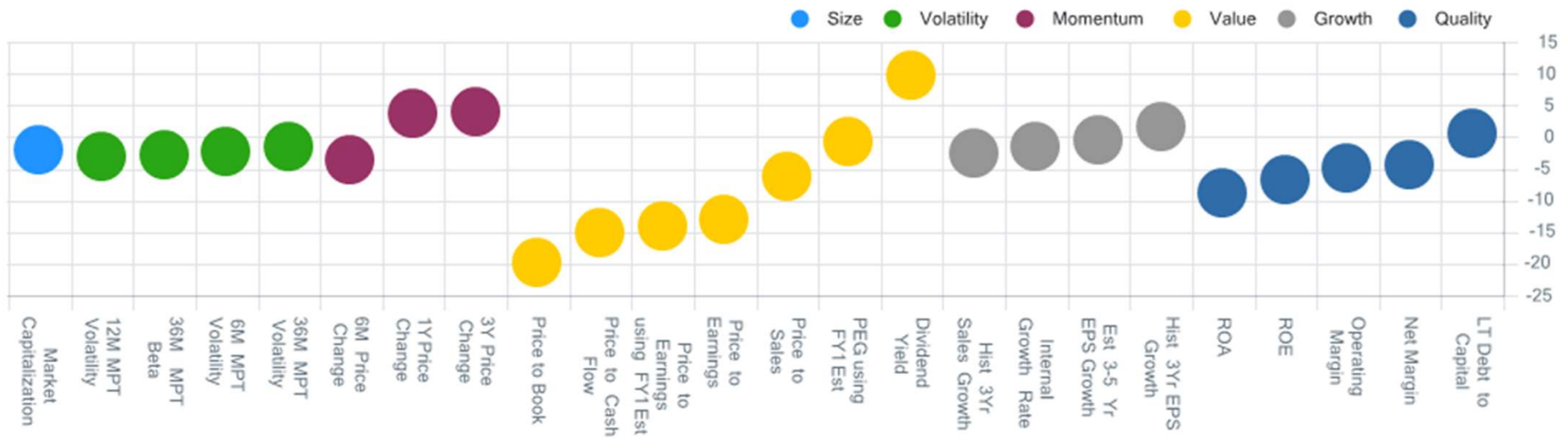


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## Risk – 15 Years

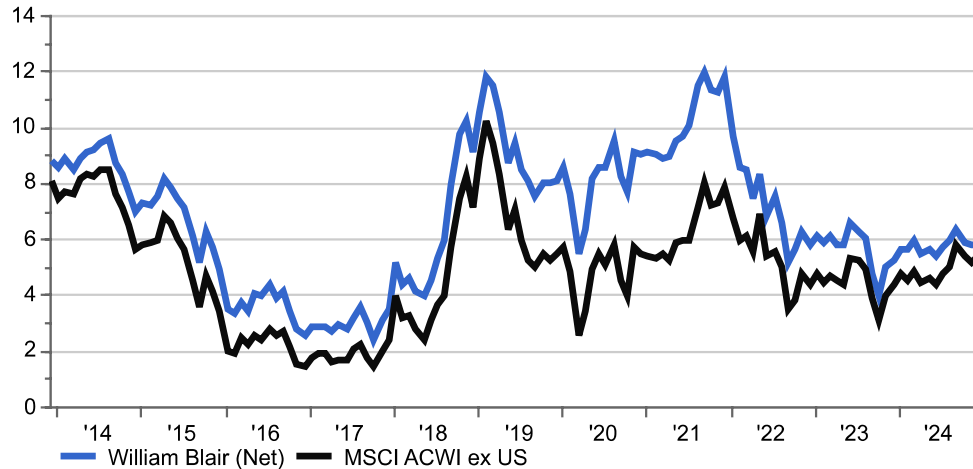
	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
DFA Int'l Small Cap (Net)	6.8	17.9	0.2	0.3	0.0	4.5	1.0
MSCI EAFE Small Cap	6.4	16.8	--	0.3	--	--	1.0
MSCI World ex US Small Cap Value	6.0	17.1	--	0.3	--	--	1.0

## Characteristics Tilt vs Benchmark 12/31/2024



# William Blair Portfolio Snapshot – December 31, 2024

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



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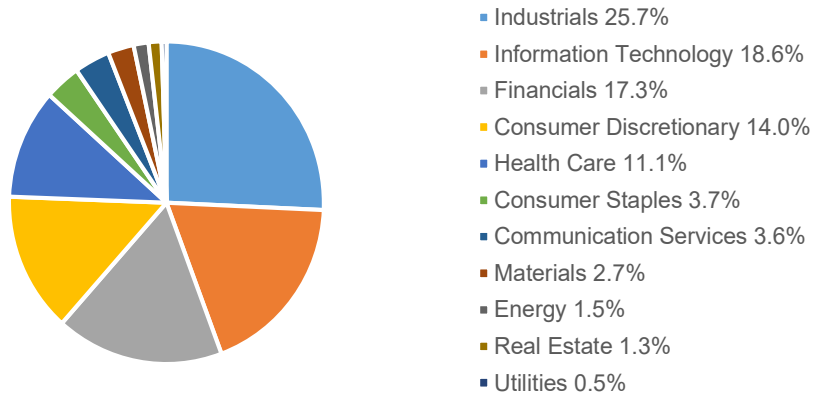
## Top 10 Holdings

	Portfolio Weight	Quarterly Return
Taiwan Semiconductor Manufacturing Company Limited	3.11	8.83
SAP SE	1.75	7.26
3i Group plc	1.60	1.51
Tencent Holdings Limited	1.36	-6.21
London Stock Exchange Group plc	1.32	3.10
Hermes International SCA	1.31	-2.34
Lonza Group AG	1.24	-6.71
DSV A/S	1.21	2.58
MTU Aero Engines AG	1.19	6.70
Keyence Corporation	1.15	-13.95

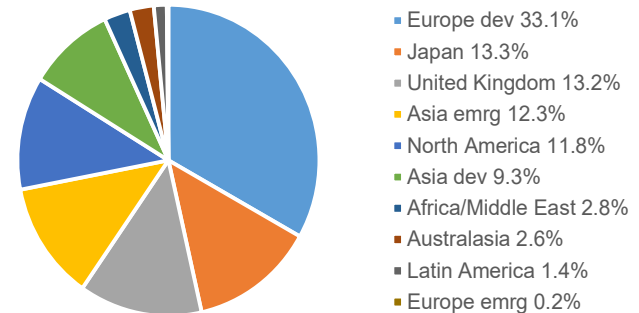
## Trailing Returns

	QTR	1 Year	3 Year	5 Year	10 Year	15 Year
William Blair (Net)	-6.4	3.4	-5.2	4.6	5.8	6.9
MSCI ACWI ex US	-7.5	6.1	1.3	4.6	5.3	5.2
MSCI ACWI ex US Growth	-7.8	5.4	-2.4	3.7	5.7	5.6

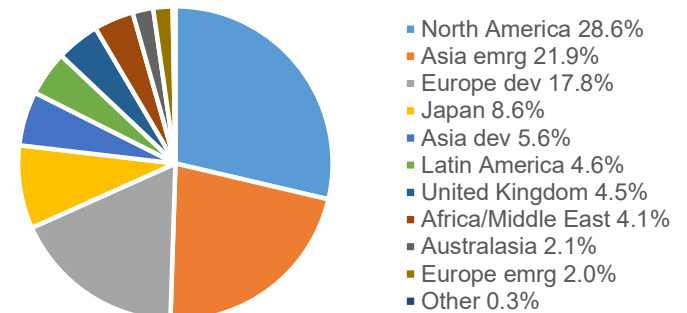
## Equity Sector Exposure (GICS)



## Regional Exposure by Domicile



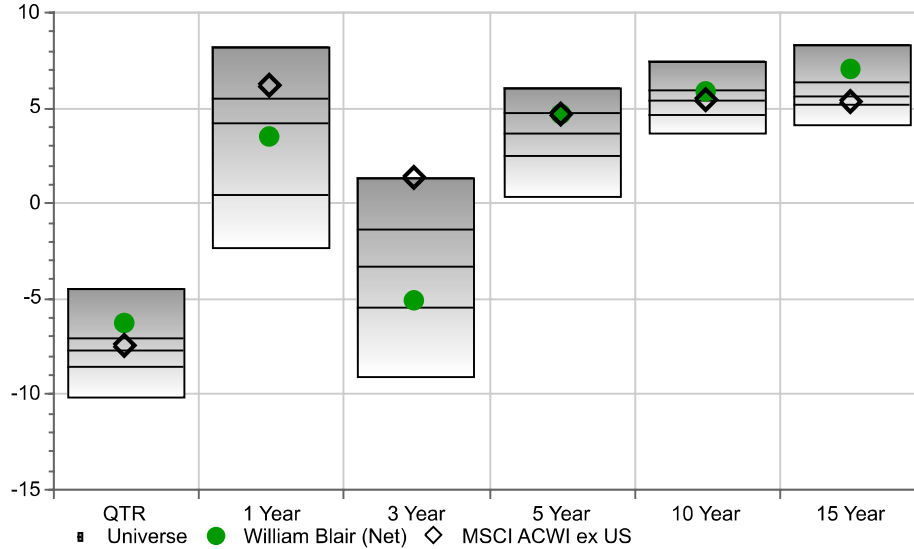
## Regional Exposure by Source of Revenue



# William Blair vs Universe & Benchmark

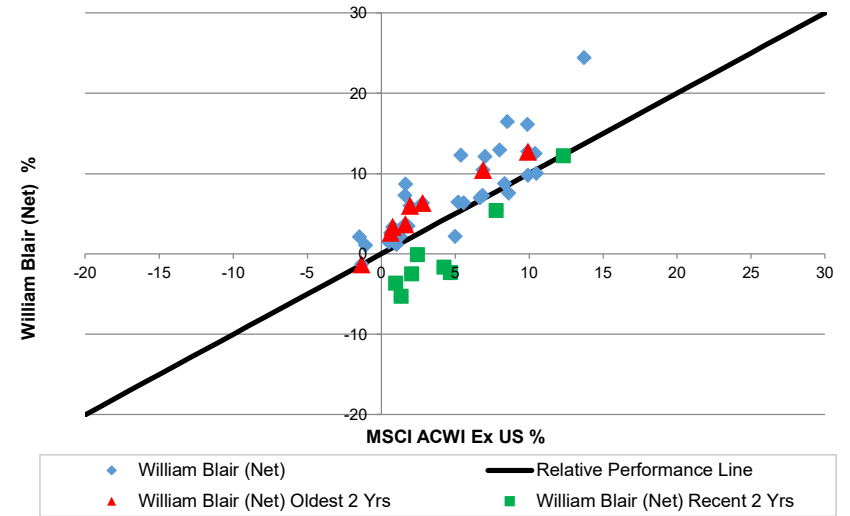
## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US:International Multi-Cap Growth



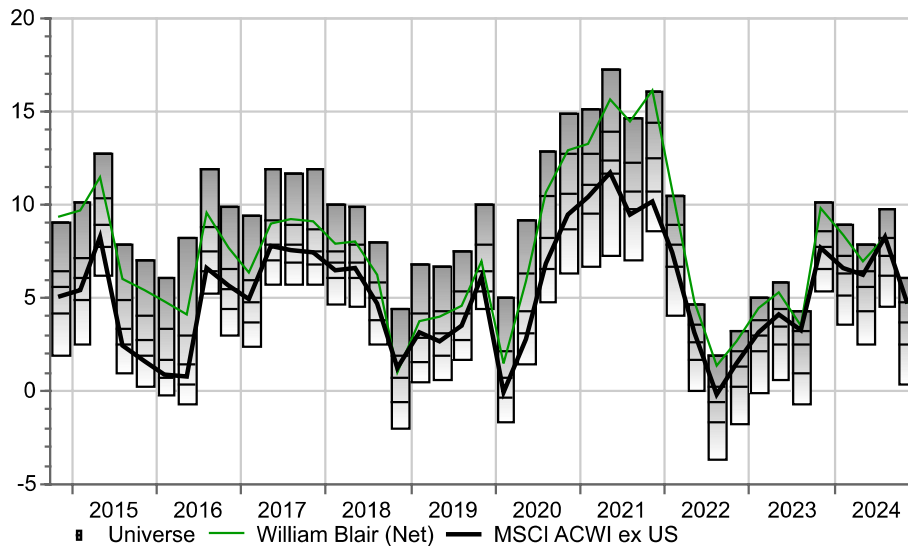
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## Three-Year Rolling Return Versus Benchmark



## Rolling Returns 7/1/2008 – 12/31/2024 (5 Year, 3 Month Shift)

Universe: Lipper US:International Multi-Cap Growth



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## Over/Under Benchmark Analysis

<b>28</b>	Outperform
<b>12</b>	Underperform
<b>40</b>	# Observations
<b>70%</b>	% Outperform

# William Blair Attribution Analysis – December 31, 2024

## Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Teva Pharmaceutical Industries Limited	0.80	0.73	0.19
Pro Medicus Limited	0.65	0.62	0.14
Advantest Corporation	0.74	0.58	0.12
Shopify Inc.	0.61	0.20	0.08
Samsung Electronics Co., Ltd.	0.56	-0.31	0.07
SAP SE	1.93	1.02	0.07
Dixon Technologies (India) Limited	0.27	0.25	0.07
MTU Aero Engines AG	1.13	1.06	0.07
DBS Group Holdings Ltd	0.90	0.68	0.06
Sumitomo Mitsui Financial Group, Inc.	0.83	0.52	0.06

## Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
ICON plc	0.57	0.57	-0.27
Kingspan Group plc	0.75	0.70	-0.17
Sika AG	0.69	0.53	-0.17
Keyence Corporation	1.27	0.95	-0.14
Symrise AG	0.56	0.50	-0.13
Experian PLC	0.83	0.66	-0.13
Linde Plc	0.96	0.96	-0.12
MercadoLibre, Inc.	0.65	0.65	-0.12
BAE Systems plc	1.01	0.83	-0.11
CTS Eventim AG & Co. KGaA	0.55	0.53	-0.11

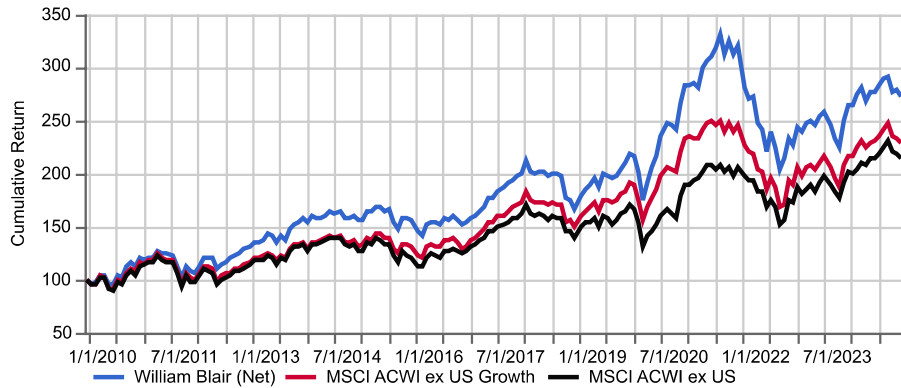
## Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-2.1	-7.8	-6.5	0.0	-0.1	-0.1
Consumer Discretionary	2.0	-5.7	-8.1	0.0	0.2	0.3
Consumer Staples	-3.0	-11.5	-12.4	0.1	0.0	0.2
Energy	-3.4	-13.8	-7.1	0.0	-0.1	-0.1
Financials	-6.7	-4.0	-2.8	-0.3	-0.2	-0.5
Health Care	3.0	-7.8	-13.8	-0.2	0.8	0.6
Industrials	12.2	-8.5	-7.0	0.2	-0.6	-0.3
Information Technology	4.7	-0.9	-1.7	0.3	0.2	0.4
Materials	-3.3	-16.3	-17.2	0.3	-0.1	0.4
Real Estate	-0.7	-3.2	-11.9	0.0	0.1	0.1
Utilities	-2.6	-23.3	-12.6	0.1	-0.1	0.1
Total	0.0	-6.5	-7.5	0.6	0.1	1.0

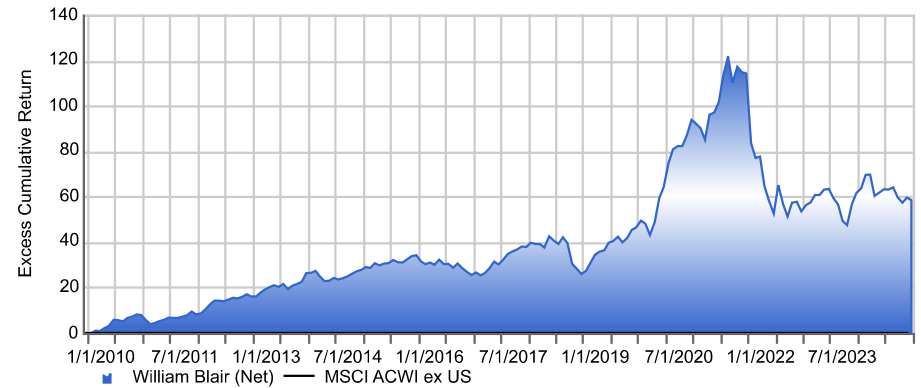


# William Blair 15 Year Performance & Statistics

## Investment Growth – 15 Years



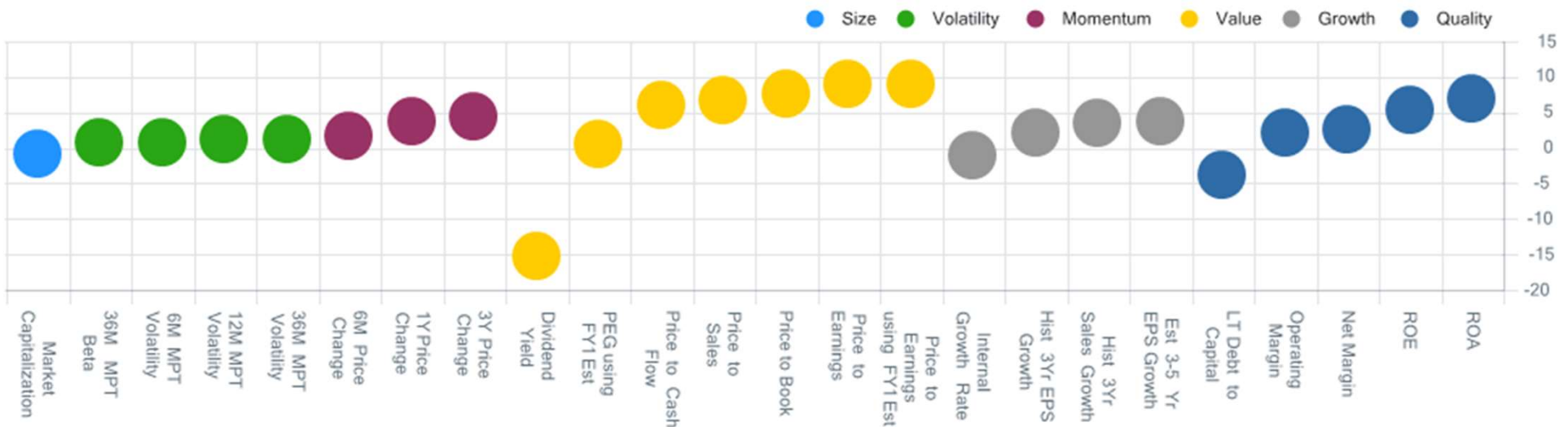
## Relative Cumulative Performance – 15 Years



## Risk – 15 Years

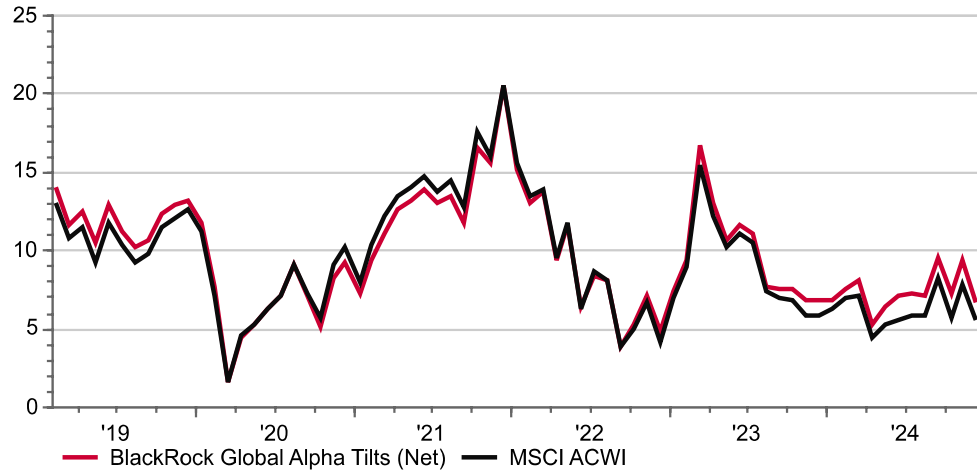
	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
William Blair (Net)	6.9	15.7	1.9	0.4	0.3	5.4	1.0
MSCI ACWI ex US	5.2	15.4	--	0.3	--	--	1.0
MSCI ACWI ex US Growth	5.6	15.4	--	0.3	--	--	1.0

## Characteristics Tilt vs Benchmark 12/31/2024



# BlackRock Global Portfolio Snapshot – December 31, 2024

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



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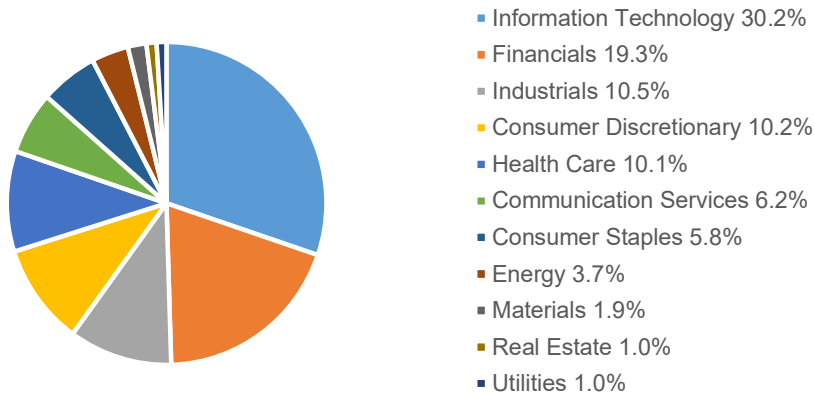
## Top 10 Holdings

	Portfolio Weight	Quarterly Return
Apple Inc.	5.82	7.59
NVIDIA Corporation	5.35	10.59
Microsoft Corporation	4.82	-1.85
Amazon.com, Inc.	2.61	17.74
Alphabet Inc.	2.42	14.18
Bank of America Corporation	1.49	11.42
Morgan Stanley	1.31	21.57
Booking Holdings Inc.	1.29	18.16
Meta Platforms, Inc.	1.26	2.37
Taiwan Semi. Mfg. Co. Ltd.	1.23	8.83

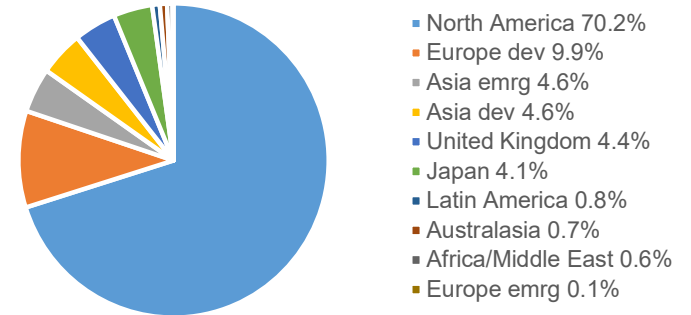
## Trailing Returns

	QTR	1 Year	3 Year	5 Year	Inception 3/1/2016
BlackRock Global Alpha Tilts (Net)	-0.9	18.5	6.6	10.8	12.3
MSCI ACWI	-1.0	17.5	5.4	10.1	11.7

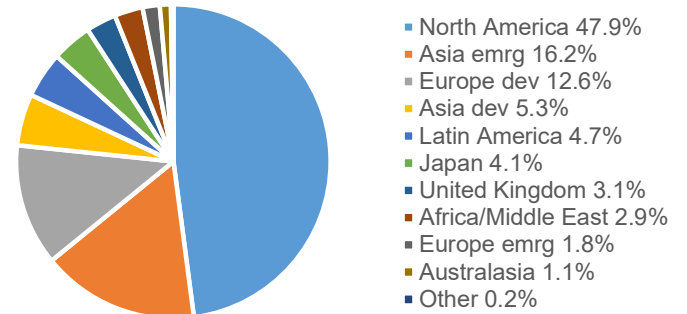
## Equity Sector Exposure (GICS)



## Regional Exposure by Domicile



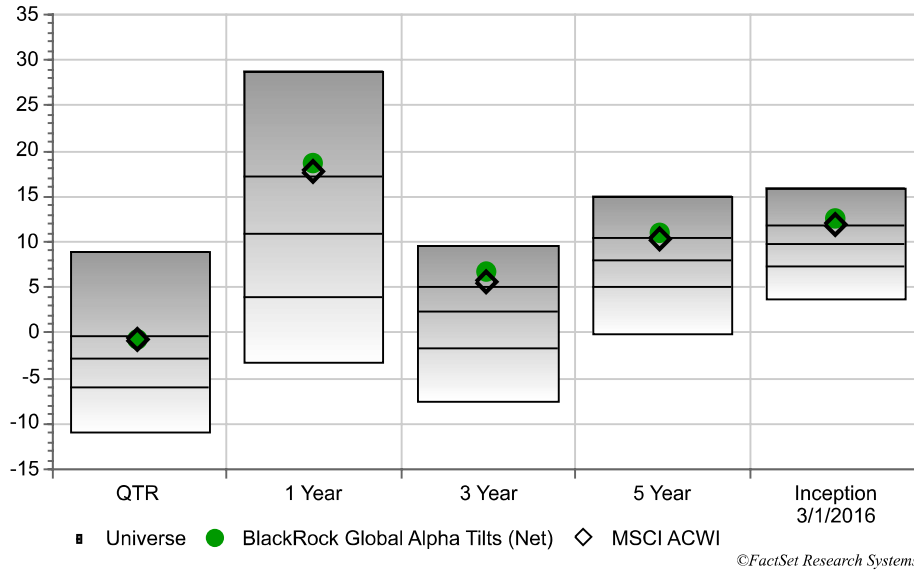
## Regional Exposure by Source of Revenue



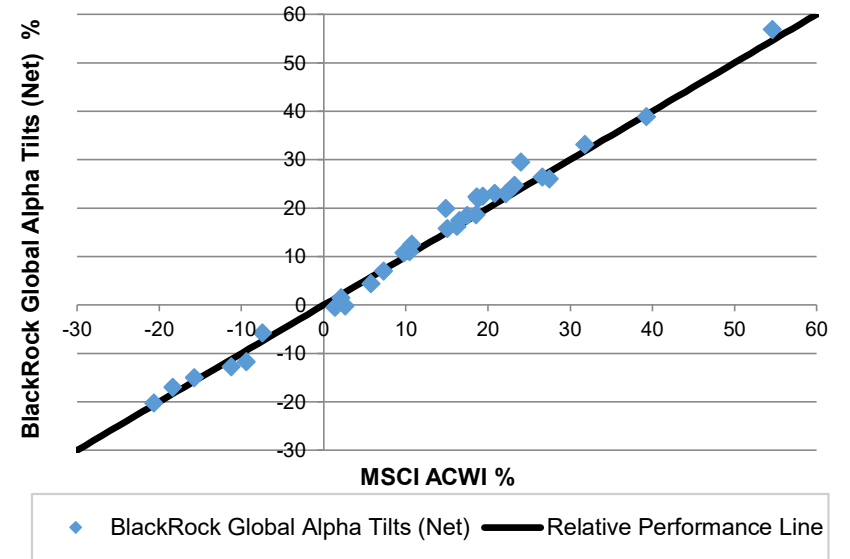
# BlackRock Global vs Universe & Benchmark

## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US:Global

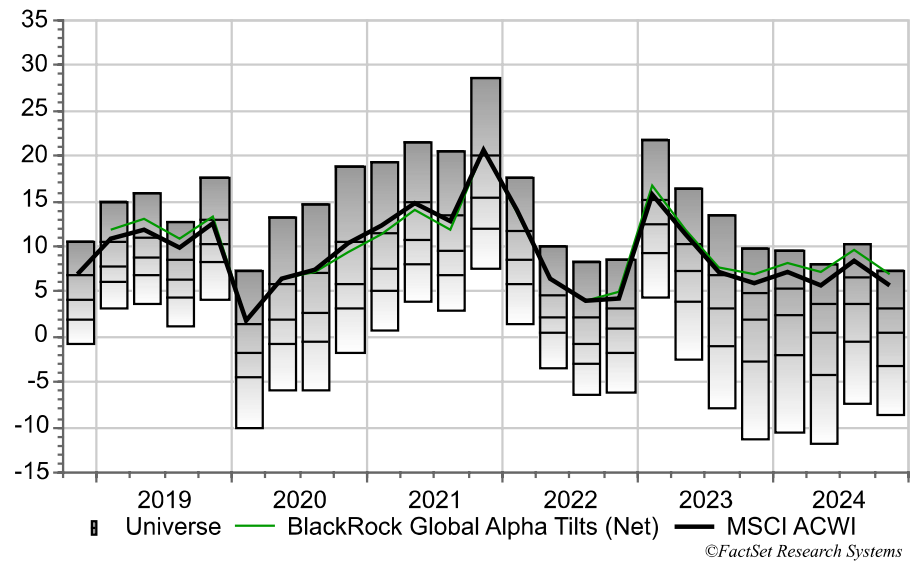


## One-Year Rolling Return Versus Benchmark



## Rolling Returns 3/1/2016 – 12/31/2024 (3 Year, 3 Month Shift)

Universe: Lipper US Global Equity



### Over/Under Benchmark Analysis

<b>22</b>	Outperform
<b>10</b>	Underperform
<b>32</b>	# Observations
<b>69%</b>	% Outperform

# BlackRock Global Attribution Analysis – December 31, 2024

## Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
Walmart Inc.	1.49	1.01	0.14
Wells Fargo & Company	0.72	0.43	0.14
Bank of America Corporation	1.53	1.15	0.13
United Airlines Holdings, Inc.	0.13	0.13	0.11
Siemens Energy AG	0.18	0.15	0.10
Fortinet, Inc.	0.51	0.44	0.09
Advanced Micro Devices, Inc.	0.01	-0.29	0.08
Wix.com Ltd.	0.33	0.32	0.08
Citigroup Inc.	0.80	0.64	0.08
Shanghai Electric Group Co., Ltd.	0.08	0.08	0.08

## Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
Broadcom Inc.	0.12	-0.83	-0.33
HCA Healthcare, Inc.	0.96	0.87	-0.26
Tesla, Inc.	0.54	-0.51	-0.17
Novartis AG	1.25	0.98	-0.15
Lockheed Martin Corporation	1.04	0.88	-0.15
Novo Nordisk A/S	0.95	0.49	-0.11
Micron Technology, Inc.	0.68	0.54	-0.11
Thermo Fisher Scientific Inc.	0.81	0.53	-0.10
MARA Holdings, Inc.	0.08	0.08	-0.10
AIA Group Limited	0.48	0.36	-0.10

## Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
Communication Services	-1.0	6.4	5.3	-0.1	0.1	0.0
Consumer Discretionary	-1.4	3.1	4.9	0.0	-0.2	-0.2
Consumer Staples	1.5	0.4	-7.2	-0.1	0.5	0.5
Energy	-0.2	-5.5	-4.7	0.0	0.0	-0.1
Financials	0.6	3.2	2.7	0.0	0.0	0.1
Health Care	0.8	-12.6	-11.3	-0.1	-0.2	-0.2
Industrials	1.7	-3.2	-4.8	0.0	0.1	0.2
Information Technology	2.4	1.6	4.3	0.1	-0.8	-0.6
Materials	-1.9	-22.6	-14.5	0.2	-0.1	0.1
Real Estate	-0.7	-2.5	-8.9	0.1	0.1	0.2
Utilities	-1.9	-6.7	-7.7	0.1	0.0	0.1
Total	0.0	-0.9	-0.9	0.2	-0.5	0.0

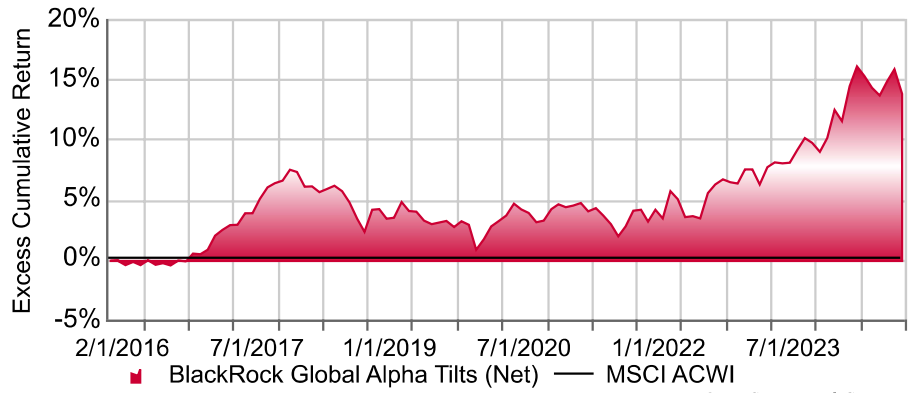
# BlackRock Global Inception Performance & Statistics

## Investment Growth Since Inception 3/1/2016



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

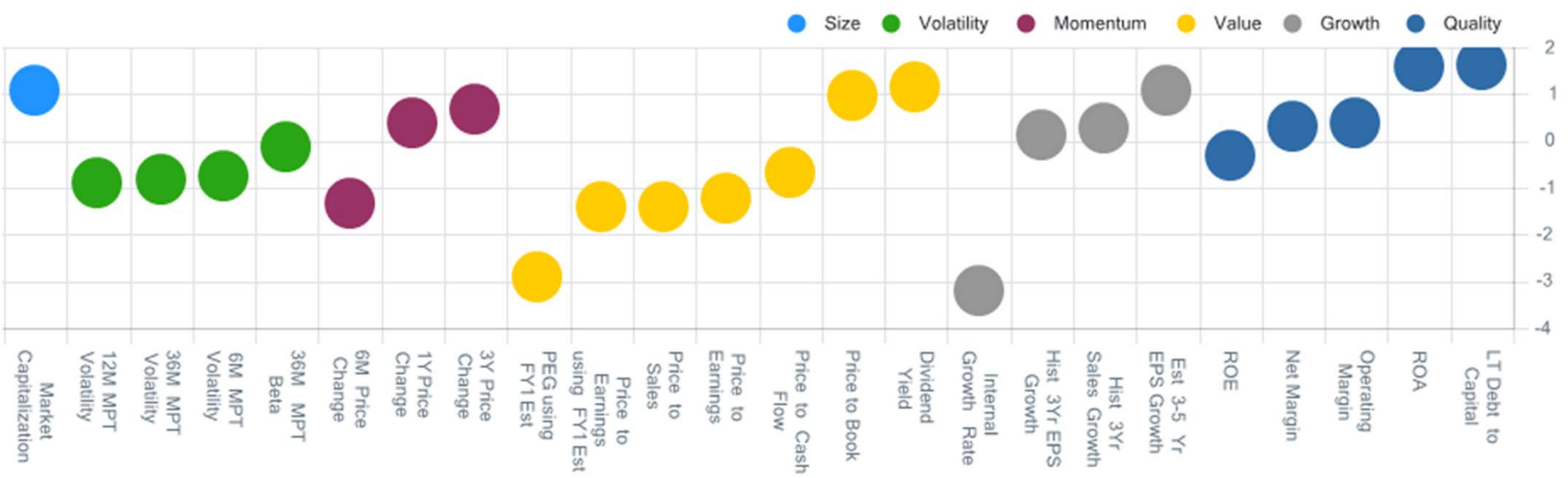


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## Risk Since Inception 3/1/2016

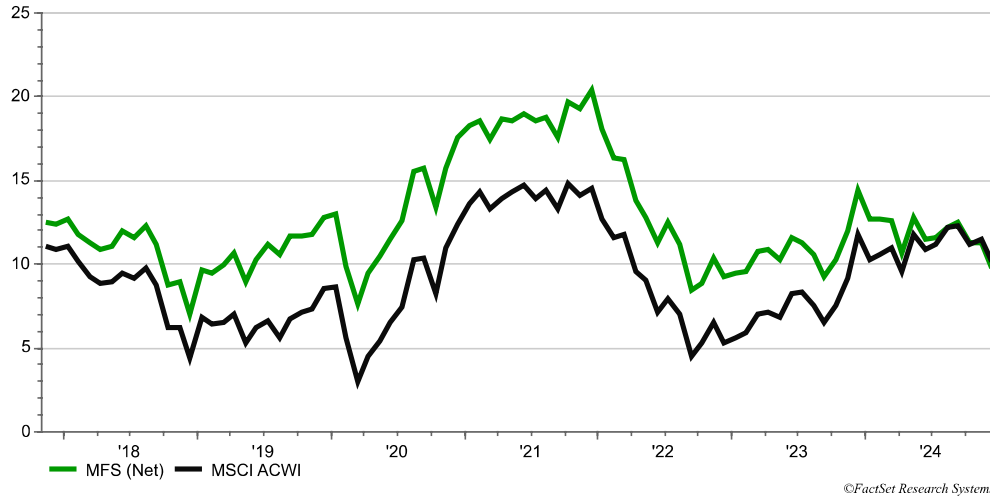
	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
BlackRock Global Alpha Tilts (Net)	12.3	15.1	0.5	0.7	0.4	1.6	1.0
MSCI ACWI	11.7	14.8	--	0.7	--	--	1.0

## Characteristics Tilt vs Benchmark 12/31/2024



# MFS Portfolio Snapshot – December 31, 2024

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



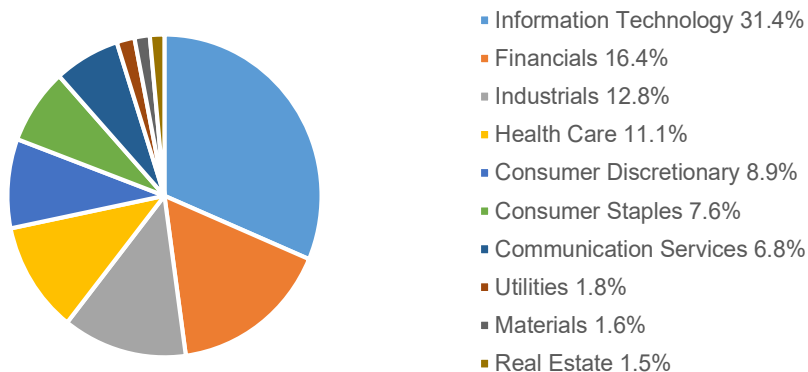
## Top 10 Holdings

	Portfolio Weight	Quarterly Return
Microsoft Corporation	6.32	-1.85
Visa Inc.	3.94	15.16
Taiwan Semiconductor Mfg Co Ltd	3.23	8.83
NVIDIA Corporation	3.07	10.59
Accenture plc	2.81	-0.05
Salesforce, Inc.	2.35	22.29
Apple Inc.	2.29	7.59
Tencent Holdings Limited	2.28	-6.21
Agilent Technologies, Inc.	2.15	-9.19
HDFC Bank Ltd.	2.12	0.17

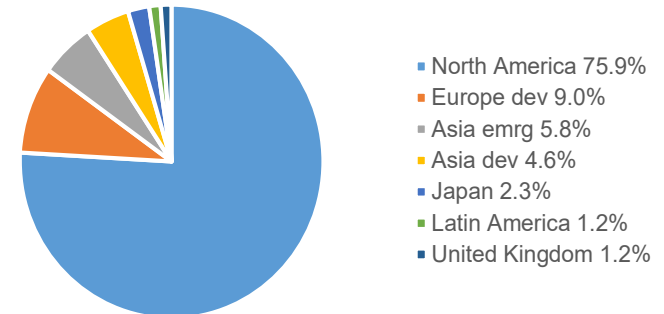
## Trailing Returns

	QTR	1 Year	3 Year	5 Year	10 Year	Inception 12/1/2012
MFS (Net)	-3.2	11.4	3.1	9.7	11.2	11.7
MSCI ACWI	-1.0	17.5	5.4	10.1	9.2	10.0
MSCI ACWI Growth	2.6	24.2	5.7	13.1	11.9	12.3

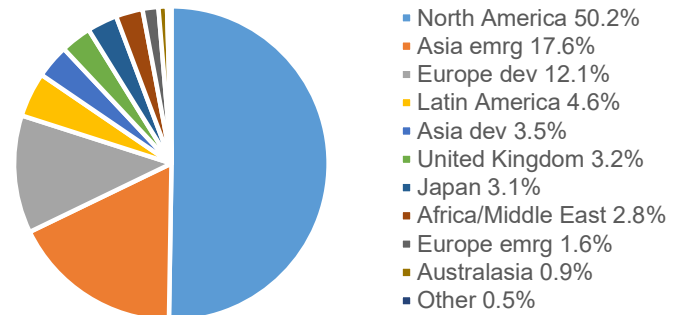
## Equity Sector Exposure (GICS)



## Regional Exposure by Domicile



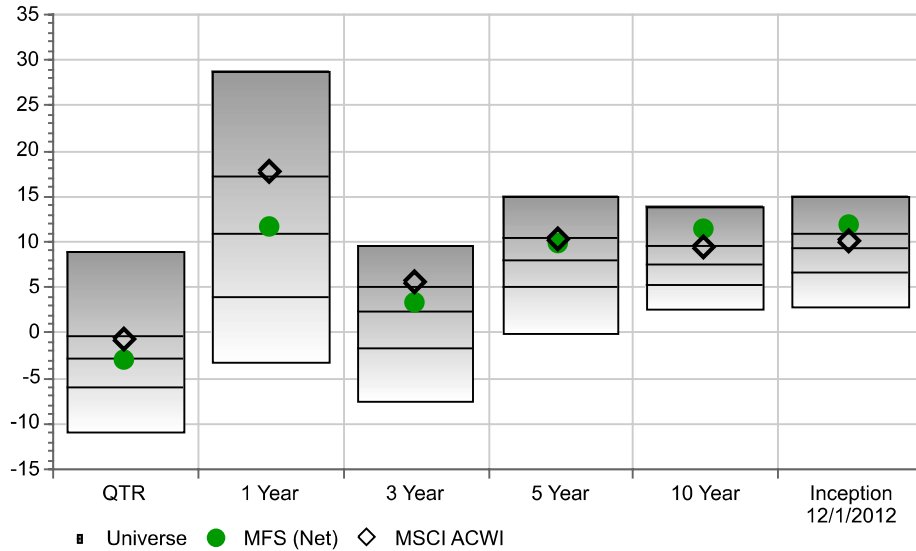
## Regional Exposure by Source of Revenue



# MFS vs Universe & Benchmark

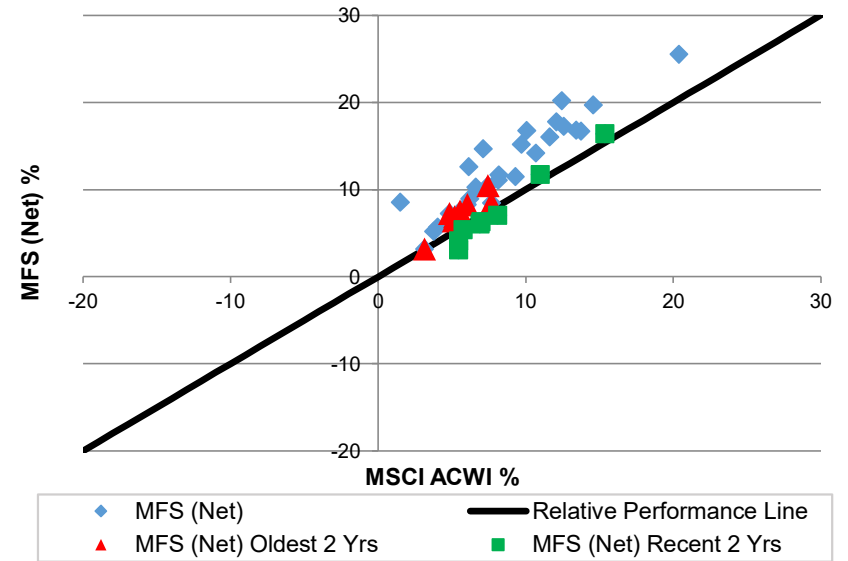
## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US:Global



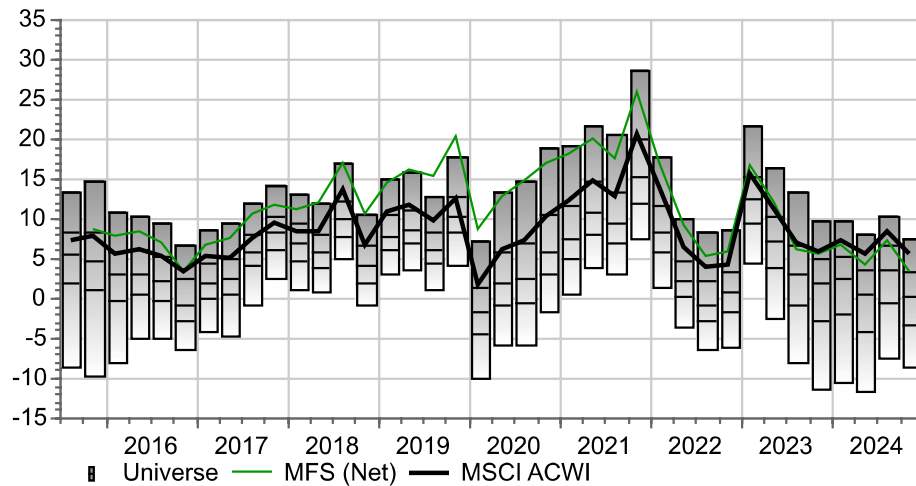
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## Three-Year Rolling Return Versus Benchmark



## Rolling Returns 12/1/2012 – 12/31/2024 (3 Year, 3 Month Shift)

Universe: Lipper US Global Equity



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### Over/Under Benchmark Analysis

<b>31</b>	Outperform
<b>6</b>	Underperform
<b>37</b>	# Observations
<b>84%</b>	% Outperform

# MFS Attribution Analysis – December 31, 2024

## Top 10 Leading Contributors

	Avg. Weights	Relative Weights	Active Return
-----			
Visa Inc.	3.59	2.98	0.42
Salesforce, Inc.	2.06	1.69	0.34
Fiserv, Inc.	1.93	1.79	0.23
Taiwan Semiconductor Mfg Co Ltd	3.46	2.48	0.17
Walt Disney Company	1.15	0.91	0.14
Brookfield Asset Management Limited	0.98	0.96	0.13
Charles Schwab Corporation	0.86	0.72	0.09
Amphenol Corporation	1.48	1.37	0.09
Aon plc	2.06	1.97	0.07
Boston Scientific Corporation	1.24	1.07	0.07

## Top 10 Leading Detractors

	Avg. Weights	Relative Weights	Active Return
-----			
Tesla, Inc.	0.00	-1.05	-0.52
Amazon.com, Inc.	0.00	-2.33	-0.39
Estee Lauder Companies Inc.	1.19	1.17	-0.35
American Tower Corporation	1.74	1.61	-0.34
Broadcom Inc.	0.00	-0.95	-0.33
Canadian Pacific Kansas City Limited	2.14	2.05	-0.33
ICON plc	0.97	0.97	-0.31
STERIS plc	1.79	1.76	-0.28
Capgemini SE	1.08	1.04	-0.27
Kweichou Moutai Co. Ltd. A	1.41	1.39	-0.24

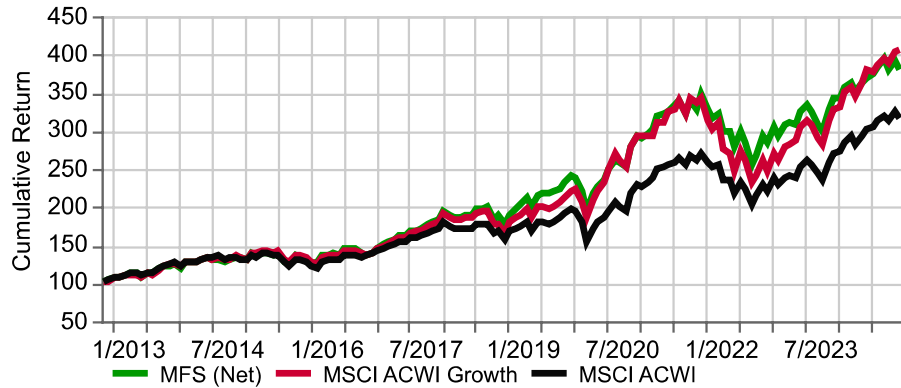
## Sector Attribution

	Average relative weighting (%)	Portfolio returns (%)	Benchmark returns (%)	Sector allocation (%)	Stock selection (%)	Relative contribution (%)
-----						
Communication Services	-0.1	2.0	5.3	0.0	-0.2	-0.2
Consumer Discretionary	-2.0	-8.4	4.9	-0.1	-1.2	-1.3
Consumer Staples	1.5	-11.4	-7.2	-0.1	-0.5	-0.5
Energy	-3.8	0.0	-4.7	0.1	0.0	0.1
Financials	-0.4	7.5	2.7	0.0	0.4	0.7
Health Care	0.8	-9.1	-11.3	-0.1	0.0	0.2
Industrials	2.4	-10.9	-4.8	-0.1	-0.9	-0.9
Information Technology	4.3	1.0	4.3	0.2	-0.7	-0.7
Materials	-2.1	-18.4	-14.5	0.2	-0.1	0.2
Real Estate	-0.4	-20.2	-8.9	0.0	-0.2	-0.2
Utilities	-1.6	-5.1	-7.7	0.1	0.0	0.1
Cash	1.4	1.1	0.0	0.0	0.0	0.0
-----						
Total	0.0	-3.4	-0.9	0.2	-3.4	-2.5



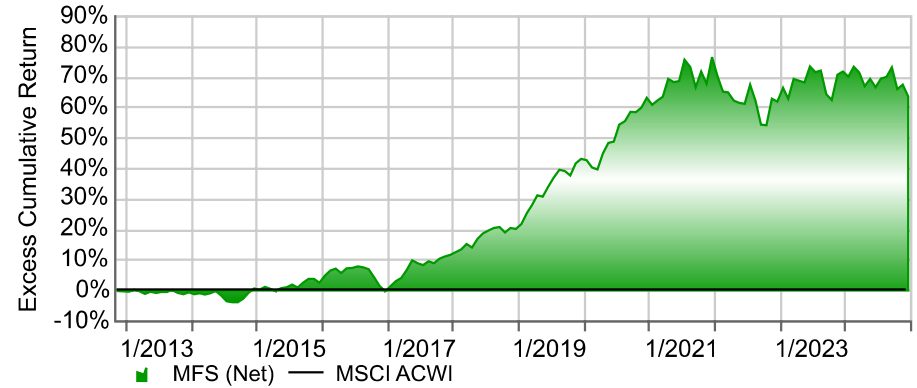
# MFS Inception Performance & Statistics

## Investment Growth Since Inception 12/1/2012



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## Relative Cumulative Performance Since Inception 12/1/2012

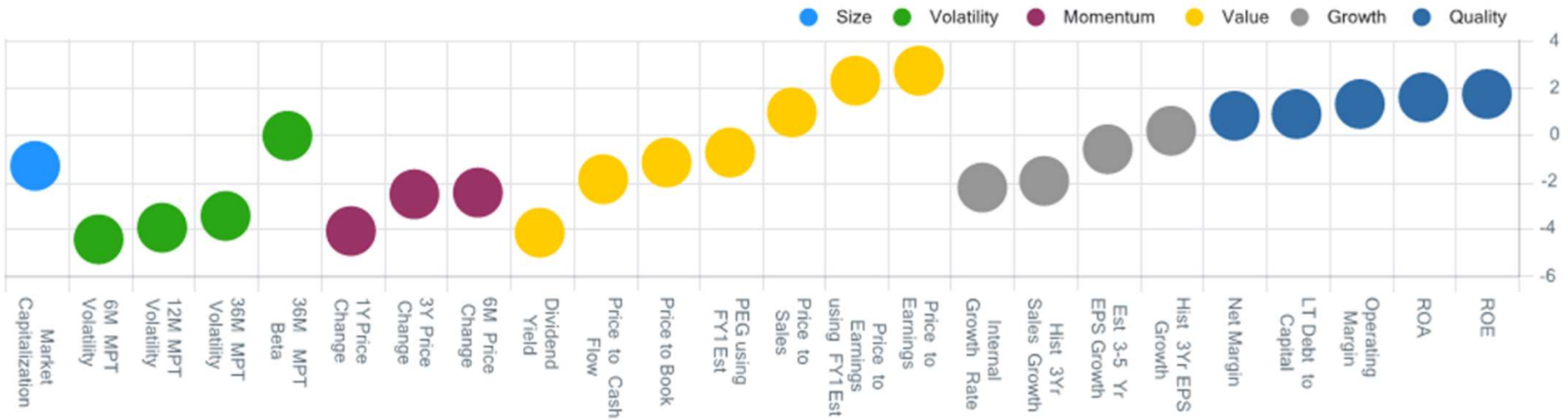


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## Risk Since Inception 12/1/2012

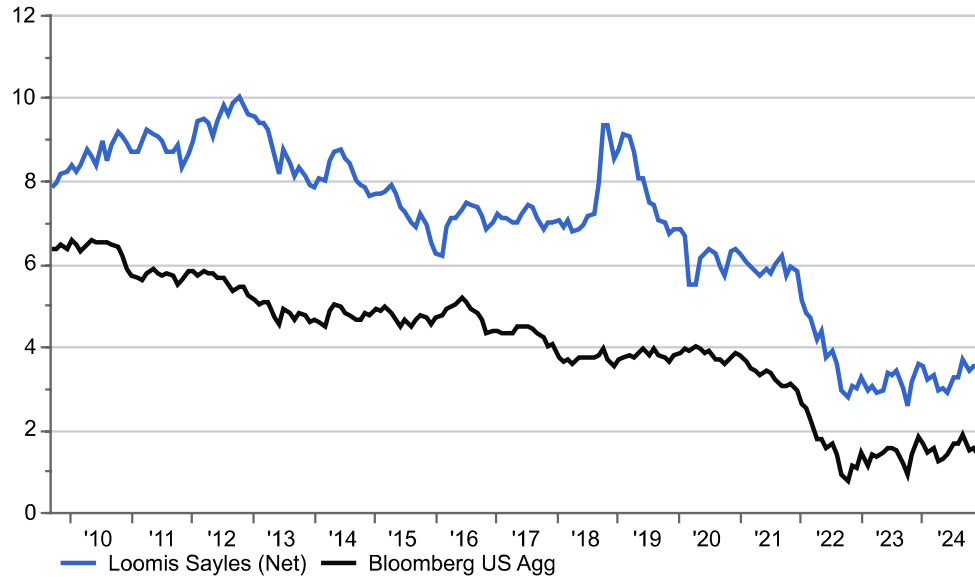
	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
MFS (Net)	11.7	14.1	1.7	0.7	0.5	3.2	1.0
MSCI ACWI	10.0	13.9	--	0.6	--	--	1.0
MSCI ACWI Growth	12.3	15.1	--	0.7	--	--	1.0

## Characteristics Tilt vs Benchmark 12/31/2024

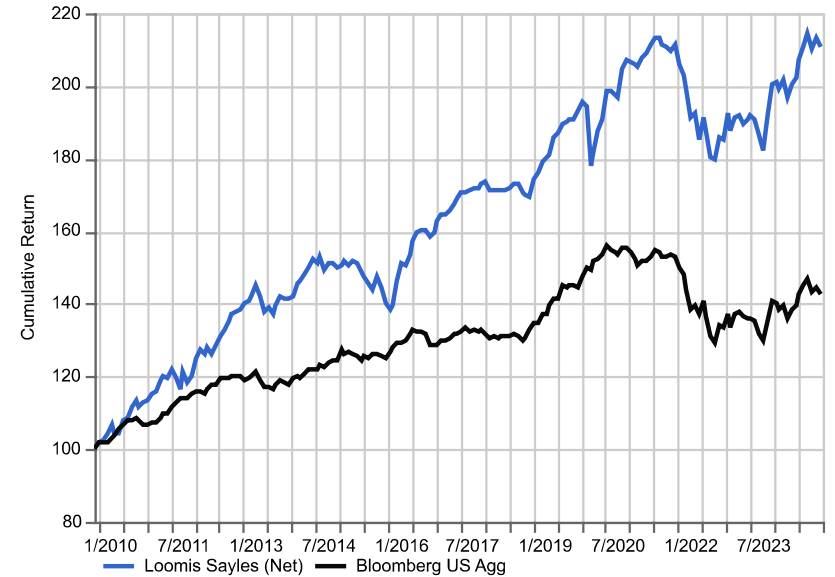


# Loomis Sayles Portfolio Snapshot – December 31, 2024

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



## Investment Growth – 15 Years



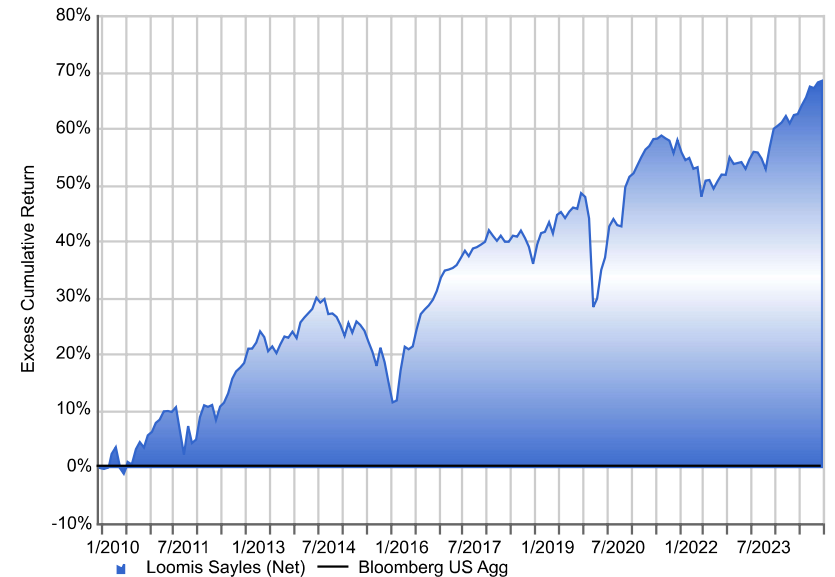
## Trailing Returns

	QTR	1 Year	3 Year	5 Year	10 Year	15 Year
Loomis Sayles (Net)	-1.6	5.1	-0.1	1.8	3.5	5.1
Bloomberg US Aggregate	-3.1	1.3	-2.4	-0.3	1.3	2.4

## Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Loomis Sayles (Net)	5.1	6.3	2.8	0.6	0.6	4.8	0.9
Bloomberg US Aggregate	2.4	4.4	--	0.3	--	--	1.0

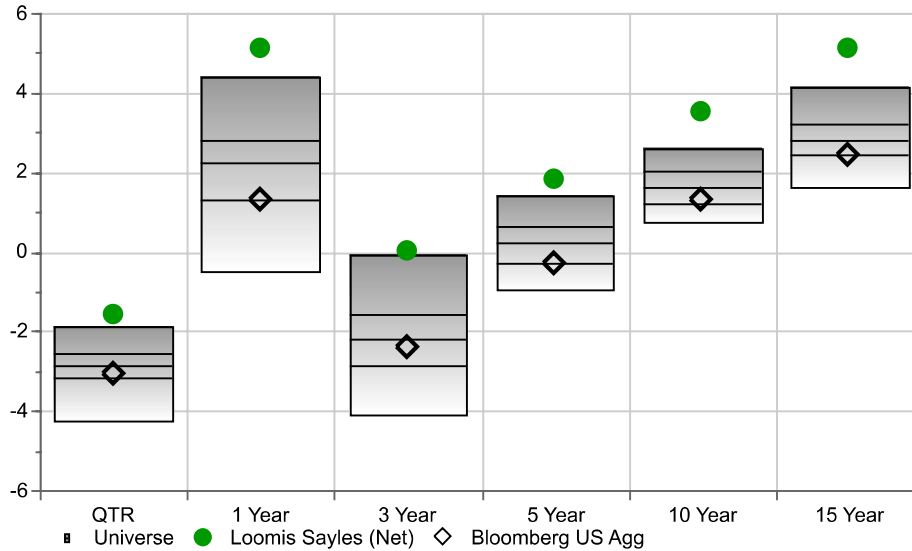
## Relative Cumulative Performance – 15 Years



# Loomis Sayles vs Universe & Benchmark

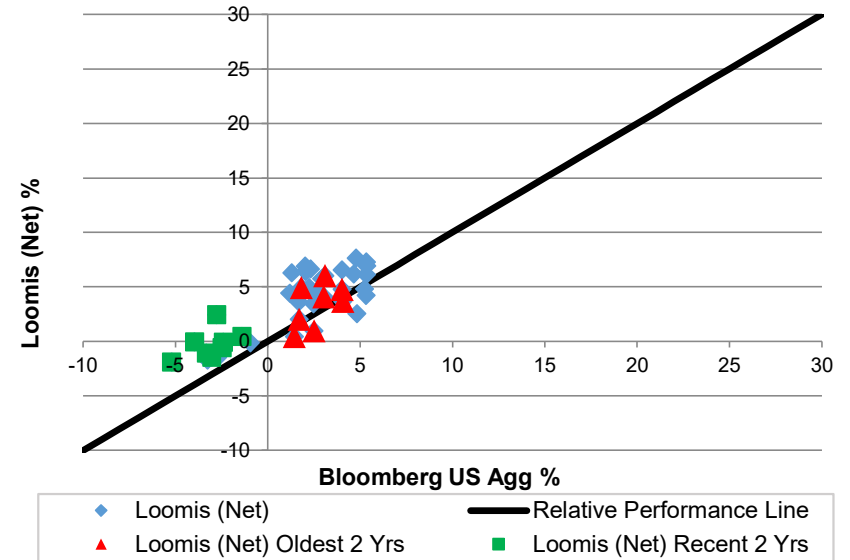
## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US Core Plus Bond



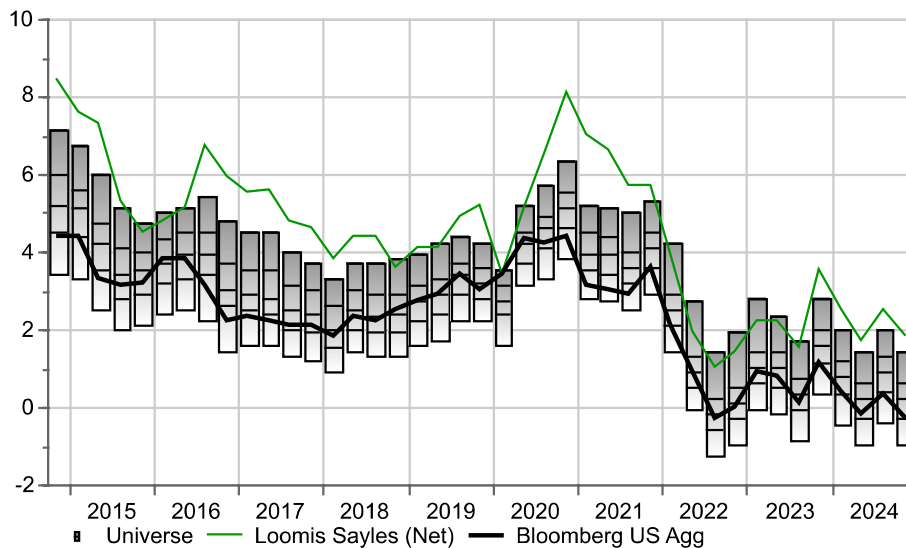
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## Three-Year Rolling Return Versus Benchmark



## Rolling Returns 7/1/2008 – 12/31/2024 (5 Year, 3 Month Shift)

Universe: Lipper US:Core Plus Bond



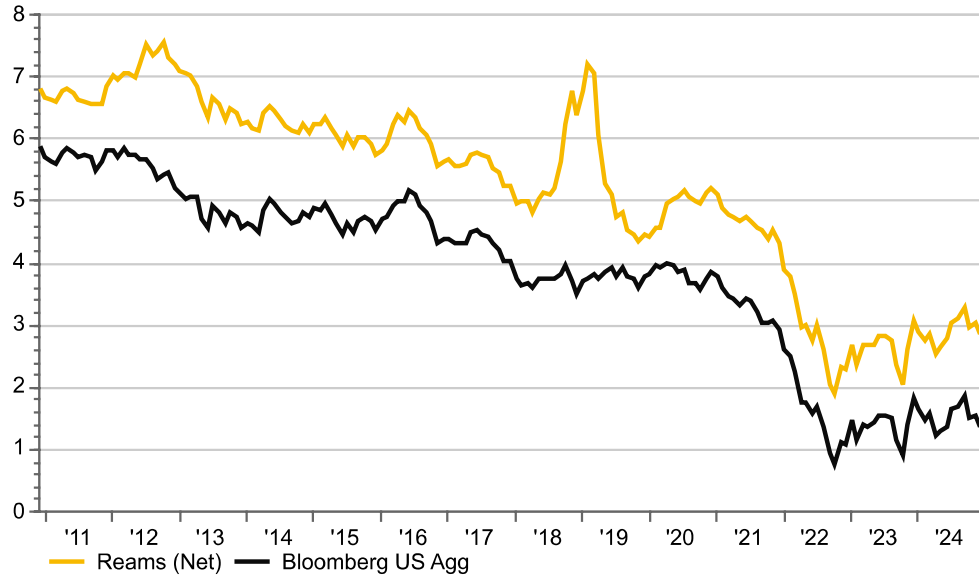
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## Over/Under Benchmark Analysis

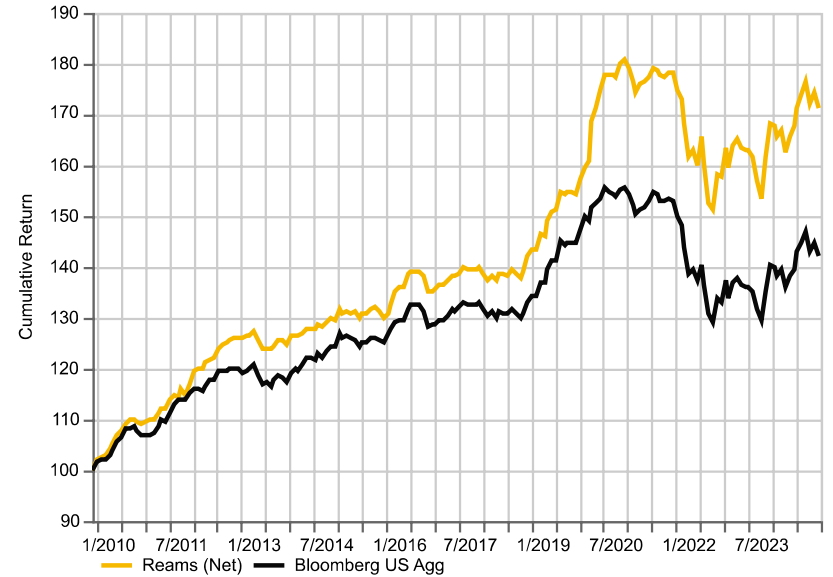
**34** Outperform  
**6** Underperform  
**40** # Observations  
**85%** % Outperform

# Reams Portfolio Snapshot – December 31, 2024

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



## Investment Growth – 15 Years



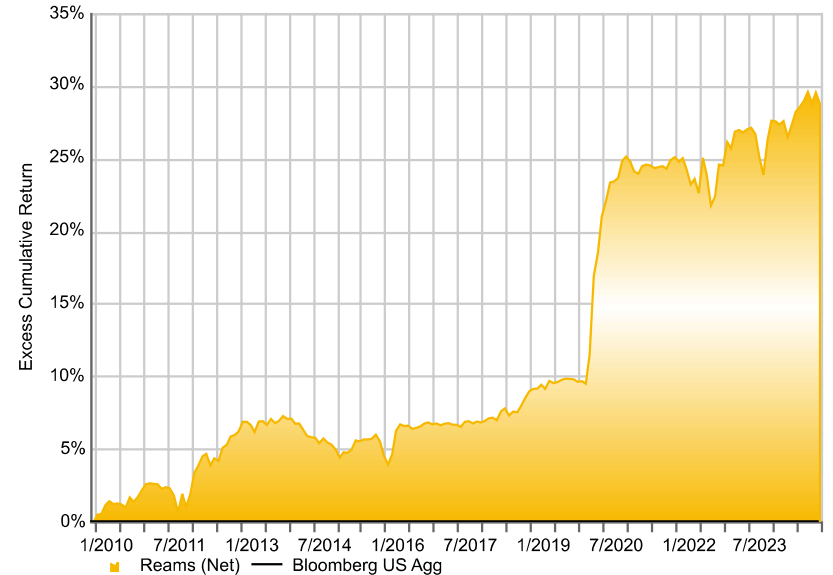
## Trailing Returns

	QTR	1 Year	3 Year	5 Year	10 Year	15 Year
Reams (Net)	-3.0	1.7	-1.4	2.1	2.8	3.6
Bloomberg US Aggregate	-3.1	1.3	-2.4	-0.3	1.3	2.4

## Risk – 15 Years

	Return	Std Dev	Alpha	Sharpe Ratio	Information Ratio	Tracking Error	Beta
Reams (Net)	3.6	4.9	1.2	0.5	0.8	1.5	1.1
Bloomberg US Aggregate	2.4	4.4	--	0.3	--	--	1.0

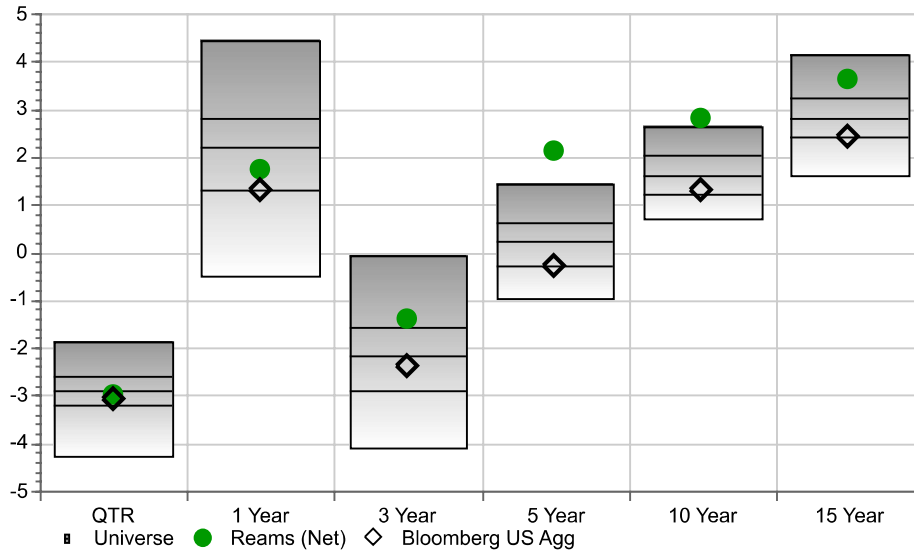
## Relative Cumulative Performance – 15 Years



# Reams vs Universe & Benchmark

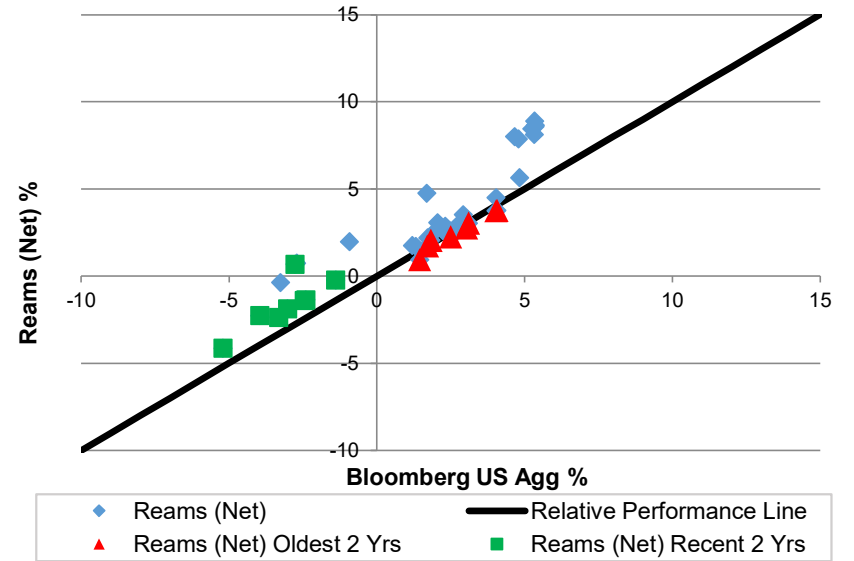
## Performance Relative to Peer Group as of 12/31/2024

Universe: Lipper US Core Plus Bond



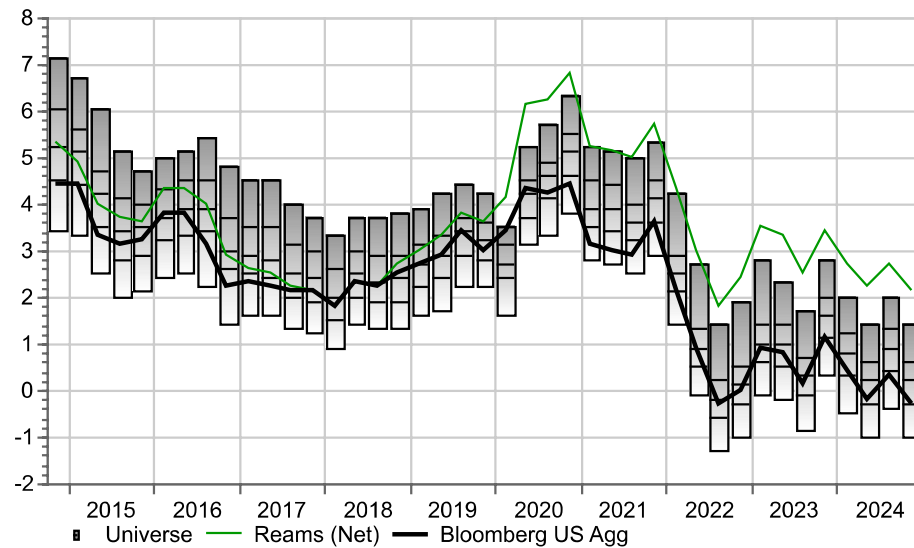
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## Three-Year Rolling Return Versus Benchmark



## Rolling Returns 7/1/2008 – 12/31/2024 (5 Year, 3 Month Shift)

Universe: Lipper US Core Plus Bond



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## Over/Under Benchmark Analysis

<b>33</b>	Outperform
<b>7</b>	Underperform
<b>40</b>	# Observations
<b>83%</b>	% Outperform

# Memorandum

**To:** CMERS Investment Committee  
**From:** Erich A. Sauer, CFA, CAIA  
**Date:** February 13, 2025  
**Re:** UBS Due Diligence Meeting: August 14, 2024 (New York) and October 8, 2024 (London)  
**Team:** Erich Sauer, Keith Dickerson, Joe McGuane (Callan) – NY; Erich Sauer and Tim Heling – London

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## **Background**

UBS Hedge Fund Solutions (HFS) has managed a customized hedge fund-of-funds portfolio for the City of Milwaukee ERS (CMERS) since December 31, 2014. CMERS classifies HFS as one of two absolute return managers that collectively have a target of 7.0% of Fund assets. The goal of absolute return is to generate long-term returns between bonds and stocks while keeping a low correlation to stock and bond markets. Additionally, CMERS has previously defined its absolute return allocation as having a chance to deliver positive returns regardless of the direction of the stock or bond markets.

As CMERS' absolute return allocation evolved over time, HFS' target grew from an initial allocation of 2.5% to a peak of 7.0% of Fund assets. After the retirement of long-time CIO Bruce Amlicke in early 2023, CMERS reduced HFS' target to 4.0%. Throughout 2023 and 2024, HFS successfully executed a redemption plan that brought the allocation in line with CMERS' target, while leaving capacity in difficult to access underlying managers largely intact. As of December 31, 2024, HFS managed \$277.3 million, or 4.7% of Fund assets.

## **Key Takeaways from Recent Meeting**

- The HFS group's investment philosophy and process remain little changed since Edoardo Rulli assumed the CIO role from Mr. Amlicke.
- UBS is undergoing another consolidation in which the HFS group will be combined into a new business line. While Staff will continue to monitor, HFS has successfully navigated similar reorganizations in the past, and the investment process should remain unchanged.
- The reorganization will remove a significant amount of business management responsibilities from Mr. Rulli's plate, allowing him to spend more time on investments. This resulted in the elimination of the director of research position, with strategy heads now reporting directly to Mr. Rulli.
- Overall, Staff remains confident in the ability of the HFS team to construct a quality hedge fund-of-funds portfolio for CMERS.

## **Firm Summary**

HFS, an SEC-registered Investment Adviser, is the hedge fund provider within UBS Asset Management, and was formed in 2004 through the combination of the O'Connor Multi-Manager program (established in 2000) and the Alternative Investment Strategies group (established in 1994 in Hong Kong). In 2013, O'Connor was split into a separate business line. As mentioned above, Mr. Amlicke retired in March of 2023, and was succeeded as CIO by Edoardo Rulli. Mr. Rulli worked at HFS early in his career, left to co-found a boutique fund of funds business, then rejoined HFS in 2016 as Head of European Investments, before being named Deputy CIO in 2022.

At several points since the start of our relationship, UBS has sought to consolidate or integrate the HFS business with other asset management units in the firm, first in 2016 by combining HFS with the Global Investment Solutions business into a platform called "Solutions" and then in 2021 by integrating Solutions under the firm's Asset Management arm. As these reorganizations took place,

Staff was able to gain comfort that the investment philosophy and process at HFS remained unchanged, and that the impact on the portfolio HFS has constructed for us would be minimal.

In 2024, UBS undertook another of these consolidations, combining teams from their Asset Management and Global Wealth Management divisions to create a unit called Unified Global Alternatives (UGA). HFS will become the Hedge Fund Solutions offering for UGA, with Mr. Rulli the sole head of hedge funds. Mr. Rulli being named head is important, as CMERS can once again expect the philosophy and process we hired to remain in place despite the changes to the corporate structure.

Subsequent to our visit, HFS announced in December of 2024 that they would be eliminating the Director of Research position, and that Adolfo Oliete would be departing the firm. The new corporate structure actually removes a significant amount of business management responsibilities from Mr. Rulli's plate, giving him more time to spend on investments. HFS' strategy heads will now report directly to him, making the Director of Research position redundant. It would appear that Mr. Rulli working more directly with the strategy heads is a positive development, but Staff will continue to monitor this situation closely.

HFS has invested significant resources in Investment Risk. HFS believes its investment risk monitoring is leading edge and provides the most granular detail available in the hedge fund industry. This level of detail is designed around investment risk's Enhanced Monitoring (EM) process, which utilizes a template that underlying managers populate for use by HFS. EM allows HFS to develop internal models that replicate the exposures of the underlying manager investments. This provides higher frequency and more detailed reporting to risk, compliance, and the investment team.

HFS has 52 custom client mandates, including U.S. and non-U.S. public and corporate pension plans; endowments and foundations; sovereign wealth funds; and high net worth individuals. To serve those clients, as of March 31, 2024, HFS had 114 employees, 72 of whom were investment professionals. Those 72 investment professionals managed \$47.8 billion of client assets as of June 1, 2024, an increase of \$4.8 billion from our last visit.

The majority of client assets that UBS manages are in customized mandates, and UBS has developed an efficient process to manage all the custom portfolios. Underlying hedge fund managers are discussed at their strategy meetings and each is given a ranking. Those rankings are taken into the Portfolio Management Meetings and the committee applies those rankings across each mandate. Mr. Rulli noted that most custom portfolios "rhyme" and weights within the portfolios are modestly adjusted depending on each mandate's guidelines. This process has not changed since Mr. Rulli assumed CIO responsibility.

HFS holds the view that sources of alpha change over time due to the highly competitive nature of the industry. Therefore, the firm plans to continually invest in the business to attract and retain top investment talent. Additionally, HFS believes it is important to continually allocate capital to existing and emerging managers to maintain access and preferential terms that benefit investors such as CMERS.

### **Fund Terms**

HFS's investment objective is to construct a broad based neutral fund of funds (FOF) that aims to achieve capital appreciation over the long term while maintaining zero to low correlation to traditional asset classes and low volatility over an economic cycle, which they define as three to five years. The FOF allocates to strategies within five categories – equity hedged, relative value,

credit/income, trading, and other (defined as niche opportunities that do not fit into one of the four major categories). Permissible allocation ranges for our customized fund are listed below:

Equity Hedged – 0-50%	Relative Value – 0-60%	Direct Trading – 0-5%
Trading – 0-40%	Credit/Income – 0-50%	Other – 0-10%

CMERS' board approved the direct trading allocation in 2022 in order to allow our custom fund to participate in UBS' diversified co-investment vehicle. This vehicle sources investment ideas from external managers, but may implement some of those ideas directly in order to save on costs.

In markets with positive returns and low to normal volatility, HFS expects equity hedged and credit/income to perform well, while relative value and trading strategies may offer less upside potential. Conversely, the opposite holds true during market dislocations.

Our fund is also allowed to invest in multi-strategy managers, which are single funds that execute several of the above strategies. Investments in multi-strategy managers will be broken out based on the strategies used into the categories above for guideline monitoring purposes. Over the past several years, multi-strategy managers have been some of the best performers in the hedge fund industry, and the capacity HFS has secured for us with top-tier, difficult to access managers has been a significant contributor to our performance.

ERS approved a guideline change in 2016 that allows a maximum of 39, up from 30, underlying funds, excluding co-investments. This allows HFS the flexibility to construct a more diversified portfolio in times when they believe it is prudent, based on global economic uncertainty and market cycles at given points in time. As of September 30, 2024, the portfolio held 19 underlying funds, excluding co-investments.

At least 70% of the value of CMERS' customized fund must be allocated to underlying managers that allow for redemption of funds within one year. Up to 30% of the fund may be allocated to managers with lock-ups greater than a year, including 10% of the fund that can be allocated to managers with lock-ups of greater than two years. As of September 30, 2024, UBS estimated that approximately 75% of the portfolio could be redeemed within one year, with only approximately 9.5% of the portfolio needing greater than two years to redeem.

Although underlying hedge fund managers employ leverage in the implementation of their investment strategies, HFS does not employ leverage in the management of the customized fund. Because hedge funds only allow for redemptions or contributions on certain days, instances will arise when HFS will need to provide funds for a new investment before receiving funds redeemed from an existing manager. In these cases, CMERS has the ability to provide temporary funds from our internal cash balances. This avoids the need for the customized fund to borrow from an external party and saves on interest costs. HFS has not yet had to utilize this option when moving between funds.

### **Investment Philosophy and Process**

HFS's investment philosophy is based upon the belief that markets offer temporary inefficiencies that can be monetized through the utilization of best-of-breed hedge fund talent. Conditions that could cause inefficiencies to be present include forced selling of assets, regulatory driven inefficiencies, complex and misunderstood stories, and differing discount rates among investors. HFS aims to add value to the investment process through tactical strategy tilts, providing seed capital for emerging managers, making well-timed redemptions from hedge funds, and partnering with hedge funds to identify tactical investment opportunities and co-investments.



HFS's allocation process is a combination of bottom-up and top-down analysis. The bottom-up analysis includes HFS' outlook on an underlying fund's investment and business expertise. The Solutions team will dive into the track record of management, along with their portfolio construction and research processes. In addition, the team also evaluates each fund's ability to manage its business operations and implement their best investment ideas. At the same time, this analysis is shaped by the relative attractiveness of investment opportunities available to each hedge fund, as well as HFS's top-down market, economic, and strategy views. Additionally, the investment team allocates a portion of the portfolio to what the investment team refers to as innovation, such as co-investments that seek to create structures to take advantage of unique opportunities. HFS describes the resultant portfolio as the intersection of their bottom-up and top-down analyses.

Portfolio management is led by the CIO and coordinated by the Director of Portfolio Management, Jeff Colodny. Input is provided by the strategy teams, portfolio specialists, and members of investment risk. Each portfolio is also supported by the strategy team members, and is assigned a dedicated Senior Portfolio Manager, Portfolio Specialist, and member of Investment Risk. HFS' compliance, market risk, and client advocacy groups also help to support the PM teams.

HFS has a proprietary database, OCTANE, which serves as HFS' central repository for all hedge fund data. OCTANE has been in place since 2001 and since that time has collected data on over 50,000 hedge funds. HFS also receives hedge fund data from numerous third-party providers. OCTANE is also a powerful tool that helps in portfolio construction, cash management, liquidity analysis, and risk monitoring.

HFS uses a team structure as the basis of their investment process, which takes place over repeating four-week cycles. Each strategy team meets with the CIO to discuss current and prospective investment managers as well as the market environment facing each strategy. The strategy teams have two core responsibilities: bottom-up manager selection and top-down strategy research. One output from the strategy team meetings is an action rating for each manager that classifies managers as high priority add, add, hold, trim, or redeem. Strategy teams also attend four distinct "cluster" meetings for the equity, credit/income, relative value, and trading strategies.

The CIO and the Director of Portfolio Management, along with other senior members of the investment team, also hold a series of **Portfolio Management Meetings (PMM)** during the month. The objectives of PMMs include trade proposals and management of exposures, liquidity, and cash flows within individual portfolios. The meetings also provide a forum to review portfolio level analysis, debate changes to portfolios, and make top-down or bottom-up recommendations for month-end trade decisions.

Top-down processes include an **Asset Allocation Meeting** that all strategy teams and the CIO attend in order to discuss the attractiveness and expected returns of different strategies as well as to identify potential tactical tilts to portfolios. These meetings produce up to date model portfolios that encompass all strategies and sub strategies along with associated allocations.

The **Manager Approval Forum (MAF)** is conducted by senior members of the investment team. This meeting provides a forum to discuss new fund recommendations in the pipeline. The Risk team provides tools to run a number of tests on a proposed fund where the fund and peer group performance are analyzed along with internal risk management and controls. The OpDD and Structuring groups are also involved and introduce preliminary findings on each proposed fund. Full redemptions from funds may also be discussed at this meeting. These proposed hedge fund investments must receive a "sufficient" rating from OpDD as well as completed reviews from Investment Risk and Client Advocacy prior to moving to the final stage of the process.

The **Review Committee (RC)** serves as a final control for investment functions. The RC reviews month-end trade process, new manager or fund approvals, pending open issues or risks, and various business topics. This committee also approves the monthly trade blotter and material corporate actions. The CIO and Deputy Head of HFS are able to veto fund approvals and portfolio decisions.

Special situation investments, such as co-investments, require a separate and distinct approval process. Each manager considered for special situation partnership with HFS must be approved as a manager and as a special situation partner by the MAF. In addition to approving the underlying manager, each specific investment must also be approved by the CIO, Head of Special Situations, Director of Research, and Director of Portfolio Management. Additional input is provided by relevant senior investment professionals, Head of Investment Risk, OpDD, and Client Advocacy.

HFS' investment process has historically resulted in relatively high turnover in our portfolio. This is typical of the strategy due to the fact that the team is always looking for the best ideas in the space. This does not mean that the entire portfolio regularly turns over, however. It is best to think of our portfolio as being made up of a core allocation to best-of-breed managers that are long-term holdings, with satellite managers changing often as the HFS team sees opportunity. With CMERS reducing the target to UBS, the portfolio became more focused on the core managers, reducing the manager count from just over 30 to the current 19. Our portfolio still has the ability to be tactical, however, with the HFS team adding eight funds, and redeeming from five, in 2024.

HFS conducts extensive due diligence on all funds before making an investment. The first step is an initial screening which includes a comprehensive review of legal documentation of a fund, as well as background checks on all key personnel. OpDD then conducts an on-site review of key business controls. Next, due diligence is conducted on key service providers as well as any outsourced manager functions. Finally, the team's findings and recommendations are published in an internal report to the committees. OpDD classifies each fund as low, medium, or high risk. Low risk managers are visited every 36 months, medium risk managers are visited every 24 months, while high risk managers are visited every 12 months. Co-Head of OpDD Stephanie Sirois departed the firm in October. Kunle Amusan, the other Co-Head, remains in place, illustrating the importance of the Co-Head structure.

### **Compliance and Internal Controls**

Peter Gyr, Chief Compliance Officer of UBS Asset Management (Americas), is responsible for compliance at HFS. He reports to the Global Compliance group at UBS.

There is a firm wide compliance policy that HFS employees must follow that includes: Pre-clearance of personal trades; disclosure of personal holdings and monitoring of broker statements; and holding securities for a required minimum holding period. The code stresses that employees are to conduct all personal transactions in such a way that places client interests first, avoid any actual or potential conflict of interest with clients, and act in compliance with all laws and regulations at all times.

HFS is evaluated by the United States Securities and Exchange Commission (SEC), and the National Futures Association (NFA). The NFA conducted a routine examination of HFS in October of 2017, which found no material deficiencies. The SEC conducted a routine examination of HFS in 2019, which was closed in 2020 with no findings.

HFS has an Operations and Product Control team that is responsible for all the support functions involved in running a FOF. This includes preparing cash analyses and forecasts; monitoring compliance with client guidelines; reviewing NAV calculations provided by the administrator;

producing monthly client reports; and applying HFS’s trade allocation policy, with the review of the CCO. HFS’s trade allocation policy is designed to treat all clients in a fair and equitable manner. CMERS has certainly benefitted from this over the years, as HFS has built a portfolio for us that has a significant allocation to managers that are either closed or difficult to access.

Upon the recommendation of HFS, CMERS originally selected UBS Fund Services as the administrator of the customized fund, and Ernst & Young (E&Y) as the auditor. UBS subsequently sold the administration business to Mitsubishi UFJ Financial Group in December 2015, and they have been our administrator ever since. HFS provides unaudited monthly reports to CMERS, while audited year-end reports will typically be provided five to six months after the end of the year.

**Information Systems and Disaster Recovery**

HFS’ technology team is part of the Asset Management Americas technology team led by Nelli Novak (Product Lead) and Sibiu Thomas (Technical Lead). HFS has dedicated crew leads who are responsible for the maintenance and strategic development of the platforms and applications used by the HFS business. The technology team closely partners with the business team to implement any necessary technology changes.

HFS maintains a disaster recovery (DR) plan which includes departmental recovery, crisis management, and system recovery plans. Departmental recovery addresses key business functions and includes both remote access for staff and DR sites, as well as critical systems recovery requirements. The crisis management plan addresses the escalation, notification, contacts, responsibilities and guidelines to appropriately respond to a business disruption. The system recovery plan addresses the recovery strategy and steps to switch to backup infrastructure for each critical application. The DR plan is tested annually.

**Performance Summary and Conclusion**

As mentioned above, UBS went through a significant personnel change with Mr. Rulli taking over for Mr. Amlicke. In response, CMERS right-sized the allocation to UBS, and the HFS team focused the portfolio on the core of difficult to access, best of breed managers. This portfolio appears to still be very strong, and the investment process and philosophy under Mr. Rulli appear to be little changed. Net of fee performance for our fund, through December 31, 2024, is below.

	1-year	3-year	5-year	Inception (1/1/15)
CMERS Low Beta (net)	10.6%	8.8%	9.3%	6.9%
<i>1 Year Libor/SOFR + 4%</i>	<i>9.3%</i>	<i>7.7%</i>	<i>6.8%</i>	<i>6.4%</i>
<i>ACWI IMI</i>	<i>16.4%</i>	<i>4.9%</i>	<i>9.7%</i>	<i>9.0%</i>
<i>Bloomberg U.S. Agg Index</i>	<i>1.3%</i>	<i>0.5%</i>	<i>-0.2%</i>	<i>1.3%</i>

The strategy has outperformed its absolute return target over all time periods shown, while also significantly outperforming the Fund’s fixed income index. Performance also stacks up well against the Fund’s public equity index, when considering the much lower volatility of the FoF portfolio. Importantly, the UBS portfolio was able to generate positive returns in the 2022 period that saw both stock and bond indices suffer significant drawdowns, which was CMERS’ expressed goal in constructing its absolute return allocation. Overall, Staff remains confident in the ability of UBS to fill the role of hedge fund of funds manager.

# Memorandum

**To:** CMERS Investment Committee  
**From:** Aaron Shew, CFA  
**Date:** February 13, 2025  
**Re:** Mesirow Due Diligence Meeting: December 19, 2024  
**Team:** Aaron Shew, Erich Sauer, Keith Dickerson, and Thomas Courtright

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## **Background**

Mesirow Financial (Mesirow) is one of four managers hired by the Employees' Retirement System (ERS) to invest its Private Equity allocation via fund-of-funds. The ERS has committed a total of \$475 million to five Mesirow Partnership Fund (MPF) vehicles; \$75 million to MPF V in 2010, \$60 million to MPF VI in 2012, \$100 million to MPF VII-A (\$40 million in 2016 with a \$60 million follow-on in 2017), \$120 million to MPF VIII-A, and \$120 million to MPF IX (\$100 million in 2023 with a \$20 million follow-on in 2024). As of September 30, 2024, CMERS' invested capital in the above funds totaled \$282.4 million.

## **Key Takeaways from Recent Meeting**

- Succession planning is an issue that has been noted in past reports, Marc Sacks (former CEO) and Tom Galuhn (former President) have transitioned to Chairman and Senior Advisor, respectively. Both remain active members of the investment committee, providing insight and counsel to the investment process. In addition, Bob DeBolt transitioned from CIO to CEO, while remaining the investment team lead. We are comfortable with the careful planning that Mesirow has taken to ensure continuity within their senior leadership team.
- Mesirow has a separate account business that exists to provide certain clients commitment pacing flexibility which executes a very similar strategy to the fund-of-funds. We are comfortable that this business is not a distraction to the investment team and will monitor to ensure that remains the case.
- Mesirow launched a dedicated secondary fund to take advantage of opportunities in the GP-led secondary space. Secondary opportunities will follow a defined process that allocates fairly across funds and investors.
- Overall, staff is comfortable with Mesirow and believes they remain a strong choice as a Private Equity fund-of-funds manager.

## **Firm Summary**

Mesirow, a registered investment advisor with the Securities and Exchange Commission, is a wholly owned subsidiary of Mesirow Financial Services, Inc. The parent organization, which was founded in 1937, is headquartered in Chicago, IL. The parent company provides traditional and alternative investment strategies with over \$250 billion in assets under management.

Mesirow functions as an independent business unit of Mesirow Financial. However, they have access to the resources that a larger parent organization can provide. The parent company's primary office is in Chicago where they handle investment management, accounting, marketing, and administration. Mesirow began private equity investment activities in 1982 and launched their first fund-of-funds in 1999. The firm manages approximately \$6.7 billion in committed assets as of June 30, 2024.

Mesirow's private equity business has 293 clients, including U.S. and non-U.S. public and corporate pension plans, endowments and foundations, and other institutional investors. To

serve those clients, Mesirow has a team of 23, 10 of whom are investment professionals. The parent company provides additional direct support from over 100 dedicated employees in the areas of institutional sales and marketing, compliance, legal, human resources, and accounting.

Our 2020 memo noted that Dan Howell had transitioned his role from Senior Managing Director to Senior Advisor in anticipation of his retirement in 2022. As part of this transition, Ryan Fedronich and Kristina Pierce were promoted to Managing Director and added to the investment committee alongside Marc Sacks, Tom Galuhn, and Bob DeBolt. Sadly, Mr. Howell passed away in 2021. With the exception of his passing, Mesirow has not seen any other senior investment professional turnover since 2004.

Since our 2022 memo Mesirow Private Equity has started to execute its succession plans, expecting the eventual retirements of Mr. Sacks and Mr. Galuhn. Changes to the senior leadership team are as follows, Mr. Sacks is now the Chairman (formerly the CEO), Mr. Galuhn is now a Senior Advisor (formerly the President), Mr. DeBolt is now the CEO (formerly the CIO), and both Mr. Fedronich and Ms. Pierce have been elevated to Senior Managing Directors (formerly Managing Directors). There have been no changes to Mesirow Private Equity's investment committee.

The investment committee is made up of the senior leadership team listed above. Together, the investment committee is responsible for the implementation of Mesirow's investment philosophy through their investment process. Mr. DeBolt, along with Mr. Fedronich, Ms. Pierce, and Patrick Ryan (Vice President) are responsible for leading the portfolio construction process under the oversight of the investment committee. They are also responsible for leading the mid-level and junior investment team members in the due diligence and monitoring of investments.

Mesirow went through a period where they launched a new commingled partnership fund every two years but that pace has slowed to every three to four years for the funds in which the ERS is invested. They expect the three-to-four-year timeframe between funds to continue going forward since the client base seems to prefer this. This extended time between fund launches is why CMERS makes larger commitments to Mesirow in comparison to Abbott who has historically launched a fund each calendar year.

Mesirow typically does not start raising capital for a new fund until the prior fund has been 65% committed. Funds III through VI are all currently performing above the median in the Cambridge "All Private Equity" benchmark. Fund II made its liquidating distribution on December 18, 2020 and performed in the upper 2<sup>nd</sup> quartile compared to the benchmark. Mesirow's track record is a strong indicator of their sourcing, due diligence, and investment capabilities.

Fund sizes are as follows, Fund V raised \$879 million, Fund VI raised \$694 million, Fund VII-A raised \$712 million, Fund VIII-A raised \$986 million, and Fund IX has a target size of \$900 million. The decrease from Fund V to Fund VI was due to the decision of one large client to engage in a separate account relationship with Mesirow that has involved annual commitments over the 2013-17 period. Funds VI and VII are roughly similar in size to Fund V when the separate account relationships are included.

### **Investment Philosophy and Process**

Mesirow's primary investment objective is to create a well-diversified private equity fund-of-funds. Investment sub-asset classes include U.S./non-U.S. buyouts, venture capital, and special situation funds. Historically, secondary interests were purchased opportunistically. Mesirow made some secondary investments in Fund V during an attractive pricing environment in the

aftermath of the global financial crisis which helped to mitigate the J-curve effect and enhance returns. Funds VI and VII-A did not include secondaries to the same extent since Mesirow found the pricing much less attractive. Funds VIII-A and IX also include an allocation of up to 15% for co-investments which Mesirow believes will improve fund returns.

The maturation of the GP-led secondary market has allowed Mesirow to find many more secondary investments that they believe are attractive. This means that Funds VIII-A and IX are likely to be much closer to their 15% target to secondaries. In addition, Mesirow believes that the opportunity in the GP-led secondary space is so great that they have begun raising capital for their inaugural dedicated secondary fund to capitalize on the secondaries market. The target size for this fund is \$250 million. ERS staff will continue to monitor how this dedicated secondary fund evolves alongside the fund-of-funds product.

Targeted sub-asset class allocations for Fund IX, shown below, are consistent with prior funds.

US Buyout	45% - 55%	Special Situations	5% - 10%
Non-US Buyout	15% - 20%	Venture Capital	20% - 25%

\*Secondaries may be purchased on an opportunistic basis and are expected to utilize ~15% of committed capital.

Mesirow's investment team conducts bottom-up research on partnership offerings in order to find managers with stable organizations, effective investment strategies, long-term track records, and proper alignment of interests between the general partner and limited partners. The team monitors statistics on the private equity industry which includes exit data, private equity fundraising trends, and secondary transaction pricing to remain current on the private equity environment. In addition, the research team utilizes external research reports on private equity markets, credit markets, and economic research.

Funds are sourced directly through manager offerings, regular dialogues with placement agents, and independent identification. Mesirow identifies potential investment managers by reviewing private equity journals and paid databases. Moreover, Mesirow maintains a database of general partners based in the U.S. and Europe in order to assess the general partner against their competition. Mesirow appears to have a mature network of relationships for fund identification and a well-established fund tracking system.

Mesirow reviews 400+ fund offerings annually, and of those, 125-150 funds that are identified as the most promising receive an initial review of the Fund's private placement memorandum and due diligence materials. Once the potential funds are narrowed to 75-100, Mesirow conducts their initial due diligence and meets with the fund's management team. At this point, Mesirow will consider whether to reinvest with a manager from a prior fund. Mesirow further narrows the potential opportunities to 30-40 funds and conducts a more thorough and intensive due diligence. Mesirow performs on-site due diligence, initiates both quantitative and qualitative portfolio analysis on these managers, and conducts reference calls. At the completion of this phase, Mesirow identifies what they believe to be the top 8-12 best-in-class funds and begins to negotiate contract terms and prepare an investment memorandum for review by their Investment Committee. The top 8-12 funds tend to include 1-2 new managers each year.

The key to their investment process occurs during the due diligence phase. Mesirow visits the general partners' office to conduct an intensive review. While at the general partners' office, a team of Mesirow professionals meets with every available partner and investment professional to assess the firm's current senior leadership and the emerging generation of partners. They investigate the general partner's succession planning, mentoring, thoroughness of due

diligence, organizational stability, performance, and alignment with LPs. Mesirow is attempting to uncover potential red flag issues, for which they have a very low tolerance, such as excessive investment team turnover, lack of focus and strategy drift, or low-quality reporting standards during this intensive review. Members of Mesirow's investment team also sit on numerous advisory boards of the underlying funds, giving them a unique insight into fund management.

The 2020 COVID-19 pandemic caused a shift to virtual meetings. Mesirow believes that the virtual option does create some efficiencies, particularly for meeting with people in satellite offices, but now that in-person work and travel have started to return to normal, the team attempts to meet in-person with potential managers whenever possible.

Staff meetings are typically held weekly to concentrate on potential partnership investment opportunities. At the time of our visit, Mesirow was on a hybrid schedule, with all team members required to be in the office Tuesday, Wednesday, and Thursday of each week. There is a deal team of up to three professionals that provides weekly updates on due diligence progress. The team leverages the expertise of the other professionals at the firm for supplementary insight.

The investment process culminates in a list of recommended managers, each accompanied with an investment memorandum that is provided to the private equity Investment Committee for their consideration. Investment in a specific fund requires the unanimous approval of all five members of the Committee.

### **Compliance and Internal Controls**

In 2021, Mesirow's long-serving Chief Compliance Officer, Jeff Levine, was promoted to Chief Operating Officer of the firm's Institutional Sales and Trading business. Mary Jo Hayes, who joined Mesirow's compliance department in 2011, was promoted to replace him. Ms. Hayes has over 25 years of industry experience in compliance and operations.

Ms. Hayes is assisted by a team within the parent organization and is responsible for monitoring compliance of the private equity operations. The compliance team routinely communicates with Mesirow staff and reviews procedures designed to ensure that private equity operations comply with applicable regulatory requirements.

There is a firm wide compliance policy that private equity employees must follow that includes pre-clearance of personal trades, monitoring of broker statements, completing an annual compliance questionnaire, attendance of ethics training, and maintenance of required securities licenses. The firm must also review the adequacy and effectiveness of its compliance policies and procedures annually. In addition, all employees must abide by the firm's Code of Ethics, which conforms to SEC Rule 204A-1.

Mesirow is evaluated by the Securities and Exchange Commission (SEC). The SEC last conducted an evaluation of Mesirow in April 2014 and found no material deficiencies. In addition, at the time of the visit there were no current investor complaints or lawsuits filed and no known SEC allegations against any of the underlying managers.

Internally, Mesirow's operations team monitors cash flows to and from limited partners, portfolio funds, fee payment, fund extensions, and wind downs. Two operations team members are required to process bank wire transactions. Each partnership investment is also audited annually.

During our meeting with Mesirow they demonstrated the capabilities of their new portfolio monitoring software, LP Analyst, that they implemented over the last couple years. LP Analyst is a major improvement for Mesirow since it is designed for limited partners. The prior portfolio monitoring software, iLevel, was geared toward general partners. One of the significant efficiencies provided to the Mesirow team is that LP Analyst has an automated process for collecting and recording data for their investments, freeing up valuable time for team members and mitigating the risk of data entry errors that can occur during a manual process. The new software also includes analytical dashboards that summarize point-in-time metrics such as exposures to strategies, regions, fund managers, and top holdings. It also provides useful time-series metrics such as exposures over time, cash flows, and J-curves. These dashboards utilize Power BI and have the ability to filter and drill down further into specific strategies, funds, managers, etc. so that the investment team can quickly find and visualize information. Staff came away impressed by the enhancements made in data collection as well as the data analytics advancements that were built within LP Analyst.

### **Information Systems and Disaster Recovery**

The parent organization, Mesirow Financial, provides all IT investment services for the private equity operations team. The department is responsible for IT investment services, application development, computer operations, desktop design and management, and help desk services. Additionally, Mesirow subscribes to several databases for market insight including, but not limited to, Preqin and Thomson Reuters.

Mesirow has a business continuity plan to protect clients in the event of an emergency or significant business disruption. The firm has established redundancies for business-critical systems and expects that these systems can be up and running within the same business day of declaring an event. Mesirow's IT team performs a disaster recovery test at least annually, with the most recent being completed in March of 2024. The last third-party test was conducted by PC Connect in October of 2024, without issue. Mesirow partially implemented their business continuity plan during the NATO meetings held in Chicago in 2012 and executed it in March of 2020 during the COVID-19 pandemic.

### **Conclusion**

Callan and staff are comfortable with Mesirow. Performance of our early investments has been very strong. Fund V is reporting a 2.39X TVPI, and Fund VI is reporting a 2.59X TVPI as of September 30, 2024. Importantly, both funds have returned more than our initial investment in actual cash distributions, 1.93X for Fund V, and 1.54X for Fund VI. While it is still too early to reasonably judge performance for Fund VII-A, it is off to a nice start, with a 1.77X TVPI. An issue we had been monitoring for the past few reports is the eventual retirements of Mr. Galuhn and Mr. Sacks. Due to this, Mesirow has begun implementing their succession plans and has taken the necessary steps to build the next level of leadership in Mr. Debolt, Mr. Fedronich, and Ms. Pierce. The investment team is happy that the succession plans have been implemented with more transparency and a longer runway than other managers have provided in the past when key individuals retire from their firms.

Mesirow has been consistent in executing their investment process and we believe they remain a solid option as a core manager in our private equity fund-of-funds program. As mentioned in the key takeaways section, staff will continue to monitor Mesirow's separate account business and the implementation of their new dedicated secondaries fund.



# Memorandum

**To:** CMERS Investment Committee  
**From:** Keith Dickerson, CFA  
**Date:** February 13, 2025  
**Re:** Polen Due Diligence Meeting, December 10, 2024  
**Team:** David Silber and Keith Dickerson

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## **Background**

Polen Capital Management (Polen) has managed an Active U.S. Large Cap Equity mandate for the City of Milwaukee ERS (CMERS) since June 2012. CMERS is invested in Polen's Focus Growth strategy. As of December 31, 2024 Polen managed approximately \$121.4 million for CMERS, or 2.1% of the Fund.

## **Key Takeaways From the Recent Meeting**

- Focus Growth faced a challenging performance environment in 2024, posting a return of 15.6% against the S&P 500 benchmark return of 25.0%. Staff discussed the strategy's performance during our visit with Polen to gain a better understanding of the market environment and its impact on performance. Staff and Callan are comfortable with the explanation provided by Polen, but will continue to monitor the situation closely.
- Asset levels have continued to hold up well given challenging performance, so Staff remains in the unique position of monitoring assets both to ensure that growth in strategy assets does not impact expected future performance, while also monitoring for an increase in outflows if strategy performance continues to be challenged.
- Lead portfolio manager Dan Davidowitz is very engaged with the strategy. Staff and Callan consider him to be integral to the success of the strategy going forward, and will continue to monitor his level of engagement.
- Jeff Mueller retired from the asset management industry on December 31, 2023. While not listed as a portfolio manager on the Focus Growth strategy that CMERS invests in, Mr. Mueller was an integral part of the Large Company Growth Team (LCGT) and served as Head of Research for the team. Bryan Power has since been promoted to Director of Research and serves as Portfolio Manager on a separate large cap growth strategy at Polen.
- Despite the challenging recent performance, Staff and Callan do believe that the philosophy and process remain in place, and are comfortable with Polen as an Active U.S. Large Cap Equity Manager going forward.

## **Firm Summary**

Polen is a privately held investment management firm that was founded by David Polen in 1979. The firm, and the LCGT, is headquartered in Boca Raton, FL. Between 1979 and 1988, Polen operated primarily as a financial advisor to high net worth clients. In 1989, Polen launched Focus Growth based upon a belief that a concentrated portfolio of only the highest-quality businesses would provide a greater margin of safety and share prices would follow earnings growth over long-term investment horizons.

Focus Growth remained the firm's only strategy through 2014, when Polen began to broaden its product offering. Polen launched a Global Growth strategy in 2014, and an International Growth strategy in 2017. These strategies follow a similar process and philosophy to Focus Growth, and the investment professionals that manage them are part of the LCGT. Importantly, Polen added

sufficient resources to the team to support these strategies, such that they did not distract from the flagship Focus Growth.

The success of Focus Growth has also allowed Polen to grow through acquisition, bringing on a U.S. Small Cap Growth team based in Boston in 2017, and an Emerging Markets Growth team based in London in 2020. In 2023 and 2024, Polen further expanded its emerging markets capabilities through acquisitions from Columbia Threadneedle AM (Asia) and Somerset Capital Management, respectively. In 2022, Polen acquired DDJ Capital Management, a U.S. High Yield Fixed Income firm based in Boston, that has since been renamed Polen Capital Credit. These products are all separate and distinct from the LCGT.

Polen had \$63.3 billion in AUM as of September 30, 2024. This is an increase from \$57.2 billion at our last visit, and is up significantly from approximately \$4 billion when CMERS hired Polen in 2012. The majority of assets (\$46.6 billion) are in the Focus Growth product, although growth in the other strategies has lessened this concentration compared to past visits. Focus Growth is soft-closed. In practice this means that Polen will only consider high-quality institutional clients for new mandates. Registered Investment Advisors that have Focus Growth on their platform can still add new clients, and these additions can add up to significant dollar amounts in good years. Strategy capacity will be an item Staff will continue to monitor.

The current leadership of the firm joined in the early 2000s, with Stan Moss, CEO, and Damon Ficklin, PM and Analyst, joining in 2003, and Dan Davidowitz, Lead PM of Focus Growth, joining in 2005. This meant that the firm was well positioned to handle the passing of Mr. Polen in 2012, and has thrived in the time since. Brandon Ladoff, the co-PM on Focus Growth, joined in 2013.

Employees own 72% of the firm, with the balance owned by the Polen Family Trust (8%) and iM Global Partner (20%). The minority stakes are both passive, giving employees full voting control over the firm. In 2020, the legal structure of Polen Capital Management LLC was modified such that the 72% of Polen that is owned by employees is now held through a limited partnership entity. This was driven by tax considerations, and no changes were made to the management of the firm. Since Mr. Polen's passing in 2012, employee ownership has risen from 51% to its current level of 72%. Polen views the increase in employee ownership over the years as critical for alignment of interests between employees and clients.

Polen implemented a Results Only Work Environment (ROWE) policy in 2015. This means that employees have flexibility with respect to hours and location of work, and are evaluated solely on their success in meeting clearly-defined goals and objectives. Mr. Moss believes the flexibility this policy provides has been a competitive advantage in recruiting and retaining top investment talent. Prior to the start of the COVID pandemic, over 90% of employees would still be in the office on any given day, and one of the main benefits of the policy is that it removes the stigma when an employee has to leave early to take care of something personal, for example. Given that Polen's employees had already been set up to work remotely for a number of years, the ROWE policy allowed Polen to seamlessly transition to work from home during the COVID pandemic. Polen employees have since returned to the office, but the firm still operates under its ROWE policy. Polen will continue to evaluate the ROWE policy to ensure a proper balance of in-office attendance and remote work.

Polen has 254 full time employees, 50 of whom are investment professionals. This is up from 208 and 37, respectively, at our last visit, with the vast majority of the growth a result of the DDJ acquisition mentioned previously. When CMERS hired Polen in 2012, the firm had only one strategy. The investment team was comprised of two PMs, Mr. Davidowitz and Mr. Ficklin, and

one research analyst, Todd Morris. Now the firm has grown to the point where there are multiple separate investment teams. Specific to the LCGT, there are currently 12 professionals, with seven PMs and five analysts, which is an increase of one analyst from staff's last visit.

The Focus Growth strategy has experienced modest changes in leadership over the past year. On January 1, 2024, Mr. Ficklin rejoined the Focus Growth strategy as a co-PM. Mr. Ficklin's responsibilities changed in 2019, where he left the Focus Growth strategy to lead Polen's Global Growth strategy. During this time, Mr. Ladoff was promoted to co-PM on the Focus Growth strategy. Polen has announced that Mr. Ladoff will be transitioning off of the Focus Growth strategy to lead a Global UCITS strategy managed by Polen. As a result, the Focus Growth Strategy will be led by Mr. Ficklin and Mr. Davidowitz going forward, which represents the original leadership team when CMERS hired Polen in 2012.

In 2022, Mr. Ficklin assumed the role of Head of the LCGT from Mr. Davidowitz, who had been head of the team since Mr. Polen's passing in 2012. In speaking with Mr. Davidowitz, he made it clear that as the team had grown over the years, he did not enjoy serving in a role that is primarily responsible for things like recruitment, employee reviews, setting compensation, and reporting to the firm's operating committee. He noted that Mr. Ficklin is much better suited to the role, and taking this step back allows him to focus on researching companies and managing the portfolio, which is what he truly enjoys. Staff and Callan are comfortable with this change, as it takes administrative burden off Mr. Davidowitz and allows him to focus on the portfolio.

### **Investment Philosophy & Process**

Polen believes that consistent earnings growth is the primary driver of intrinsic value and long-term stock price appreciation. The investment team attempts to identify companies with growing earnings that have a sustainable competitive advantage (i.e. wide moats), superior financial strength, proven management teams, and strong product or service lines. They believe stocks with these characteristics equate to having a margin of safety that conveys inherently less risk.

Polen utilizes a bottom-up, fundamental investment approach in identifying candidates for investment. They employ the same financial and qualitative criteria across all Large Company Growth strategies, regardless of where a company is based or the industry in which it operates. These "guardrails" include above average normalized earnings growth, sustainable return on equity greater than 20%, stable to increasing operating margins, strong cash flow, and strong balance sheets.

The screen is followed by an initial research project which tests for sustainability and excludes companies the team believes are benefitting from cyclical factors. This narrows the universe from several thousand stocks down to approximately 150, which are then actively followed by the team. All analysts are generalists, and the universe is split amongst them. This involves examining SEC filings, management presentations, news releases, earnings announcements, and related conference calls.

Polen has developed a formal framework for ESG as part of the research process. Staff has discussed this with Polen, who stressed that what the team is interested in with respect to ESG is identifying potential risks to the sustainability of the competitive advantage of a business. These are risks that the strategy has considered throughout its 30+ year history, but now they have a formal process for the ones that fall in the category of ESG. This message has been consistent as we've discussed ESG with Polen over our past several meetings. Because it is

being used to evaluate the competitive advantages of candidate businesses, CMERS staff does not have concerns with Polen considering ESG.

Approximately 90% of the investment team's research is generated internally with the remainder procured from external sources. Part of this research includes meetings with company management. If a stock is a strong candidate for investment, it is presented to the entire investment team for peer review. The strategy's concentrated nature (approximately 20 stocks) and its low turnover permit Polen to pursue a time intensive investment research process such as this. Once an idea has been thoroughly reviewed and debated, a formal recommendation to purchase the company for the portfolio is made. The PMs make the final buy and sell decisions together, with Mr. Davidowitz having final decision-making authority. Existing portfolio holdings are monitored using the same investment process and subject to the same quantitative screens and continued fundamental analysis.

The portfolio is constructed in a way so only the "best ideas", regardless of sector, are selected for inclusion in the portfolio. The investment team believes this concentration of stocks imposes a greater degree of risk control by ensuring the companies are among the highest quality in the market and have very strong balance sheets.

An important aspect of the firm's philosophy is that the investment team defines success by their ability to construct a portfolio that is able to consistently generate above average earnings expansion, increasing intrinsic value over the very long-term. In any given year, the portfolio could outperform or underperform the benchmark, but the team believes that constructing a portfolio that is able to grow earnings at their target of 15% will ultimately lead to outperformance over longer time periods.

Portfolio construction is agnostic to benchmark weightings, however, the most typical client guidelines, which the ERS has adopted, limit exposure to 60% in any one sector. The investment team's research and portfolio construction process has led to very little, if any, exposure to the Materials, Utilities, Telecom, and Energy sectors. These sectors tend to be capital intensive and cyclical in nature with inconsistent growth rates. Generally, Focus Growth has tended to be overweight the healthcare and technology sectors. As of December 31, 2024, the largest sector exposure was information technology, with a weight of approximately 38.7%.

The investment team attempts to manage risk at the individual security level, however, the team will also attempt to further diversify the portfolio across the growth spectrum by investing in durable growth firms for safety, stable firms with underappreciated growth, and firms with significant growth potential, so that the portfolio can perform well in different environments. Polen defines risk as the permanent impairment of capital. Therefore, if the team lacks complete conviction in a company, they will not consider purchasing the stock regardless of its growth prospects. CMERS' guidelines limit the size of individual holdings in the portfolio to the greater of 10% of the portfolio or 3% over the S&P 500 Index weighting, measured at market value.

As the largest companies in the investable universe have grown to make up a significant portion of the growth benchmark, Polen has relaxed the 10% limit and allowed certain best ideas to appreciate above 10% in the model portfolio. For clients like CMERS, who believe the 10% limit is an important risk control, Polen trims the security in question as it approaches 10%, and invests the proceeds pro-rata across the rest of the portfolio. This was the case most recently with Amazon in early 2023.

Polen uses the same investment philosophy in deciding whether to sell an existing holding. The PMs do not have an automatic sell discipline, but will typically sell if they observe a potential threat to the company's competitive advantage, degradation in the company's long-term earnings growth, or if a more compelling opportunity exists.

Valuation is an important consideration during the sell process. If the stock price is so expensive that the earnings growth rate will not be able to overcome a high valuation in order to provide double-digit annualized returns, then the stock is trimmed or sold.

### **Trading**

Polen employs five dedicated traders located in the U.S., Hong Kong, and London. Polen terminated its contract with Jones Trading Institutional Services as Polen no longer needs the additional trading capacity given its increase in staff within the trading area. The firm uses the Charles River IMS platform as their trade order management system, a platform upgrade in 2016 that is able to perform pre- and post-trade compliance checks. Polen has developed an internal Microsoft based trade allocation software to ensure trade allocations are performed in accordance with Polen's allocation policy.

Trading costs of Focus Growth rank in the third quartile over the trailing 12-month period ending September 30, 2024, according to CMERS' transaction cost measurement provider, Global Trading Analytics (GTA). This results in a higher net market impact cost, but still falls within an acceptable range. Staff will continue to monitor Polen's trading and provide GTA's feedback to Polen as necessary.

The turnover for the past three years has averaged about 20.1%, which is in line with the expected annual turnover of 20-25%. This equates to roughly a 4-5 year holding period, and remains the expectation going forward. About half of the average turnover can be attributed to trimming or adding to positions.

### **Firm and Portfolio Compliance**

Lauren Walsh, Chief Compliance Officer (CCO), is responsible for the administration of the Company's compliance program and directs all compliance activity for the firm. Ms. Walsh joined Polen in 2024 after the firm decided to split the CCO and General Counsel role previously held by Brian Goldberg. Mr. Goldberg now solely holds the role of General Counsel. This change was the result of firm growth and the need for additional capacity. Both individuals report directly to Jeb Doggett, Chief Administrative Officer. Polen has developed a compliance manual that outlines the policies and procedures for their compliance program, personal investment transactions, violation identification and whistleblower policy, disciplinary process, as well as ethical and fiduciary standards.

Polen utilizes ACA Compliance Group (ACA) to support the Chief Compliance Officer in monitoring and maintaining regulatory requirements. ACA provides compliance and regulatory research, operational consulting, and compliance support services to investment firms such as Polen. ACA conducts an annual compliance review that includes a regulatory risk assessment, policies and procedures gap analysis, and testing. The most recent was for the period ended September 2021, and ACA noted that Polen's compliance program is well-tailored and comprehensive relative to the scope of Polen as a firm.

Regulatory agencies, including the Securities and Exchange Commission (SEC) and the Ontario Securities Commission (OSC), routinely perform inspections from time to time. Polen's most recent exam was conducted by the OSC in February 2020, with no material deficiencies.

**Proxy Voting**

Polen utilizes third party service provider Institutional Shareholder Services (ISS) for proxy voting matters due to their reputation as a leading provider of corporate governance solutions to the global financial community. The investment team reviews proxy issues, particularly those where Polen and ISS disagree. In the event of a disagreement, Polen will vote the proxies based on what it believes are in clients' best interests, document its reasoning, and maintain a record of the decision.

**Information Systems and Disaster Recovery**

Polen's slightly reorganized its Operations and Technology teams in 2024, where the firm's Performance team, comprised of three individuals, has now moved from the Data and Applications umbrella to the Distribution function. Matt Bornhorst, Head of Infrastructure and Information Security, and John Hammar, Head of Data and Applications, both report to Mike Guarasci, Chief Operating Officer. As a result of this reorganization, six employees are dedicated to the Infrastructure and Information Security team, and 37 employees are dedicated to the Data and Applications team.

Polen has developed a business continuity plan to address continuity of operations in the event of an incident impacting the availability of locations, systems, or data. The plan includes strategies that address immediate, short-term, and long-term interruptions for each critical business function. Polen's Boston office serves as the back-up work site for Boca Raton, and vice versa. London employees could be hosted in Boston or Boca Raton given a disruptive event. Each office includes sufficient space and capabilities for staff relocated during a continuity event.

Polen's critical business systems, i.e., Research, Portfolio Accounting, Order Management, Customer Relationship Management, General Ledger and email, are hosted off-site by the system vendor or partner. For example, email is hosted in the Microsoft 365 Cloud.

Polen's cloud-sourced systems mentioned above, combined with the ROWE policy, has allowed employees to become practiced at working remotely. Polen has faced a number of hurdles in the recent past, including a number of hurricanes along with the global pandemic in 2020. Polen had noted that none of these instances caused an interruption in business operations.

**Performance Summary and Conclusion**

The table below shows Polen's performance in comparison to its benchmark, the S&P 500 Index, for time periods ended December 31, 2024, net of fees.

	1 Year	3 Year	5 Year	10 Year	Since Inception (7/1/2012)
Polen (net)	15.6%	-0.2%	10.7%	14.0%	14.7%
S&P 500 Index	25.0%	8.9%	14.5%	13.1%	14.6%

With a strategy like Focus Growth, it is important to remember that because of the concentration of the portfolio, the strategy can exhibit significant tracking error, both above and below the

benchmark. The strategy underperformed its benchmark by an annualized 6.9% net of fees between its inception date and August 31, 2014. The strategy also outperformed its benchmark by an annualized 6.5% net of fees between August 31, 2014 and December 31, 2021. Staff stresses evaluating all our managers over a full market cycle, but this concept is particularly important to keep in mind with Polen.

With that said, performance in 2023 improved after a disappointing year in 2022. However, while absolute performance in 2024 was positive, the Polen Focus Growth strategy underperformed its S&P 500 benchmark by 9.4%. Staff had a particular focus during the most recent meeting with Polen, as well as follow-up conversations with Callan afterwards, on making sure that the team, philosophy, and process that has been successful for Polen over time remains in place in light of the strategy's performance over the past three years. We believe those elements do remain in place, and Polen remains a solid option as an Active Large Cap Equity manager in our portfolio.

# Memorandum

**To:** CMERS Investment Committee  
**From:** Keith Dickerson, CFA  
**Date:** February 13, 2024  
**Re:** Earnest Partners Due Diligence Meeting: December 11, 2024  
**Team:** David Silber and Keith Dickerson

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## **Background**

Earnest Partners (Earnest) has managed a Mid-Cap Core Equity Strategy for the City of Milwaukee Employees' Retirement System (CMERS) since May of 2005. As of December 31, 2024, Earnest managed 3.0% of the Fund's assets, or \$175.6 million.

## **Key Takeaways from Recent Visit**

- Turnover on the Earnest investment team has stabilized since CMERS' last visit. Previously, three equity investment team members departed the firm and Earnest had hired new members for these positions. These personnel changes do not appear to have had an impact but CMERS staff and Callan will continue to monitor the situation.
- Management noted that the firm has seen increased search activity and their strategies have been able to win new business. This has led to increases in strategy and firm AUM, and has helped to mitigate an issue noted in past reports related to AUM.
- Overall, CMERS staff remains impressed with Earnest, and believes they are extremely capable of filling the role of Mid-Cap Core Equity manager for the CMERS.
- Earnest faced a challenging performance environment in 2024. Staff discussed the performance environment at length during our visit with Earnest. Staff and Callan are comfortable with the explanation provided by Earnest, but will continue to monitor the situation closely.

## **Firm Summary**

Earnest was incorporated in 1998 and is headquartered in Atlanta, GA with an additional research office in China. Earnest is employee owned with Paul E. Viera, CEO, having a controlling interest. Mr. Viera has consistently maintained that he intends to keep the firm private and employee-owned. Earnest provides investment management services to 270 institutional clients, with assets under management (AUM) totaling approximately \$33.1 billion, which is an increase compared to \$24.3 billion at the time of our last visit in 2022. All of the firm's equity strategies either have core or value style philosophies. The Mid-Cap Core strategy in which the CMERS is invested has approximately \$2.9 billion in assets, which is up from a level of \$1.7 billion in 2022. Earnest also manages a Small-Mid-Cap (SMID) strategy, which has approximately \$5.4 billion in assets.

Earnest reported that they have seen an increased level of interest in the Mid-Cap strategy over the past several years, and they have been successful in winning new business. Past memos had noted falling client counts and asset levels as something staff would be monitoring, so it is nice to see the strategy grow to the point that those issues are no longer something that requires enhanced attention from CMERS staff.

Earnest has 43 employees, 16 of whom are investment professionals. The equity investment team experienced no turnover since our last meeting in 2022. Earnest emphasizes a team approach to investing, and each member has responsibilities for researching and monitoring all companies in the portfolio. Earnest believes the team structure and their process of investing mitigates the



detrimental effects of an investment team member departure. CMERS staff and Callan are comfortable with the current investment team dynamics at Earnest.

Earnest employees worked successfully from home during the pandemic and have since transitioned to being primarily in the office again. The firm does continue to allow flexible work arrangements, but it appeared at our visit that the majority of employees were back in the office.

### **Investment Process**

Earnest's process begins by screening a universe of over 1,000 stocks using their proprietary Return Pattern Recognition (RPR) model, which reduces the initial universe to approximately 150 stocks that are expected to outperform based on characteristics that have historically been in place when those stocks have outperformed in the past. The characteristics include valuation measures, market trends, operating trends, growth measures, profitability measures, and macroeconomics. The model divides sectors into 36 industry groups to determine which characteristics specifically drive returns in each group. Generally, Earnest believes only 2-3 characteristics are significant to the historical returns of a specific industry group. Earnest reviews the model every three years. No major changes were made at the last review.

Earnest then subjects each of the 150 companies identified by the screen to a second, more rigorous, review. They develop and test an investment thesis for each company. To test this thesis, members of the investment team meet with company management teams and industry specialists. Earnest routinely makes a concerted effort to have face-to-face meetings with company management at least annually, which they believe adds value (academic studies support this belief). In addition, they review financial reports, analyze industry trends and company-specific studies, and conduct independent field research.

Earnest's investment team represents a wide range of professional and cultural backgrounds and many members of the team are considered subject matter specialists due to prior direct work experience with companies that operate in the sector they cover. Additionally, nearly all of the firm's investment professionals have worked, studied, or lived abroad, which provides global perspectives and insight. Earnest believes being a specialist allows the member to view companies as an industry practitioner would, which provides unique perspectives and differentiated relationship networks within respective industries. This gives the investment team a number of advantages in assessing the fundamentals of the companies being analyzed.

The research responsibilities of the investment team members are classified by their respective global sector expertise. Each member is responsible for monitoring their assigned coverage companies that are in the portfolio as well as researching new companies. Historically, members analyze six to eight new companies per year. The investment team meets weekly to discuss new research ideas and current portfolio holdings.

As the final step in the investment process, Earnest then constructs a portfolio that includes stocks expected to outperform while effectively managing risk. Earnest prefers to measure risk according to downside deviation since the risk their clients are primarily concerned with is underperforming the reference benchmark. The portfolio attempts to combine securities that are likely to limit significant underperformance while maintaining a high expected return. The approach utilizes 12 fundamental factors such as price-to-book ratio, return on equity, and dividend yield.

Dinkar Singh, Ph. D., Partner, provided live demonstrations of both the RPR model and the downside deviation model to CMERS staff during the meeting. Staff came away impressed with the efficiency of the models as well as the robust results of model output.

Earnest targets a portfolio of approximately 60 stocks. About four to six weeks are needed to carefully evaluate a candidate stock for inclusion in the portfolio. Each member of the investment team has a vote for purchasing, holding, or selling any stock in, or considered for, the portfolio. Before any stock is added to or removed from the portfolio, the process requires approval by 80% of the investment team members. Historically, Mr. Viera was the primary decision maker with respect to security weights in the portfolio, but he has been ceding that responsibility to senior investment team members in recent years, with an eye toward long-term succession planning.

Earnest has deliberately designed its investment process to avoid behavioral biases. In order to defend against consensus thinking, each investment team member monitors all stocks in the portfolio and is required to support and recommend three independent sell ratings per year for existing portfolio companies. One of these sell recommendations must come from outside the member's designated research responsibility.

Earnest defines their sell discipline as "crowding out." The firm's portfolio contains only its best investment ideas. As a result, less attractive stocks are sold from the portfolio. Drivers for selling a stock include:

- Stock reaches valuation target;
- Another stock presents more compelling risk and return characteristics;
- Deterioration of the company's fundamentals.

### **Trading**

CMERS staff met with Hollis Gilliam, head trader, during our visit. Mr. Gilliam was promoted to his current role after the former head, Ryan Kelly, departed in late 2020. The firm subsequently operated with two traders, which they were able to do because of the low turnover of the strategies, while they conducted a search for the right individual to bring the team back to full strength. They added Chris Blake to the team in 2022 and are back to three full time traders.

Mr. Gilliam emphasized that traders do not attempt to add alpha through the trading process. Earnest's definition of "best execution" is for the traders to reflect a portfolio manager's ideas in the portfolio, as quickly as possible, at a price below the target buy price specified by the portfolio manager. Earnest trades with brokers that specialize in specific industries. They believe this method works well because brokers who have a unique skill in a particular sector are able to help the traders achieve the stated goal of reflecting ideas in the portfolio as quickly as possible. The expected annual turnover for the strategy is 20-25% over the long term, which equates to a holding period of 4-5 years. The majority of turnover is caused by adding and subtracting names from the portfolio, rather than by trimming or adding to position weightings of stocks already in the portfolio.

The department has been focused on adding technology and automation to enhance productivity. Earnest uses the Bloomberg AIM trading platform, a leading portfolio management system that fully integrates trading, compliance, and portfolio management into one seamless process. Earnest changed their portfolio accounting system from Geneva to FIS in 2024, which is integrated into the Bloomberg AIM system.

CMERS uses the services of Global Trading Analytics (GTA) to provide trade cost analysis. Earnest's trade costs results were volatile for the trailing eight quarters, ranking in the bottom quartile of GTA's universe for 2021, while ranking in the top quartile for most quarters in 2022. This inconsistency is only a minor concern – since Earnest is a low turnover manager, poor trading does not have as significant of an impact on the portfolio as it would for a manager with higher turnover. Still, CMERS staff will continue to monitor this situation closely.

## **Compliance**

Earnest has a full-time compliance department. Jay Wilson, Chief Compliance Officer (CCO) reports directly to the CEO. Primary responsibilities of the department include handling regulatory inquiries, administering the firm's trading policies, and ensuring adherence to investment guidelines. Earnest ensures compliance with CMERS' guidelines by, first, screening trade orders using the compliance system, Bloomberg AIM, which would automatically flag a potential violation before a trade is executed. Bloomberg AIM then analyzes portfolios daily for compliance with client and firm guidelines. Finally, the investment team and compliance team meet each month with the specific purpose of reviewing each account's compliance with client and firm guidelines. If there are any trade errors or guideline exceptions, they are resolved in a timely fashion with the client. Earnest has maintained compliance with CMERS' guidelines since inception.

The CCO is also responsible for implementing the firm's Ethics Code. Earnest uses TerraNua's MyComplianceOffice to monitor employees' personal trading and compliance with the code of ethics. This system facilitates the trade pre-clearance process and automates the capture of employee brokerage statements, which allows the compliance department to easily review trading activity against the restricted list. This system also facilitates employees' annual attestation that they are in compliance with Earnest's ethics code.

Earnest undergoes an annual SSAE 18 review, which is conducted by Schellman & Company, the most recent of which found no material deficiencies. The firm is also evaluated by the Securities and Exchange Commission. The most recent inspection was in 2016, with no material violations.

## **Information Systems and Disaster Recovery**

The IT Department consists of two dedicated professionals, including Brad Heath, Head of Information Technology. Mr. Heath reports to Carsten Fiege, Chief Operating Officer. The IT infrastructure is centralized in Atlanta and is fully replicated to a redundant cloud environment.

In the event the Atlanta office building is not accessible, but the network remains operational, staff can connect via VPN. They can access email through Microsoft Outlook Web Access and can operate out of a back-up office space in Jackson, MS if needed. In addition, incoming calls can quickly be routed to cellphones of key personnel. In the case of a total outage in Atlanta, users can access the network through the redundant cloud environment.

IT backup systems have experienced real world tests in prior years, when Atlanta was impacted by snow and ice storms. The Atlanta office was inaccessible, but remote access worked seamlessly for the firm. Earnest states that testing of the Disaster Recovery Plan and systems upgrades are continuous.

## **Proxies**

Earnest's proxy director ensures all proxies are reviewed with the assistance of Institutional Shareholder Services (ISS). Any controversial decisions are referred back to Earnest's Investment Committee for review. Once the reviews are completed, ISS will cast the vote based on Earnest's recommendation. Summaries of proxy votes are provided quarterly.

## **Performance Summary and Conclusion**

Earnest's offerings, research process, and back office continue to be stable. It is encouraging to hear them report that they are continuing to see increased investor interest in their offerings over the past several years. CMERS Staff and Callan will continue to monitor investment team turnover and strategy performance. The Earnest team has stayed true to their investment philosophy and style for which the Board hired them and the strategy provides an effective complement to CMERS'

existing US large-cap and small-cap equity managers. The strategy's focus on downside deviation has often resulted in protection in down markets while participating in positive trending markets, which has ultimately led to relative outperformance over longer time horizons.

The table below shows Earnest's performance in comparison to its benchmark, the Russell Midcap, for multiple time periods ended December 31, 2024, net of fees:

	1 Year	3 Year	5 Year	10 Year	Since Inception (5/1/05)
Earnest Mid-Cap Core (net)	7.6%	2.1%	10.1%	11.3%	10.5%
<i>Russell Midcap</i>	<i>15.3%</i>	<i>3.8%</i>	<i>9.9%</i>	<i>9.6%</i>	<i>10.0%</i>

The strategy has outperformed, net of fees, over the longer time periods shown. Earnest Partners has applied its Mid-Cap Core strategy consistently over time and appears capable of continuing to provide CMERS with a strong solution for our exposure to the mid-cap space.