

Wilshire



# Wilshire Advisors

## Executive Summary of Investment Performance

As of December 31, 2022

## IMRF Performance Summary

- IMRF market value as of December 2022 : \$47.87 billion
- IMRF total fund return for 4Q 2022: 6.02% vs the Total Fund Benchmark return of 4.77%
  - Through the end of 2022, IMRF returned -12.90% vs its benchmark of -13.26% for the calendar year
- U.S. equity markets rebounded for the quarter as CPI reports pointed to inflation having already peaked
- IMRF U.S. Equity Portfolio outperformed the benchmark during the quarter, returning 8.91% versus 7.32%
  - For the calendar year 2022, the U.S. Equity Portfolio returned -19.25% vs its benchmark of -18.53%
- International equity markets benefited from a softening U.S. dollar, broadly outperforming domestic markets during the quarter
- IMRF International Equity Portfolio outperformed the benchmark during the quarter, returning 14.67% versus 14.28%
  - Through the end of 2022, the International Equity Portfolio returned -18.14% vs its benchmark of -16.00% for the calendar year
- Fixed income markets stabilized during the quarter on the hope that the current rate hike cycle was coming to an end
- IMRF Fixed Income Portfolio underperformed the benchmark during the quarter, returning 2.09% versus 2.17%
  - Over the trailing one-year, the Fixed Income Portfolio returned -11.90% vs its benchmark of -11.58%
- All asset class allocations remain within the rebalancing range in the Investment Policy

Performance referenced above is Net of Fees.

## Market Commentary

### U.S. Equity

The U.S. stock market was up 7.1% for the fourth quarter but was down -19.0% for all of 2022. A majority of sectors were up for the quarter. The best performing were Energy (+19.9%), Industrials (+16.6%) and Materials (+14.6%). Consumer Discretionary was down -8.0%. From a size perspective, small-cap outperformed large-cap by 86 basis points. Growth stocks underperformed value for the quarter and also trailed meaningfully for the year.

The Federal Reserve's aggressive action to combat unacceptably high inflation is the story of 2022 with uncertainty around Fed policy poised to drive market volatility in 2023. The FOMC raised rates 4.25%, with increases becoming more dramatic in May. This marks the largest 12-month increase since 1981 (also a period of inflation near or above double-digits). Unsurprisingly, fixed income suffered but so did equities as investors repriced off a higher risk-free rate. The Fed is currently forecasting a rate 0.75% higher by the end of 2023. The open market does not agree – or perhaps doubts their credibility to continue tightening, with a modest change forecasted for the next year. How this disagreement plays out is likely to be a primary market driver this year.

### Non-U.S. Equity

Europe faced similar headwinds as the United States in 2022 – surging inflation and aggressive central bank tightening – but also had to more directly contend with the ongoing war in Ukraine. The labor market remains tight in the eurozone and many businesses report that a labor shortage is limiting production. Despite China's zero-COVID policies, including lockdowns, infections continued to surge intermittently. Tension among the country's citizens continued to rise and led to protests not seen in decades. In early December, the central government took definitive steps to ease restrictions.

### Fixed Income

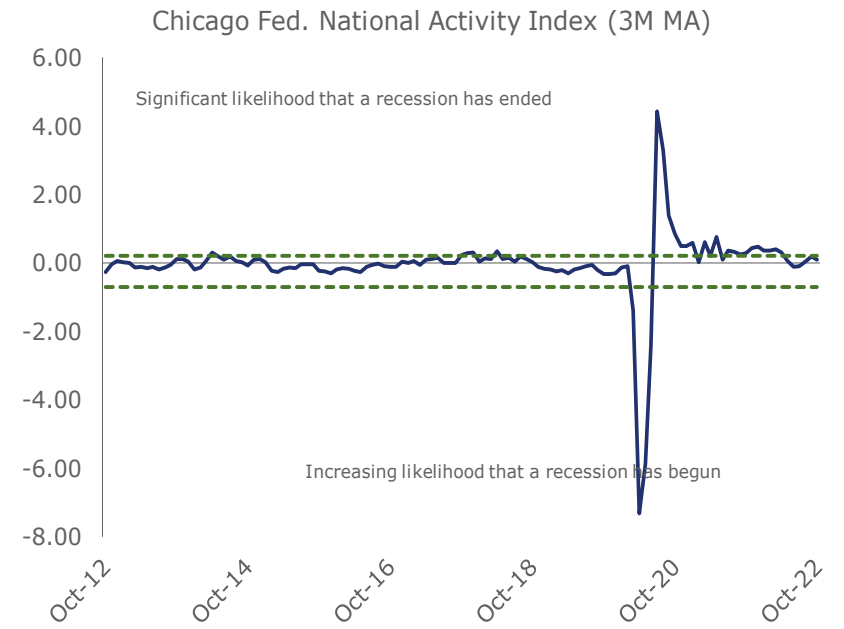
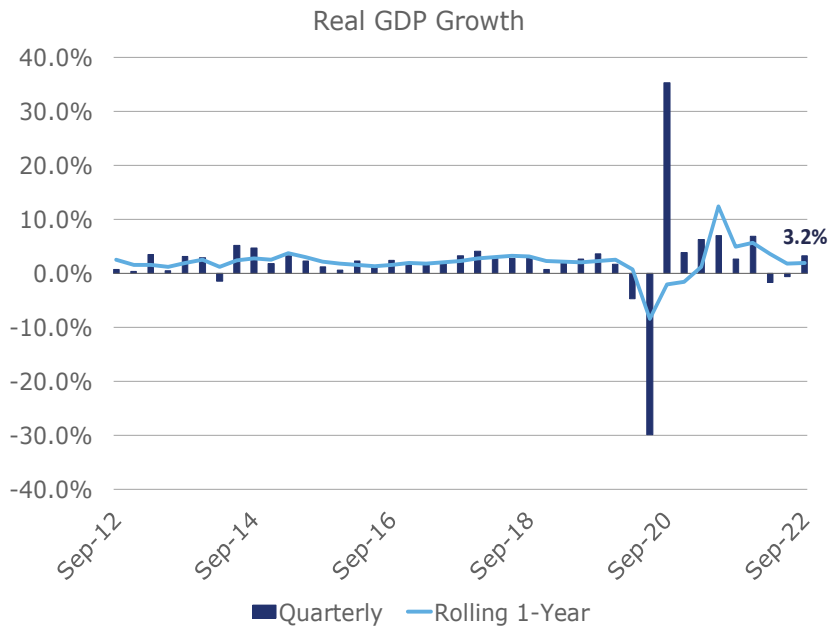
The U.S. Treasury yield curve was up in the short-end (below 3-years) by 50-135 basis points but largely unchanged across the remainder of the curve. The 10-year Treasury yield ended the quarter at 3.88%, up just 5 basis points from September. The Fed increased the overnight rate by 0.75% in November and 0.50% in December, targeting a range of 4.25% to 4.50%. The Fed's "dot plot" is messaging that the current intent is for another 75 basis points in increases before the end of 2023.

# December 2022 Asset Class Assumptions

	Equity						Fixed Income						Real Assets						
	US Stock	Dev ex-US Stock	Emg Stock	Global ex-US Stock	Global Stock	Private Equity	Cash	Core Bond	LT		High Yield	Private Credit	Dev ex-US Bond (Hdg)	Real Estate			Real Assets	US CPI	
									Core Bond	TIPS				US RES	Global RES	Private RE			Cmdty
Compound Return (%)	6.50	7.25	7.50	7.60	7.05	9.90	4.00	4.90	4.90	3.95	6.55	8.85	3.05	5.65	5.80	6.20	6.25	6.65	2.25
Expected Risk (%)	17.00	18.00	26.00	19.10	17.10	29.00	0.75	4.70	9.80	6.00	10.00	12.75	4.00	17.50	16.45	14.00	16.00	12.35	1.75
Cash Yield (%)	1.75	3.25	2.80	3.10	2.25	0.00	4.00	5.10	5.25	4.40	9.65	5.10	3.75	3.95	3.95	2.25	4.00	3.15	0.00
Growth Exposure	8.00	8.00	8.00	8.00	8.00	14.00	0.00	-0.95	-2.40	-3.00	4.00	5.10	-1.00	6.00	6.00	3.50	0.00	2.70	0.00
Inflation Exposure	-3.00	0.00	5.00	1.45	-1.30	-3.75	0.00	-2.50	-6.80	2.50	-1.00	-1.50	-3.00	1.00	1.80	1.00	12.00	5.25	1.00
<b>Correlations</b>																			
US Stock	1.00																		
Dev ex-US Stock (USD)	0.81	1.00																	
Emerging Mkt Stock	0.74	0.74	1.00																
Global ex-US Stock	0.84	0.95	0.89	1.00															
Global Stock	0.95	0.91	0.84	0.94	1.00														
Private Equity	0.72	0.63	0.61	0.67	0.73	1.00													
Cash Equivalents	-0.05	-0.09	-0.05	-0.08	-0.06	0.00	1.00												
Core Bond	0.28	0.13	0.00	0.08	0.20	0.30	0.18	1.00											
LT Core Bond	0.31	0.15	0.01	0.11	0.24	0.31	0.11	0.94	1.00										
TIPS	-0.05	0.00	0.15	0.06	-0.01	-0.03	0.20	0.60	0.48	1.00									
High Yield Bond	0.54	0.39	0.49	0.46	0.53	0.31	-0.10	0.24	0.32	0.05	1.00								
Private Credit	0.68	0.55	0.58	0.60	0.68	0.44	0.00	0.24	0.30	0.00	0.76	1.00							
Dev ex-US Bond (Hdg)	0.16	0.25	-0.01	0.16	0.17	0.26	0.10	0.68	0.66	0.39	0.26	0.22	1.00						
US RE Securities	0.58	0.47	0.44	0.49	0.57	0.49	-0.05	0.17	0.22	0.10	0.56	0.62	0.05	1.00					
Global RE Securities	0.64	0.57	0.54	0.60	0.65	0.55	-0.05	0.17	0.21	0.11	0.61	0.68	0.04	0.96	1.00				
Private Real Estate	0.55	0.45	0.45	0.49	0.54	0.50	-0.05	0.19	0.25	0.09	0.58	0.63	0.05	0.79	0.78	1.00			
Commodities	0.25	0.34	0.39	0.38	0.32	0.28	0.00	-0.03	-0.03	0.25	0.29	0.29	-0.10	0.25	0.28	0.25	1.00		
Real Assets	0.62	0.63	0.65	0.69	0.67	0.57	-0.03	0.22	0.24	0.30	0.64	0.69	0.04	0.78	0.84	0.76	0.64	1.00	
Inflation (CPI)	-0.10	-0.15	-0.13	-0.15	-0.13	-0.10	0.10	-0.12	-0.12	0.15	-0.08	0.00	-0.08	0.05	0.04	0.05	0.44	0.22	1.00

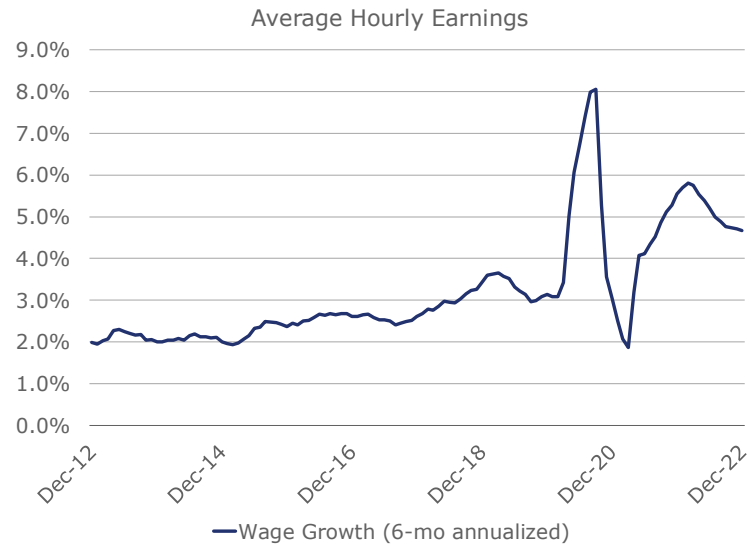
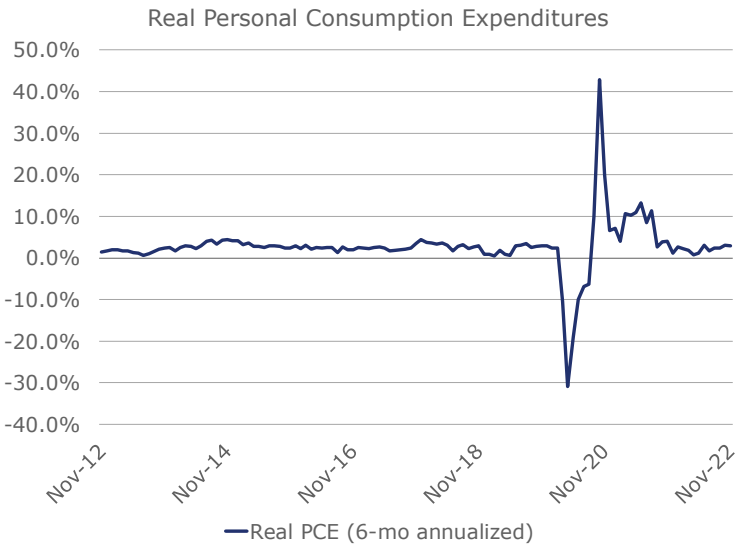
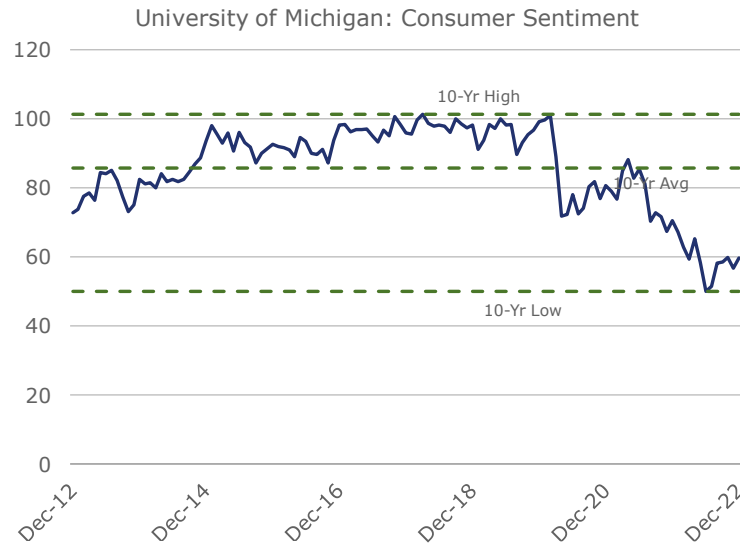
# Economic/Market Activity

# Economic Growth



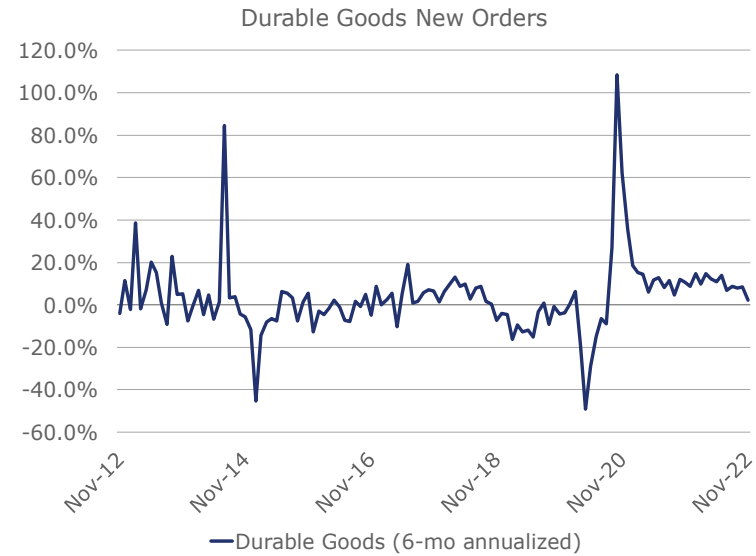
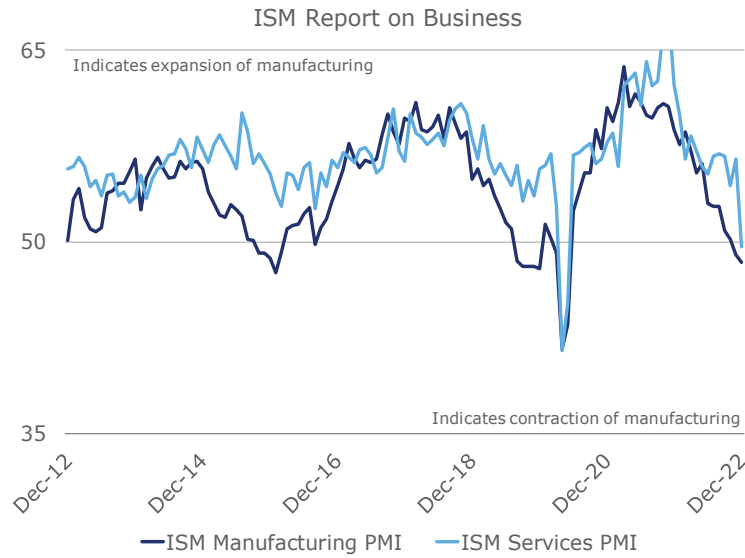
Data Sources: Bloomberg

# Consumer Activity



Data Sources: Bloomberg

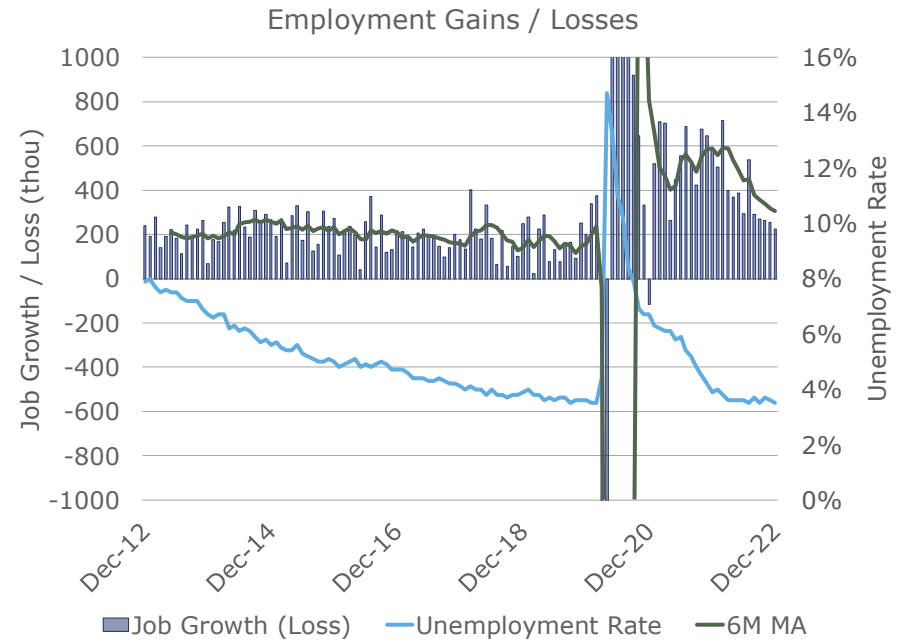
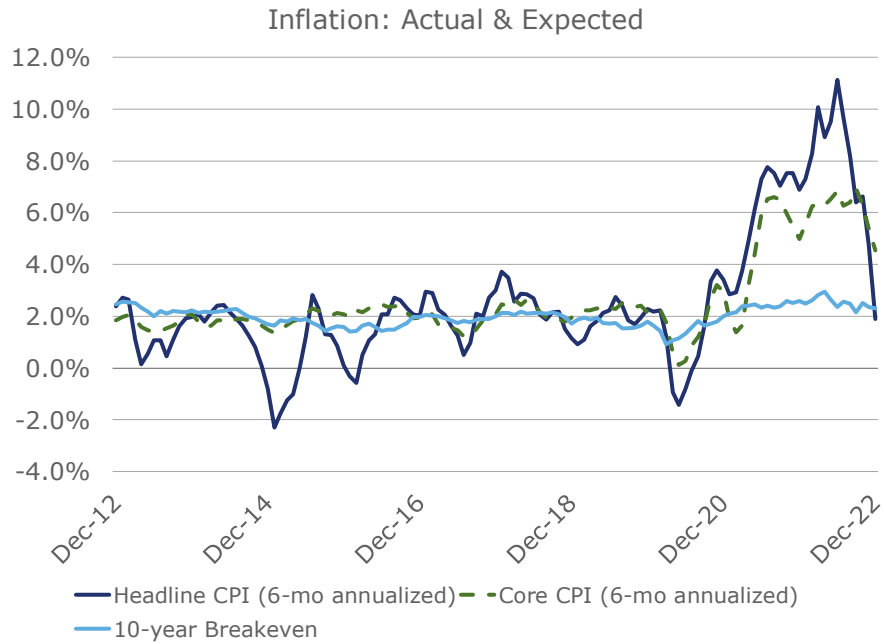
# Business Activity



Data Sources: Bloomberg



# Inflation and Employment

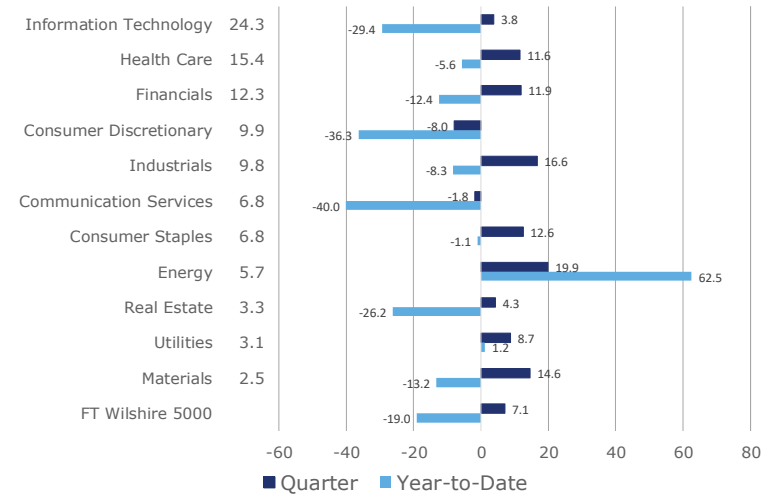


Data Sources: Bloomberg

## U.S. Equity Market

As of 12/30/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
FT Wilshire 5000	7.1	-19.0	-19.0	7.4	9.0	12.3
Wilshire U.S. Large Cap	7.1	-19.0	-19.0	7.7	9.4	12.6
Wilshire U.S. Small Cap	7.9	-18.7	-18.7	4.4	5.1	9.7
Wilshire U.S. Large Growth	0.8	-29.5	-29.5	7.1	10.0	13.6
Wilshire U.S. Large Value	13.8	-5.5	-5.5	8.1	8.7	11.5
Wilshire U.S. Small Growth	7.1	-23.1	-23.1	3.2	5.1	9.9
Wilshire U.S. Small Value	8.7	-14.2	-14.2	5.6	5.0	9.3
Wilshire REIT Index	4.0	-26.8	-26.8	-0.5	3.4	6.3
MSCI USA Min. Vol. Index	9.8	-9.2	-9.2	5.1	8.6	11.9
FTSE RAFI U.S. 1000 Index	12.5	-7.4	-7.4	9.6	9.1	12.2

U.S. Sector Weight and Return (%)



Large Cap vs Small Cap



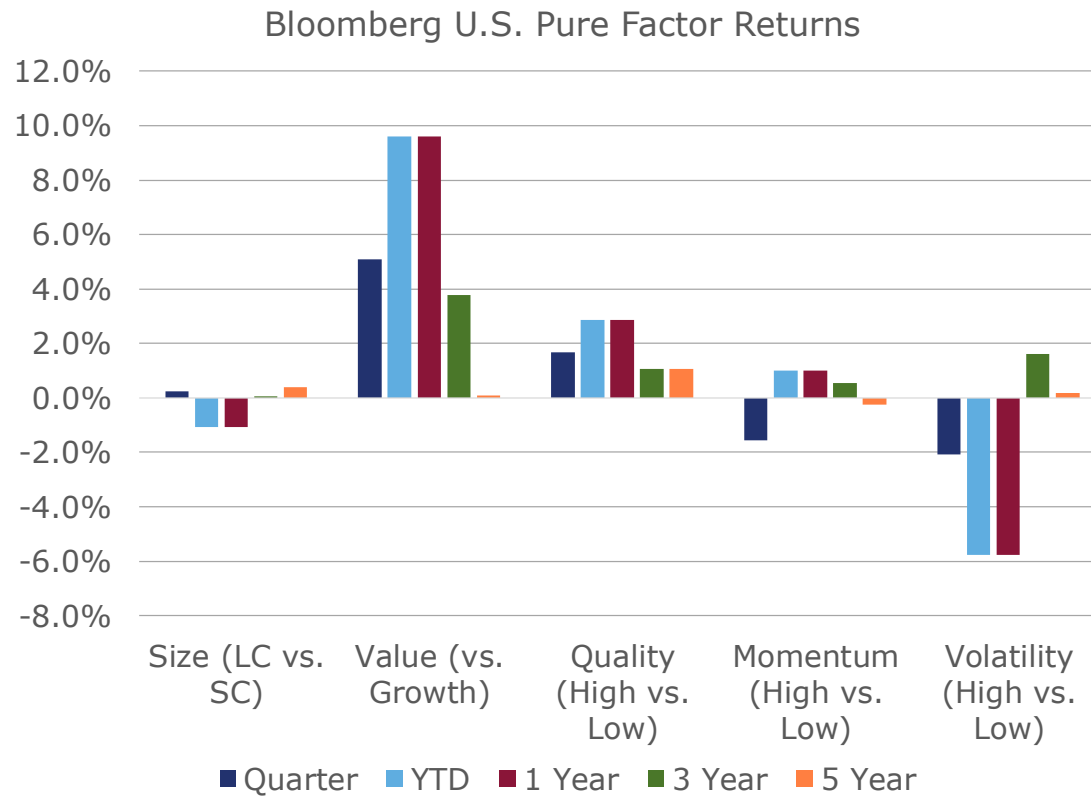
Large Growth vs Large Value



Data Sources: Bloomberg, Wilshire Atlas

## U.S. Factor Returns

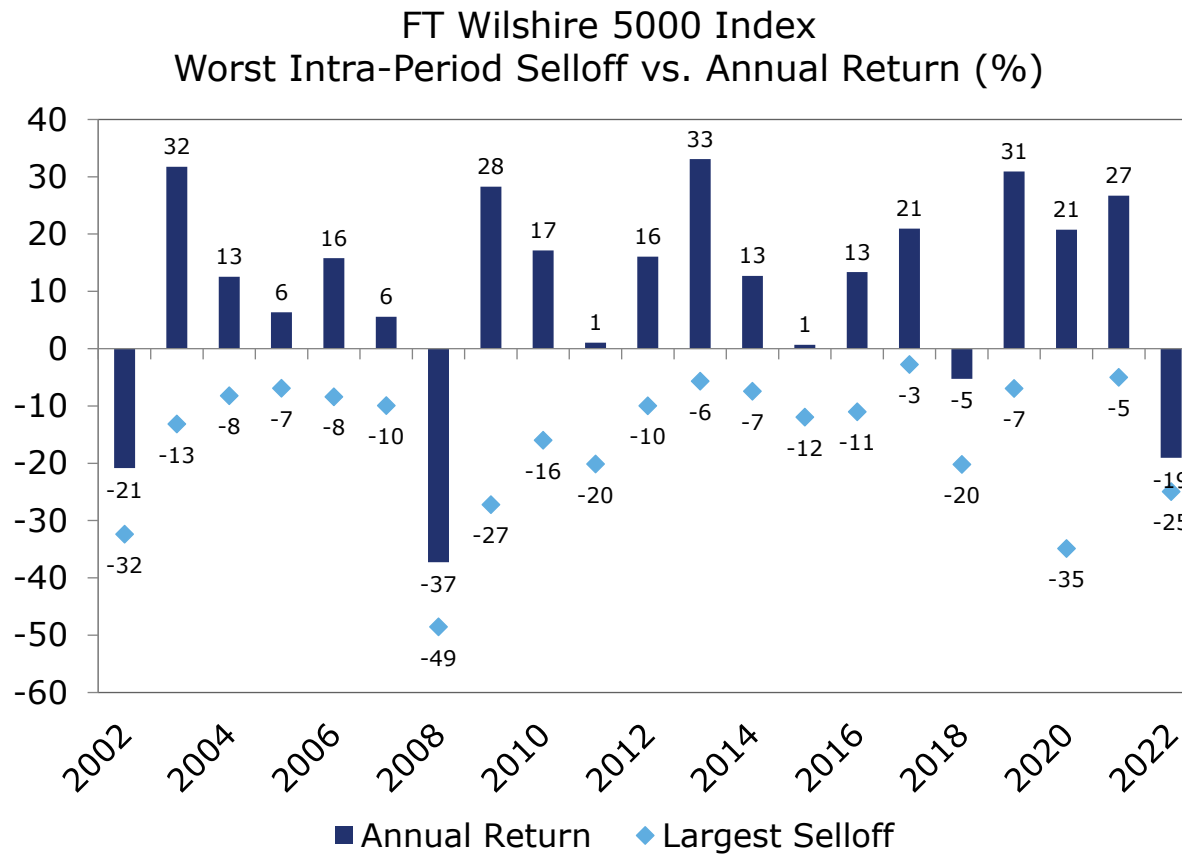
- Factor returns represent the contribution from large cap, value, etc. stocks within Bloomberg’s Portfolio & Risk Analytics module
- Value and low volatility have mostly outperformed this year



Data Sources: Bloomberg

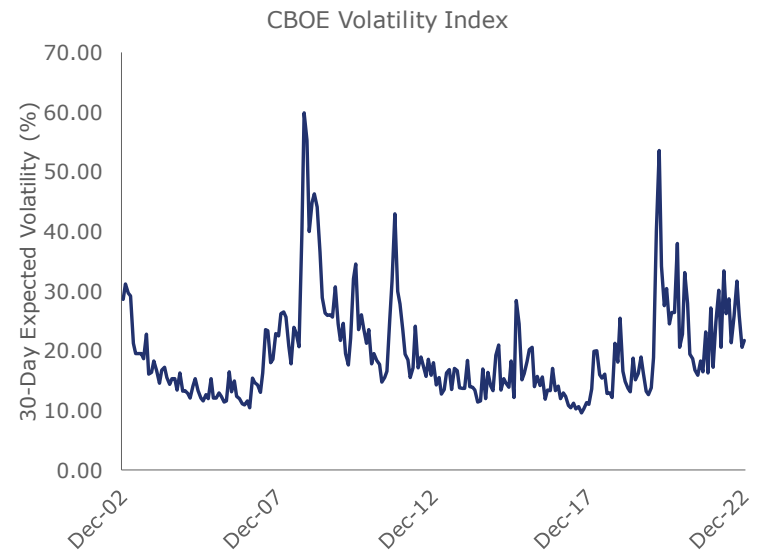
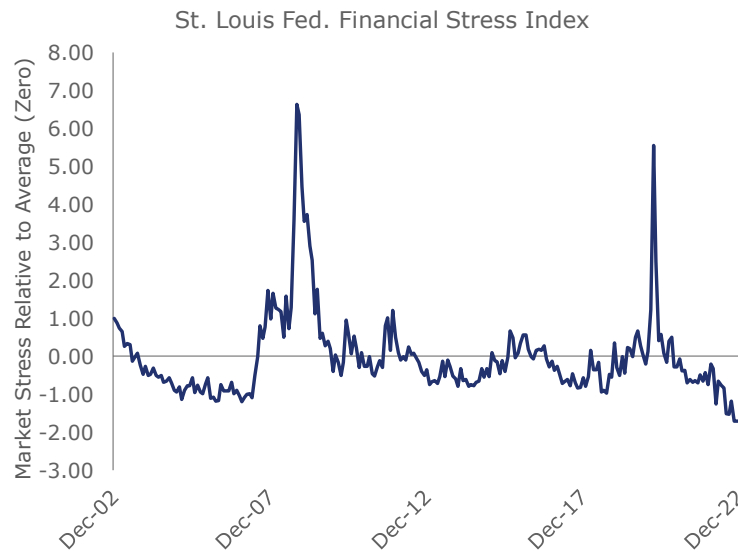
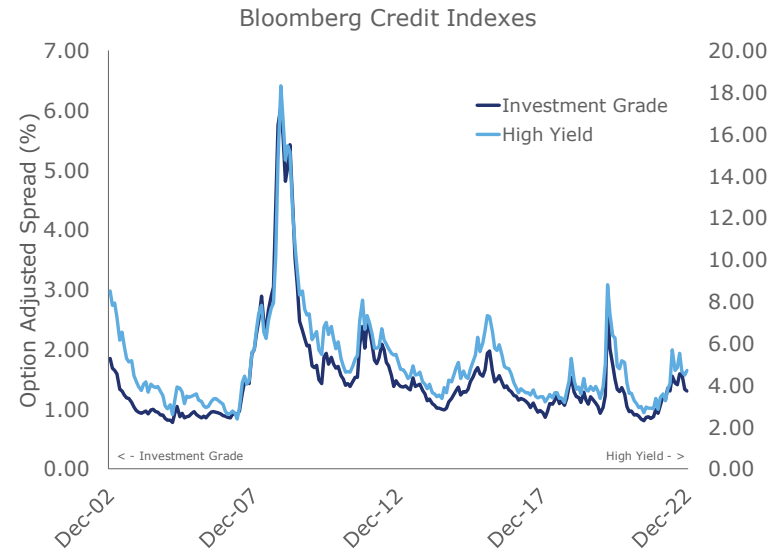
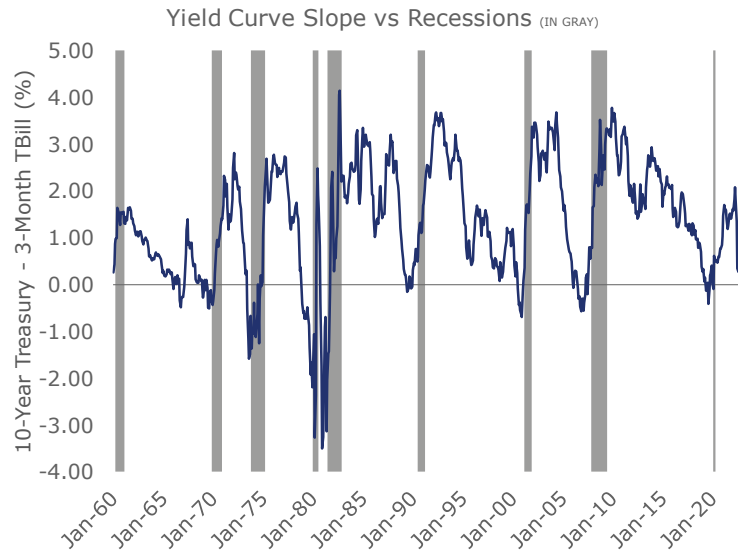
# Annual Equity Market Selloffs

U.S. equity suffered its worse year since the 2008 global financial crisis



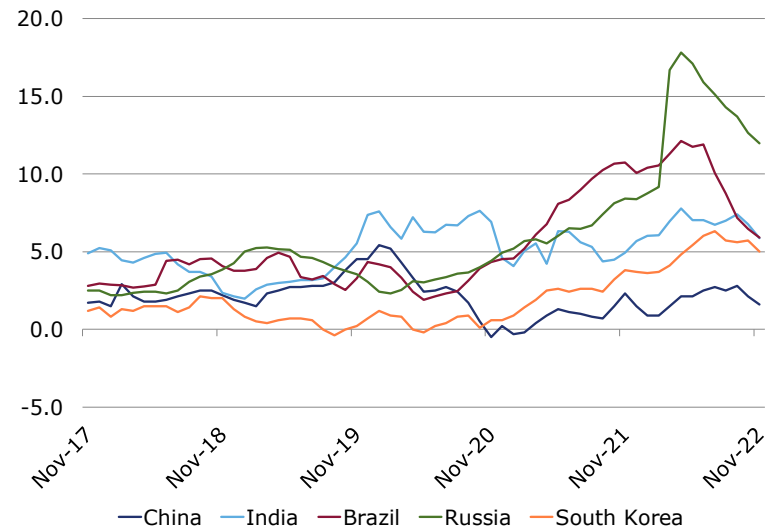
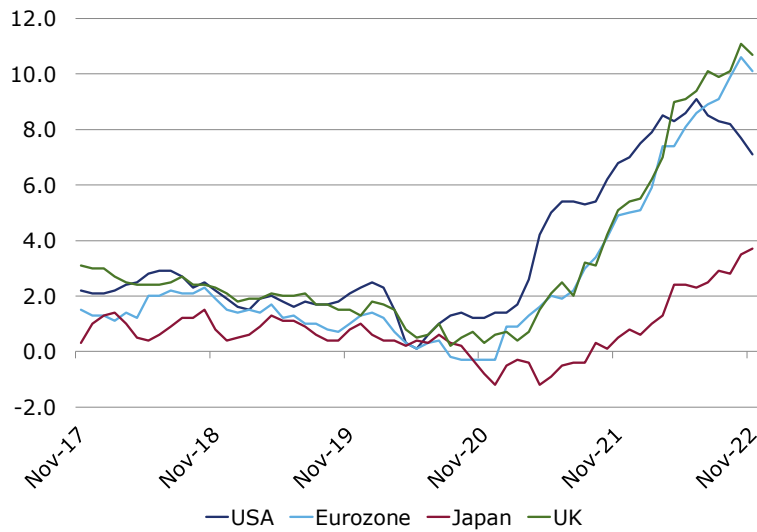
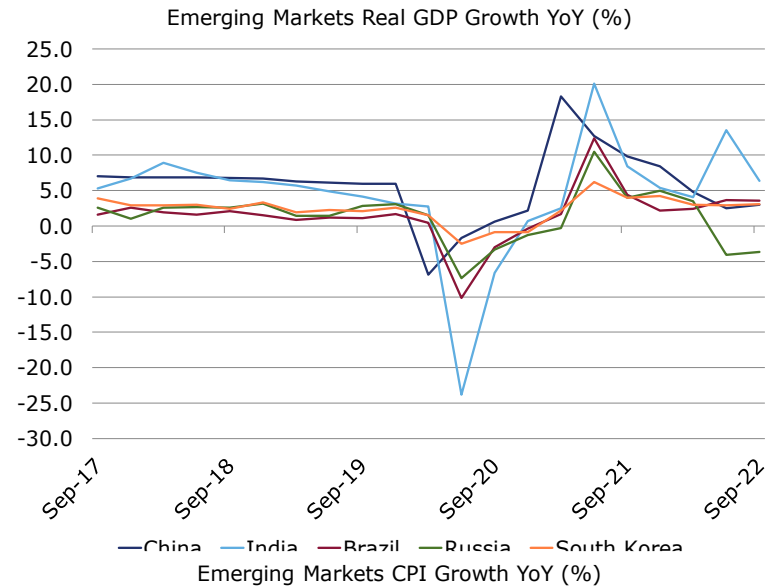
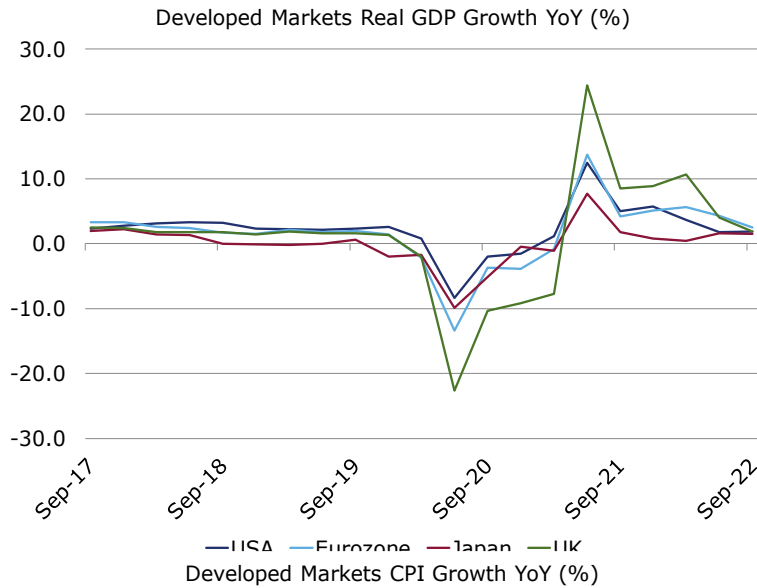
Data Sources: Wilshire Web, Bloomberg

# Risk Monitor



Data Sources: Bloomberg

# Non-U.S. Growth and Inflation

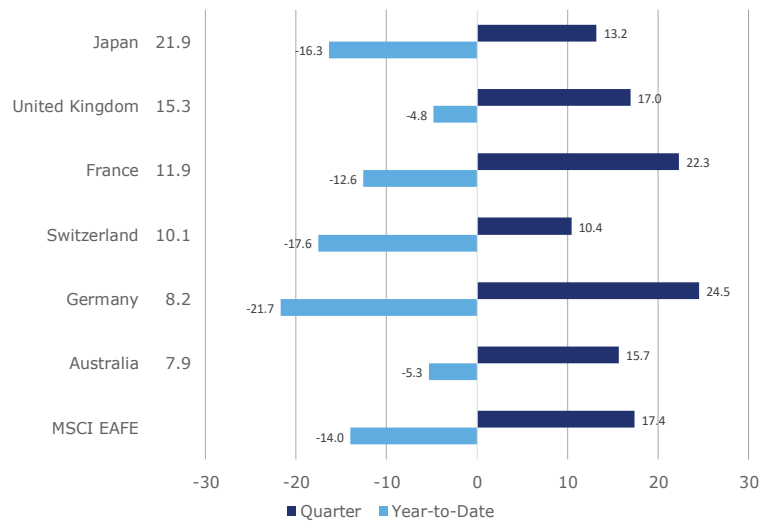


Data Sources: Bloomberg

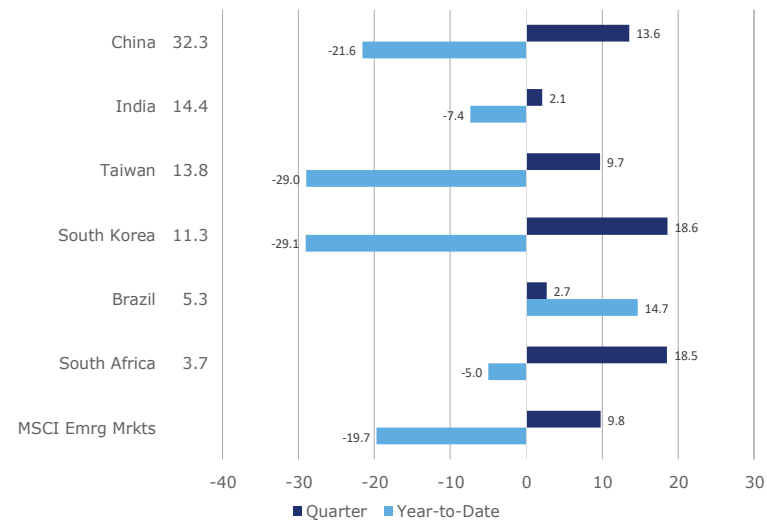
# Non-U.S. Equity Market

As of 12/30/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
MSCI ACWI ex-US (\$G)	14.4	-15.6	-15.6	0.5	1.4	4.3
MSCI EAFE (\$G)	17.4	-14.0	-14.0	1.3	2.0	5.2
MSCI Emerging Markets (\$G)	9.8	-19.7	-19.7	-2.3	-1.0	1.8
MSCI Frontier Markets (\$G)	9.2	-17.8	-17.8	-5.7	-3.8	0.2
MSCI ACWI ex-US Growth (\$G)	12.9	-22.8	-22.8	-0.1	1.8	5.0
MSCI ACWI ex-US Value (\$G)	15.7	-8.7	-8.7	0.8	0.6	3.6
MSCI ACWI ex-US Small (\$G)	13.4	-19.6	-19.6	1.5	1.1	5.6
MSCI ACWI Minimum Volatility	8.6	-9.8	-9.8	2.2	5.2	8.4
MSCI EAFE Minimum Volatility	12.5	-14.6	-14.6	-2.6	0.6	5.1
FTSE RAFI Developed ex-US	18.3	-9.0	-9.0	2.7	1.7	4.9
MSCI EAFE LC (G)	8.8	-6.5	-6.5	4.1	4.3	8.1
MSCI Emerging Markets LC (G)	6.7	-15.2	-15.2	0.5	1.7	5.0

Developed Markets Weight and Return (%)



Emerging Markets Weight and Return (%)

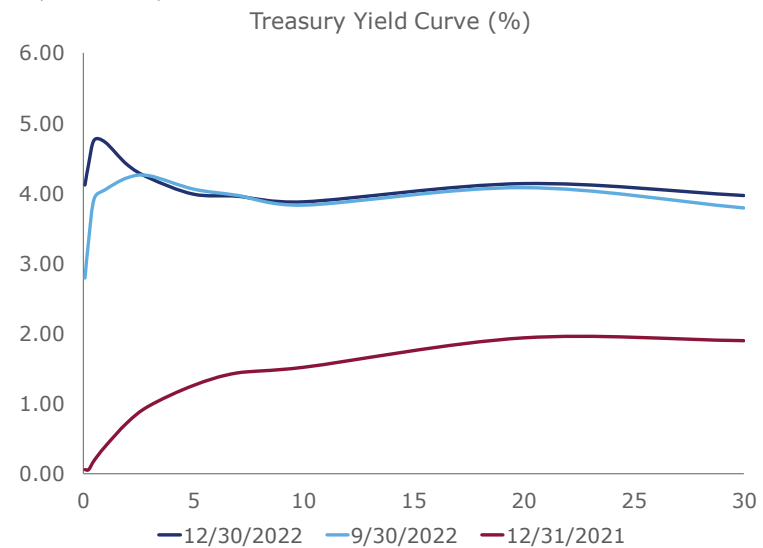
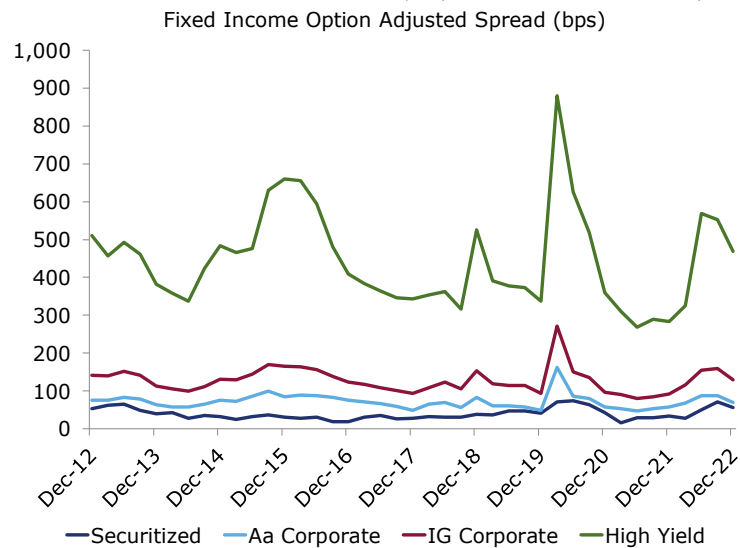


Data Sources: Bloomberg

# U.S. Fixed Income

As of 12/30/2022	YTW	DUR.	QTR	YTD	1 YR	3 YR	5 YR	10 YR
Bloomberg Aggregate	4.7	6.2	1.9	-13.0	-13.0	-2.7	0.0	1.1
Bloomberg Treasury	4.2	6.1	0.7	-12.5	-12.5	-2.6	-0.1	0.6
Bloomberg Gov't-Rel.	4.8	5.2	1.9	-11.1	-11.1	-2.4	0.3	1.1
Bloomberg Securitized	4.8	5.7	2.0	-11.7	-11.7	-3.1	-0.4	0.8
Bloomberg Corporate	5.4	7.1	3.6	-15.8	-15.8	-2.9	0.5	2.0
Bloomberg LT Gov't/Credit	4.9	14.3	2.6	-27.1	-27.1	-6.2	-1.2	1.6
Bloomberg LT Treasury	4.1	16.2	-0.6	-29.3	-29.3	-7.4	-2.2	0.6
Bloomberg LT Gov't-Rel.	5.5	11.6	4.2	-22.7	-22.7	-5.9	-0.8	1.6
Bloomberg LT Corporate	5.6	13.0	5.4	-25.6	-25.6	-5.7	-0.8	2.2
Bloomberg U.S. TIPS *	3.8	7.6	2.0	-11.8	-11.8	1.2	2.1	1.1
Bloomberg High Yield	9.0	3.9	4.2	-11.2	-11.2	0.0	2.3	4.0
S&P/LSTA Leveraged Loan	9.1	0.3	2.7	-0.6	-0.6	2.5	3.3	3.7
Treasury Bills	4.4	0.3	0.9	1.3	1.3	0.7	1.2	0.8

\* Yield and Duration statistics are for a proxy index based on similar maturity, the Bloomberg Barclays U.S. Treasury 7-10 Year Index



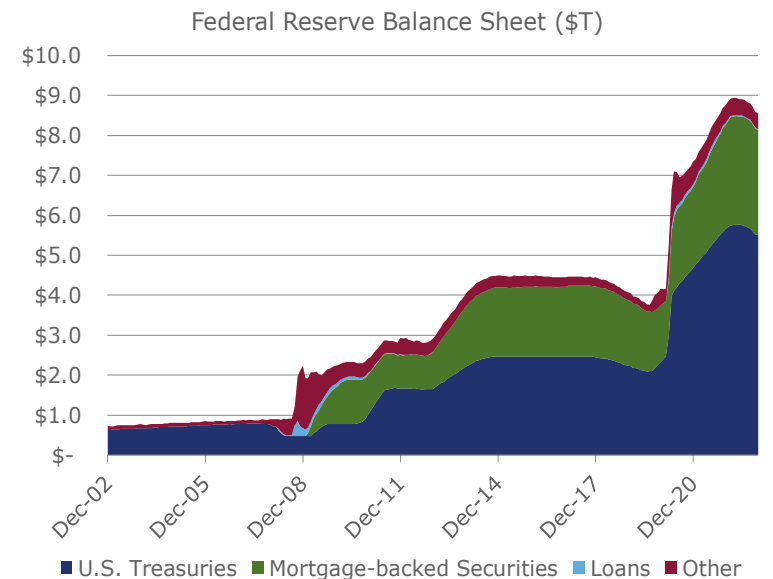
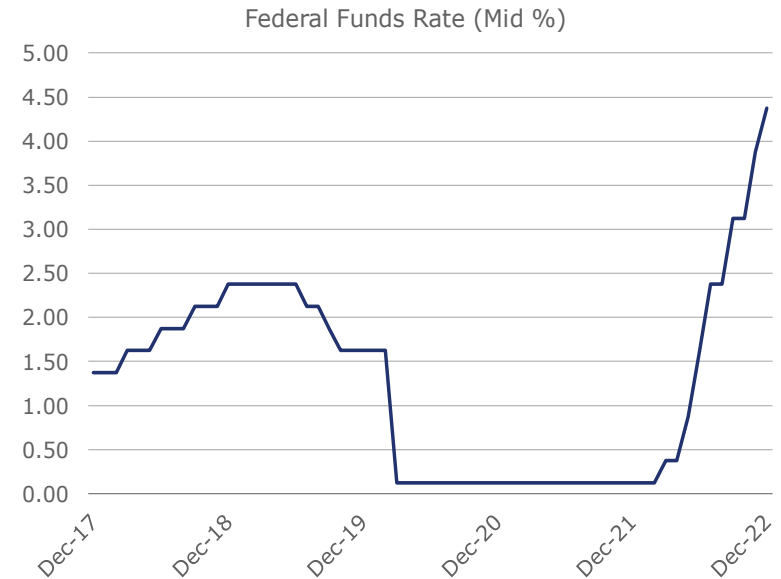
Data Sources: Bloomberg



# Federal Reserve

- After 300 basis point increase in the Fed-funds rate through September, the FOMC increased the rate an additional 125 basis points during Q4
- Federal Reserve has added more than \$4.5 trillion in assets to their balance sheet during the past two years
- QE4 was larger than the 3 phases of quantitative easing – combined – following the global financial crisis

	Announced	Closed	Amount (bil)
QE1	11/25/2008	3/31/2010	\$1,403
QE2	11/3/2010	6/29/2012	\$568
QE3	9/13/2012	10/29/2014	\$1,674
QE4	3/23/2020	3/15/2022	\$4,779

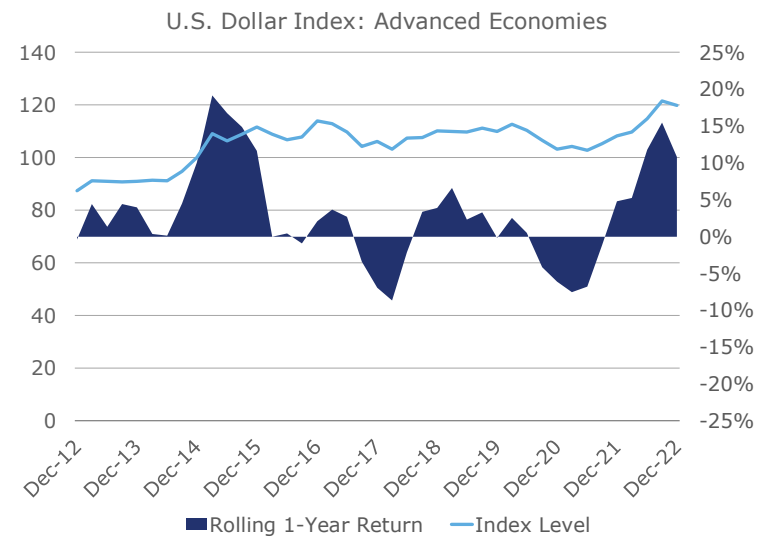
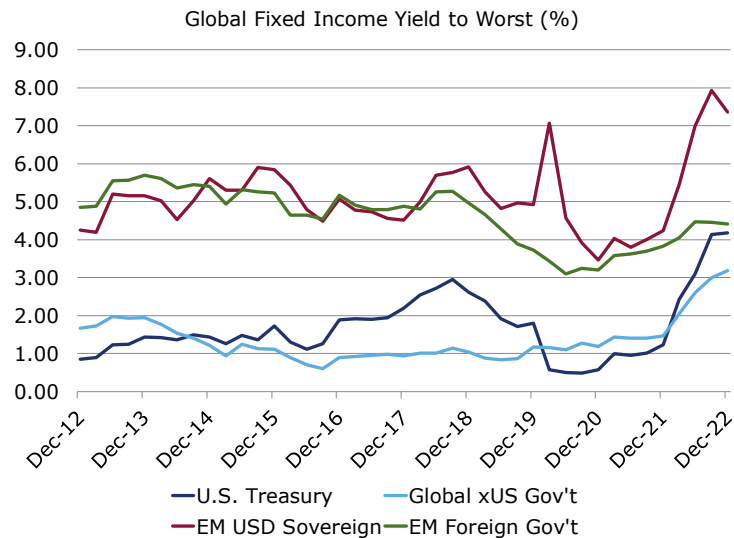


Data Sources: Bloomberg

# Non-U.S. Fixed Income

As of 12/30/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
<b>Developed Markets</b>						
Bloomberg Global Aggregate xUS	6.8	-18.7	-18.7	-5.9	-3.1	-1.6
Bloomberg Global Aggregate xUS *	0.2	-9.8	-9.8	-2.6	0.5	2.1
Bloomberg Global Inflation Linked xUS	5.8	-29.6	-29.6	-7.0	-4.0	-0.9
Bloomberg Global Inflation Linked xUS *	-1.7	-21.1	-21.1	-3.5	-0.4	2.7
<b>Emerging Markets (Hard Currency)</b>						
Bloomberg EM USD Aggregate	6.6	-15.3	-15.3	-3.9	-0.4	1.7
<b>Emerging Markets (Foreign Currency)</b>						
Bloomberg EM Local Currency Gov't	5.9	-8.4	-8.4	-1.7	0.1	0.2
Bloomberg EM Local Currency Gov't *	1.9	-2.7	-2.7	-0.3	2.0	1.9
Euro vs. Dollar	9.2	-5.8	-5.8	-1.5	-2.3	-2.1
Yen vs. Dollar	10.4	-12.2	-12.2	-6.1	-3.0	-4.0
Pound vs. Dollar	8.2	-10.7	-10.7	-3.0	-2.2	-2.9

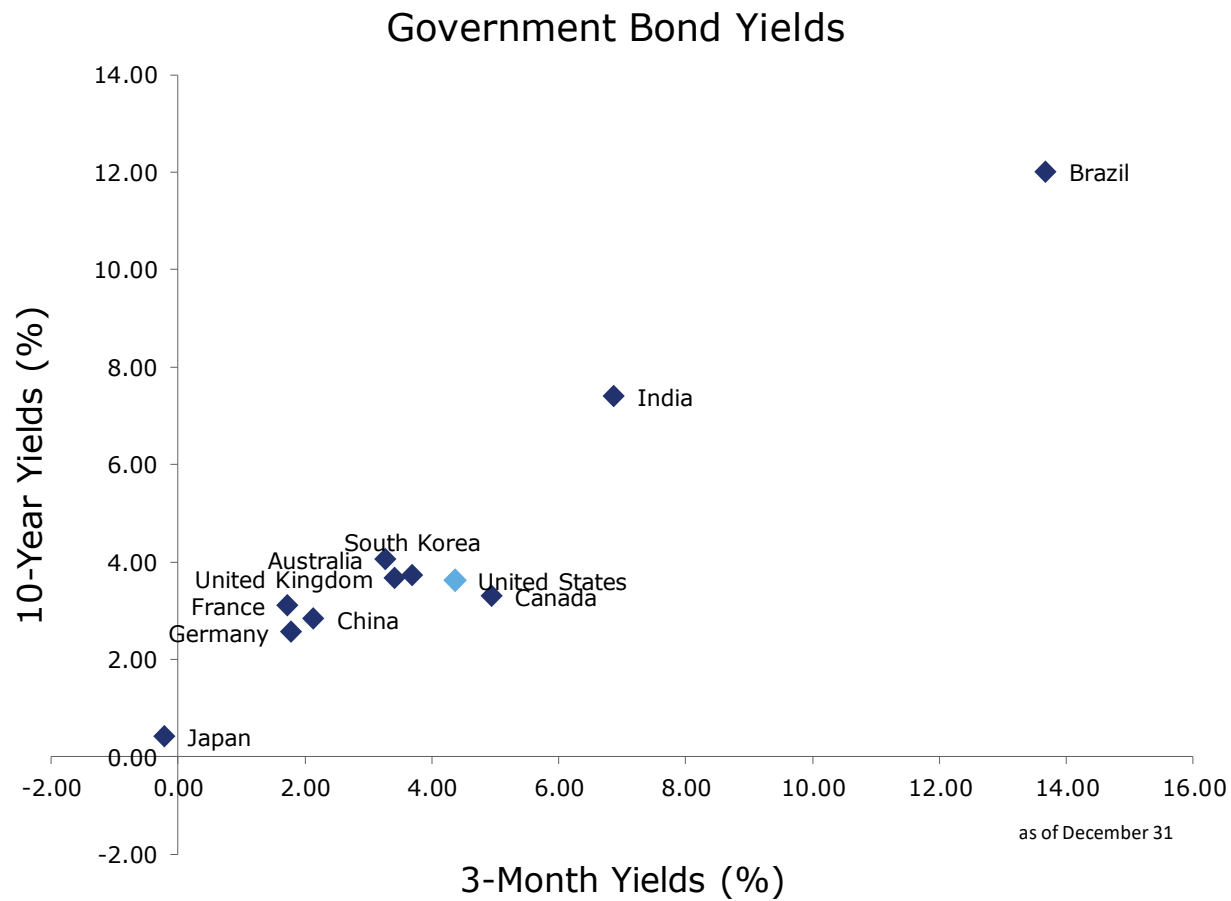
\* Returns are reported in terms of local market investors, which removes currency effects.



Data Sources: Bloomberg

# Global Interest Rates

Short-term rates have turned positive in most larger countries; longer-term rates around 4% in the U.K., Australia, South Korea and the U.S.

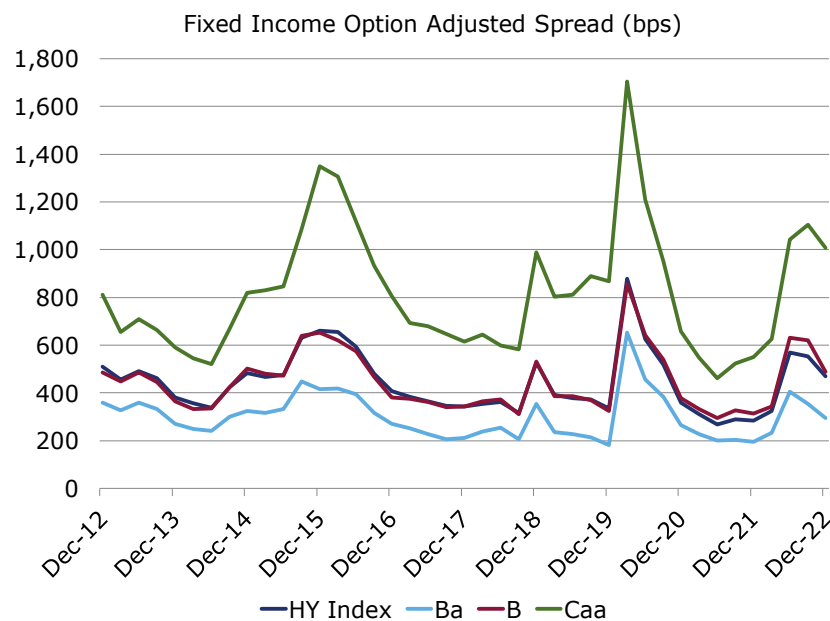


Data Sources: Bloomberg

# High Yield Bond Market

As of 12/31/2022

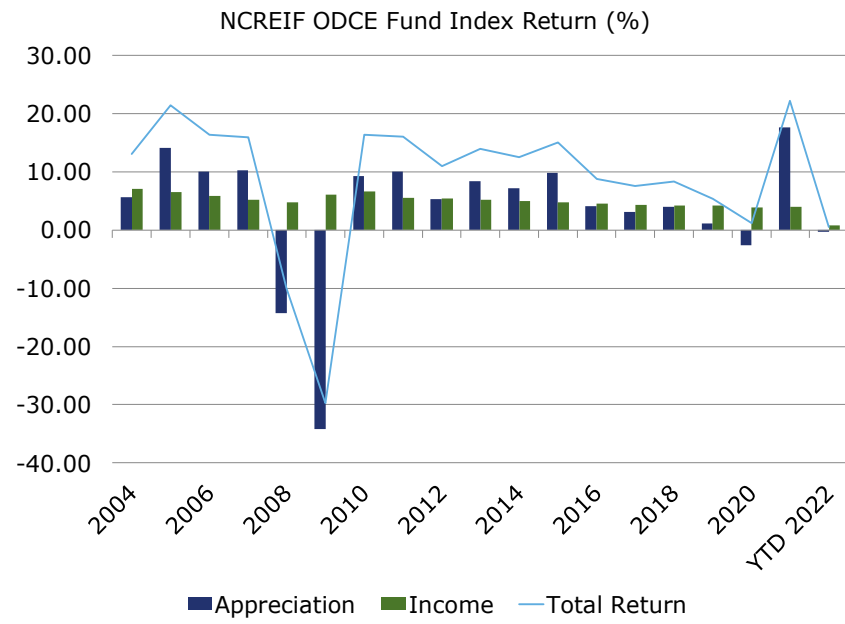
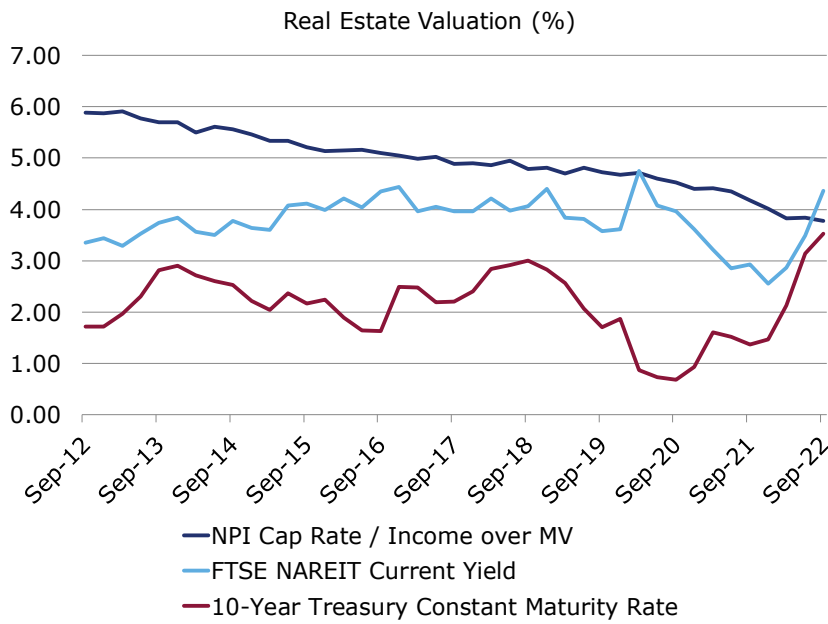
	YTW	QTR	YTD	1 YR	3 YR	5 YR	10 YR
Bloomberg High Yield	9.0	4.2	-11.2	-11.2	0.0	2.3	4.0
S&P LSTA Leveraged Loan	9.1	3.8	-0.6	-0.6	1.9	3.1	3.2
<b>High Yield Quality Distribution</b>	<b>Weight</b>						
Ba U.S. High Yield	49.9%	7.2	4.3	-10.8	-10.8	0.9	3.0
B U.S. High Yield	38.6%	9.2	4.9	-10.3	-10.3	-0.5	2.2
Caa U.S. High Yield	10.7%	14.3	0.5	-16.3	-16.3	-2.4	3.5
Ca to D U.S. High Yield	0.7%	36.3	13.8	-10.4	-10.4	1.1	-5.0



Data Sources: Bloomberg

# Real Assets

As of 12/30/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
Bloomberg U.S. TIPS	2.0	-11.8	-11.8	1.2	2.1	1.1
Bloomberg Commodity Index	2.2	16.1	16.1	12.7	6.4	-1.3
Bloomberg Gold Index	9.5	-0.7	-0.7	4.7	5.7	0.0
Wilshire Global RESI Index	6.4	-24.9	-24.9	-2.7	1.6	4.8
NCREIF ODCE Fund Index	0.0	13.1	13.1	11.8	9.8	10.7
NCREIF Timberland Index	0.0	7.6	7.6	5.8	4.4	5.3
FTSE Global Core Infrastructure 50/50	9.2	-4.1	-4.1	2.3	5.5	7.9
Alerian Midstream Energy	8.4	21.5	21.5	8.8	6.8	n.a.
Bitcoin	-14.9	-64.3	-64.3	32.2	3.3	103.6



Data Sources: Bloomberg, National Council of Real Estate Investment Fiduciaries

# Asset Class Performance

Asset Class Returns - Best to Worst

2017	2018	2019	2020	2021	2022 YTD	Annualized 5-Year as of 12/22
Emrg Mrkts 37.7%	T-Bills 1.9%	U.S. Equity 31.0%	U.S. Equity 20.8%	REITs 46.2%	Commodities 16.1%	U.S. Equity 9.0%
Developed 25.6%	Core Bond 0.0%	REITs 25.8%	Emrg Mrkts 18.7%	Commodities 27.1%	T-Bills 1.3%	Commodities 6.4%
U.S. Equity 21.0%	U.S. TIPS -1.3%	Developed 22.7%	U.S. TIPS 11.0%	U.S. Equity 26.7%	High Yield -11.2%	REITs 3.4%
High Yield 7.5%	High Yield -2.1%	Emrg Mrkts 18.9%	Developed 8.3%	Developed 11.8%	U.S. TIPS -11.8%	High Yield 2.3%
REITs 4.2%	REITs -4.8%	High Yield 14.3%	Core Bond 7.5%	U.S. TIPS 6.0%	Core Bond -13.0%	U.S. TIPS 2.1%
Core Bond 3.6%	U.S. Equity -5.3%	Core Bond 8.7%	High Yield 7.1%	High Yield 5.3%	Developed -14.0%	Developed 2.0%
U.S. TIPS 3.0%	Commodities -11.2%	U.S. TIPS 8.4%	T-Bills 0.7%	T-Bills 0.0%	U.S. Equity -19.0%	T-Bills 1.2%
Commodities 1.7%	Developed -13.4%	Commodities 7.7%	Commodities -3.1%	Core Bond -1.5%	Emrg Mrkts -19.7%	Core Bond 0.0%
T-Bills 0.8%	Emrg Mrkts -14.2%	T-Bills 2.3%	REITs -7.9%	Emrg Mrkts -2.2%	REITs -26.8%	Emrg Mrkts -1.0%

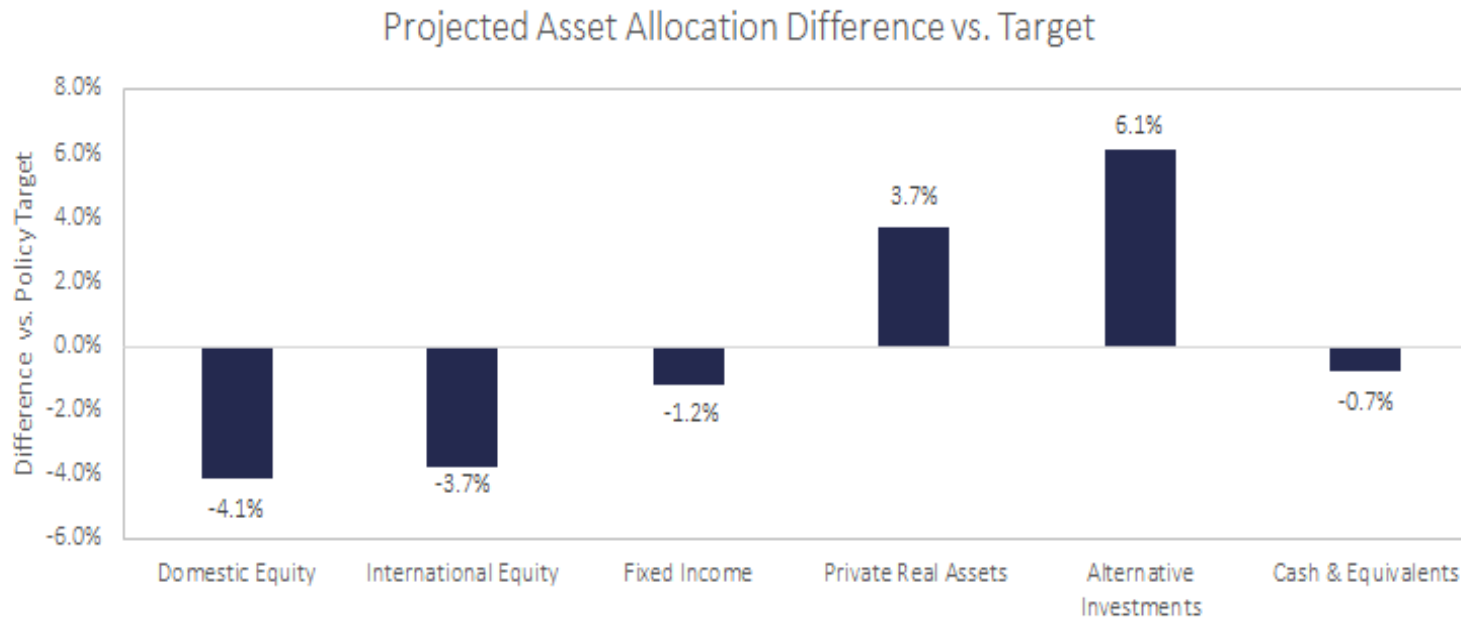
Data Sources: Bloomberg

Note: Developed asset class is developed equity markets ex-U.S., ex-Canada

# Total Fund

# Projected Deviations from the Benchmark

As of December 31, 2022



- Includes committed, but unfunded amounts for Real Assets (\$1.97 billion) and Alternatives (\$2.41 billion). Assumes Real Assets and Alternatives allocations are fully funded as of month-end.
- Assumes that outstanding commitments are funded from a basket of public markets asset classes (Domestic Equity, International Equity and/or Fixed Income) that best reflects the expectations of risk, yield and regional allocations of the asset class.

Alternatives Proxy: 60% Domestic Equity, 40% International Equity

Real Assets Proxy: 50% Domestic Equity, 30% International Equity, 20% Fixed Income

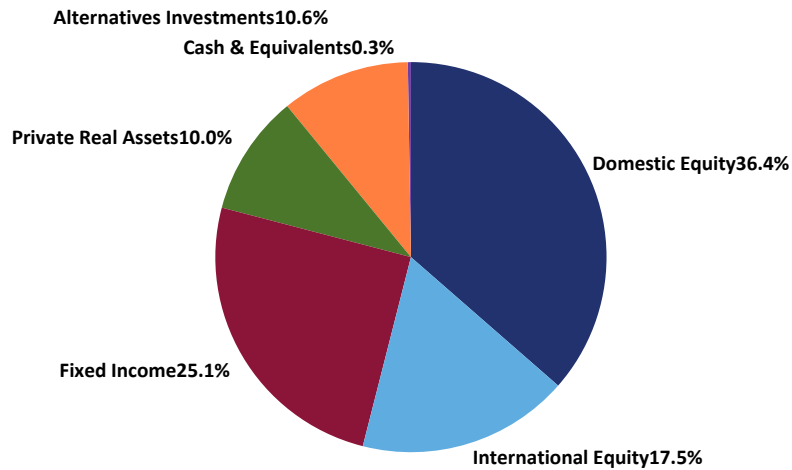


# Asset Allocation

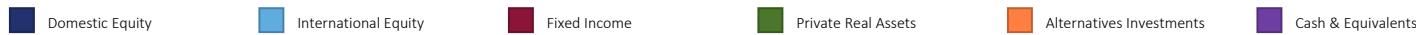
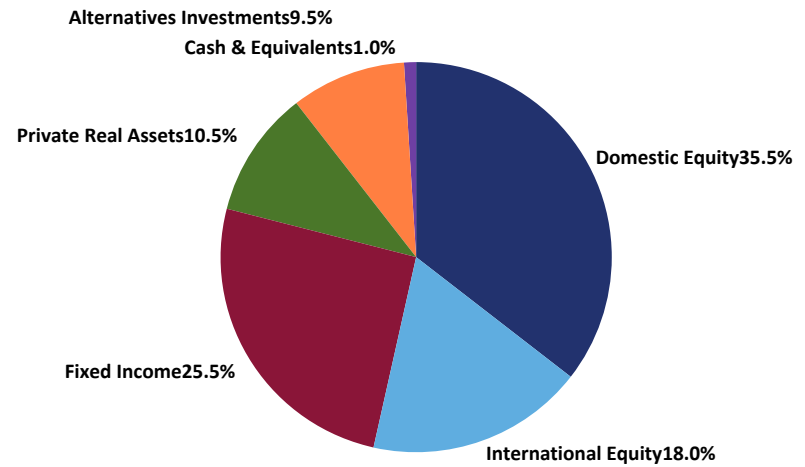
Total Fund

Periods Ended As of December 31, 2022

Actual Allocation



Target Allocation



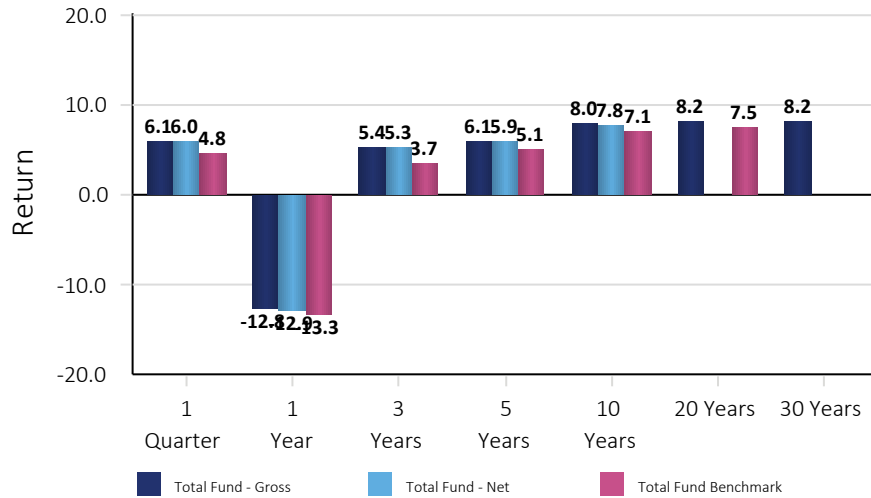
	Actual Allocation \$Millions	Actual Allocation %	Target Allocation %	Differences %	Differences \$Millions
Total Fund	47,875	100.0	100.0	0.0	
Domestic Equity	17,449	36.4	35.5	0.9	453
International Equity	8,387	17.5	18.0	-0.5	-230
Fixed Income	12,028	25.1	25.5	-0.4	-180
Private Real Assets	4,792	10.0	10.5	-0.5	-235
Alternatives Investments	5,098	10.6	9.5	1.1	550
Cash & Equivalents	121	0.3	1.0	-0.7	-357

# Composite Performance Summary

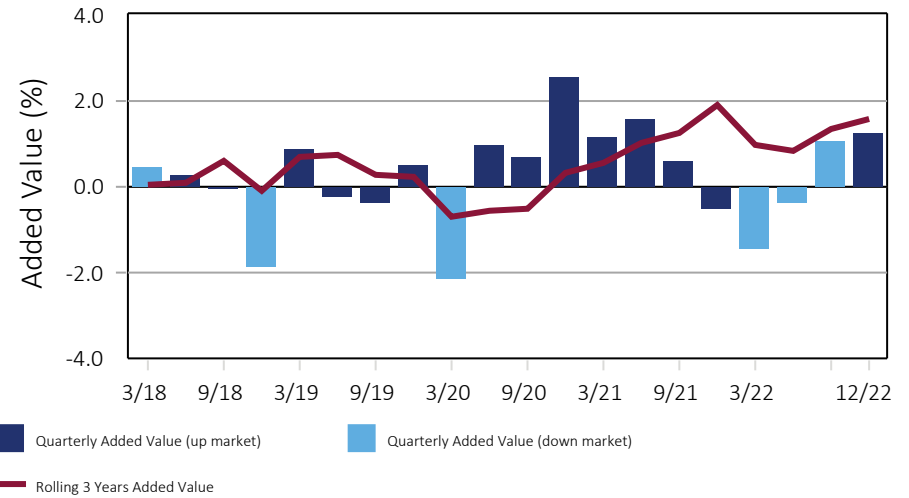
## Total Fund

Periods Ended December 31, 2022

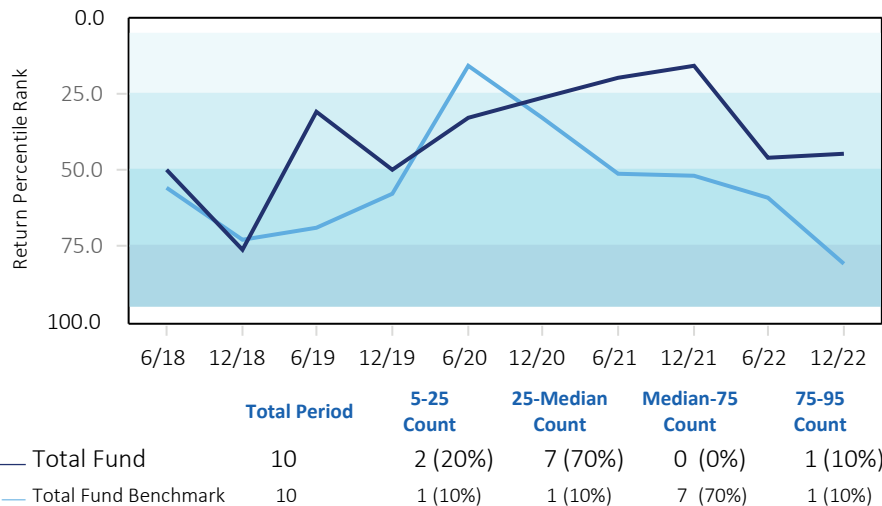
### Comparative Performance



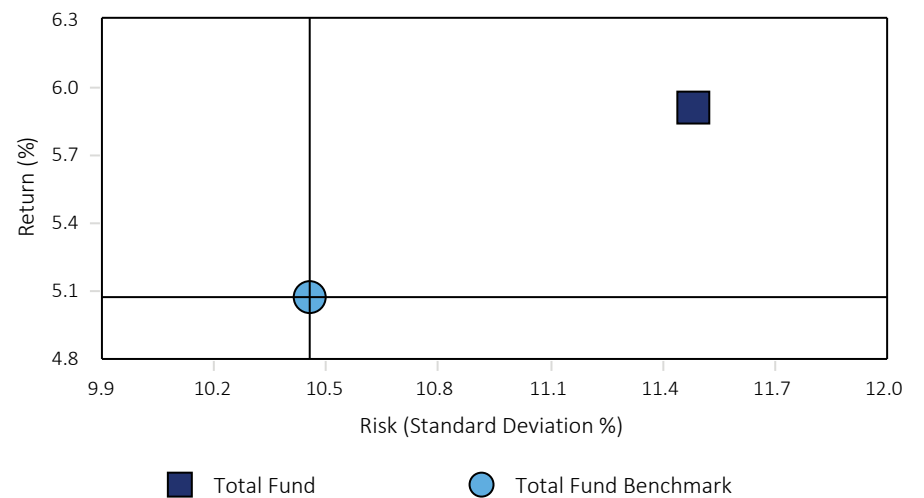
### Added Value History



### Rolling Percentile Rank : All Public Plans > \$1B - Total Fund



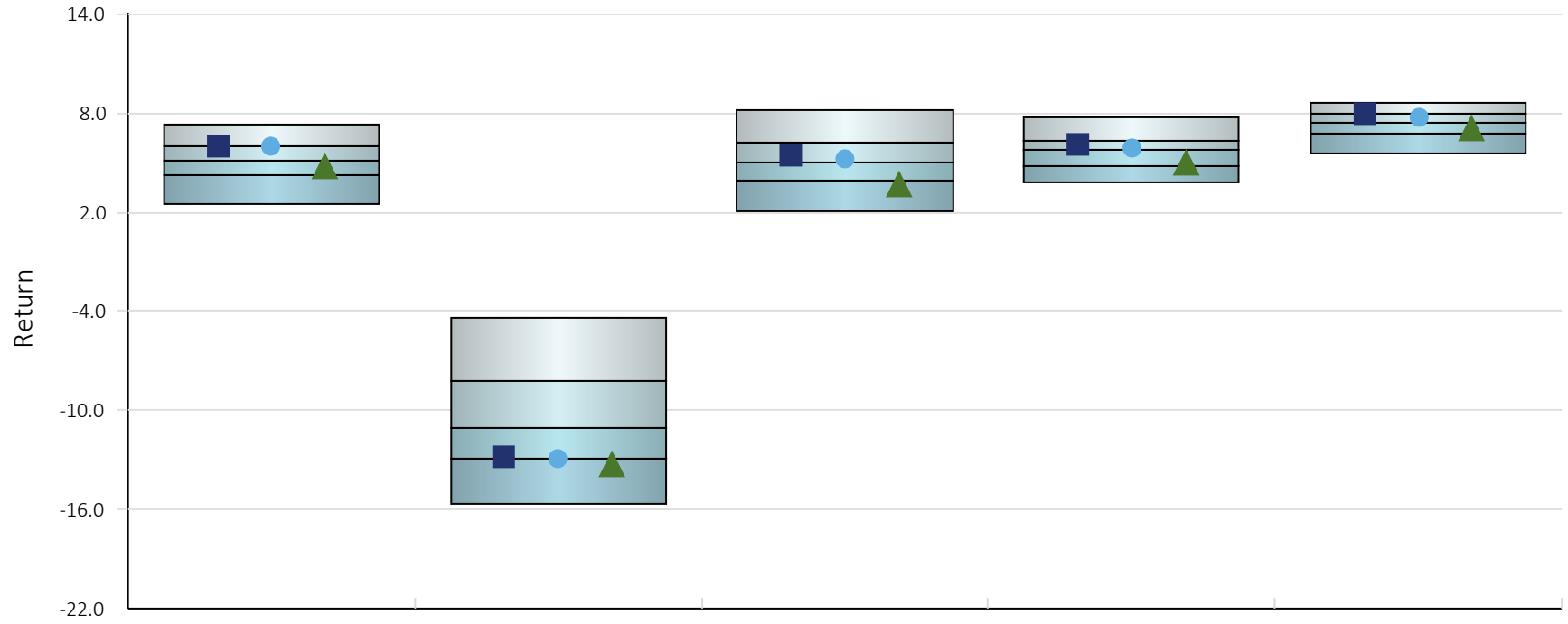
### Risk and Return 01/01/18 - 12/31/22



# Plan Sponsor Peer Group Analysis

Total Fund vs All Public Plans > \$1B-Total Fund(Gross)

Periods Ended December 31, 2022



	QTD	1 Year	3 Years	5 Years	10 Years
■ Total Fund	6.06 (25)	-12.77 (73)	5.43 (44)	6.09 (38)	8.01 (24)
● Total Fund - Net	6.02 (26)	-12.90 (77)	5.25 (45)	5.92 (46)	7.80 (33)
▲ Total Fund Benchmark	4.77 (63)	-13.26 (79)	3.66 (81)	5.07 (72)	7.13 (65)
5th Percentile	7.31	-4.41	8.16	7.81	8.65
1st Quartile	6.06	-8.20	6.24	6.36	7.97
Median	5.17	-11.10	4.99	5.78	7.43
3rd Quartile	4.24	-12.87	3.98	4.84	6.76
95th Percentile	2.52	-15.63	2.10	3.79	5.58
Population	142	137	133	132	125

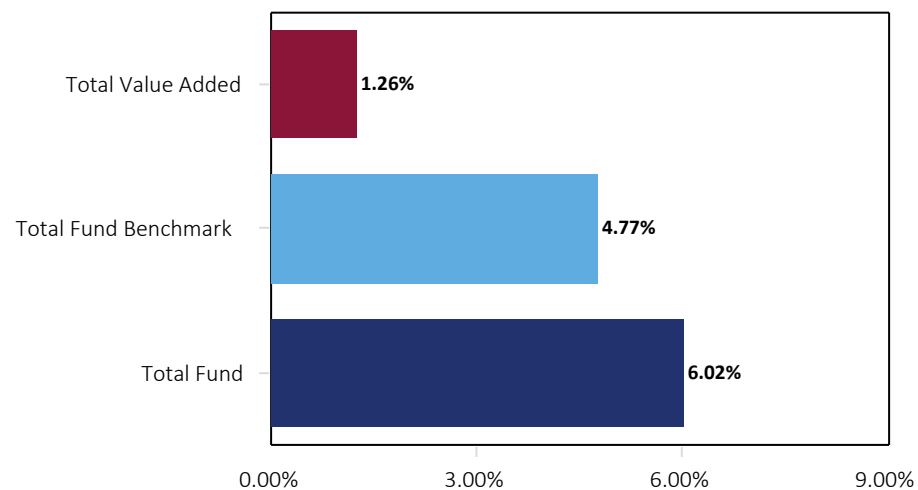
Total Fund Benchmark = 35.5% Domestic Equity Custom Benchmark, 25.5% Fixed Income Custom Benchmark, 18.0% MSCI ACWI ex USA (Net), 10.5% Private Real Assets Custom Benchmark, 9.5% Alternatives Custom Benchmark, 1.0% 90 Day US Treasury Bill.

# Total Fund Attribution

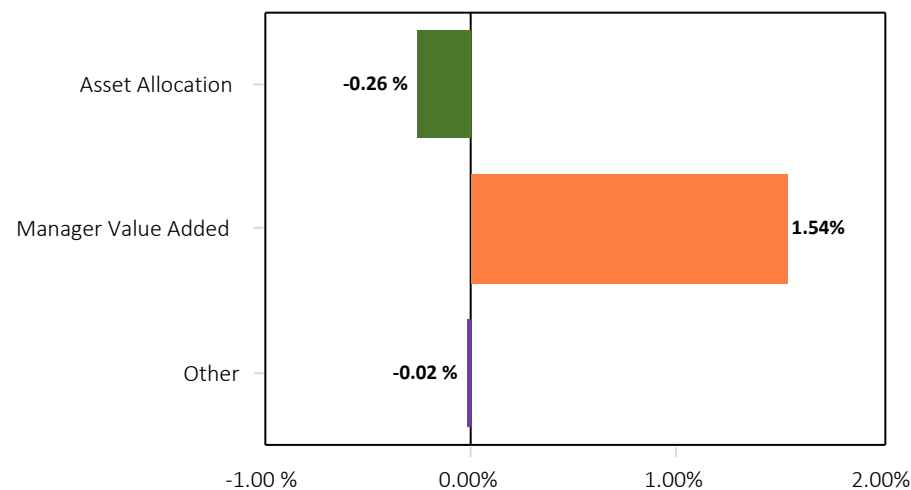
Total Fund

1 Quarter Ending December 31, 2022

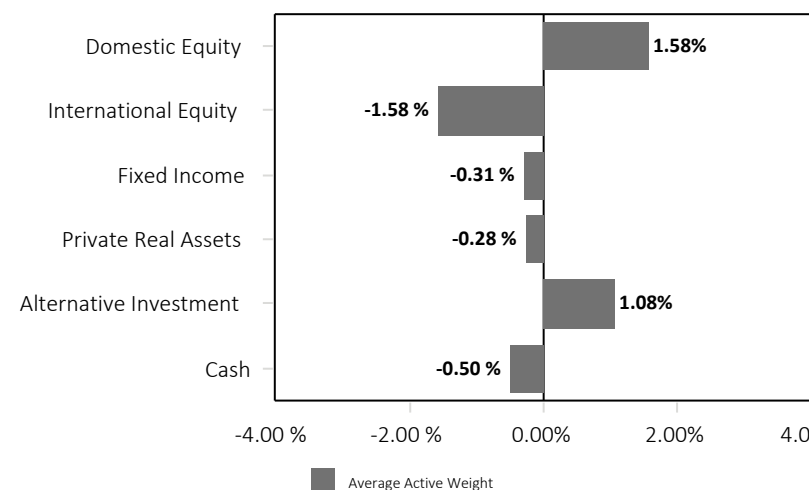
## Total Fund Performance



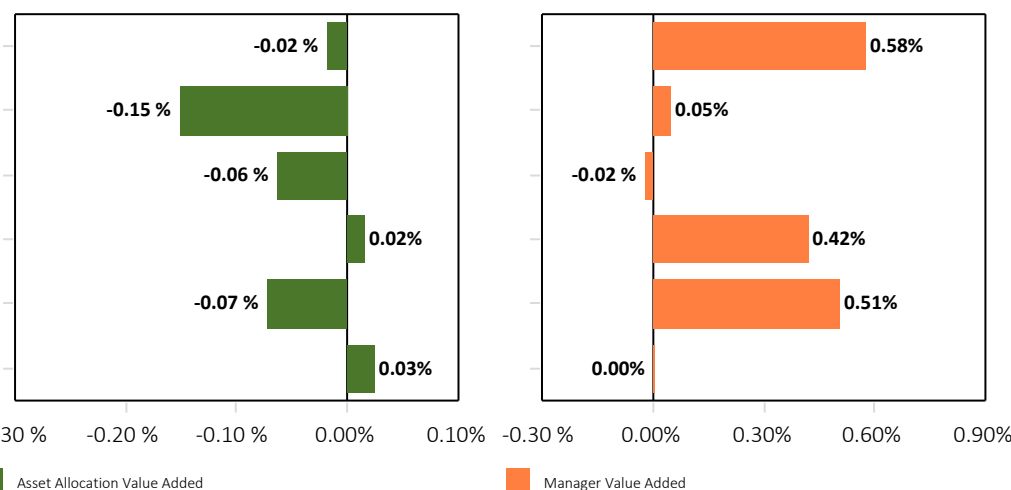
## Total Value Added: 1.26%



## Asset Class Under or Overweighting



## Asset Allocation Value Added: -0.26% Total Manager Value Added: 1.54%

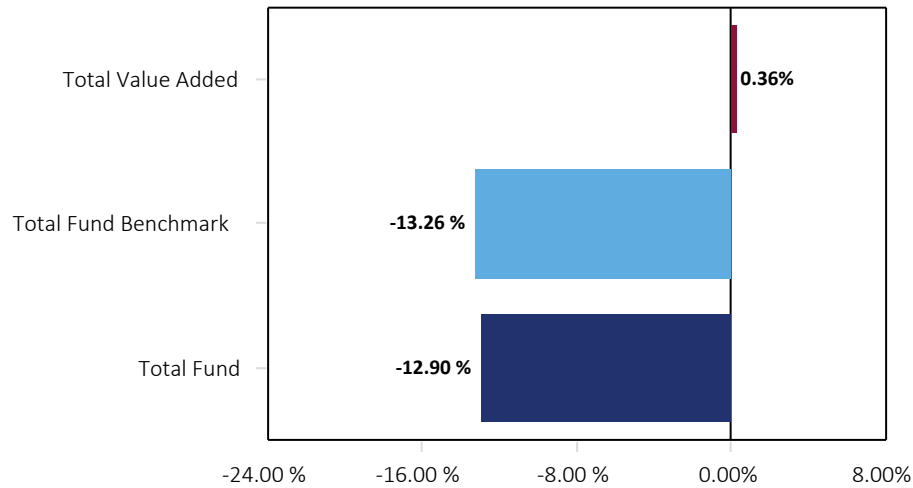


# Total Fund Attribution

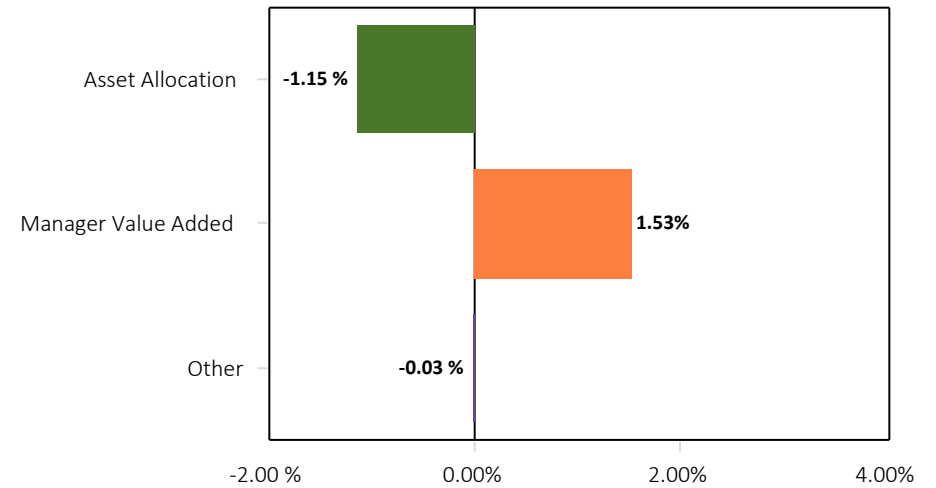
Total Fund

Year To Date Ending December 31, 2022

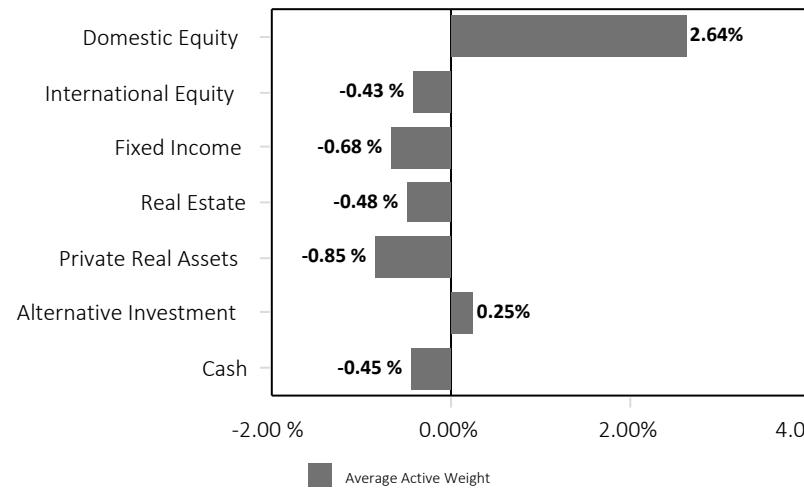
## Total Fund Performance



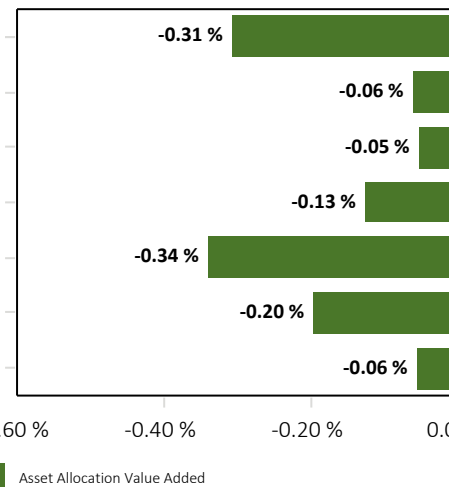
## Total Value Added: 0.36%



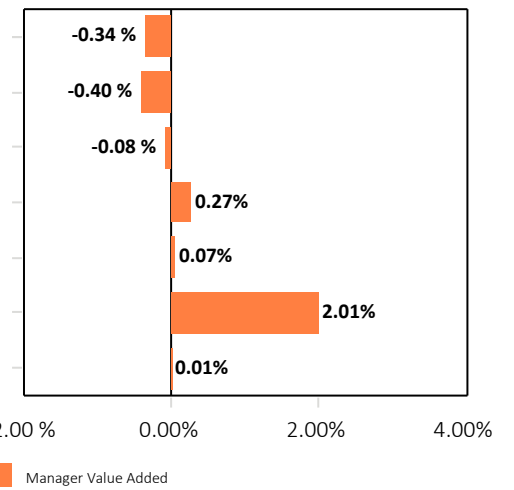
## Asset Class Under or Overweighting



## Asset Allocation Value Added: -1.15%



## Total Manager Value Added: 1.53%



# Asset Class Returns

*Periods Ended December 31, 2022*

	Performance (%)								
	1 Quarter	1 Year	3 Years	5 Years	10 Years	20 Years	30 Years	Since Inception	Inception Date
<b>Total Fund</b>	<b>6.06</b>	<b>-12.77</b>	<b>5.43</b>	<b>6.09</b>	<b>8.01</b>	<b>8.19</b>	<b>8.15</b>	<b>9.56</b>	<b>1/1/1982</b>
Total Fund - Net	6.02	-12.90	5.25	5.92	7.80				
Total Fund Benchmark	4.77	-13.26	3.66	5.07	7.13	7.47			
<b>Domestic Equity</b>	<b>8.94</b>	<b>-19.12</b>	<b>7.24</b>	<b>8.40</b>	<b>11.81</b>	<b>10.13</b>	<b>9.88</b>	<b>11.34</b>	<b>1/1/1982</b>
Domestic Equity - Net	8.91	-19.25	7.06	8.21	11.58				
Custom Benchmark (U.S. Equity)	7.32	-18.53	7.36	8.97	12.21	10.06	9.62		
U.S. Equity IMRF Custom Benchmark	8.34	-18.21	6.65	7.95					
<b>International Equity</b>	<b>14.76</b>	<b>-17.86</b>	<b>0.78</b>	<b>1.70</b>	<b>5.15</b>	<b>7.76</b>	<b>7.24</b>	<b>7.26</b>	<b>9/1/1986</b>
International Equity - Net	14.67	-18.14	0.41	1.35	4.80				
MSCI AC World ex USA (Net)	14.28	-16.00	0.07	0.88	3.80	6.73			
International Equity IMRF Custom Benchmark	13.71	-16.70	-0.17	0.67					
<b>Fixed Income</b>	<b>2.11</b>	<b>-11.83</b>	<b>-1.80</b>	<b>0.68</b>	<b>1.85</b>	<b>4.09</b>	<b>5.17</b>	<b>7.43</b>	<b>1/1/1982</b>
Fixed Income - Net	2.09	-11.90	-1.90	0.57	1.71				
Custom Benchmark (Fixed Income)	2.17	-11.58	-2.18	0.35	1.22	3.18	4.61	6.92	
Fixed Income IMRF Custom Benchmark	2.17	-11.99	-2.17	0.42					
<b>Private Real Assets</b>	<b>-0.87</b>							<b>6.95</b>	<b>3/1/2022</b>
Private Real Assets - Net	-0.88							6.90	
Custom Benchmark (Private Real Assets)	-4.86							6.64	
<b>Real Estate</b>	<b>-1.35</b>	<b>11.77</b>	<b>12.41</b>	<b>11.07</b>	<b>11.06</b>	<b>8.27</b>	<b>7.18</b>	<b>6.09</b>	<b>5/1/1985</b>
Real Estate - Net	-1.36	11.71	12.35	11.02	11.03				
Blended Benchmark (Real Estate)	-5.17	6.54	8.97	7.72	9.11	7.68	7.58	7.80	
<b>Agriculture</b>	<b>2.71</b>	<b>3.98</b>	<b>3.79</b>	<b>1.09</b>	<b>6.57</b>	<b>7.32</b>		<b>6.58</b>	<b>10/1/1997</b>
NCREIF Farmland Index	3.26	9.64	6.82	6.40	8.83	12.53		11.21	

Benchmark definitions are on the following pages.

Real Estate, Private Equity, Agriculture, Timberland, Unlisted Infrastructure returns shown are gross of fees.

# Asset Class Returns

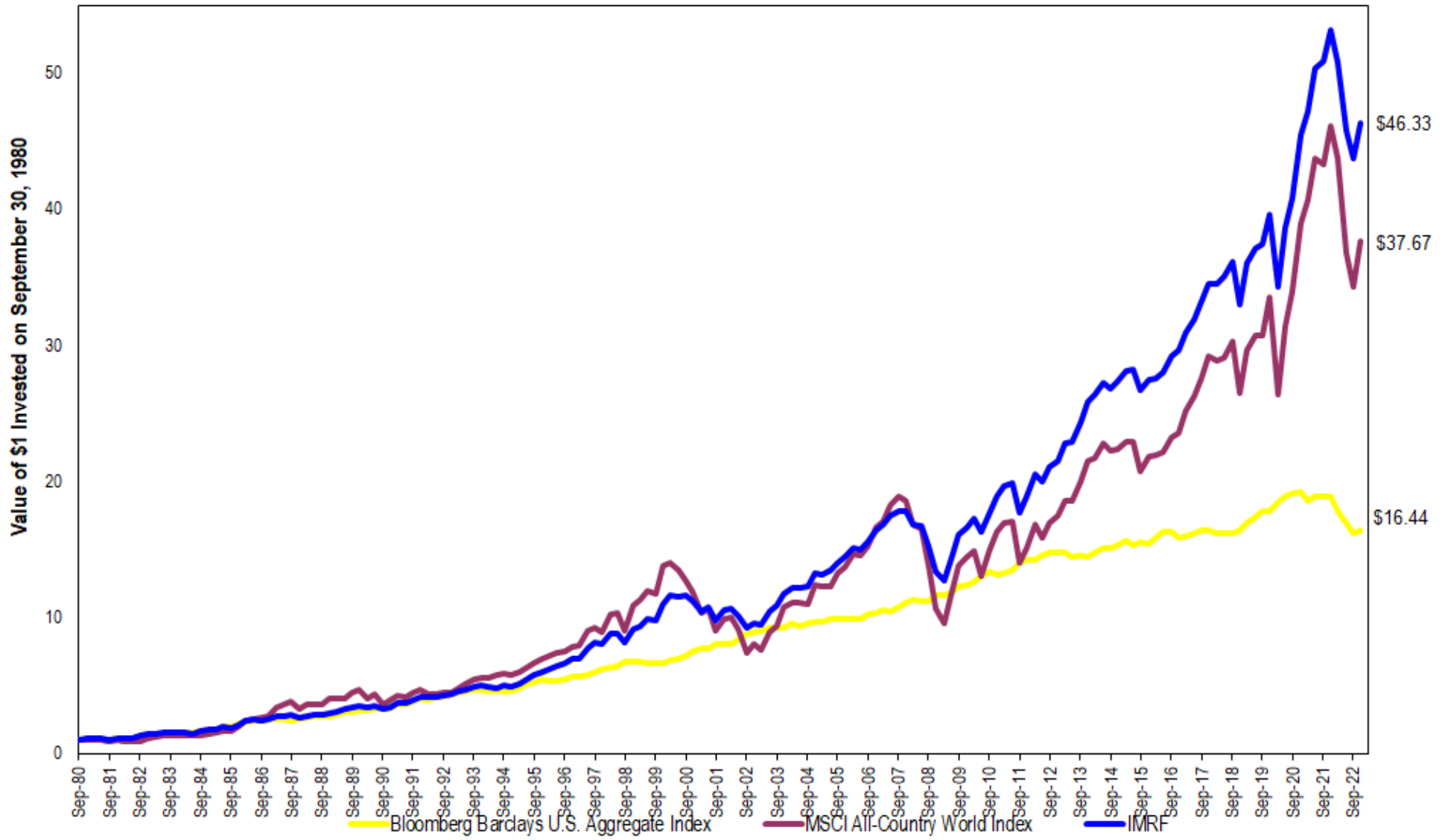
*Periods Ended December 31, 2022*

	Performance (%)								
	1 Quarter	1 Year	3 Years	5 Years	10 Years	20 Years	30 Years	Since Inception	Inception Date
<b>Timberland</b>	<b>10.63</b>	<b>11.94</b>	<b>4.41</b>	<b>2.07</b>	<b>3.65</b>	<b>3.50</b>	<b>6.87</b>	<b>7.04</b>	<b>10/1/1992</b>
NCREIF Timberland Index	4.89	12.90	7.51	5.37	5.80	6.98	7.85	8.51	
<b>Unlisted Infrastruct</b>	<b>4.64</b>	<b>11.76</b>	<b>13.10</b>					<b>12.03</b>	<b>4/1/2018</b>
Blended Benchmark (Unlisted Infrastructure)	0.98	9.65	9.22					9.14	
<b>Alternatives Investments</b>	<b>0.35</b>	<b>4.39</b>	<b>19.75</b>	<b>17.14</b>	<b>13.29</b>	<b>10.65</b>	<b>12.94</b>	<b>11.56</b>	<b>2/1/1986</b>
Alternatives Investments - Net	0.35	4.38	19.72	17.08	13.09				
Custom Benchmark (Alternative Investments)	-4.98	-18.08	-0.90	2.95	5.93	8.60	10.69	11.49	
<b>Private Equity</b>	<b>0.38</b>	<b>5.36</b>	<b>22.97</b>	<b>20.35</b>	<b>16.13</b>	<b>13.30</b>	<b>15.64</b>	<b>13.85</b>	<b>2/1/1986</b>
Blended Benchmark (Private Equity)	-5.49	-19.14	-1.33	2.68	5.79	8.53			
<b>Cash</b>	<b>0.95</b>	<b>3.18</b>	<b>2.73</b>	<b>2.83</b>	<b>1.69</b>	<b>1.37</b>	<b>3.00</b>	<b>3.73</b>	<b>7/1/1986</b>
90 Day U.S. Treasury Bill	0.84	1.46	0.72	1.26	0.75	1.24	2.34	3.08	

Benchmark definitions are on the following pages.

Real Estate, Private Equity, Agriculture, Timberland, Unlisted Infrastructure returns shown are gross of fees.

Growth of a Dollar - As of December 31, 2022





# Investment Manager Asset Allocation

*Periods Ended December 31, 2022*

	Sep-2022		Dec-2022	
	\$	%	\$	%
<b>Domestic Equity</b>	<b>16,315,650,461</b>	<b>35.85</b>	<b>17,448,903,100</b>	<b>36.42</b>
<b>Large Cap Growth</b>	<b>2,888,613,741</b>	<b>6.35</b>	<b>2,944,288,673</b>	<b>6.15</b>
NTGI S&P 500 Growth	1	0.00		0.00
Sands Capital	1,182,736,987	2.60	1,201,012,297	2.51
Xponance Russell 1000 G	1,705,876,754	3.75	1,743,276,376	3.64
<b>Large Cap Value</b>	<b>4,097,277,619</b>	<b>9.00</b>	<b>4,631,558,697</b>	<b>9.67</b>
Dodge & Cox	1,535,830,131	3.38	1,728,993,204	3.61
LSV Asset	1,246,140,802	2.74	1,418,302,933	2.96
NTGI S&P 500 Value	1,315,306,686	2.89	1,484,262,560	3.10
<b>Large Cap Pass. Core</b>	<b>2,093,071,894</b>	<b>4.60</b>	<b>1,945,750,947</b>	<b>4.06</b>
NTGI MarketCap Idx.	2,093,071,894	4.60	1,945,750,947	4.06
<b>Factor Diversity Strategies</b>	<b>2,147,600,430</b>	<b>4.72</b>	<b>2,318,030,533</b>	<b>4.84</b>
U.S. Large Cap FDP-GSAM	2,147,600,430	4.72	2,318,030,533	4.84
<b>Quantitative Factor Strategies</b>	<b>1,934,901,790</b>	<b>4.25</b>	<b>2,155,151,638</b>	<b>4.50</b>
Quantitative US Equity - SciBeta	1,934,901,790	4.25	2,155,151,638	4.50
<b>Small Cap Growth</b>	<b>638,701,529</b>	<b>1.40</b>	<b>679,167,546</b>	<b>1.42</b>
Frontier Capital	638,701,529	1.40	679,167,546	1.42
<b>Small Cap Value</b>	<b>1,255,131,472</b>	<b>2.76</b>	<b>1,399,941,970</b>	<b>2.92</b>
Channing	265,686,926	0.58	285,902,968	0.60
DFA Small Cap Val.	464,803,082	1.02	532,395,280	1.11
William Blair Small Cap Value	524,641,464	1.15	581,643,721	1.21

# Investment Manager Asset Allocation

*Periods Ended December 31, 2022*

	Sep-2022		Dec-2022	
	\$	%	\$	%
<b>Public Real Assets</b>	<b>1,260,351,986</b>	<b>2.77</b>	<b>1,375,013,095</b>	<b>2.87</b>
Brookfield	353,567,055	0.78	384,584,077	0.80
Cohen & Steers	906,784,931	1.99	990,429,018	2.07
<b>International Equity</b>	<b>7,309,519,862</b>	<b>16.06</b>	<b>8,387,346,009</b>	<b>17.51</b>
<b>Intl Large Cap Growth</b>	<b>1,229,245,744</b>	<b>2.70</b>	<b>1,392,016,238</b>	<b>2.91</b>
EARNEST Part. Intl	496,145,739	1.09	568,088,257	1.19
William Blair	733,100,004	1.61	823,927,981	1.72
<b>Intl Large Cap Value</b>	<b>1,074,693,959</b>	<b>2.36</b>	<b>1,267,341,613</b>	<b>2.65</b>
Brandes Investment	473,217,973	1.04	571,218,749	1.19
Mondrian	493,323,935	1.08	572,193,568	1.19
Lazard	108,152,051	0.24	123,929,296	0.26
<b>Intl Large Cap Core</b>	<b>3,524,619,326</b>	<b>7.75</b>	<b>4,049,262,218</b>	<b>8.45</b>
Arrowstreet Capital	863,327,062	1.90	1,002,514,846	2.09
Brown Capital	417,000,087	0.92	464,085,668	0.97
GlobeFlex Capital	690,534,889	1.52	790,620,542	1.65
Xponance Intl EQ	76,323,694	0.17	88,657,644	0.19
Transition Account	187,888	0.00	188,525	0.00
Progress Intl Equity	556,193	0.00	592,962	0.00
NTGI ACWI ex US Index Fund	1,476,689,513	3.25	1,702,602,031	3.55
<b>Intl All Cap Developed</b>	<b>125,967,378</b>	<b>0.28</b>	<b>144,466,592</b>	<b>0.30</b>
Ativo International	125,967,378	0.28	144,466,592	0.30
<b>International Small Cap</b>	<b>438,760,355</b>	<b>0.96</b>	<b>502,629,501</b>	<b>1.05</b>
Franklin Templeton	173,675,228	0.38	199,582,016	0.42

# Investment Manager Asset Allocation

*Periods Ended December 31, 2022*

	<b>Sep-2022</b>		<b>Dec-2022</b>	
	<b>\$</b>	<b>%</b>	<b>\$</b>	<b>%</b>
William Blair IntSC	265,085,127	0.58	303,047,485	0.63
<b>Emerging Mkt Equity</b>	<b>916,233,100</b>	<b>2.01</b>	<b>1,031,629,847</b>	<b>2.15</b>
Genesis Investment Management, LLP.	916,233,100	2.01	1,031,629,847	2.15

# Investment Manager Asset Allocation

*Periods Ended December 31, 2022*

	Sep-2022		Dec-2022	
	\$	%	\$	%
<b>Fixed Income</b>	<b>11,956,987,031</b>	<b>26.28</b>	<b>12,027,573,713</b>	<b>25.11</b>
<b>Domestic Fixed Core</b>	<b>3,708,036,365</b>	<b>8.15</b>	<b>3,738,475,455</b>	<b>7.80</b>
Attucks Fixed Income	84,906,040	0.19	86,159,511	0.18
Brandes FI Core	328,443,611	0.72	332,122,012	0.69
EARNEST Partners	884,446,982	1.94	888,905,464	1.86
Garcia Hamilton	941,005,194	2.07	954,134,051	1.99
Ramirez Asset Management	514,073,825	1.13	517,063,703	1.08
Xponance Yield Advantage Agg.	955,160,714	2.10	960,090,715	2.00
<b>Domestic Fixed Passive Core</b>	<b>2,727,981,673</b>	<b>5.99</b>	<b>2,699,434,195</b>	<b>5.63</b>
NTGI Blmbg Agg.	1,155,912,468	2.54	1,100,651,759	2.30
BlackRock US Debt I	1,572,069,206	3.45	1,598,782,435	3.34
<b>Domestic Fixed Core Plus</b>	<b>2,867,955,733</b>	<b>6.30</b>	<b>2,908,690,745</b>	<b>6.07</b>
LM Capital Group FI	824,418,556	1.81	836,206,981	1.75
Progress Inv. FI	978	0.00	1,101	0.00
Loop Capital Management	557,579,547	1.23	567,833,210	1.19
Western Asset	927,123,840	2.04	941,743,453	1.97
Longfellow Core Plus	558,832,812	1.23	562,906,000	1.18
<b>Bank Loans</b>	<b>1,612,323,391</b>	<b>3.54</b>	<b>1,616,072,322</b>	<b>3.37</b>
Barings Global Loan Fund	1,612,323,391	3.54	1,616,072,322	3.37
<b>Emerging Markets Debt</b>	<b>2,452,746</b>	<b>0.01</b>	<b>413,942</b>	<b>0.00</b>
Standish-Mellon EMD	2,452,746	0.01	413,942	0.00
<b>High Yield</b>	<b>1,038,237,123</b>	<b>2.28</b>	<b>1,064,487,054</b>	<b>2.22</b>
MacKay Shields	1,038,237,123	2.28	1,064,487,054	2.22

# Investment Manager Asset Allocation

Periods Ended December 31, 2022

	Sep-2022		Dec-2022	
	\$	%	\$	%
<b>Private Real Assets</b>	<b>4,842,223,932</b>	<b>10.64</b>	<b>4,791,842,770</b>	<b>10.01</b>
<b>Real Estate</b>	<b>4,426,977,194</b>	<b>9.73</b>	<b>4,362,776,353</b>	<b>9.11</b>
<b>Real Estate Core Cmp</b>	<b>2,428,952,037</b>	<b>5.34</b>	<b>2,350,380,042</b>	<b>4.91</b>
TA Assoc. Buckhead	990,254,880	2.18	900,720,750	1.88
Barings Euro Core Property	131,454,529	0.29	141,907,419	0.30
Blackstone Property Euro	165,351,985	0.36	184,852,309	0.39
INVESCO Core Real Estate	261,713,524	0.58	250,478,467	0.52
INVESCO European real estate	54,542,157	0.12	56,881,071	0.12
AEW Core Property Tr	303,751,085	0.67	288,235,321	0.60
CBRE Core Partners	328,560,056	0.72	333,822,479	0.70
JPM Strategic Property Fund	193,323,821	0.42	193,482,226	0.40
<b>RE Non-Core Cmp</b>	<b>1,998,025,157</b>	<b>4.39</b>	<b>2,012,396,311</b>	<b>4.20</b>
Artemis MWBE Spruce	316,990,821	0.70	327,294,956	0.68
Franklin T. EMREFF	3,953,769	0.01	2,870,680	0.01
Security Capital	89,946,438	0.20	93,311,385	0.19
Dune II	8,031,504	0.02	7,607,645	0.02
Non-Core Real Estate Funds	1,354,225,599	2.98	1,340,145,446	2.80
Non-Core Intl Real Estate	224,795,201	0.49	241,086,483	0.50
Almanac ARS V	81,825	0.00	79,717	0.00
<b>Agriculture</b>	<b>241,046,869</b>	<b>0.53</b>	<b>247,585,848</b>	<b>0.52</b>
Premiere Partners IV	241,046,869	0.53	247,585,848	0.52
<b>Timberland</b>	<b>57,865,591</b>	<b>0.13</b>	<b>63,349,367</b>	<b>0.13</b>
Forest Investment	57,865,591	0.13	63,349,367	0.13
<b>Unlisted Infrastructure</b>	<b>116,334,278</b>	<b>0.26</b>	<b>118,131,202</b>	<b>0.25</b>
Unlisted Infrastructure Funds	116,334,278	0.26	118,131,202	0.25

# Investment Manager Asset Allocation

*Periods Ended December 31, 2022*

	Sep-2022		Dec-2022	
	\$	%	\$	%
<b>Alternatives Investments</b>	<b>4,972,045,500</b>	<b>10.93</b>	<b>5,097,683,692</b>	<b>10.65</b>
<b>Absolute Return</b>	<b>114,351</b>	<b>0.00</b>	<b>75,952</b>	<b>0.00</b>
Aurora Investment	114,351	0.00	75,952	0.00
<b>Private Equity</b>	<b>4,807,584,066</b>	<b>10.56</b>	<b>4,924,786,019</b>	<b>10.29</b>
<b>Abbott S/A Comp.</b>	<b>522,190,715</b>	<b>1.15</b>	<b>507,256,863</b>	<b>1.06</b>
Muller Monroe MPEFF	1	0.00	1	0.00
<b>Pantheon S/A Comp.</b>	<b>439,912,751</b>	<b>0.97</b>	<b>416,250,559</b>	<b>0.87</b>
Private Equity Fund - Domestic	3,177,221,389	6.98	3,255,891,125	6.80
Private Equity Fund - International	465,331,972	1.02	536,451,555	1.12
Oakbrook Opportunities Fund	202,927,238	0.45	208,935,917	0.44
<b>Private Credit</b>	<b>164,347,083</b>	<b>0.36</b>	<b>172,821,721</b>	<b>0.36</b>
Private Credit Fund - Domestic	164,347,083	0.36	172,821,721	0.36
<b>Cash &amp; Equivalents</b>	<b>109,259,037</b>	<b>0.24</b>	<b>121,363,972</b>	<b>0.25</b>
<b>Total Fund</b>	<b>45,505,685,823</b>	<b>100.00</b>	<b>47,874,713,254</b>	<b>100.00</b>

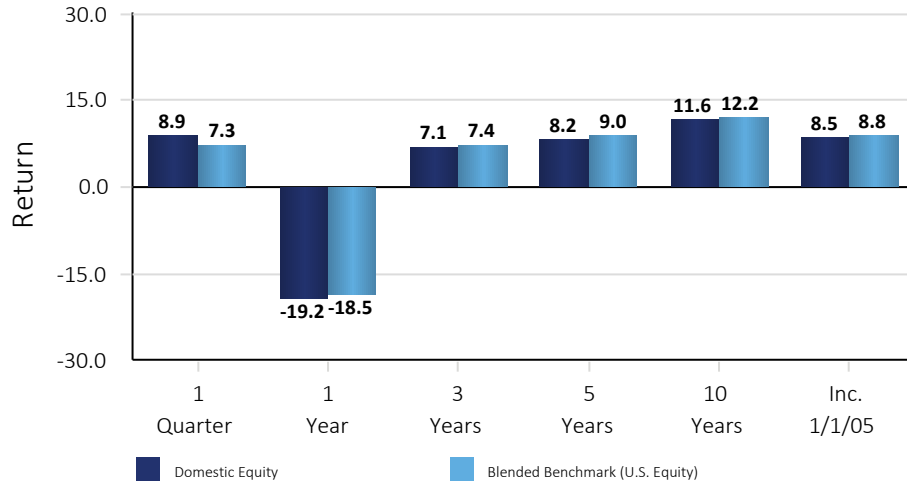
# Domestic Equity

# Composite Performance Summary

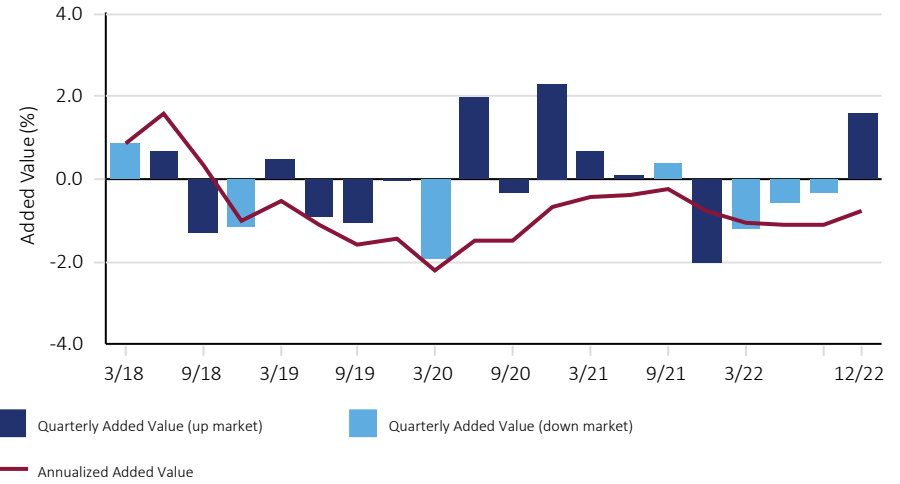
## Domestic Equity

Periods Ended December 31, 2022

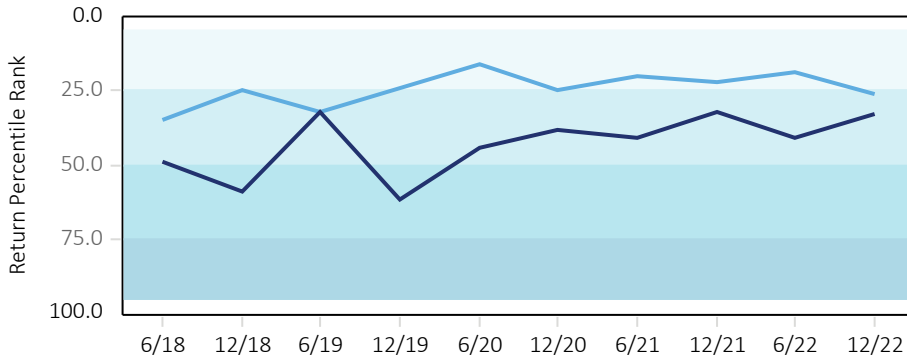
### Comparative Performance



### Added Value History

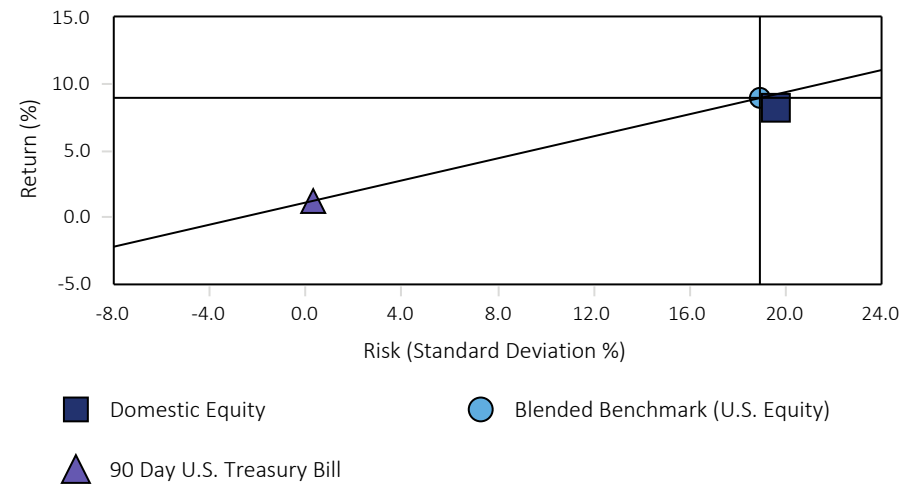


### Rolling Percentile Rank: All Public Plans > \$1B-US Equity Segment



	Total Period	5-25 Count	25-Median Count	Median-75 Count	75-95 Count
— Domestic Equity	10	0 (0%)	8 (80%)	2 (20%)	0 (0%)
— Benchmark	10	7 (70%)	3 (30%)	0 (0%)	0 (0%)

### Risk and Return 01/1/18 - 12/31/22

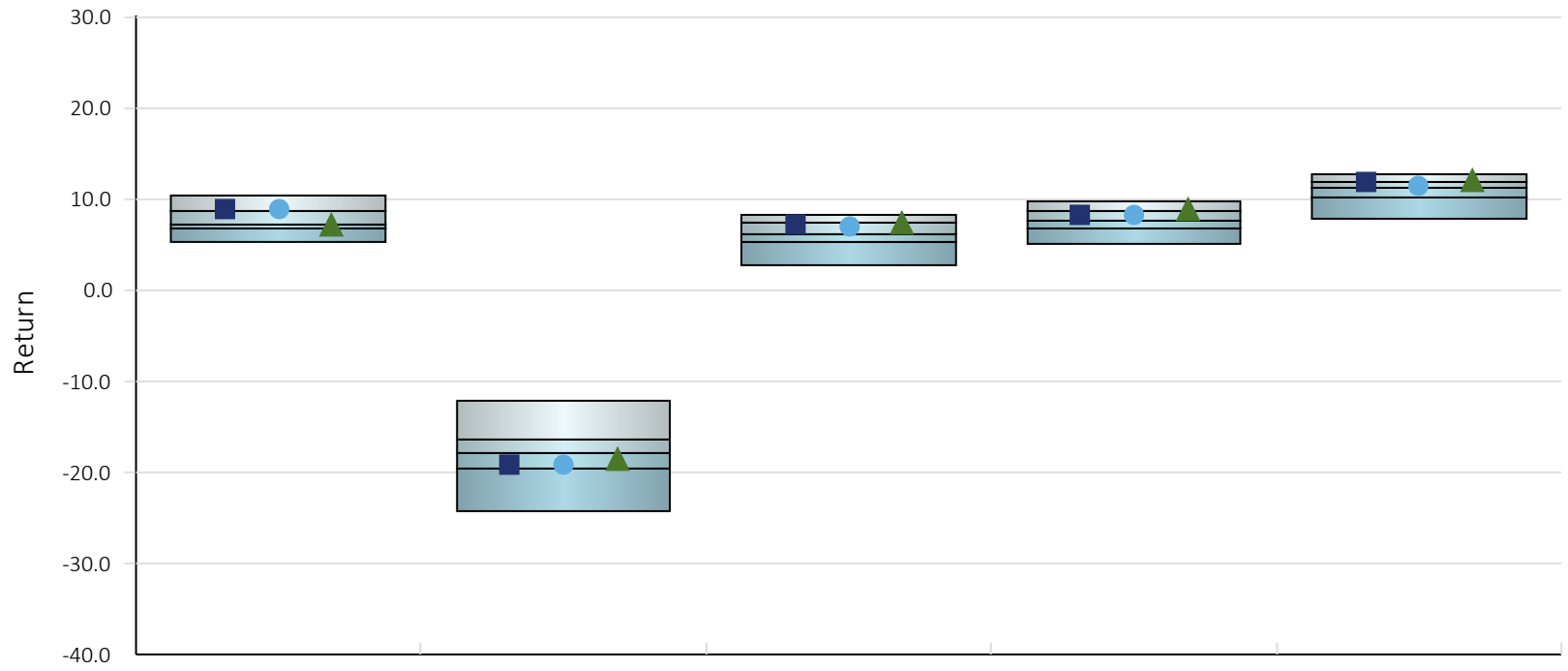




# Plan Sponsor Peer Group Analysis

Domestic Equity vs All Public Plans > \$1B-US Equity Segment(Gross)

Periods Ended December 31, 2022



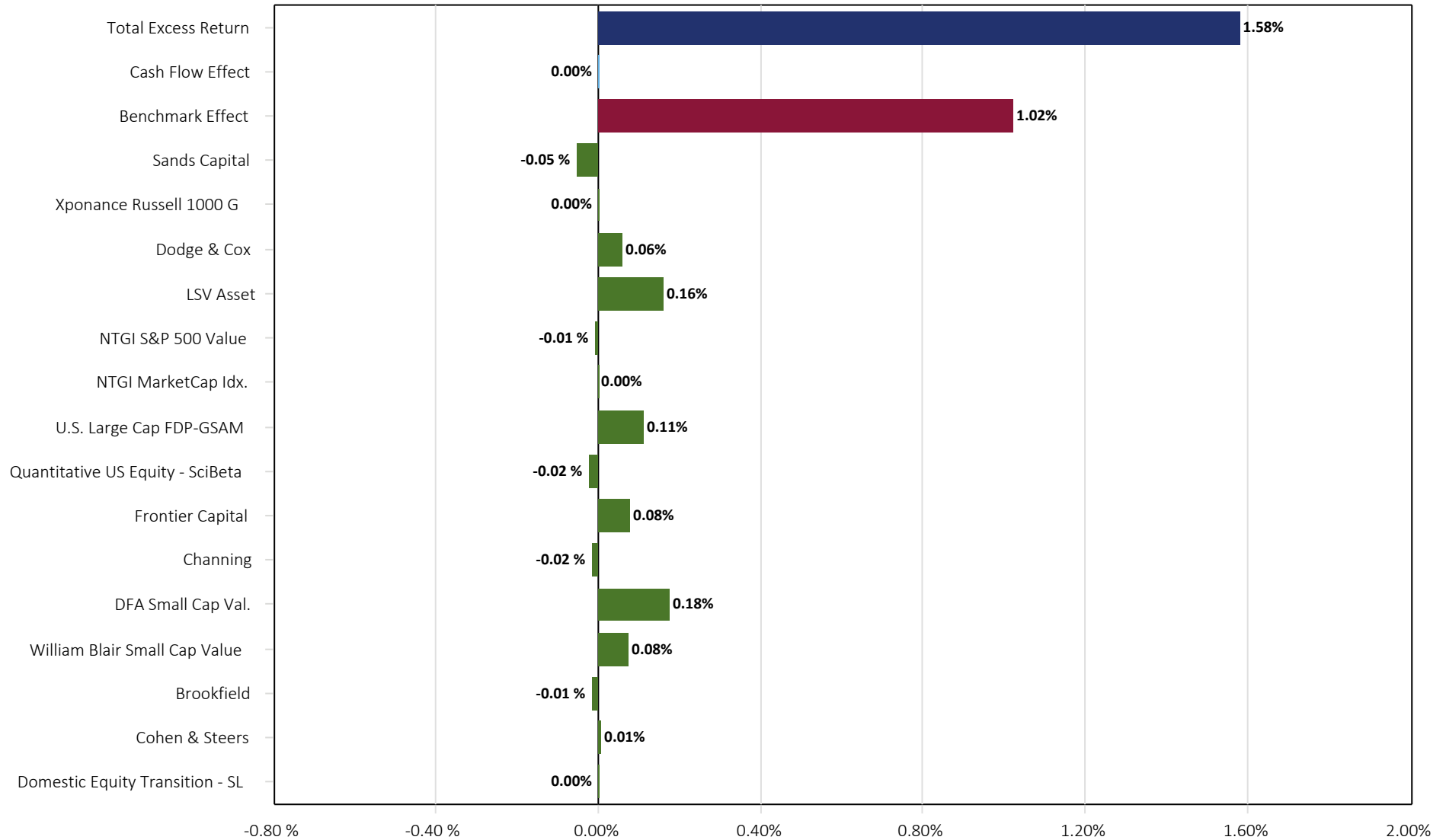
	QTD	1 Year	3 Years	5 Years	10 Years
■ Domestic Equity	8.94 (19)	-19.12 (62)	7.24 (29)	8.40 (35)	11.81 (30)
● Domestic Equity - Net	8.91 (19)	-19.25 (64)	7.06 (33)	8.21 (38)	11.58 (42)
▲ Blended Benchmark (U.S. Equity)	7.32 (51)	-18.53 (57)	7.36 (26)	8.97 (21)	12.21 (19)
5th Percentile	10.44	-12.18	8.40	9.87	12.67
1st Quartile	8.68	-16.45	7.39	8.68	11.93
Median	7.33	-17.92	6.26	7.67	11.33
3rd Quartile	6.86	-19.49	5.32	6.82	10.31
95th Percentile	5.30	-24.35	2.82	5.18	7.84
Population	47	45	40	38	30

# Asset Class Attribution

## Domestic Equity

Periods Ended 1 Quarter Ending December 31, 2022

### 1 Quarter



# Performance

## Domestic Equity

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						Inception Date
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	
<b>Domestic Equity</b>	<b>17,448,903,100</b>	<b>8.94</b>	<b>-19.12</b>	<b>7.24</b>	<b>8.40</b>	<b>11.81</b>	<b>11.34</b>	<b>1/1/1982</b>
Domestic Equity - Net		8.91	-19.25	7.06	8.21	11.58		
Blended Benchmark (U.S. Equity)		7.32	-18.53	7.36	8.97	12.21		
Russell 3000 Index		7.18	-19.21	7.07	8.79	12.13	11.25	
U.S. Equity IMRF Custom Benchmark		8.34	-18.21	6.65	7.95			
<b>Large Cap Equity</b>	<b>11,839,628,851</b>	<b>8.35</b>	<b>-21.69</b>	<b>6.89</b>	<b>8.51</b>	<b>12.10</b>	<b>11.01</b>	<b>1/1/1982</b>
Large Cap Equity - Net		8.33	-21.76	6.80	8.41	11.97		
Russell 1000 Index		7.24	-19.13	7.35	9.13	12.37	11.41	
<b>Large Cap Growth</b>	<b>2,944,288,673</b>	<b>1.93</b>	<b>-34.61</b>	<b>5.86</b>	<b>10.28</b>	<b>12.84</b>	<b>11.58</b>	<b>1/1/1982</b>
Large Cap Growth - Net		1.90	-34.67	5.77	10.18	12.70		
LCG Blended Benchmark*		2.20	-29.14	7.79	10.96	14.10		
Russell 1000 Growth Index		2.20	-29.14	7.79	10.96	14.10	11.06	
<b>Xponance Russell 1000 G</b>	<b>1,743,276,376</b>	<b>2.19</b>	<b>-29.12</b>	<b>7.78</b>			<b>8.89</b>	<b>10/1/2018</b>
Xponance Russell 1000 G - Net		2.19	-29.14	7.76			8.87	
Russell 1000 Growth Index		2.20	-29.14	7.79			8.90	
<b>Sands Capital</b>	<b>1,201,012,297</b>	<b>1.55</b>	<b>-48.94</b>	<b>-2.78</b>	<b>5.63</b>	<b>10.41</b>	<b>9.92</b>	<b>11/1/2003</b>
Sands Capital - Net		1.49	-49.07	-3.00	5.39	10.17		
LCG Blended Benchmark*		2.20	-29.14	7.79	10.96	14.10	9.97	
Russell 1000 Growth Index		2.20	-29.14	7.79	10.96	14.10	10.01	

\* The LCG Blended Benchmark is currently the Russell 1000 Growth Index. Returns prior to January 1, 2006, reflect those the S&P 500/Citigroup Growth Index.

\*\* The LCV Blended Benchmark is currently the Russell 1000 Value Index. Returns prior to January 1, 2006, reflect those of the S&P 500/Citigroup Value Index.

\*\*\* Public Real Assets benchmark is 1/3 Dow Jones Global Infrastructure Composite Index + 2/3 FTSE Global Core Infrastructure 50/50 Net Tax Index.

# Performance

## Domestic Equity

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
<b>Large Cap Value</b>	<b>4,631,558,697</b>	<b>13.72</b>	<b>-5.95</b>	<b>7.52</b>	<b>7.26</b>	<b>11.56</b>	<b>10.21</b>	<b>10/1/1982</b>
Large Cap Value - Net		13.68	-6.10	7.37	7.10	11.38		
LCV Blended Benchmark**		12.42	-7.54	5.96	6.67	10.29		
Russell 1000 Value Index		12.42	-7.54	5.96	6.67	10.29	11.47	
<b>Dodge &amp; Cox</b>	<b>1,728,993,204</b>	<b>13.13</b>	<b>-6.93</b>	<b>9.64</b>	<b>8.81</b>	<b>12.61</b>	<b>9.76</b>	<b>9/1/2003</b>
Dodge & Cox - Net		13.07	-7.12	9.41	8.58	12.37		
LCV Blended Benchmark**		12.42	-7.54	5.96	6.67	10.29	8.22	
Russell 1000 Value Index		12.42	-7.54	5.96	6.67	10.29	8.36	
<b>LSV Asset</b>	<b>1,418,302,933</b>	<b>14.66</b>	<b>-5.36</b>	<b>6.27</b>	<b>6.17</b>	<b>11.51</b>	<b>10.43</b>	<b>2/1/2003</b>
LSV Asset - Net		14.59	-5.58	6.01	5.92	11.24		
LCV Blended Benchmark**		12.42	-7.54	5.96	6.67	10.29	8.99	
Russell 1000 Value Index		12.42	-7.54	5.96	6.67	10.29	9.00	
<b>NTGI S&amp;P 500 Value</b>	<b>1,484,262,560</b>	<b>13.52</b>	<b>-5.38</b>	<b>6.29</b>	<b>7.62</b>	<b>10.89</b>	<b>6.33</b>	<b>8/1/1999</b>
NTGI S&P 500 Value - Net		13.52	-5.38	6.29	7.61	10.89		
S&P 500 Value		13.59	-5.22	6.26	7.58	10.86	6.31	
<b>Large Cap Pass. Core</b>	<b>1,945,750,947</b>	<b>7.18</b>	<b>-19.50</b>	<b>6.91</b>	<b>8.68</b>	<b>12.10</b>	<b>10.94</b>	<b>1/1/1985</b>
Large Cap Pass. Core - Net		7.18	-19.50	6.91	8.68	12.10		
Dow Jones U.S. Total Stock Market Index		7.18	-19.53	6.89	8.65	12.03		
<b>NTGI MarketCap Idx.</b>	<b>1,945,750,947</b>	<b>7.18</b>	<b>-19.50</b>	<b>6.91</b>	<b>8.68</b>	<b>12.10</b>	<b>10.73</b>	<b>2/1/1985</b>
NTGI MarketCap Idx. - Net		7.18	-19.50	6.91	8.68	12.10		
Dow Jones U.S. Total Stock Market Index		7.18	-19.53	6.89	8.65	12.03		

\* The LCG Blended Benchmark is currently the Russell 1000 Growth Index. Returns prior to January 1, 2006, reflect those the S&P 500/Citigroup Growth Index.

\*\* The LCV Blended Benchmark is currently the Russell 1000 Value Index. Returns prior to January 1, 2006, reflect those of the S&P 500/Citigroup Value Index.

\*\*\* Public Real Assets benchmark is 1/3 Dow Jones Global Infrastructure Composite Index + 2/3 FTSE Global Core Infrastructure 50/50 Net Tax Index.

# Performance

## Domestic Equity

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
<b>Factor Diversity Strategies</b>	<b>2,318,030,533</b>	<b>7.94</b>	<b>-18.46</b>				<b>6.56</b>	<b>8/18/2020</b>
<b>U.S. Large Cap FDP-GSAM</b>	<b>2,318,030,533</b>	<b>7.94</b>	<b>-18.47</b>				<b>6.56</b>	<b>8/18/2020</b>
U.S. Large Cap FDP-GSAM - Net		7.93	-18.50				6.51	
Solactive GBS U.S. 1000 Index		7.07	-19.57				6.04	
GSAM Active Beta US. Large Cap FDC Index		7.93	-18.46				6.54	
<b>Quantitative Factor Strategies</b>	<b>2,155,151,638</b>	<b>11.38</b>	<b>-11.05</b>	<b>6.87</b>			<b>7.92</b>	<b>9/17/2019</b>
<b>Quantitative US Equity - SciBeta</b>	<b>2,155,151,638</b>	<b>11.38</b>	<b>-11.05</b>	<b>6.87</b>			<b>7.92</b>	<b>9/17/2019</b>
Quantitative US Equity - SciBeta - Net		11.37	-11.10	6.67			7.74	
SciBeta US Hi-Fctr-Intst Div Multi-Beta Multi-Strat Index		11.56	-11.98	5.97			6.99	

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\*\*\* Public Real Assets benchmark is 1/3 Dow Jones Global Infrastructure Composite Index + 2/3 FTSE Global Core Infrastructure 50/50 Net Tax Index.

# Performance

## Domestic Equity

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
<b>Small Cap</b>	<b>2,079,109,516</b>	<b>9.78</b>	<b>-13.09</b>	<b>8.20</b>	<b>7.56</b>	<b>10.81</b>	<b>11.78</b>	<b>7/1/1988</b>
Small Cap Composite - Net		9.67	-13.70	7.51	6.94	10.19		
Russell 2000 Index		6.23	-20.44	3.10	4.13	9.01	8.92	
<b>Small Cap Growth</b>	<b>679,167,546</b>	<b>6.34</b>	<b>-21.04</b>	<b>7.76</b>	<b>9.61</b>	<b>11.97</b>	<b>12.59</b>	<b>7/1/1988</b>
Small Cap Growth - Net		6.20	-22.01	6.69	8.75	11.24		
Russell 2000 Growth Index		4.13	-26.36	0.65	3.51	9.20	7.57	
<b>Frontier Capital</b>	<b>679,167,546</b>	<b>6.34</b>	<b>-21.05</b>	<b>8.73</b>	<b>12.08</b>	<b>12.85</b>	<b>12.94</b>	<b>8/1/1988</b>
Frontier Capital - Net		6.20	-22.01	7.59	11.09	12.04		
Russell 2000 Growth Index		4.13	-26.36	0.65	3.51	9.20	7.65	
<b>Small Cap Value</b>	<b>1,399,941,970</b>	<b>11.54</b>	<b>-8.62</b>	<b>8.64</b>	<b>6.37</b>	<b>10.39</b>	<b>11.45</b>	<b>9/1/1989</b>
Small Cap Value - Net		11.44	-9.01	8.14	5.86	9.85		
Russell 2000 Value Index		8.42	-14.48	4.70	4.13	8.48	9.55	
<b>Channing</b>	<b>285,902,968</b>	<b>7.61</b>	<b>-16.61</b>	<b>5.68</b>	<b>4.40</b>	<b>9.31</b>	<b>9.11</b>	<b>7/1/2011</b>
Channing - Net		7.48	-17.03	5.16	3.89	8.77	8.53	
Russell 2000 Value Index		8.42	-14.48	4.70	4.13	8.48	8.01	
<b>DFA Small Cap Val.</b>	<b>532,395,280</b>	<b>14.54</b>	<b>-1.62</b>	<b>12.70</b>	<b>7.76</b>	<b>11.02</b>	<b>11.91</b>	<b>2/1/1996</b>
DFA Small Cap Val. - Net		14.47	-1.92	12.24	7.29	10.50		
Russell 2000 Value Index		8.42	-14.48	4.70	4.13	8.48	8.99	
<b>William Blair Small Cap Value</b>	<b>581,643,721</b>	<b>10.87</b>	<b>-10.24</b>	<b>6.88</b>	<b>6.23</b>	<b>10.84</b>	<b>10.96</b>	<b>5/1/1999</b>
Inv. Couns. Maryland - Net		10.76	-10.68	6.36	5.70	10.31		
Russell 2000 Value Index		8.42	-14.48	4.70	4.13	8.48	8.53	

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\*\*\* Public Real Assets benchmark is 1/3 Dow Jones Global Infrastructure Composite Index + 2/3 FTSE Global Core Infrastructure 50/50 Net Tax Index.

# Performance

## Domestic Equity

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
<b>Public Real Assets</b>	<b>1,375,013,095</b>	<b>9.10</b>	<b>-3.41</b>	<b>3.22</b>	<b>6.16</b>		<b>6.11</b>	<b>8/1/2017</b>
Public Real Assets - Net		9.01	-3.70	2.85	5.73		5.70	
Public Real Assets Benchmark***		9.14	-4.86	1.46	4.39		4.27	
<b>Brookfield</b>	<b>384,584,077</b>	<b>8.77</b>	<b>-0.12</b>	<b>3.18</b>	<b>5.39</b>		<b>4.88</b>	<b>8/1/2017</b>
Brookfield - Net		8.66	-0.52	2.68	4.86		4.38	
Dow Jones Brookfield Global Infrastructure Composi		9.38	-4.91	1.14	3.67		3.31	
<b>Cohen &amp; Steers</b>	<b>990,429,018</b>	<b>9.22</b>	<b>-4.06</b>	<b>3.57</b>	<b>6.72</b>		<b>6.89</b>	<b>8/1/2017</b>
Cohen & Steers - Net		9.15	-4.32	3.23	6.33		6.51	
FTSE Global Core Infrastructure 50/50 Index (Net)		9.01	-4.87	1.59	4.72		4.71	

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\*\*\* Public Real Assets benchmark is 1/3 Dow Jones Global Infrastructure Composite Index + 2/3 FTSE Global Core Infrastructure 50/50 Net Tax Index.

# International Equity

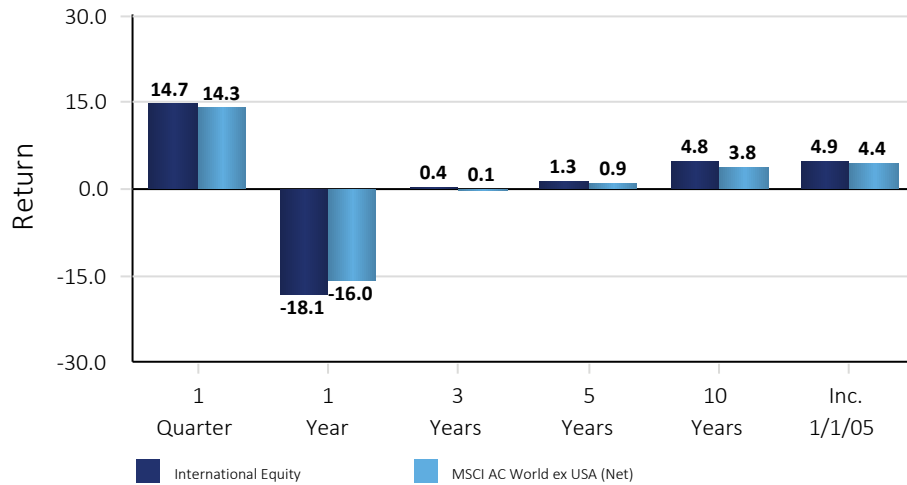


# Composite Performance Summary

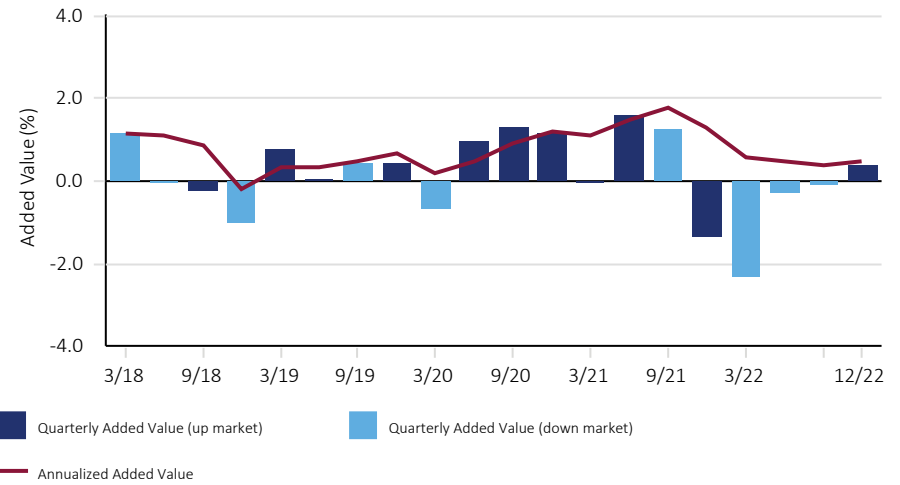
## International Equity

Periods Ended December 31, 2022

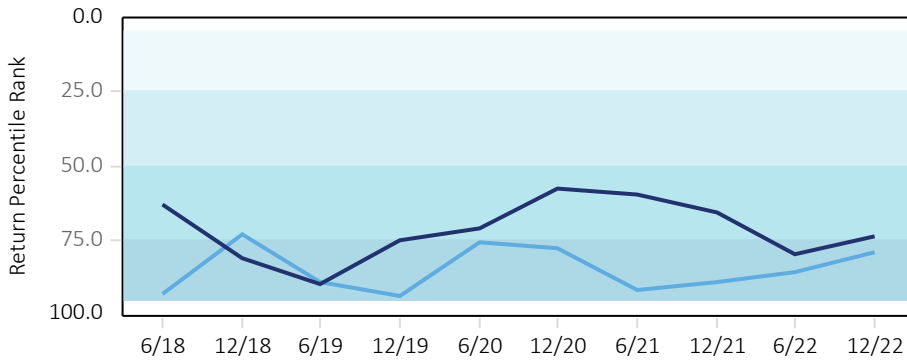
### Comparative Performance



### Added Value History

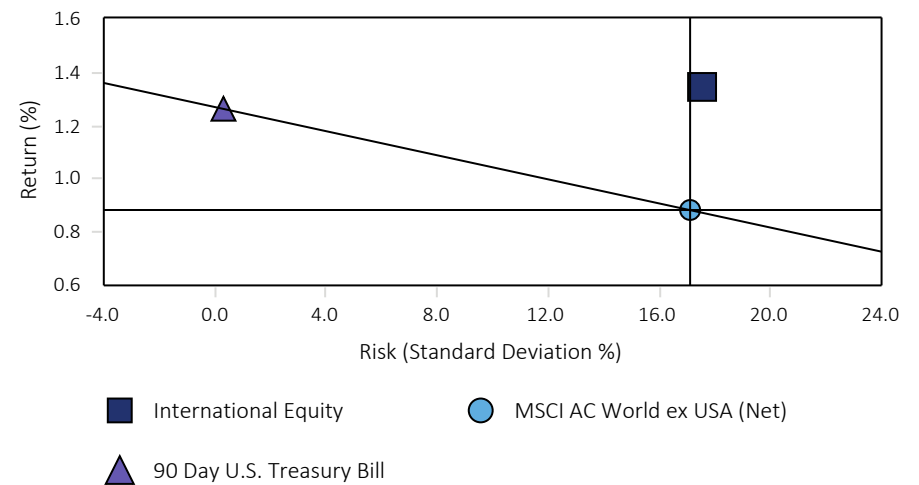


### Rolling Percentile Rank: All Public Plans > \$1B-Intl. Equity Segment



	Total Period	5-25 Count	25-Median Count	Median-75 Count	75-95 Count
International Equity	10	0 (0%)	0 (0%)	7 (70%)	3 (30%)
Benchmark	10	0 (0%)	0 (0%)	1 (10%)	9 (90%)

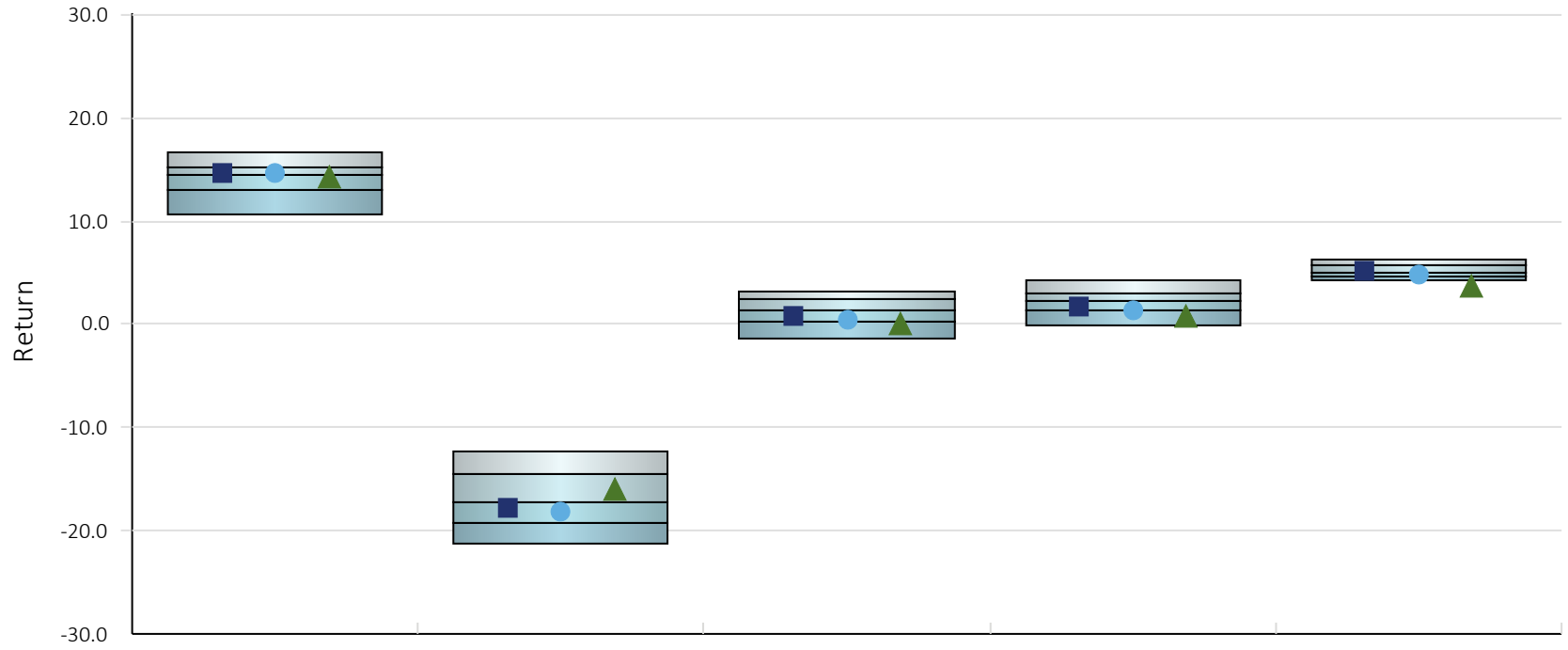
### Risk and Return 01/1/18 - 12/31/22



# Plan Sponsor Peer Group Analysis

International Equity vs All Public Plans > \$1B-Intl. Equity Segment(Gross)

Periods Ended December 31, 2022



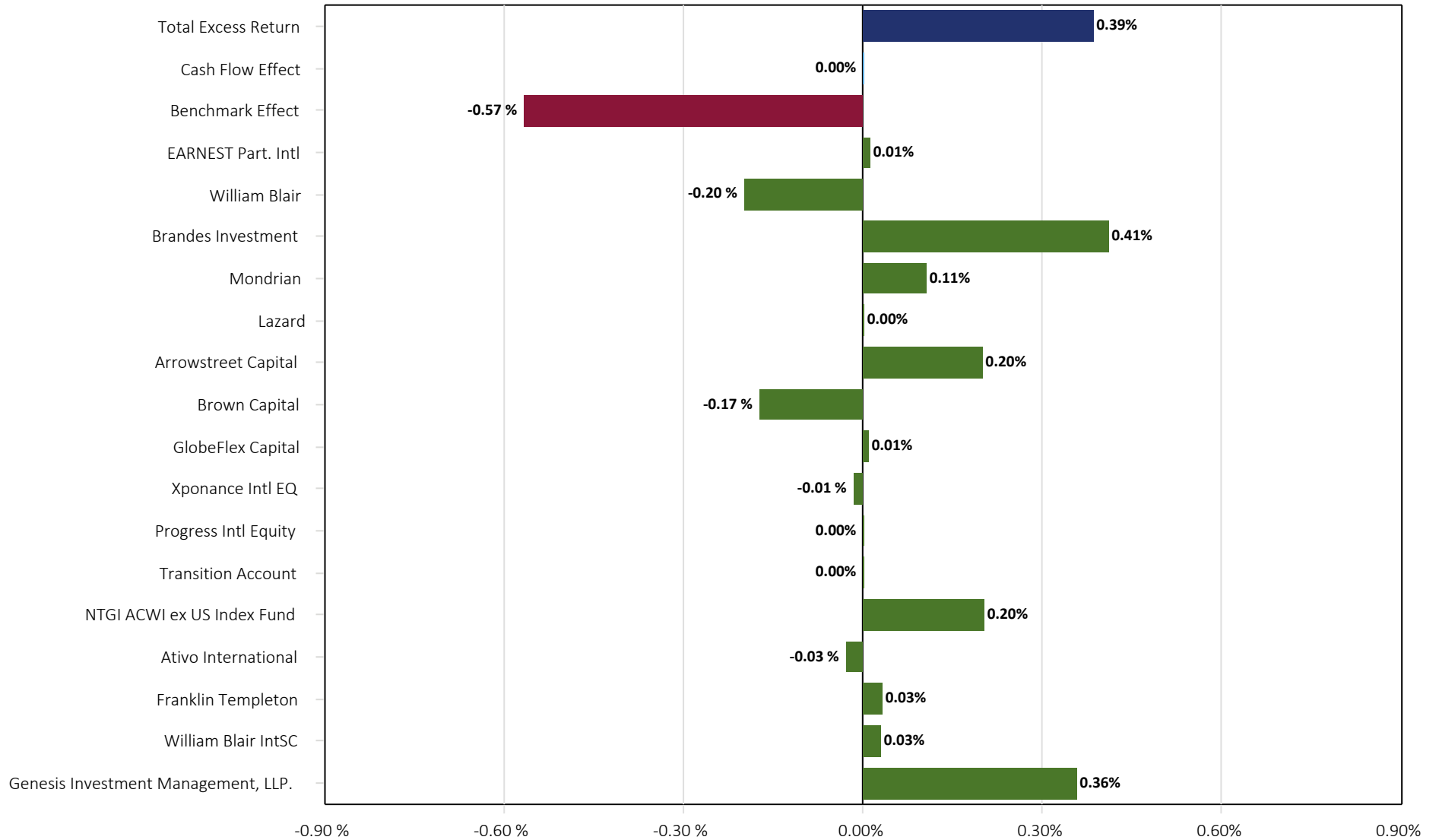
	QTD	1 Year	3 Years	5 Years	10 Years
■ International Equity	14.76 (47)	-17.86 (54)	0.78 (64)	1.70 (70)	5.15 (46)
● International Equity - Net	14.67 (49)	-18.14 (63)	0.41 (74)	1.35 (78)	4.80 (73)
▲ MSCI AC World ex USA (Net)	14.28 (57)	-16.00 (37)	0.07 (79)	0.88 (86)	3.80 (100)
5th Percentile	16.71	-12.30	3.22	4.32	6.35
1st Quartile	15.29	-14.49	2.43	2.94	5.68
Median	14.56	-17.31	1.42	2.33	5.09
3rd Quartile	13.13	-19.16	0.34	1.39	4.72
95th Percentile	10.67	-21.27	-1.34	-0.05	4.29
Population	48	48	45	44	35

# Asset Class Attribution

## International Equity

Periods Ended 1 Quarter Ending December 31, 2022

### 1 Quarter



# Performance

## International Equity

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						Inception Date
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	
<b>International Equity</b>	<b>8,387,346,009</b>	<b>14.76</b>	<b>-17.86</b>	<b>0.78</b>	<b>1.70</b>	<b>5.15</b>	<b>7.26</b>	<b>9/1/1986</b>
International Equity - Net		14.67	-18.14	0.41	1.35	4.80		
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80		
International Equity IMRF Custom Benchmark		13.71	-16.70	-0.17	0.67			
<b>Intl Large Cap Equity</b>	<b>6,708,620,069</b>	<b>15.10</b>	<b>-15.73</b>	<b>2.10</b>	<b>2.44</b>	<b>5.60</b>	<b>7.36</b>	<b>9/1/1986</b>
Intl LargeCap Equity - Net		15.03	-15.95	1.80	2.16	5.31		
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80		
<b>Intl Large Cap Grwth</b>	<b>1,392,016,238</b>	<b>13.24</b>	<b>-21.61</b>	<b>2.85</b>	<b>2.93</b>	<b>5.47</b>	<b>7.73</b>	<b>9/1/2002</b>
Intl Large Cap Grwth - Net		13.16	-21.85	2.53	2.64	5.17		
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80	6.37	
<b>EARNEST Part. Intl</b>	<b>568,088,257</b>	<b>14.50</b>	<b>-10.28</b>	<b>4.10</b>	<b>2.91</b>	<b>4.87</b>	<b>8.30</b>	<b>10/1/2004</b>
EARNEST Part. Intl - Net		14.44	-10.46	3.87	2.71	4.66		
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80	5.13	
MSCI AC World ex USA Growth (Net)		12.89	-23.05	-0.40	1.49	4.68	5.68	
<b>William Blair</b>	<b>823,927,981</b>	<b>12.39</b>	<b>-27.89</b>	<b>1.99</b>	<b>3.07</b>	<b>6.09</b>	<b>8.70</b>	<b>10/1/2002</b>
William Blair - Net		12.29	-28.15	1.60	2.69	5.70		
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80	6.99	
MSCI AC World ex USA Growth (Net)		12.89	-23.05	-0.40	1.49	4.68	7.08	
<b>Intl Large Cap Val.</b>	<b>1,267,341,613</b>	<b>17.93</b>	<b>-8.88</b>	<b>0.43</b>	<b>1.34</b>	<b>4.71</b>	<b>7.82</b>	<b>10/1/1995</b>
Intl Large Cap Val. - Net		17.84	-9.17	0.12	1.02	4.34		
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80	4.80	

\* Custom benchmark is calculated as a weighted average of each funds respective benchmark until 12/2017. After 12/2017 the benchmark is MSCI ACWI ex US - Net.

\*\* Genesis is NOF NAV commingled fund.

# Performance

## International Equity

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
<b>Brandes Investment</b>	<b>571,218,749</b>	<b>20.71</b>	<b>-5.86</b>	<b>1.74</b>	<b>2.11</b>	<b>5.43</b>	<b>8.09</b>	<b>1/1/1996</b>
Brandes Investment - Net		20.65	-6.06	1.52	1.89	5.19		
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80	4.71	
MSCI AC World ex USA Value		15.82	-7.95	0.69	0.57	3.33		
<b>Mondrian</b>	<b>572,193,568</b>	<b>15.99</b>	<b>-10.85</b>	<b>-0.57</b>	<b>0.82</b>	<b>4.16</b>	<b>4.22</b>	<b>4/1/2012</b>
Mondrian - Net		15.87	-11.13	-0.94	0.40	3.68	3.75	
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80	4.00	
MSCI AC World ex USA Value		15.82	-7.95	0.69	0.57	3.33	3.67	
<b>Lazard</b>	<b>123,929,296</b>	<b>14.59</b>	<b>-12.96</b>	<b>0.08</b>	<b>1.10</b>	<b>4.43</b>	<b>4.93</b>	<b>4/1/2012</b>
Lazard - Net		14.52	-13.13	-0.15	0.86	3.97	4.49	
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80	4.00	
MSCI AC World ex USA Value		15.82	-7.95	0.69	0.57	3.33	3.67	
<b>Intl Large Cap Active Core</b>	<b>2,346,660,187</b>	<b>14.59</b>	<b>-15.60</b>	<b>3.91</b>	<b>3.54</b>	<b>7.08</b>	<b>4.99</b>	<b>2/1/2008</b>
Intl Large Cap Active Core - Net		14.48	-15.93	3.38	3.05	6.54		
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80	2.22	
<b>Arrowstreet Capital</b>	<b>1,002,514,846</b>	<b>16.13</b>	<b>-10.04</b>	<b>9.55</b>	<b>7.38</b>	<b>9.13</b>	<b>6.34</b>	<b>3/1/2008</b>
Arrowstreet Capital - Net		15.99	-10.47	9.05	6.89	8.63	5.84	
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80	2.04	
<b>Brown Capital</b>	<b>464,085,668</b>	<b>11.29</b>	<b>-30.49</b>	<b>-1.85</b>	<b>0.67</b>	<b>5.91</b>	<b>6.40</b>	<b>10/1/2004</b>
Brown Capital - Net		11.22	-30.68	-2.52	0.15	5.08		
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80	5.13	

\* Custom benchmark is calculated as a weighted average of each funds respective benchmark until 12/2017. After 12/2017 the benchmark is MSCI ACWI ex US - Net.

\*\* Genesis is NOF NAV commingled fund.

# Performance

## International Equity

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
<b>GlobeFlex Capital</b>	<b>790,620,542</b>	<b>14.50</b>	<b>-10.98</b>	<b>3.52</b>	<b>1.77</b>	<b>6.09</b>	<b>4.80</b>	<b>3/1/2006</b>
GlobeFlex Capital - Net		14.39	-11.28	3.13	1.38	5.68	4.36	
MSCI AC World ex USA (Net)		14.28	-16.00	0.07	0.88	3.80	3.34	
<b>Xponance Intl EQ</b>	<b>88,657,644</b>	<b>16.16</b>	<b>-18.62</b>				<b>-4.05</b>	<b>2/1/2021</b>
Xponance Intl EQ - Net		15.97	-19.16				-4.60	
MSCI EAFE (Net)		17.34	-14.45				-2.00	
<b>Progress Intl Equity*</b>	<b>592,962</b>							
<b>Intl Large Cap Passive Core</b>	<b>1,702,602,031</b>	<b>15.30</b>	<b>-15.46</b>	<b>0.64</b>	<b>1.58</b>	<b>4.86</b>	<b>3.60</b>	<b>2/1/2000</b>
Intl Large Cap Passive Core - Net		15.30	-15.46	0.63	1.58	4.86		
International Large Cap Passive Core Benchmark		14.28	-16.00	-0.03	1.00	4.39	3.18	
<b>NTGI ACWI ex US Index Fund</b>	<b>1,702,602,031</b>	<b>15.30</b>	<b>-15.46</b>				<b>-11.00</b>	<b>10/1/2021</b>
NTGI ACWI ex US Index Fund - Net		15.30	-15.46				-11.01	
MSCI AC World ex USA (Net)		14.28	-16.00				-11.76	
<b>Intl All Cap Developed</b>	<b>144,466,592</b>	<b>14.69</b>	<b>-19.18</b>	<b>-0.94</b>			<b>2.93</b>	<b>2/1/2019</b>
Intl All Cap Developed - Net		14.53	-19.61	-1.44			2.45	
MSCI EAFE + Canada (Net)		16.18	-14.29	1.27			4.48	
<b>Ativo International</b>	<b>144,466,592</b>	<b>14.69</b>	<b>-19.19</b>	<b>-0.95</b>			<b>2.93</b>	<b>2/1/2019</b>
Ativo International - Net		14.53	-19.61	-1.44			2.45	
MSCI EAFE + Canada (Net)		16.18	-14.29	1.27			4.48	
<b>Intl Small Cap Eqty</b>	<b>502,629,501</b>	<b>14.56</b>	<b>-30.30</b>	<b>-1.17</b>	<b>-0.05</b>	<b>5.51</b>	<b>4.11</b>	<b>12/1/2005</b>
Intl Small Cap Eqty - Net		14.34	-30.86	-1.91	-0.80	4.72		
MSCI AC World ex USA Small Cap (Net)		13.31	-19.97	1.07	0.67	5.24	5.39	
Custom Benchmark (Intl Small Cap)		13.31	-19.97	1.07	0.67	5.24	4.79	

\* Custom benchmark is calculated as a weighted average of each funds respective benchmark until 12/2017. After 12/2017 the benchmark is MSCI ACWI ex US - Net.

\*\* Genesis is NOF NAV commingled fund.

# Performance

## International Equity

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
<b>Franklin Templeton</b>	<b>199,582,016</b>	<b>14.92</b>	<b>-22.37</b>	<b>-1.18</b>	<b>-0.28</b>	<b>5.25</b>	<b>4.63</b>	<b>8/1/2011</b>
Franklin Templeton - Net		14.72	-22.94	-1.89	-1.01	4.49	3.88	
MSCI AC World ex USA Small Cap (Net)		13.31	-19.97	1.07	0.67	5.24	4.12	
<b>William Blair IntSC</b>	<b>303,047,485</b>	<b>14.32</b>	<b>-34.70</b>	<b>-1.16</b>	<b>0.09</b>	<b>5.70</b>	<b>7.05</b>	<b>9/1/2010</b>
William Blair IntSC - Net		14.10	-35.24	-1.92	-0.68	4.89	6.24	
MSCI AC World ex USA Small Cap (Net)		13.31	-19.97	1.07	0.67	5.24	5.81	
Custom Benchmark (Intl Small Cap)		13.31	-19.97	1.07	0.67	5.24	6.04	
<b>Emerging Mkt Equity</b>	<b>1,031,629,847</b>	<b>12.73</b>	<b>-23.59</b>	<b>-5.45</b>	<b>-1.42</b>	<b>1.99</b>	<b>7.73</b>	<b>2/1/1992</b>
Emerging Mkt Equity - Net		12.59	-24.00	-5.99	-1.98	1.42		
MSCI Emerging Markets Index		9.79	-19.74	-2.34	-1.03	1.81	6.23	
<b>Genesis Investment Management, LLP.**</b>	<b>1,031,629,847</b>	<b>12.73</b>	<b>-23.60</b>	<b>-5.45</b>	<b>-1.42</b>	<b>1.99</b>	<b>8.56</b>	<b>5/1/2004</b>
Genesis Investment Management, LLP - Net		12.59	-24.00	-5.99	-1.98	1.42		
MSCI Emerging Markets Index		9.79	-19.74	-2.34	-1.03	1.81	7.13	

\* Custom benchmark is calculated as a weighted average of each funds respective benchmark until 12/2017. After 12/2017 the benchmark is MSCI ACWI ex US - Net.

\*\* Genesis is NOF NAV commingled fund.

# Fixed Income

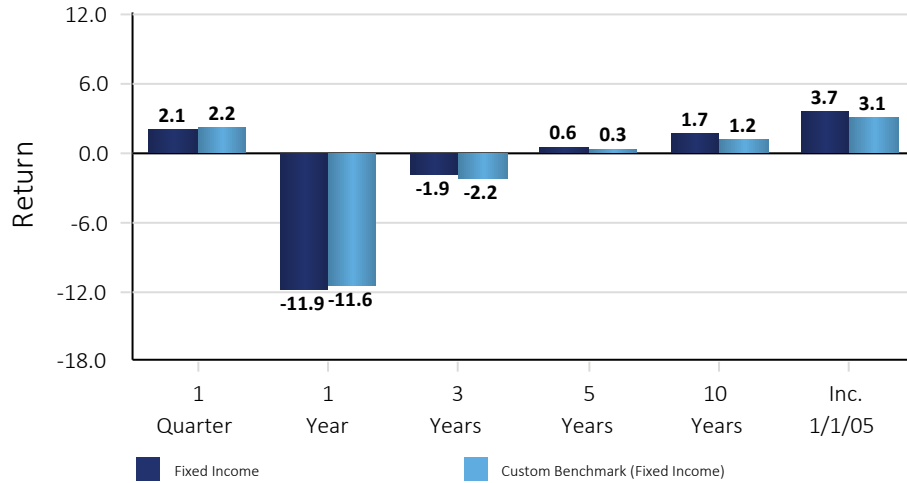


# Composite Performance Summary

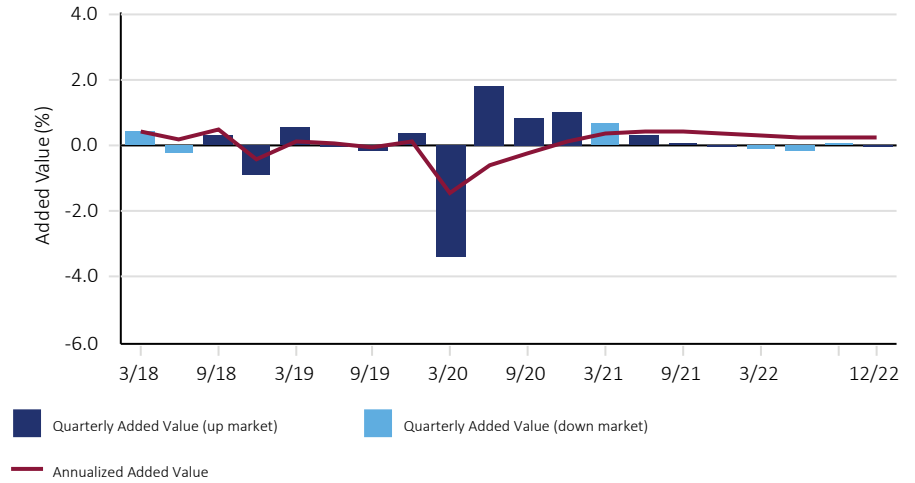
## Fixed Income

Periods Ended December 31, 2022

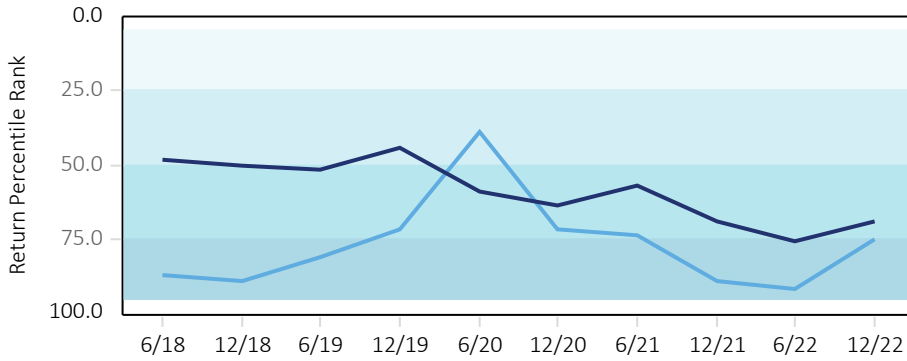
### Comparative Performance



### Added Value History

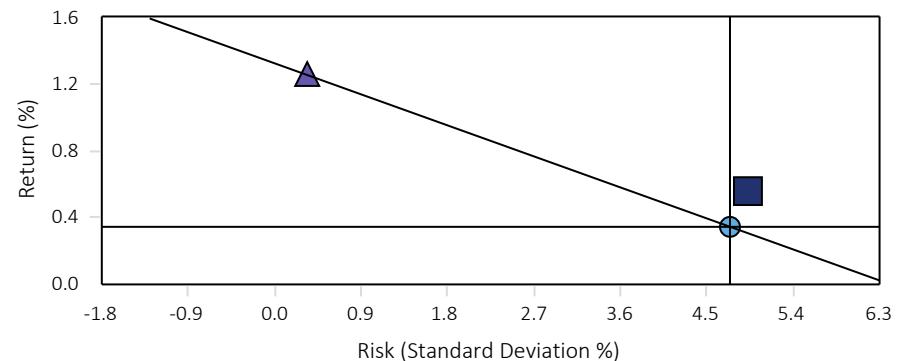


### Rolling Percentile Rank: All Public Plans > \$1B-US Fixed Income Segment



	Total Period	5-25 Count	25-Median Count	Median-75 Count	75-95 Count
— Fixed Income	10	0 (0%)	3 (30%)	6 (60%)	1 (10%)
— Benchmark	10	0 (0%)	1 (10%)	4 (40%)	5 (50%)

### Risk and Return 01/1/18 - 12/31/22

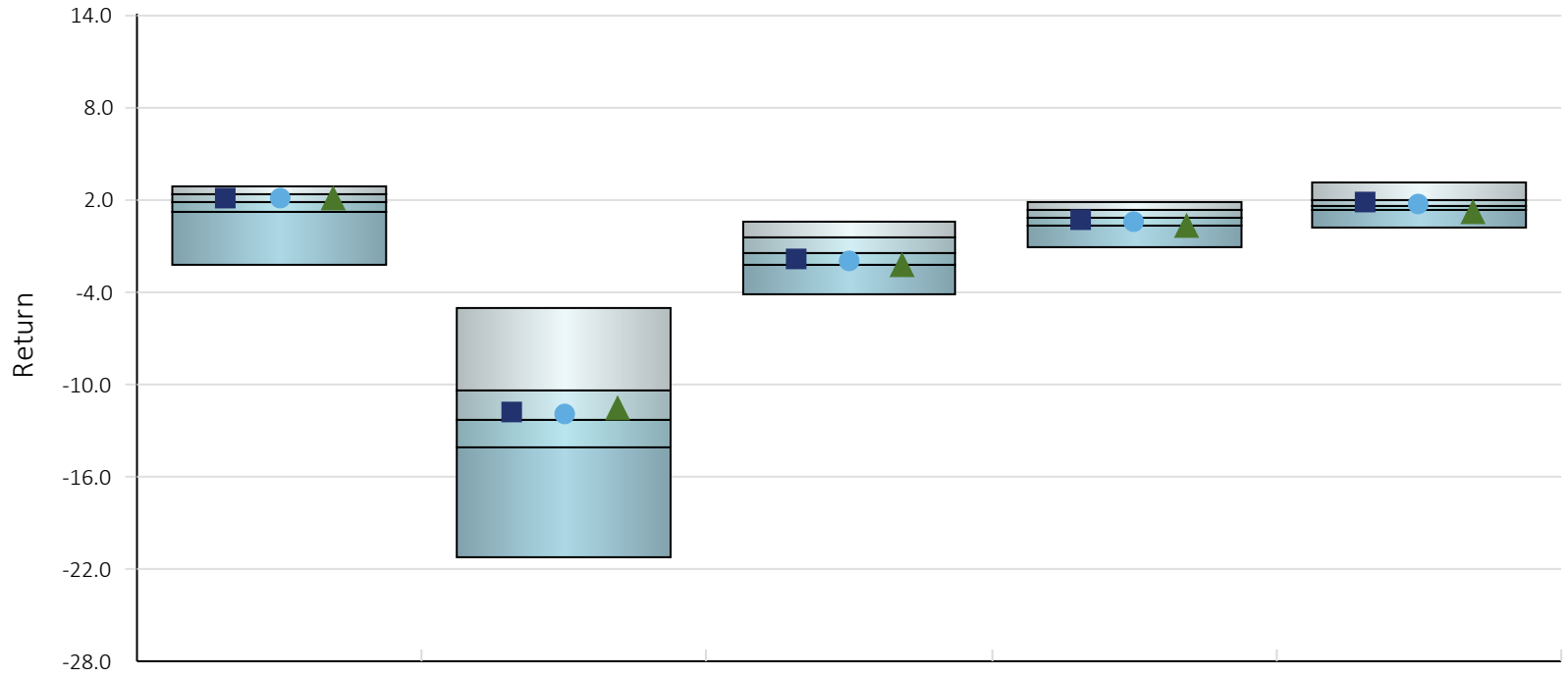


- Fixed Income
- Custom Benchmark (Fixed Income)
- ▲ 90 Day U.S. Treasury Bill

# Plan Sponsor Peer Group Analysis

Fixed Income vs All Public Plans > \$1B-US Fixed Income Segment(Gross)

Periods Ended December 31, 2022



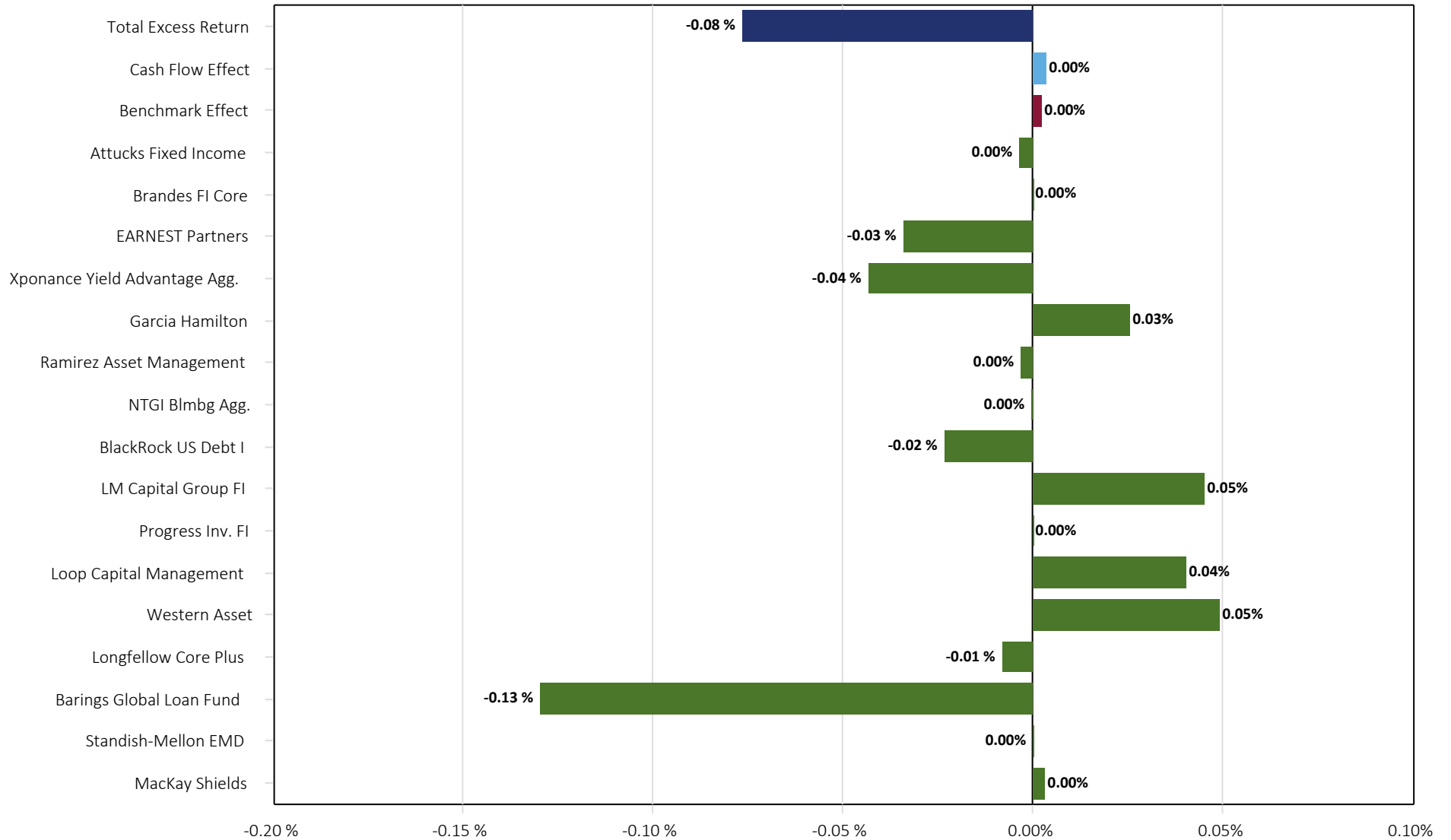
	QTD	1 Year	3 Years	5 Years	10 Years
■ Fixed Income	2.11 (36)	-11.83 (44)	-1.80 (67)	0.68 (58)	1.85 (34)
● Fixed Income - Net	2.09 (37)	-11.90 (45)	-1.90 (69)	0.57 (68)	1.71 (46)
▲ Custom Benchmark (Fixed Income)	2.17 (32)	-11.58 (41)	-2.18 (75)	0.35 (77)	1.22 (89)
5th Percentile	2.83	-4.99	0.64	1.88	3.14
1st Quartile	2.36	-10.44	-0.38	1.33	2.02
Median	1.91	-12.28	-1.40	0.82	1.68
3rd Quartile	1.22	-14.04	-2.23	0.36	1.39
95th Percentile	-2.26	-21.30	-4.15	-1.05	0.27
Population	51	51	45	43	36

# Asset Class Attribution

## Fixed Income

Periods Ended 1 Quarter Ending December 31, 2022

### 1 Quarter



# Performance

## Fixed Income

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						Inception Date
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	
<b>Fixed Income</b>	<b>12,027,573,713</b>	<b>2.11</b>	<b>-11.83</b>	<b>-1.80</b>	<b>0.68</b>	<b>1.85</b>	<b>7.43</b>	<b>1/1/1982</b>
Fixed Income - Net		2.09	-11.90	-1.90	0.57	1.71		
Custom Benchmark (Fixed Income)		2.17	-11.58	-2.18	0.35	1.22	6.92	
Fixed Income IMRF Custom Benchmark		2.17	-11.99	-2.17	0.42			
<b>Active Fixed Core</b>	<b>3,738,475,455</b>	<b>1.71</b>	<b>-12.29</b>	<b>-2.01</b>	<b>0.41</b>	<b>1.50</b>	<b>3.64</b>	<b>4/1/2001</b>
Active Fixed Core - Net		1.68	-12.39	-2.12	0.31	1.36		
Blmbg. U.S. Aggregate Index		1.87	-13.01	-2.71	0.02	1.06	3.55	
<b>Attucks Fixed Income</b>	<b>86,159,511</b>	<b>1.48</b>	<b>-13.64</b>				<b>-7.45</b>	<b>2/1/2021</b>
Attucks Fixed Income - Net		1.39	-13.93				-7.72	
Blmbg. U.S. Aggregate Index		1.87	-13.01				-7.42	
<b>Brandes FI Core</b>	<b>332,122,012</b>	<b>1.89</b>	<b>-10.61</b>	<b>-1.70</b>	<b>0.46</b>		<b>0.80</b>	<b>3/1/2016</b>
Brandes FI Core - Net		1.89	-10.63	-1.72	0.45		0.79	
Blmbg. U.S. Aggregate Index		1.87	-13.01	-2.71	0.02		0.61	
<b>EARNEST Partners</b>	<b>888,905,464</b>	<b>1.45</b>	<b>-12.38</b>	<b>-2.13</b>	<b>0.44</b>	<b>1.52</b>	<b>3.43</b>	<b>5/1/2005</b>
EARNEST Partners - Net		1.41	-12.50	-2.25	0.31	1.36	3.24	
Blmbg. U.S. Aggregate Index		1.87	-13.01	-2.71	0.02	1.06	2.98	
<b>Xponance Yield Advantage Agg.</b>	<b>960,090,715</b>	<b>1.37</b>	<b>-13.02</b>	<b>-1.87</b>	<b>0.42</b>	<b>1.48</b>	<b>3.27</b>	<b>6/1/2005</b>
Xponance Yield Advantage Agg. - Net		1.33	-13.14	-2.00	0.29	1.33	3.10	
Blmbg. U.S. Aggregate Index		1.87	-13.01	-2.71	0.02	1.06	2.93	
<b>Garcia Hamilton</b>	<b>954,134,051</b>	<b>2.21</b>	<b>-11.61</b>	<b>-2.12</b>	<b>0.38</b>		<b>1.21</b>	<b>6/1/2015</b>
Garcia Hamilton - Net		2.19	-11.68	-2.19	0.30		1.13	
Blmbg. U.S. Aggregate Index		1.87	-13.01	-2.71	0.02		0.76	

Taplin, Canada, Habacht switched from core to core plus effective 10/01/2010.

\* Custom Benchmark is Credit Suisse US Leveraged Loan Index and the Credit Suisse Western European Leveraged Loan Index, weighted by the portfolio's market value to each sector.

# Performance

## Fixed Income

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						Inception Date
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	
<b>Ramirez Asset Management</b>	<b>517,063,703</b>	<b>1.83</b>	<b>-12.82</b>				<b>-2.90</b>	<b>5/1/2020</b>
Ramirez Asset Management - Net		1.79	-12.94				-3.03	
Blmbg. U.S. Aggregate Index		1.87	-13.01				-4.80	
<b>Pass. Core Fixed Income</b>	<b>2,699,434,195</b>	<b>1.77</b>	<b>-12.97</b>	<b>-2.68</b>	<b>0.07</b>	<b>1.10</b>	<b>5.11</b>	<b>1/1/1990</b>
Pass. Core Fixed Income - Net		1.77	-12.97	-2.68	0.06	1.09		
Blmbg. U.S. Aggregate Index		1.87	-13.01	-2.71	0.02	1.06	5.10	
<b>BlackRock US Debt I</b>	<b>1,598,782,435</b>	<b>1.70</b>	<b>-13.01</b>	<b>-2.68</b>	<b>0.07</b>		<b>1.45</b>	<b>10/1/2013</b>
BlackRock US Debt I - Net		1.70	-13.02	-2.68	0.07		1.44	
Blmbg. U.S. Aggregate Index		1.87	-13.01	-2.71	0.02		1.35	
<b>NTGI Blmbg Agg.</b>	<b>1,100,651,759</b>	<b>1.87</b>	<b>-12.90</b>	<b>-2.66</b>	<b>0.07</b>	<b>1.09</b>	<b>5.16</b>	<b>2/1/1990</b>
NTGI Blmbg Agg. - Net		1.87	-12.90	-2.67	0.07	1.08		
Blmbg. U.S. Aggregate Index		1.87	-13.01	-2.71	0.02	1.06	5.15	
<b>Core Plus Fixed Income</b>	<b>2,908,690,745</b>	<b>2.44</b>	<b>-13.77</b>	<b>-2.14</b>	<b>0.49</b>	<b>1.77</b>	<b>7.28</b>	<b>1/1/1982</b>
Core Plus Fixed Income - Net		2.40	-13.90	-2.30	0.32	1.60		
Blmbg. U.S. Aggregate Index		1.87	-13.01	-2.71	0.02	1.06	6.87	
<b>LM Capital Group FI</b>	<b>836,206,981</b>	<b>2.57</b>	<b>-11.82</b>	<b>-1.31</b>	<b>0.80</b>	<b>1.77</b>	<b>3.81</b>	<b>5/1/2005</b>
LM Capital Group FI - Net		2.53	-11.97	-1.47	0.64	1.61	3.64	
Blmbg. U.S. Aggregate Index		1.87	-13.01	-2.71	0.02	1.06	2.98	
<b>Progress Inv. FI</b>	<b>1,101</b>							
<b>Loop Capital Management</b>	<b>567,833,210</b>	<b>2.77</b>	<b>-13.43</b>	<b>-2.18</b>	<b>0.36</b>	<b>1.88</b>	<b>3.78</b>	<b>5/1/2005</b>
Loop Capital Management - Net		2.74	-13.55	-2.31	0.22	1.75	3.65	
Blmbg. U.S. Aggregate Index		1.87	-13.01	-2.71	0.02	1.06	2.98	

Taplin, Canada, Habacht switched from core to core plus effective 10/01/2010.

\* Custom Benchmark is Credit Suisse US Leveraged Loan Index and the Credit Suisse Western European Leveraged Loan Index, weighted by the portfolio's market value to each sector.

# Performance

## Fixed Income

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						Inception Date
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	
<b>Western Asset</b>	<b>941,743,453</b>	<b>2.54</b>	<b>-15.92</b>	<b>-3.06</b>	<b>0.17</b>	<b>1.91</b>	<b>4.29</b>	<b>11/1/2001</b>
Western Asset - Net		2.50	-16.04	-3.19	0.05	1.78		
Blmbg. U.S. Aggregate Index		1.87	-13.01	-2.71	0.02	1.06	3.30	
<b>Longfellow Core Plus</b>	<b>562,906,000</b>	<b>1.74</b>	<b>-13.23</b>				<b>-3.05</b>	<b>5/1/2020</b>
Longfellow Core Plus - Net		1.70	-13.36				-3.19	
Blmbg. U.S. Aggregate Index		1.87	-13.01				-4.80	
<b>Bank Loans</b>	<b>1,616,072,322</b>	<b>1.60</b>	<b>-3.77</b>	<b>1.48</b>	<b>2.73</b>		<b>3.54</b>	<b>8/1/2014</b>
Bank Loans - Net		1.69	-3.65	1.52	2.61		3.23	
Barings Custom Benchmark		2.64	-1.10	2.41	3.38		3.60	
<b>Barings Global Loan Fund</b>	<b>1,616,072,322</b>	<b>1.60</b>	<b>-3.77</b>	<b>1.48</b>	<b>2.73</b>		<b>3.54</b>	<b>8/1/2014</b>
Barings Global Loan Fund - Net		1.69	-3.65	1.52	2.61		3.23	
Barings Custom Benchmark*		2.64	-1.10	2.41	3.38		3.60	
<b>Emerging Markets Debt</b>	<b>413,942</b>							
<b>Standish-Mellon EMD</b>	<b>413,942</b>							
<b>High Yield</b>	<b>1,064,487,054</b>	<b>4.19</b>	<b>-7.26</b>	<b>1.79</b>	<b>3.73</b>	<b>5.00</b>	<b>8.91</b>	<b>4/1/1986</b>
High Yield - Net		4.11	-7.53	1.48	3.39	4.65		
ICE BofA US High Yield, Cash Pay Index		4.07	-11.14	-0.21	2.13	3.94	7.60	
<b>MacKay Shields</b>	<b>1,064,487,054</b>	<b>4.19</b>	<b>-7.24</b>	<b>1.80</b>	<b>3.73</b>	<b>5.10</b>	<b>7.90</b>	<b>11/1/2000</b>
MacKay Shields - Net		4.11	-7.51	1.48	3.40	4.75		
ICE BofA US High Yield, Cash Pay Index		4.07	-11.14	-0.21	2.13	3.94	6.51	

Taplin, Canada, Habacht switched from core to core plus effective 10/01/2010.

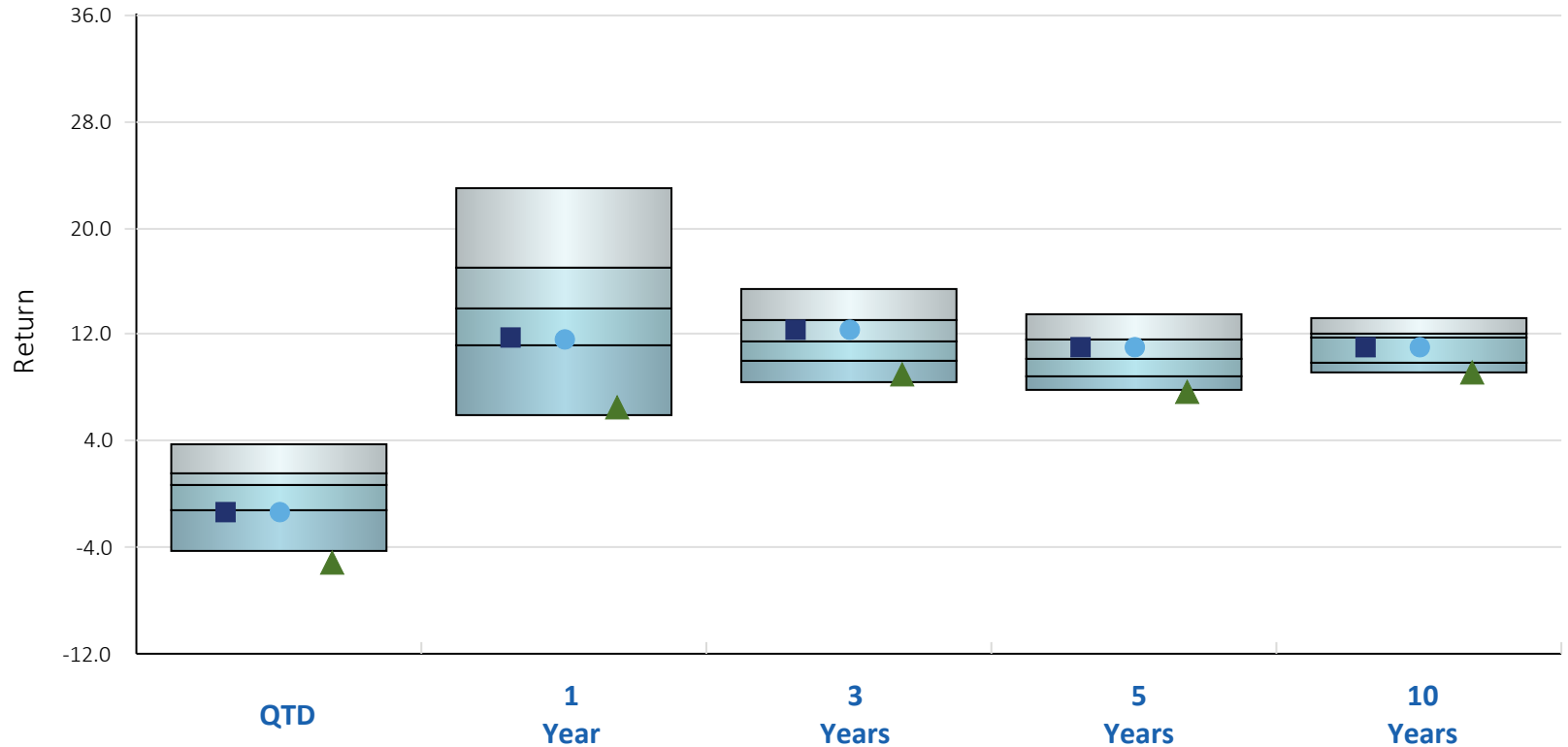
\* Custom Benchmark is Credit Suisse US Leveraged Loan Index and the Credit Suisse Western European Leveraged Loan Index, weighted by the portfolio's market value to each sector.

# Private Real Assets

# Plan Sponsor Peer Group Analysis

Real Estate vs All Public Plans > \$1B-Real Estate Segment(Gross)

Periods Ended December 31, 2022



	QTD	1 Year	3 Years	5 Years	10 Years
■ Real Estate	-1.35 (79)	11.77 (73)	12.41 (33)	11.07 (40)	11.06 (64)
● Real Estate - Net	-1.36 (79)	11.71 (73)	12.35 (34)	11.02 (41)	11.03 (64)
▲ Blended Benchmark (Real Estate)	-5.17 (99)	6.54 (90)	8.97 (89)	7.72 (100)	9.11 (96)
5th Percentile	3.70	22.96	15.36	13.57	13.20
1st Quartile	1.50	17.06	13.14	11.66	12.11
Median	0.67	13.93	11.48	10.22	11.76
3rd Quartile	-1.14	11.23	10.06	8.83	9.86
95th Percentile	-4.23	5.92	8.42	7.85	9.13
Population	45	39	31	24	13



# Asset Allocation & Performance

## Private Real Assets

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						Inception Date
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	
<b>Private Real Assets</b>	<b>4,791,842,770</b>	<b>-0.87</b>					<b>6.95</b>	<b>3/1/2022</b>
Private Real Assets- Net		-0.88					6.90	
Custom Benchmark (Private Real Assets)		-4.86					6.64	
<b>Real Estate</b>	<b>4,362,776,353</b>	<b>-1.35</b>	<b>11.77</b>	<b>12.41</b>	<b>11.07</b>	<b>11.06</b>	<b>6.09</b>	<b>5/1/1985</b>
Real Estate - Net		-1.36	11.71	12.35	11.02	11.03		
Blended Benchmark (Real Estate)		-5.17	6.54	8.97	7.72	9.11	7.80	
<b>Real Estate Core Cmp</b>	<b>2,350,380,042</b>	<b>-2.22</b>	<b>12.93</b>	<b>14.06</b>	<b>12.40</b>	<b>11.40</b>	<b>8.27</b>	<b>4/1/1999</b>
<b>TA Assoc. Buckhead</b>	<b>900,720,750</b>	<b>-6.93</b>	<b>14.48</b>	<b>20.25</b>	<b>18.14</b>	<b>14.51</b>	<b>11.79</b>	<b>8/1/1995</b>
Blended Benchmark (Real Estate)		-5.17	6.54	8.97	7.72	9.11	7.57	
<b>Barings Euro Core Property</b>	<b>141,907,419</b>	<b>7.95</b>	<b>-2.44</b>	<b>3.78</b>	<b>9.62</b>		<b>10.92</b>	<b>3/1/2017</b>
Blended Benchmark (Real Estate)		-5.17	6.54	8.97	7.72		7.57	
<b>Blackstone Property Euro</b>	<b>184,852,309</b>	<b>11.80</b>	<b>14.05</b>	<b>12.26</b>	<b>9.08</b>		<b>9.08</b>	<b>12/1/2017</b>
Blended Benchmark (Real Estate)		-5.17	6.54	8.97	7.72		7.71	
<b>INVESCO Core Real Estate</b>	<b>250,478,467</b>	<b>-3.81</b>	<b>6.88</b>	<b>8.38</b>	<b>7.39</b>	<b>9.02</b>	<b>9.12</b>	<b>4/1/2011</b>
Blended Benchmark (Real Estate)		-5.17	6.54	8.97	7.72	9.11	9.70	
<b>INVESCO European real estate</b>	<b>56,881,071</b>	<b>4.29</b>	<b>-2.13</b>	<b>-0.02</b>			<b>-0.96</b>	<b>4/1/2018</b>
Blended Benchmark (Real Estate)		-5.17	6.54	8.97			7.69	
<b>AEW Core Property Tr</b>	<b>288,235,321</b>	<b>-4.39</b>	<b>17.63</b>	<b>9.98</b>	<b>8.22</b>		<b>8.91</b>	<b>10/1/2013</b>
Blended Benchmark (Real Estate)		-5.17	6.54	8.97	7.72		8.79	
<b>CBRE Core Partners</b>	<b>333,822,479</b>	<b>1.60</b>	<b>18.16</b>	<b>18.48</b>	<b>13.98</b>		<b>12.49</b>	<b>12/1/2013</b>
Blended Benchmark (Real Estate)		-5.17	6.54	8.97	7.72		8.72	

Returns are time-weighted and are reported net of fee for all real estate managers.

The Blended Benchmark (Real Estate) is currently the NCREIF ODCE VW Net Index. Prior to January 1, 2013, it was the NCREIF Property Index + 1%. Returns prior to January, 2007, reflect those of the Consumer Price Index + 5%.

# Asset Allocation & Performance

## Private Real Assets

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						Inception Date
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	
<b>JPM Strategic Property Fund</b> Blended Benchmark (Real Estate)	193,482,226	0.08 -5.17	14.82 6.54				13.57 13.55	1/1/2021
<b>RE Non-Core Cmp</b>	2,012,396,311	-0.29	10.42	10.55	9.55	10.77	11.47	1/1/2010
<b>Artemis MWBE Spruce</b> Blended Benchmark (Real Estate)	327,294,956	0.10 -5.17	14.31 6.54	11.26 8.97	8.67 7.72		6.46 7.55	6/1/2016
<b>Franklin T. EMREFF</b> Blended Benchmark (Real Estate)	2,870,680	-27.39 -5.17	-35.21 6.54	-25.38 8.97	-12.25 7.72	1.23 9.11	0.28 9.45	9/1/2011
<b>Security Capital</b> Blended Benchmark (Real Estate)	93,311,385	5.02 -5.17	-16.81 6.54	3.86 8.97	6.35 7.72	5.49 9.11		7/1/1997
<b>Dune II</b> Blended Benchmark (Real Estate)	7,607,645	-5.28 -5.17	1.66 6.54	2.23 8.97	3.95 7.72	9.47 9.11	5.56 8.28	2/1/2009
<b>Non-Core Real Estate Funds</b> Blended Benchmark (Real Estate)	1,340,145,446	-1.85 -5.17	12.86 6.54	12.71 8.97	11.54 7.72	11.69 9.11	11.55 9.41	10/1/2011
<b>Almanac ARS V</b>	79,717							
<b>Non-Core Intl Real Estate</b> Blended Benchmark (Real Estate)	241,086,483	7.06 -5.17	2.35 6.54	3.01 8.97	1.46 7.72		-0.74 8.56	8/1/2014

Returns are time-weighted and are reported net of fee for all real estate managers.

The Blended Benchmark (Real Estate) is currently the NCREIF ODCE VW Net Index. Prior to January 1, 2013, it was the NCREIF Property Index + 1%. Returns prior to January, 2007, reflect those of the Consumer Price Index + 5%.

# Asset Allocation & Performance

## Private Real Assets

Periods Ended December 31, 2022

	Market Value \$	Performance (%)						
		1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
<b>Agriculture</b>	<b>247,585,848</b>	<b>2.71</b>	<b>3.98</b>	<b>3.79</b>	<b>1.09</b>	<b>6.57</b>	<b>6.58</b>	<b>10/1/1997</b>
NCREIF Farmland Index		3.26	9.64	6.82	6.40	8.83	11.21	
<b>Premiere Partners IV</b>	<b>247,585,848</b>	<b>2.71</b>	<b>3.98</b>	<b>3.79</b>	<b>1.09</b>		<b>2.43</b>	<b>3/1/2015</b>
<b>Timberland</b>	<b>63,349,367</b>	<b>10.63</b>	<b>11.94</b>	<b>4.41</b>	<b>2.07</b>	<b>3.65</b>	<b>7.04</b>	<b>10/1/1992</b>
NCREIF Timberland Index		4.89	12.90	7.51	5.37	5.80	8.51	
<b>Forest Investment</b>	<b>63,349,367</b>	<b>10.63</b>	<b>11.94</b>	<b>4.41</b>	<b>2.07</b>	<b>3.80</b>	<b>7.19</b>	<b>10/1/1992</b>
Blended Benchmark (Timberland)		0.98	8.09	5.95	4.46	5.34	8.35	
<b>Unlisted Infrastructure</b>	<b>118,131,202</b>	<b>4.64</b>	<b>11.76</b>	<b>13.10</b>			<b>12.03</b>	<b>4/1/2018</b>
Blended Benchmark (Unlisted Infrastructure)		0.98	9.65	9.22			9.14	
<b>Unlisted Infrastructure Funds</b>	<b>118,131,202</b>	<b>4.64</b>	<b>11.76</b>	<b>13.10</b>			<b>12.03</b>	<b>4/1/2018</b>
Blended Benchmark (Unlisted Infrastructure)		0.98	9.65	9.22			9.14	

Returns are time-weighted and are reported net of fee for all real estate managers.

The Blended Benchmark (Real Estate) is currently the NCREIF ODCE VW Net Index. Prior to January 1, 2013, it was the NCREIF Property Index + 1%. Returns prior to January, 2007, reflect those of the Consumer Price Index + 5%.

# Alternative Investments

# Asset Allocation & Performance

## Alternatives Investments

Periods Ended December 31, 2022

	Allocation	Performance (%)						
	Market Value \$	1 Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
<b>Alternatives Investments</b>	<b>5,097,683,692</b>	<b>0.35</b>	<b>4.39</b>	<b>19.75</b>	<b>17.14</b>	<b>13.29</b>	<b>11.56</b>	<b>2/1/1986</b>
Custom Benchmark (Alternative Investments)		-4.98	-18.08	-0.90	2.95	5.93	11.49	
<b>Absolute Return</b>	<b>75,952</b>							
<b>Aurora Investment</b>	<b>75,952</b>							
<b>Private Equity</b>	<b>4,924,786,019</b>	<b>0.38</b>	<b>5.36</b>	<b>22.97</b>	<b>20.35</b>	<b>16.13</b>	<b>13.85</b>	<b>2/1/1986</b>
Blended Benchmark (Private Equity)		-5.49	-19.14	-1.33	2.68	5.79		
<b>Abbott S/A Comp.</b>	<b>507,256,863</b>	<b>-0.97</b>	<b>1.13</b>	<b>24.82</b>	<b>20.84</b>	<b>16.72</b>	<b>14.74</b>	<b>6/1/1987</b>
<b>Muller Monroe MPEFF</b>	<b>1</b>							
<b>Pantheon S/A Comp.</b>	<b>416,250,559</b>	<b>-5.30</b>	<b>-0.62</b>	<b>22.37</b>	<b>19.41</b>	<b>15.87</b>	<b>11.65</b>	<b>10/1/2000</b>
<b>Private Equity Fund - Domestic</b>	<b>3,255,891,125</b>	<b>-0.30</b>	<b>7.97</b>	<b>25.40</b>	<b>23.00</b>	<b>16.73</b>	<b>15.44</b>	<b>6/1/2012</b>
<b>Private Equity Fund - International</b>	<b>536,451,555</b>	<b>14.75</b>	<b>2.58</b>	<b>13.33</b>	<b>12.44</b>		<b>-1.57</b>	<b>7/1/2015</b>
<b>Oakbrook Opportunities Fund</b>	<b>208,935,917</b>	<b>-5.87</b>	<b>0.63</b>	<b>15.15</b>			<b>8.92</b>	<b>6/1/2019</b>
<b>Private Credit</b>	<b>172,821,721</b>	<b>-0.61</b>	<b>-15.87</b>	<b>-2.62</b>			<b>-1.79</b>	<b>10/1/2019</b>
<b>Private Credit Fund - Domestic</b>	<b>172,821,721</b>	<b>-0.61</b>	<b>-15.87</b>	<b>-2.62</b>			<b>-1.79</b>	<b>10/1/2019</b>

The Alternatives Custom Benchmark is 95% MSCI World Index 1 Qtr Lagged +3%, 5% S&P LSTA Leveraged Loan Index +2%. Prior to March 1, 2022, it was based on an annualized return of 9%. Prior to July 1, 2010, it was based on an annual return of 12%. Prior to 2004, it was based on an annualized return of 13%. Prior to 2003, it was based on an annual return of 15%. Private Equity and Blended Benchmark (Private Equity) returns are 1 quarter lagged

# Manager Watch List

As of December 31, 2022

## Organization

Investment Manager	Asset Class	Effective Date	Resolution
Genesis	Equity Emerging Markets	July 2022	Reduce exposure/Implement Arrowstreet EM

# Appendix

# Asset Class Returns

*Periods Ended December 31, 2022*

	Performance (%)										
	YTD	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
<b>Total Fund</b>	<b>-12.77</b>	<b>16.82</b>	<b>14.98</b>	<b>19.77</b>	<b>-4.23</b>	<b>16.02</b>	<b>8.01</b>	<b>0.53</b>	<b>6.15</b>	<b>20.20</b>	<b>13.84</b>
Total Fund - Net	-12.90	16.63	14.79	19.57	-4.40	15.78	7.77	0.29	5.90	19.94	13.58
Total Fund Benchmark	-13.26	13.48	13.16	18.68	-3.12	14.37	7.89	1.37	7.33	15.84	12.19
<b>Domestic Equity</b>	<b>-19.12</b>	<b>24.89</b>	<b>22.07</b>	<b>29.23</b>	<b>-6.08</b>	<b>19.83</b>	<b>12.62</b>	<b>0.04</b>	<b>9.81</b>	<b>37.65</b>	<b>17.39</b>
Domestic Equity - Net	-19.25	24.69	21.86	29.00	-6.25	19.59	12.35	-0.22	9.54	37.32	17.09
Blended Benchmark (U.S. Equity)	-18.53	25.66	20.89	31.02	-5.24	21.13	12.74	0.48	12.47	33.47	16.38
U.S. Equity IMRF Custom Benchmark	-18.21	25.68	18.00	29.67	-6.79	18.08	15.43				
<b>International Equity</b>	<b>-17.86</b>	<b>9.78</b>	<b>13.52</b>	<b>23.76</b>	<b>-14.13</b>	<b>27.95</b>	<b>3.56</b>	<b>-1.90</b>	<b>-2.80</b>	<b>20.24</b>	<b>19.11</b>
International Equity - Net	-18.14	9.37	13.08	23.39	-14.41	27.52	3.21	-2.23	-3.10	19.87	18.70
MSCI AC World ex USA (Net)	-16.00	7.82	10.65	21.51	-14.20	27.19	4.50	-5.66	-3.87	15.29	16.83
International Equity IMRF Custom Benchmark	-16.70	7.30	11.30	21.37	-14.36	27.79	3.92				
<b>Fixed Income</b>	<b>-11.83</b>	<b>-0.44</b>	<b>7.87</b>	<b>9.50</b>	<b>-0.24</b>	<b>4.82</b>	<b>4.87</b>	<b>0.25</b>	<b>5.97</b>	<b>-0.59</b>	<b>7.41</b>
Fixed Income - Net	-11.90	-0.53	7.75	9.37	-0.39	4.66	4.71	0.10	5.81	-0.75	7.24
Blmbg. U.S. Aggregate Index	-13.01	-1.55	7.51	8.72	0.01	3.54	2.65	0.55	5.97	-2.02	4.21
Fixed Income IMRF Custom Benchmark	-11.99	-0.85	7.29	9.14	-0.08	3.98	3.89				
<b>Private Real Assets</b>											
Custom Benchmark (Private Real Assets)											
<b>Real Estate</b>	<b>11.77</b>	<b>21.95</b>	<b>4.20</b>	<b>9.81</b>	<b>8.36</b>	<b>10.03</b>	<b>8.97</b>	<b>12.54</b>	<b>13.02</b>	<b>10.82</b>	<b>12.85</b>
Real Estate - Net	11.71	21.88	4.16	9.76	8.36	10.03	8.97	12.46	13.02	10.82	12.85
Blended Benchmark (Real Estate)	6.54	21.02	0.34	4.39	7.36	6.66	7.79	13.95	11.46	12.90	11.54
<b>Agriculture</b>	<b>3.98</b>	<b>2.69</b>	<b>4.69</b>	<b>-5.82</b>	<b>0.28</b>	<b>-4.58</b>	<b>-0.47</b>	<b>20.18</b>	<b>24.73</b>	<b>25.68</b>	<b>13.55</b>
NCREIF Farmland Index	9.64	7.83	3.08	4.81	6.74	6.19	7.09	10.35	12.63	20.91	18.58
<b>Timberland</b>	<b>11.94</b>	<b>-2.72</b>	<b>4.51</b>	<b>1.00</b>	<b>-3.62</b>	<b>4.68</b>	<b>-4.58</b>	<b>4.99</b>	<b>12.83</b>	<b>9.14</b>	<b>-3.59</b>
NCREIF Timberland Index	12.90	9.17	0.81	1.30	3.21	3.63	2.59	4.97	10.48	9.69	7.75
<b>Unlisted Infrastruct</b>	<b>11.76</b>	<b>11.68</b>	<b>15.90</b>	<b>9.65</b>							
Blended Benchmark (Unlisted Infrastructure)	9.65	9.00	9.00	9.00							

Benchmark definitions are on the following pages.

Private Equity, Agriculture, Timberland, Unlisted Infrastructure returns shown are gross of fees.



# Asset Class Returns

*Periods Ended December 31, 2022*

	Performance (%)										
	YTD	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
<b>Alternatives Investments</b>	<b>4.39</b>	<b>46.46</b>	<b>12.31</b>	<b>9.48</b>	<b>17.32</b>	<b>12.09</b>	<b>5.32</b>	<b>6.90</b>	<b>11.63</b>	<b>12.11</b>	<b>6.24</b>
Alternative Investments - Net	4.38	46.44	12.27	9.43	17.14	11.91	5.00	6.47	11.16	11.86	6.00
Custom Benchmark (Alternative Investments)	-18.08	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
<b>Private Equity</b>	<b>5.36</b>	<b>54.15</b>	<b>14.50</b>	<b>11.78</b>	<b>21.46</b>	<b>15.61</b>	<b>8.60</b>	<b>8.41</b>	<b>13.72</b>	<b>14.13</b>	<b>5.61</b>
Blended Benchmark (Private Equity)	-19.14	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
<b>Cash</b>	<b>3.18</b>	<b>2.44</b>	<b>2.56</b>	<b>3.59</b>	<b>2.36</b>	<b>1.67</b>	<b>0.63</b>	<b>0.29</b>	<b>0.17</b>	<b>0.11</b>	<b>0.23</b>
90 Day U.S. Treasury Bill	1.46	0.05	0.67	2.28	1.87	0.86	0.25	0.03	0.04	0.05	0.08

Benchmark definitions are on the following pages.

Private Equity, Agriculture, Timberland, Unlisted Infrastructure returns shown are gross of fees.

## Benchmark Definitions

Account Name	From Date	To Date	Benchmark
Domestic Equity Custom	3/1/2022	Present	93% Russell 3000 Index, 7% FTSE Global Core Infrastructure 50/50 Index (Net)
Benchmark	1/1/2015	2/28/2022	100% Russell 3000 Index
	1/1/1982	12/31/2014	100% Dow Jones US Total Stock Market Index
Real Estate Blended Benchmark	1/1/2013	Present	100% NCREIF Fund Index-ODCE (VW) (Net)**
	1/1/2007	12/31/2012	100% NPI + 1%
	1/1/2005	12/31/2016	100% Consumer Price Index + 5%
Alternatives Custom Benchmark	3/1/2022	Present	95% MSCI World World Index (Net) 1 Qtr Lagged +3%, 5% S&P LSTA Leveraged Loan 100 Index +2%
	7/1/2010	2/28/2022	100% Annualized rate of 9.0%
	1/1/2004	6/30/2010	100% Annualized rate of 12.0%
	1/1/2003	12/31/2003	100% Annualized rate of 13.0%
	2/1/1986	12/31/2002	100% Annualized rate of 15.0%
U.S. Equity IMRF Custom Benchmark			Blend of the U.S. Equity Style benchmarks returns, dollar weighted by the actual allocation at pervious month end.
International Equity IMRF Custom Benchmark			Blend of the the International Equity Style benchmarks returns, dollar weighted by the actual allocation at previous month end.
Fixed Income IMRF Custom Benchmark			Blend of the the Fixed Income Style benchmarks returns, dollar weighted by the actual allocation at previous month end.

\*\*ODCE returns are updated quarterly.

# Benchmark Definitions

Account Name	From Date	To Date	Benchmark
Fixed Income Custom Benchmark	3/1/2022	Present	78% Bloomberg U.S. Aggregate, 14% Custom Barings Global Loan Benchmark, 8% ICE BofAML U.S. High Yield Cash Pay Index
	1/1/1976	2/28/2022	100% Bloomberg U.S. Aggregate
Private Real Assets Custom Benchmark	3/1/2022	Present	95% NCREIF Fund Index-ODCE (VW) (Net)**, 5% Consumer Price Index +4%
Unlisted Infrastructure Blended Benchmark	3/1/2022	Present	100% Consumer Price Index +4%
	4/1/2018	2/28/2022	100% Alternatives Custom Benchmark
Private Equity Blended Benchmark	3/1/2022	Present	100% MSCI World World Index (Net) 1 Qtr Lagged +3%
	2/1/1996	2/28/2022	100% Alternatives Custom Benchmark

\*\*ODCE returns are updated quarterly.

# Benchmark Definitions

Account Name	From Date	To Date	Benchmark
Total Fund Benchmark			The total fund benchmark is a blend of the asset class benchmark returns weighted by the target allocation for each asset class:
	3/1/2022	Present	35.5% Domestic Equity Custom Benchmark, 25.5% Fixed Income Custom Benchmark, 18% MSCI AC World ex USA (Net), 10.5% Private Real Assets Custom Benchmark, 9.5% Alternatives Custom Benchmark, 1% 90 Day US Treasury Bill.
	1/1/2021	2/28/2022	39% Russell 3000 Index, 25% Blmbg. Barc. U.S. Aggregate, 15% MSCI AC World ex USA (Net), 10% NCREIF Fund Index-ODCE (VW) (Net), 10% Alternatives Custom Benchmark, 1% 90 Day US Treasury Bill.
	3/1/2018	12/31/2020	37% Russell 3000 Index, 28% Blmbg. Barc. U.S. Aggregate, 18% MSCI AC World ex USA (Net), 9% NCREIF Fund Index-ODCE (VW) (Net), 7% Alternatives Custom Benchmark, 1% 90 Day US Treasury Bill.