

Wilshire



Wilshire Advisors

Executive Summary of Investment Performance

As of September 30, 2022

IMRF Performance Summary

- IMRF market value as of September 2022 : \$45.5 billion
- IMRF total fund return for 3Q 2022: -4.60% vs the Total Fund Benchmark return of -5.66%
- U.S. equity markets declined for the quarter as persistent high inflation and slowing economic growth continued to be a drag on performance
- IMRF U.S. Equity Portfolio underperformed the benchmark during the quarter, returning -5.14% versus -4.78%
- Slowing growth in Europe and China, coupled with a European energy crisis weighed on international stocks during the quarter
- IMRF International Equity Portfolio underperformed the benchmark during the quarter, returning -9.99% versus -9.91%
- Continued aggressive Fed tightening resulted in a challenging fixed income environment
- IMRF Fixed Income Portfolio outperformed the benchmark during the quarter, returning -3.55% versus -3.60%
- 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 down -4.4% for the third quarter and is now down -24.4% for all of 2022. Most sectors were down for the quarter. The worst performing were Communication Services (-12.5%), Real Estate (-10.9%) and Materials (-6.7%). From a size perspective, small-cap outperformed large by 100 basis points. Growth stocks outperformed value for the quarter but trail meaningfully for the year-to-date.

The U.S. equity market is in the midst of one of the worst sell-offs in the past 20 years, ahead of only the global financial crisis and COVID shutdown. Stock indexes produced gains during the first half of the quarter on strong earnings reports, particularly in technology and energy. While earnings have been falling short of expectations this year, they continue to trend higher versus 2021. The rally collapsed, however, after Federal Reserve Chair Jerome Powell stated in August that the Fed would continue to combat inflation in a way that could cause “some pain” for the U.S. economy. Rising rates have been the story of 2022 as investors are now able to capture a positive real return from bonds, which has allowed them to redirect dollars away from riskier assets.

Non-U.S. Equity

In Europe, monetary policy tightening and an energy crisis due, in part, to restricted Russian gas supplies weighed on stocks. In late September, the Bank of England found it necessary to intervene in the bond market after a massive sell-off of UK government bonds, announcing a temporary purchase program of long-dated bonds. China is currently struggling on several fronts – slowing growth, record high youth unemployment and a collapsing housing market. Its zero-COVID policy is arguably making matters worse, as full or partial lockdowns announced in late September will affect approximately 125 million people.

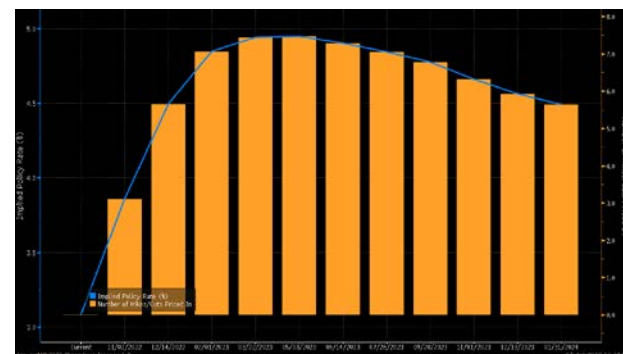
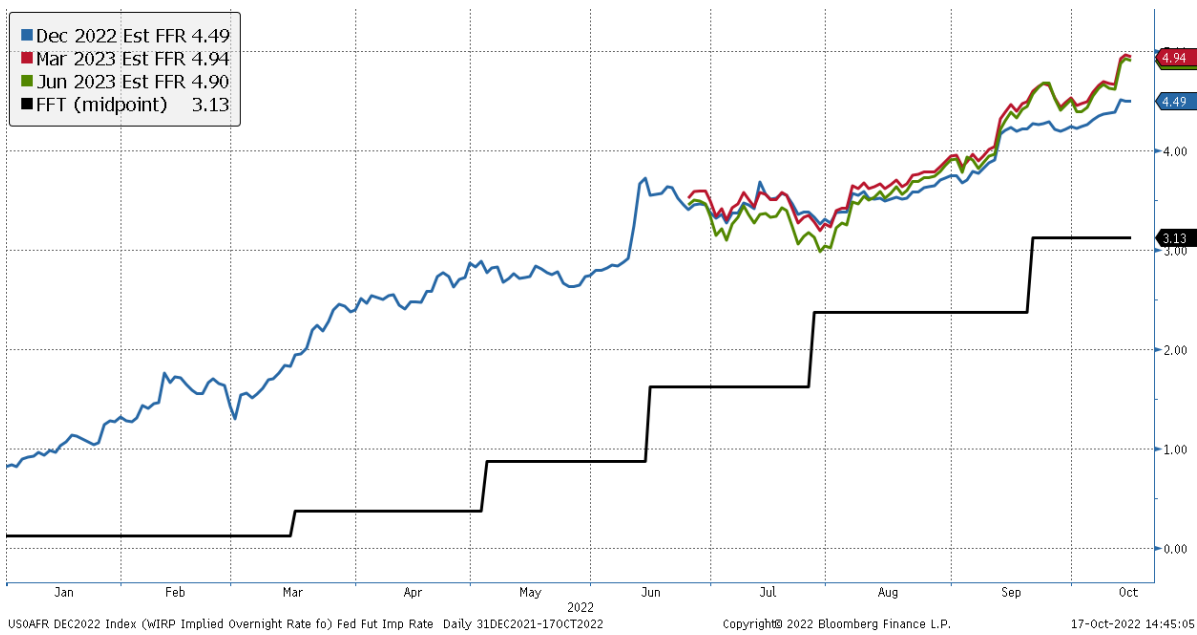
Fixed Income

The U.S. Treasury yield curve was up meaningfully across all maturities during the quarter. The 10-year Treasury yield ended the quarter at 3.83%, up 81 basis points from June. The FOMC increased their overnight rate by 0.75% in both July and September, targeting a range of 3.00% to 3.25%. Equity markets reacted negatively to Fed Chair Jerome Powell’s “pain” speech in August where he clearly stressed the committee’s current goal of taming inflation.

September 2022 Asset Class Assumptions

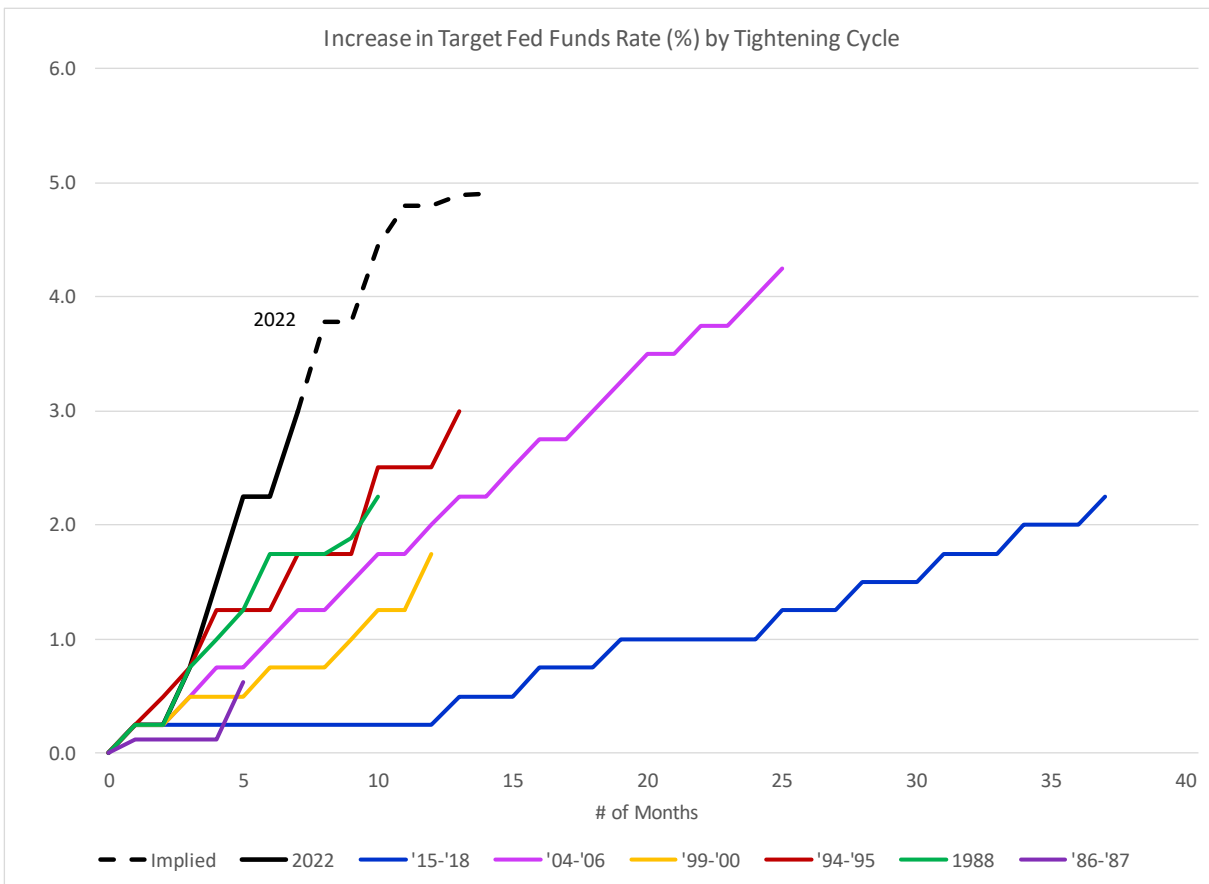
	Equity						Fixed Income					Real Assets						
	US Stock	Dev ex-US Stock	Emg Stock	Global ex-US Stock	Global Stock	Private Equity	Cash	Core Bond	LT Core Bond	TIPS	High Yield	Dev ex-US Bond (Hdg)	US RES	Global RES	Private RE	Cmdty	Real Assets	US CPI
Compound Return (%)	6.75	7.50	7.75	7.85	7.30	10.25	3.65	4.90	5.10	4.05	6.85	2.85	5.65	5.80	6.35	5.90	7.05	2.25
Expected Risk (%)	17.00	18.00	26.00	19.10	17.10	28.00	0.75	4.25	8.90	6.00	10.00	4.25	17.50	16.45	14.00	16.00	10.35	1.75
Cash Yield (%)	1.80	3.45	2.95	3.30	2.40	0.00	3.65	5.10	5.20	4.30	9.65	3.50	3.95	3.95	2.30	3.65	2.75	0.00
Growth Exposure	8.00	8.00	8.00	8.00	8.00	13.50	0.00	-0.85	-2.25	-3.00	4.00	-1.00	6.00	6.00	3.50	0.00	1.80	0.00
Inflation Exposure	-3.00	0.00	5.00	1.50	-1.25	-3.80	0.00	-2.50	-6.70	2.50	-1.00	-3.00	1.00	1.80	1.00	12.00	4.85	1.00
Correlations																		
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	0.83	0.96	0.87	1.00														
Global Stock	0.95	0.92	0.83	0.94	1.00													
Private Equity	0.74	0.64	0.62	0.67	0.74	1.00												
Cash Equivalents	-0.05	-0.09	-0.05	-0.08	-0.07	0.00	1.00											
Core Bond	0.28	0.13	0.00	0.09	0.20	0.31	0.19	1.00										
LT Core Bond	0.31	0.16	0.01	0.12	0.23	0.32	0.11	0.92	1.00									
TIPS	-0.05	0.00	0.15	0.05	0.00	-0.03	0.20	0.59	0.47	1.00								
High Yield Bond	0.54	0.39	0.49	0.45	0.51	0.34	-0.10	0.25	0.32	0.05	1.00							
Dev ex-US Bond (Hdg)	0.16	0.25	-0.01	0.17	0.18	0.26	0.10	0.66	0.65	0.39	0.26	1.00						
US RE Securities	0.58	0.47	0.44	0.49	0.56	0.50	-0.05	0.17	0.23	0.10	0.56	0.05	1.00					
Global RE Securities	0.64	0.58	0.56	0.61	0.65	0.58	-0.05	0.17	0.22	0.11	0.61	0.03	0.96	1.00				
Private Real Estate	0.54	0.44	0.44	0.47	0.52	0.51	-0.05	0.19	0.25	0.09	0.57	0.05	0.77	0.75	1.00			
Commodities	0.25	0.34	0.39	0.38	0.32	0.27	0.00	-0.02	-0.02	0.25	0.29	-0.10	0.25	0.28	0.25	1.00		
Real Assets	0.48	0.51	0.58	0.57	0.54	0.47	-0.02	0.23	0.25	0.39	0.56	0.05	0.70	0.75	0.70	0.65	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	-0.08	0.05	0.03	0.05	0.44	0.26	1.00

Center Stage: Fed Actions & Expectations



Data Source: Bloomberg

Most Aggressive Tightening in Modern Era... When/If it Bites, It Might Hurt



Data Source: Bloomberg

“While higher interest rates, slower growth, and softer labor market conditions will bring down inflation, they will also bring some pain to households and businesses. These are the unfortunate costs of reducing inflation. But a failure to restore price stability would mean far greater pain.”



Jerome Powell

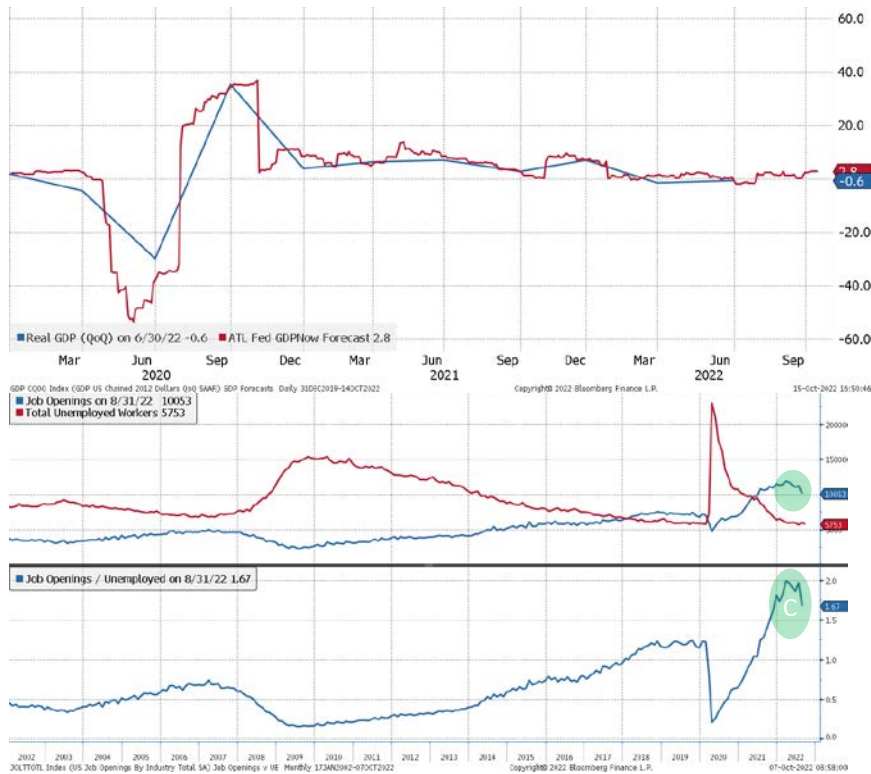
August 2022, Jackson Hole

The Fed's Dashboard: Realized & Expected Inflation



- Realized inflation remains stubbornly high
 - Sept & Oct Core CPI exceeded expectations
 - Core CPI (YoY) has ticked higher in recent months (as we anticipated last quarter)
 - Wage inflation & labor market imbalances add to inflation persistency/stickiness
- Inflation expectations have come down
 - Suggests that inflation anchoring at high levels may not yet be fully entrenched in consumer/business sentiment
 - Expectational anchoring at higher-levels would make the Fed's job even more challenging

The Fed's Dashboard: Economic Growth & Labor Market



Data Source: Bloomberg

- The odds of a “soft landing” diminish as inflation persists (as the Fed is pressured to tighten aggressively)
- Potential outcome may be somewhere between a hard and soft landing
- Powell’s “Sully” Sullenberger moment...

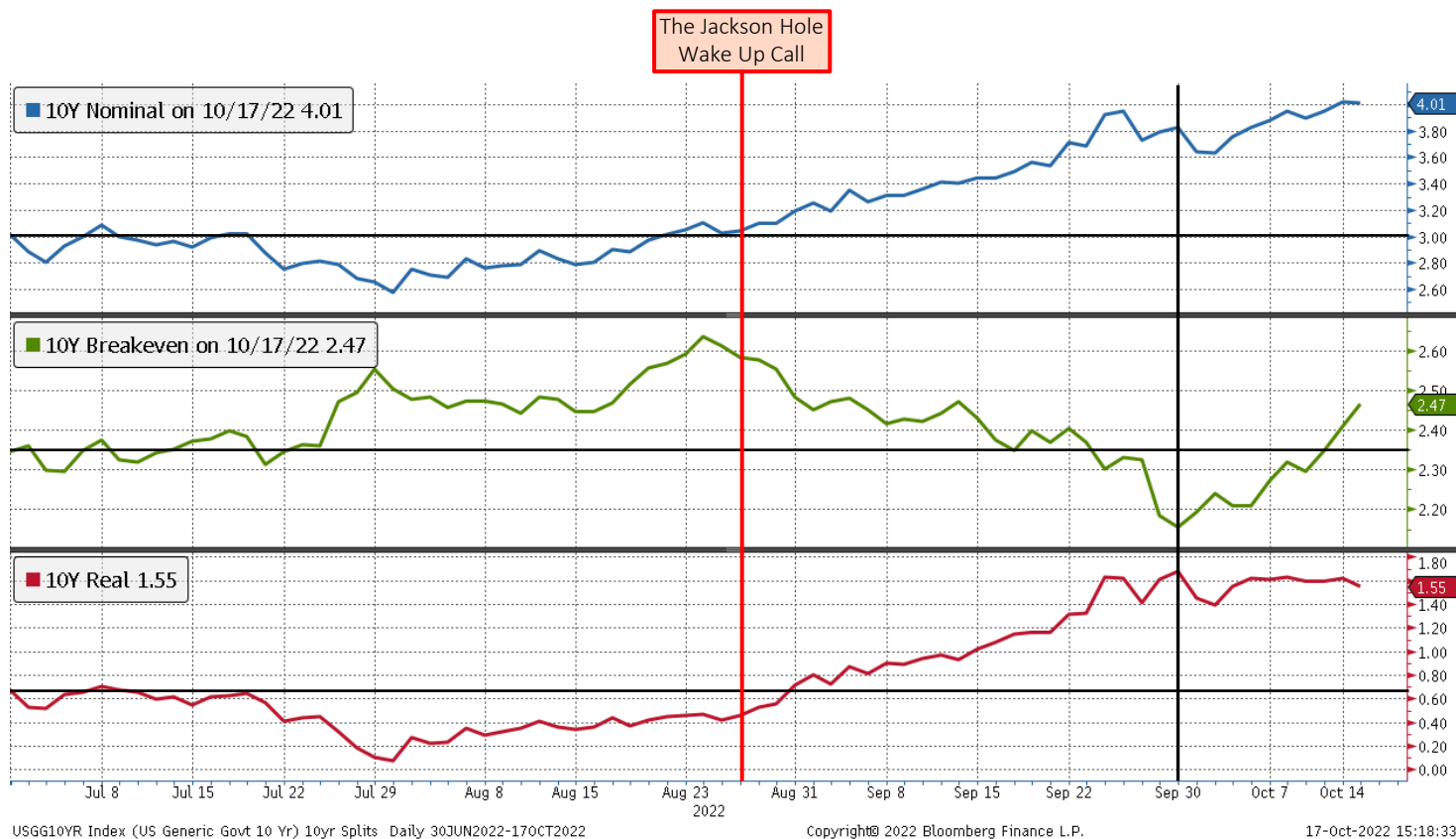


“We’re going to be in the Hudson”

Chesley Burnett "Sully" Sullenberger III
Pilot of US Airways 1549, January 15, 2009

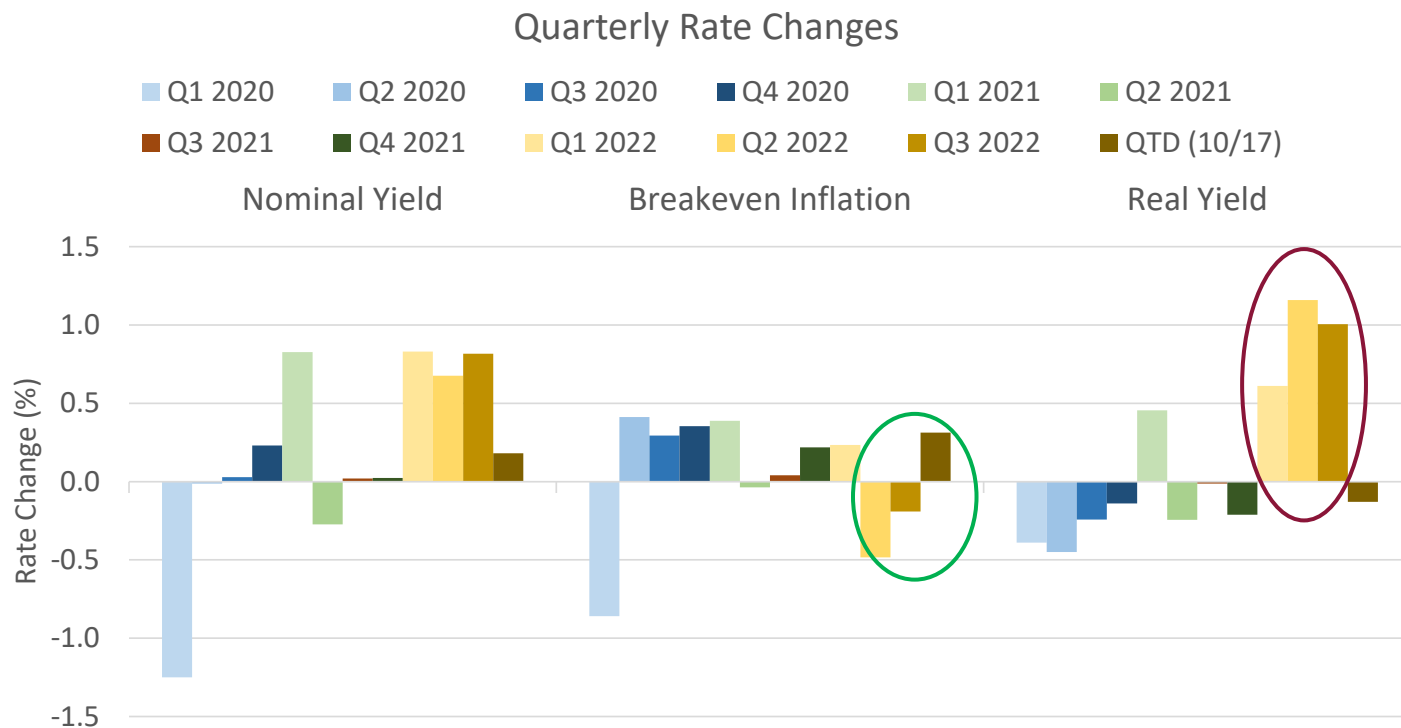
- Labor markets remain historically tight
- Difficult to see inflation pressures easing to acceptable levels without these tensions reversing
- Recent jobs reports remain strong (good news is bad news as it relates to the Fed’s current objectives)

Rate Moves (10Y Nominal, Real & BEI)



Data Source: Bloomberg

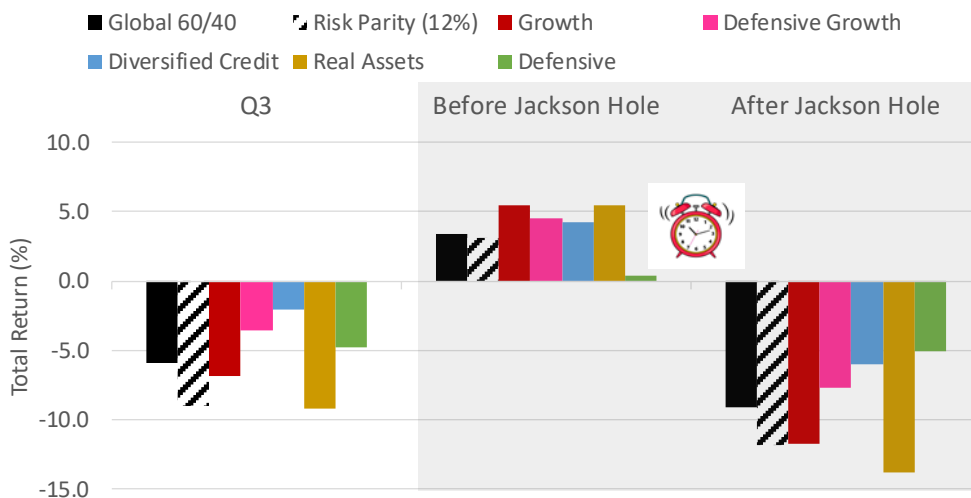
Rate Changes (2020 – YTD 2022) – Tightening the screws..



Data Source: Bloomberg

Q3 Market Returns: Before & After Jackson Hole

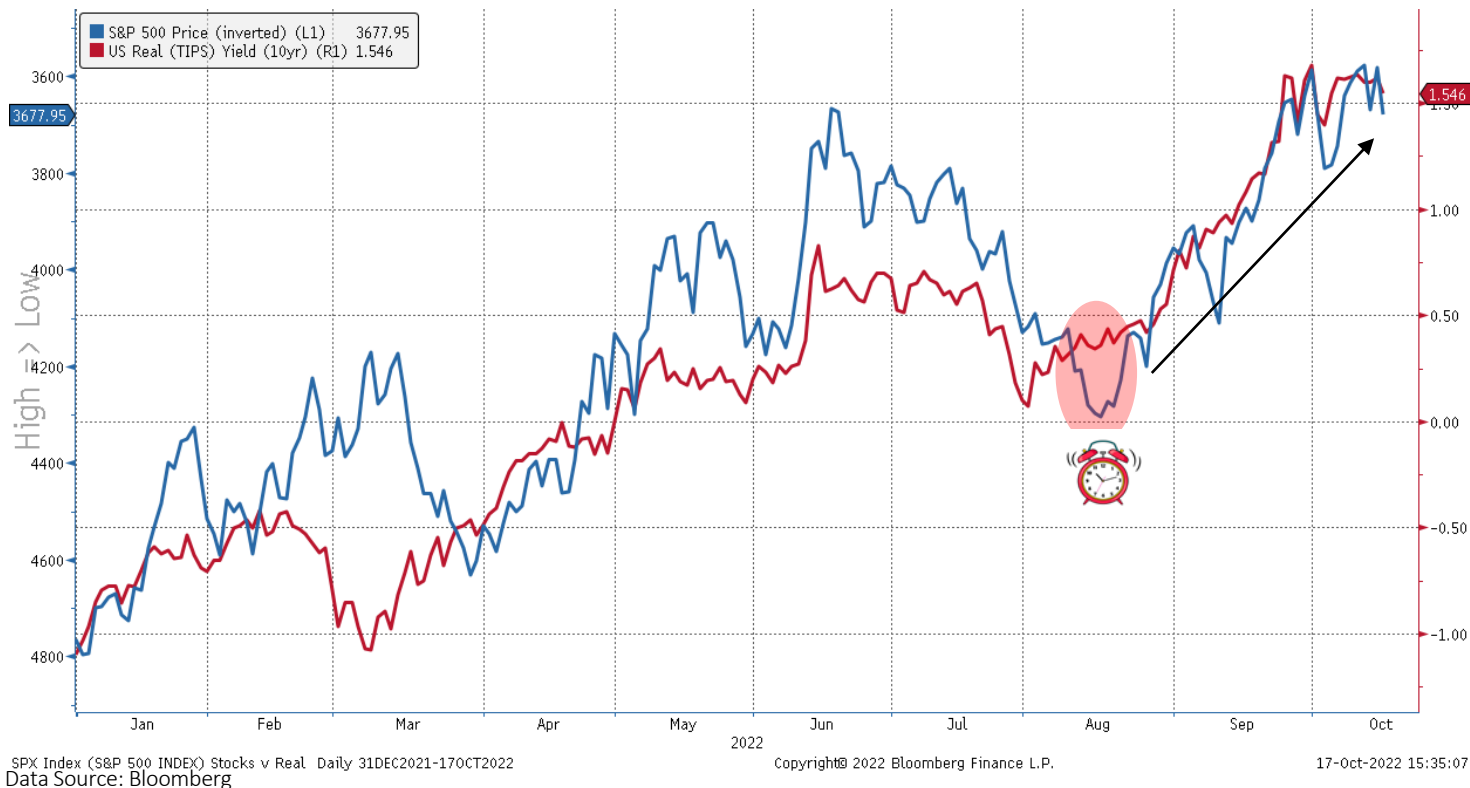
Asset Allocation & Thematic Returns



	Q3	Before Jackson Hole	After Jackson Hole
Global 60/40	(5.94)	3.44	(9.07)
Risk Parity (12%)	(9.03)	3.14	(11.80)
Growth	(6.82)	5.51	(11.68)
Defensive Growth	(3.54)	4.54	(7.73)
Diversified Credit	(2.03)	4.23	(6.01)
Real Assets	(9.14)	5.42	(13.81)
Defensive	(4.75)	0.36	(5.10)

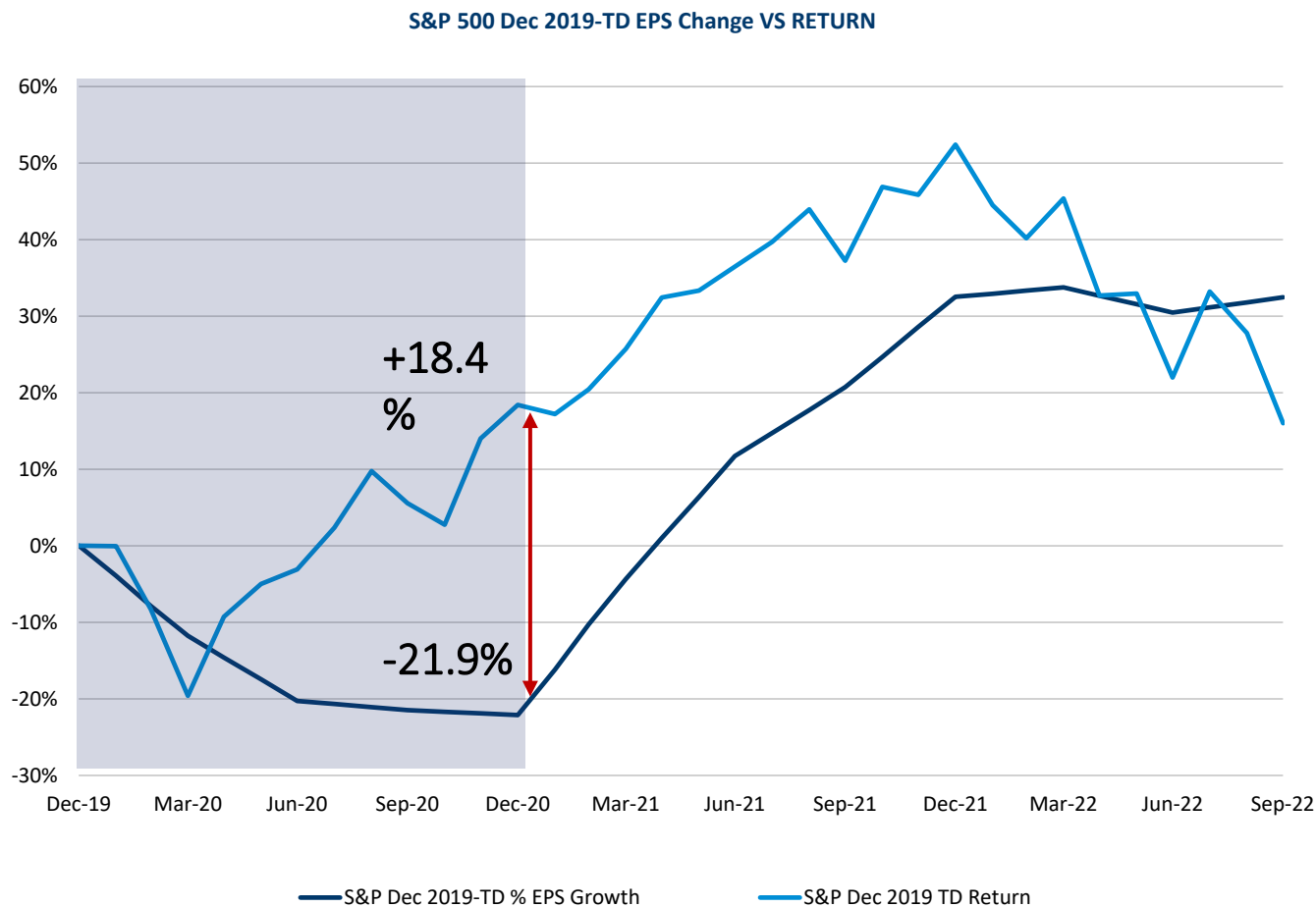
Data Source: Bloomberg, Wilshire

Liquidity/Rates-driven Market: Plenty of downside left if fundamentals deteriorate



Data Source: Bloomberg

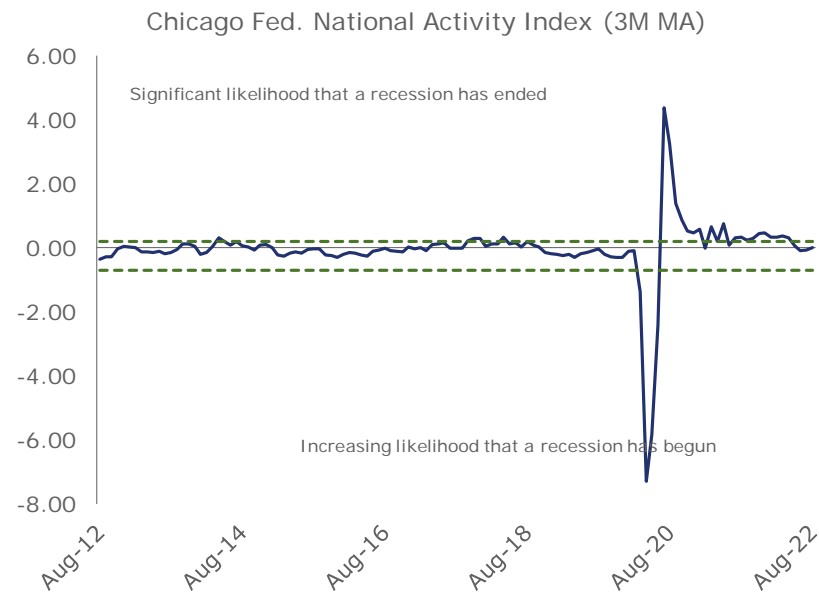
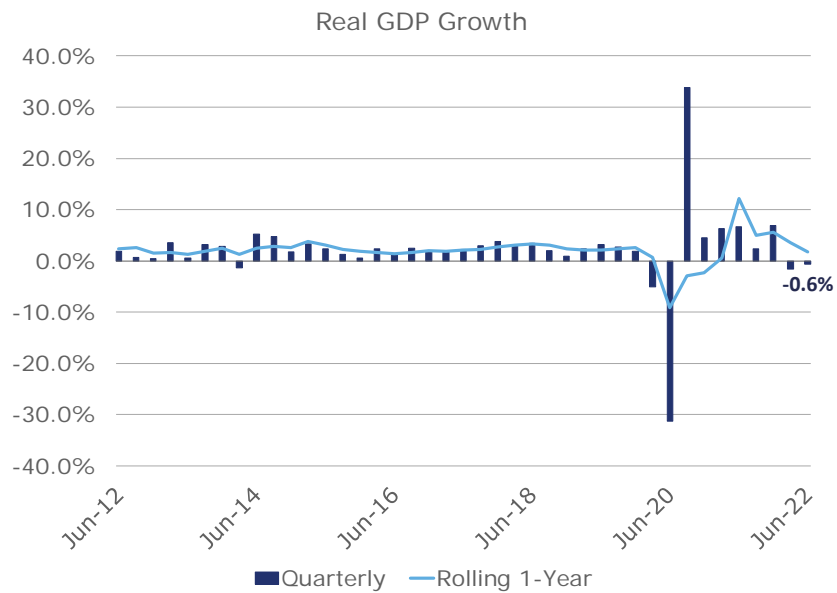
EPS Growth since Dec 2020 (prices down as growth stalls)



Data Source: Bloomberg

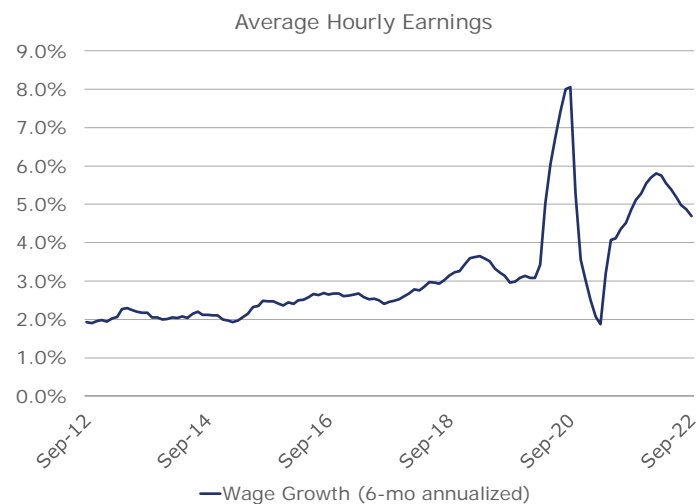
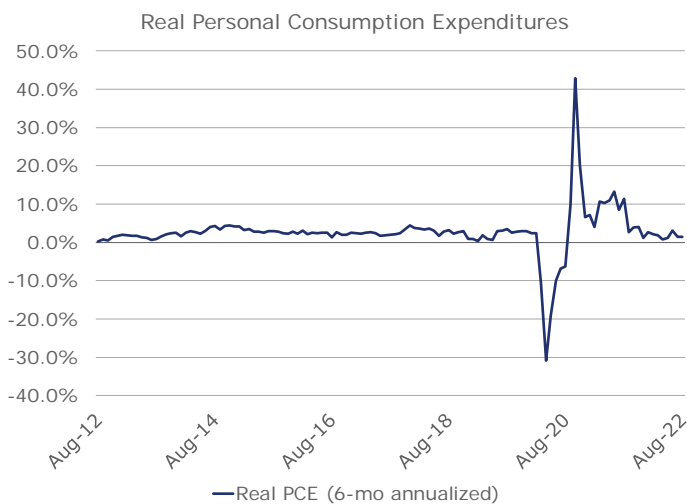
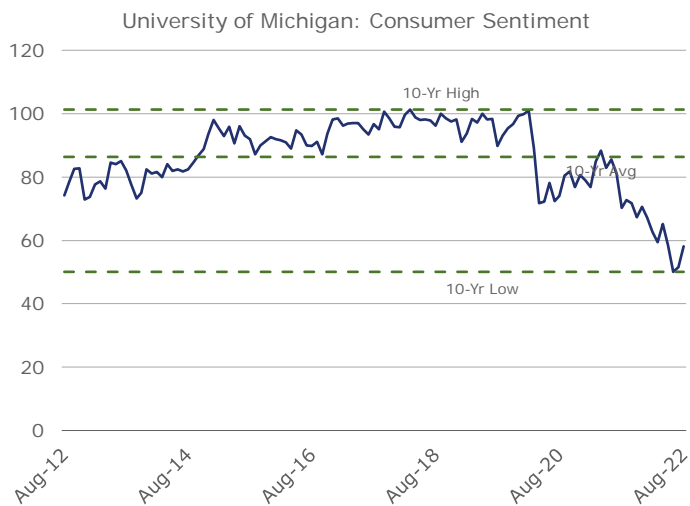
Economic/Market Activity

Economic Growth



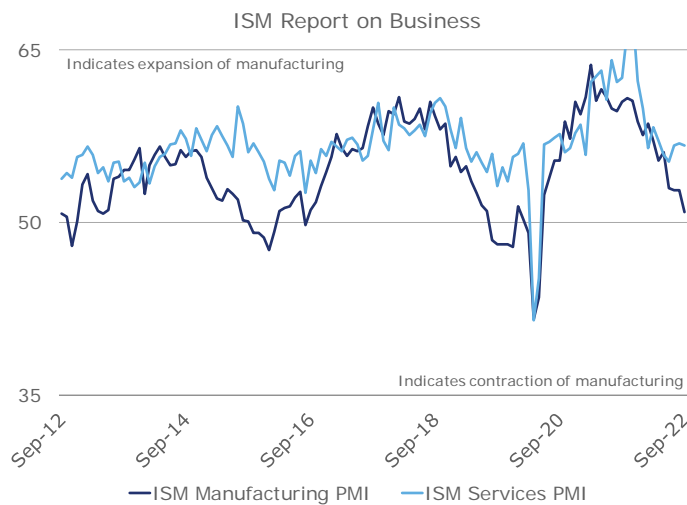
Data Sources: Bloomberg

Consumer Activity



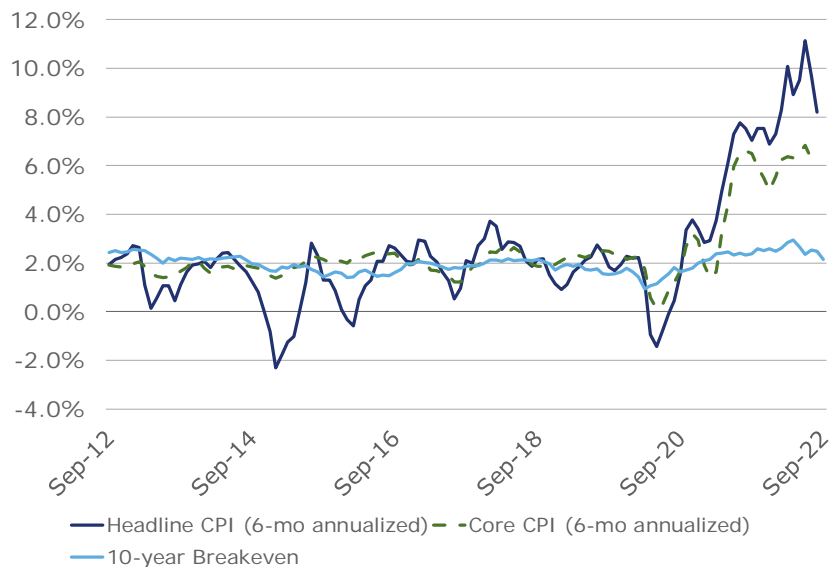
Data Sources: Bloomberg

Business Activity

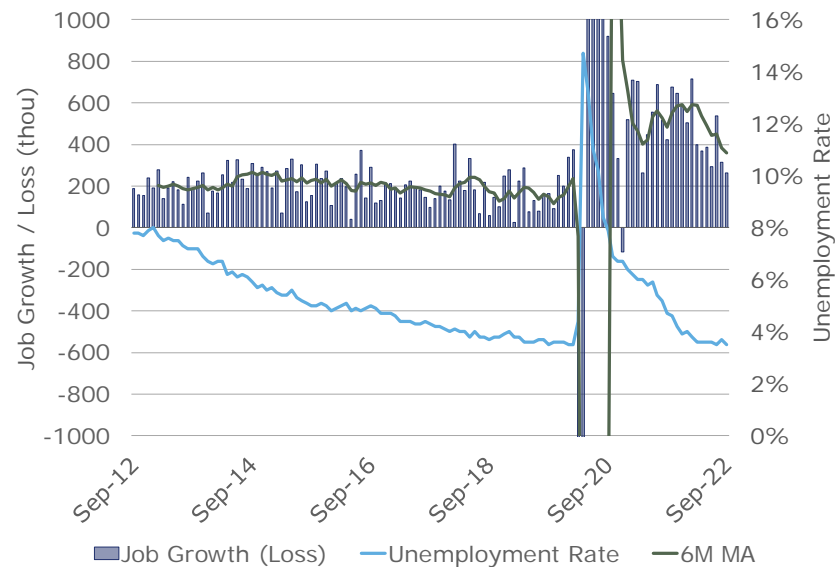


Inflation and Employment

Inflation: Actual & Expected



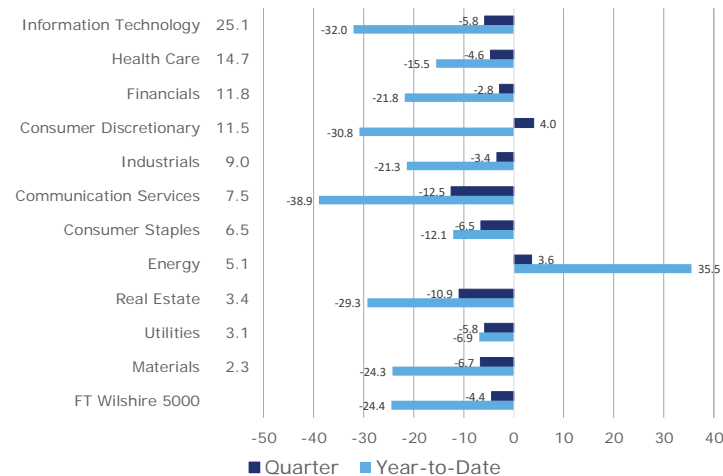
Employment Gains / Losses



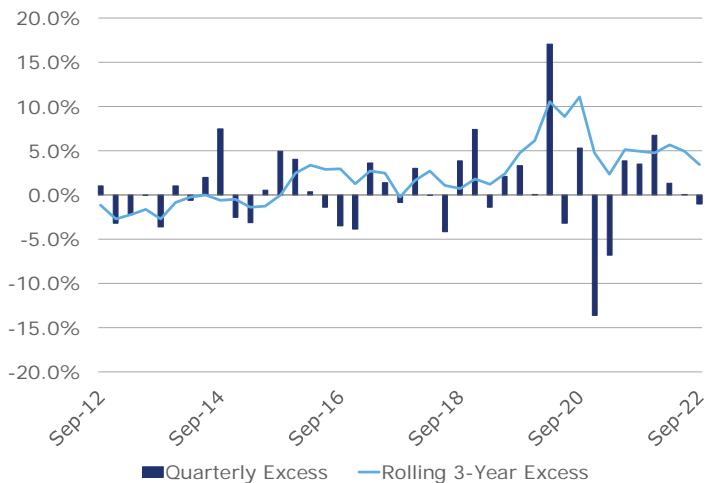
U.S. Equity Market

As of 9/30/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
FT Wilshire 5000	-4.4	-24.4	-17.2	8.1	8.8	11.5
Wilshire U.S. Large Cap	-4.5	-24.4	-16.6	8.4	9.3	11.8
Wilshire U.S. Small Cap	-3.5	-24.6	-22.1	4.8	4.2	9.2
Wilshire U.S. Large Growth	-3.3	-30.1	-22.0	10.7	11.4	13.4
Wilshire U.S. Large Value	-5.8	-16.9	-9.8	6.0	7.2	10.1
Wilshire U.S. Small Growth	-2.0	-28.2	-26.9	4.1	4.5	9.3
Wilshire U.S. Small Value	-4.9	-21.1	-17.3	5.4	3.8	8.9
Wilshire REIT Index	-10.2	-29.7	-17.6	-2.2	2.9	6.1
MSCI USA Min. Vol. Index	-5.4	-17.3	-8.7	2.9	7.7	10.7
FTSE RAFI U.S. 1000 Index	-5.7	-17.7	-10.3	8.2	7.9	11.1

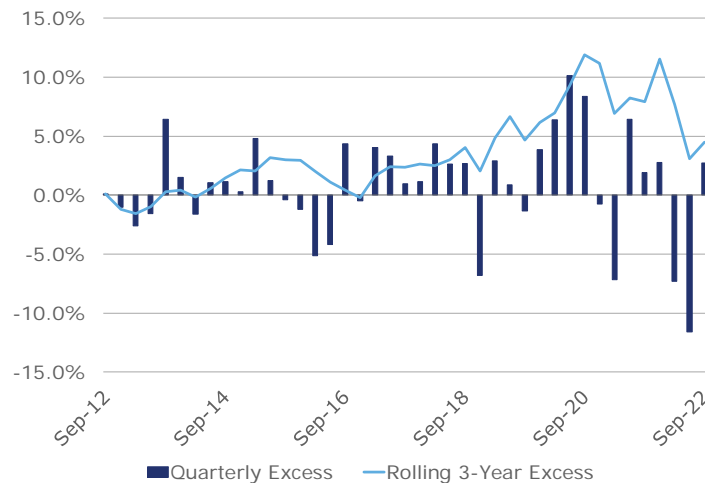
U.S. Sector Weight and Return (%)



Large Cap vs Small Cap



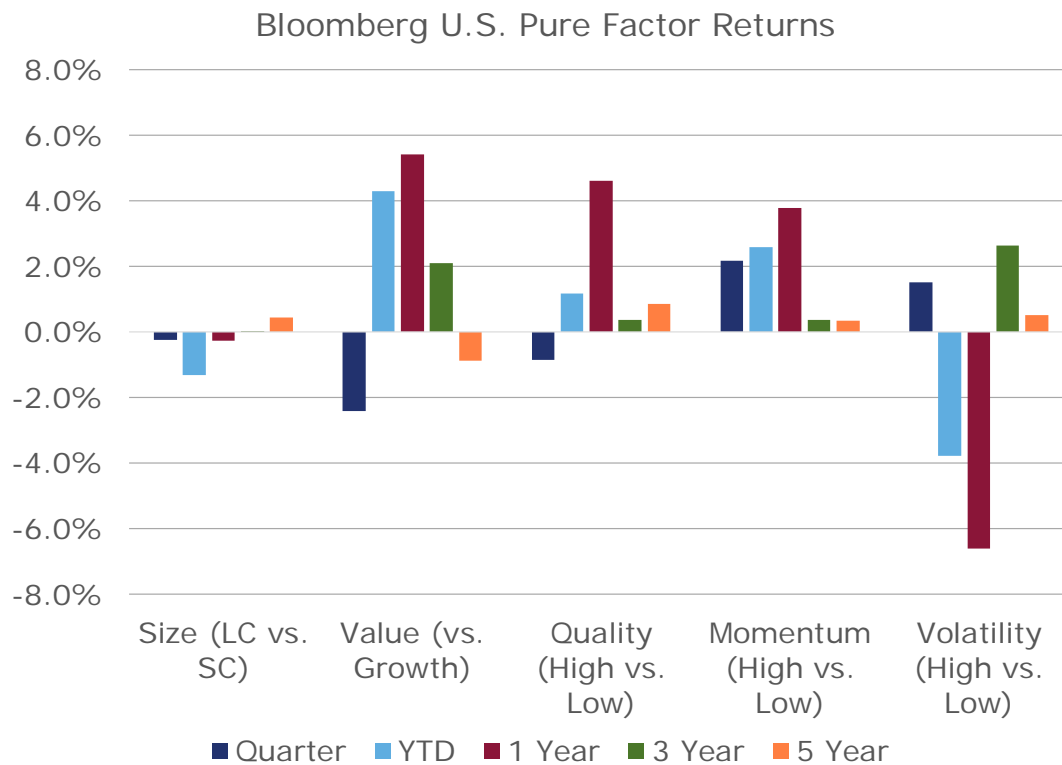
Large Growth vs Large Value



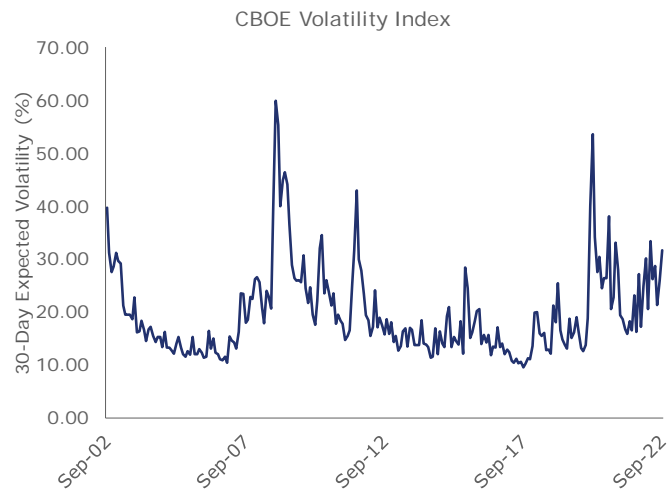
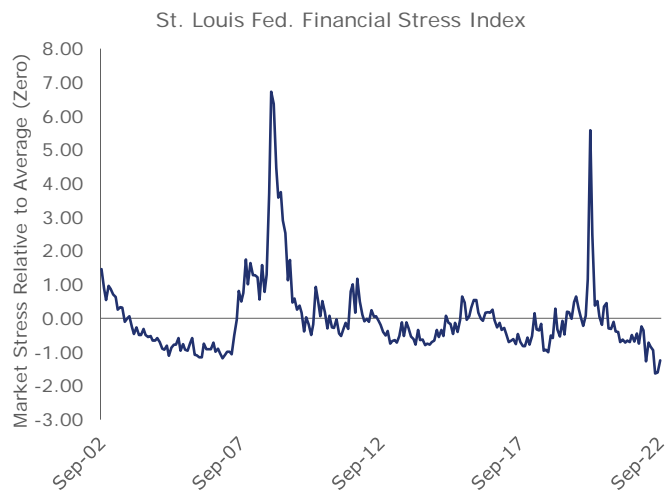
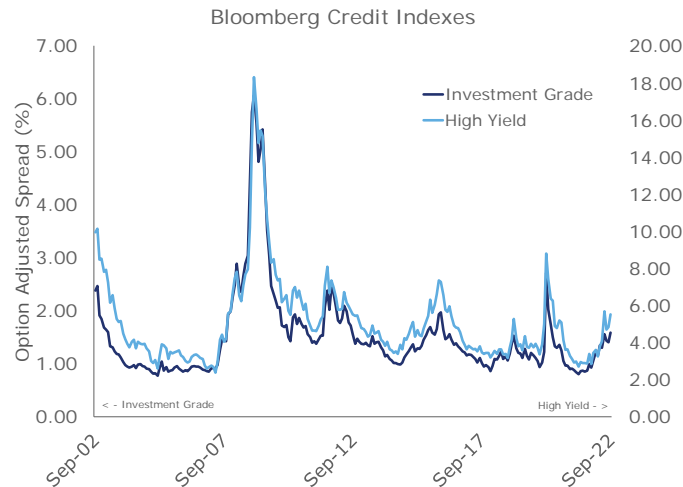
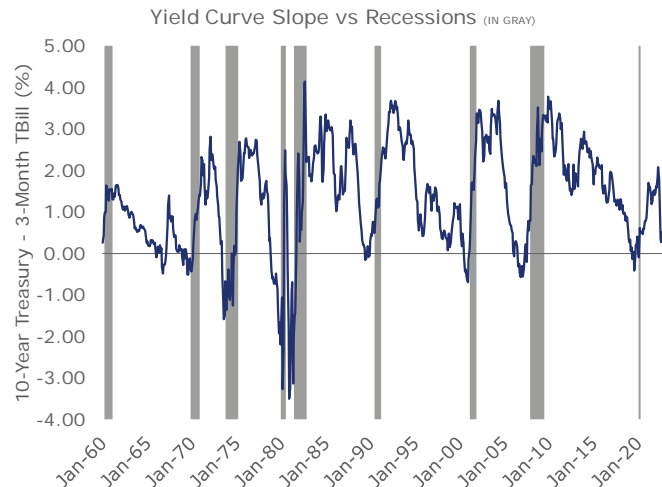
Data Sources: Bloomberg, Wilshire Atlas

U.S. Factor Returns

- Factor returns represent the contribution from large cap, value, etc. stocks within Bloomberg’s Portfolio & Risk Analytics module
- Low volatility has mostly outperformed this year, except during Q3

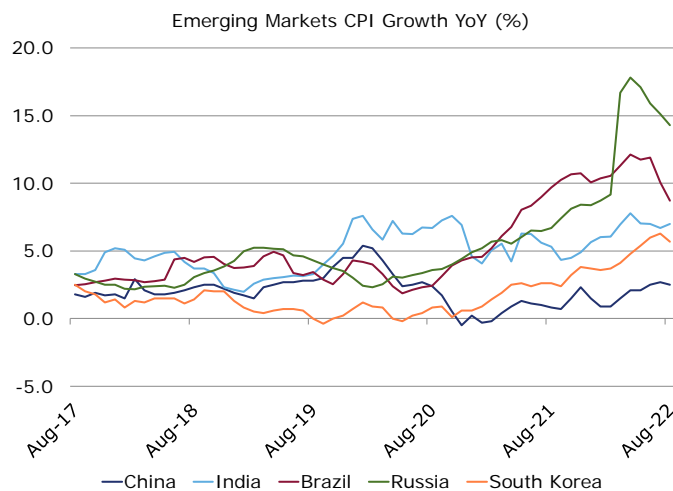
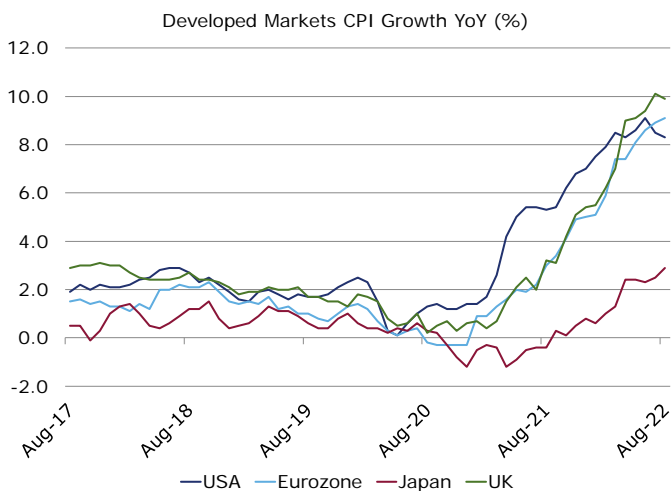
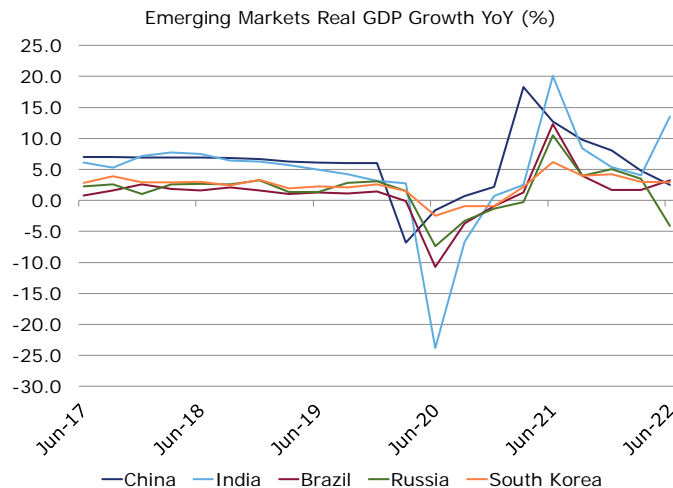
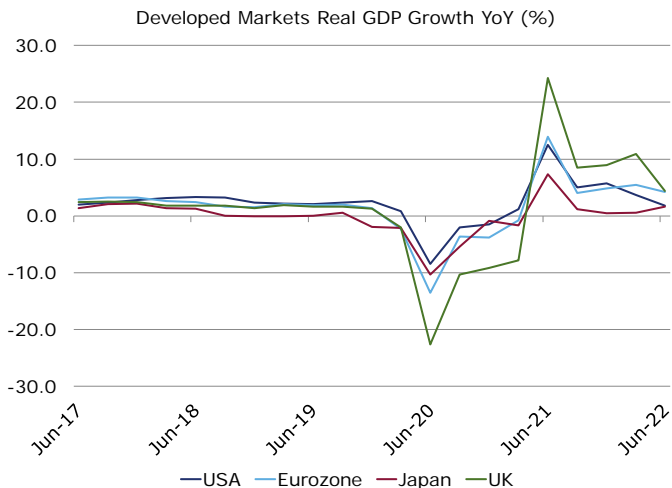


Risk Monitor



Data Sources: Bloomberg

Non-U.S. Growth and Inflation

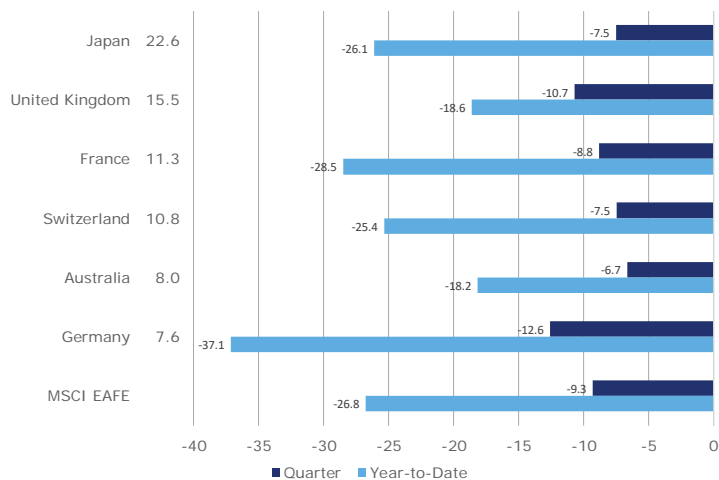


Data Sources: Bloomberg

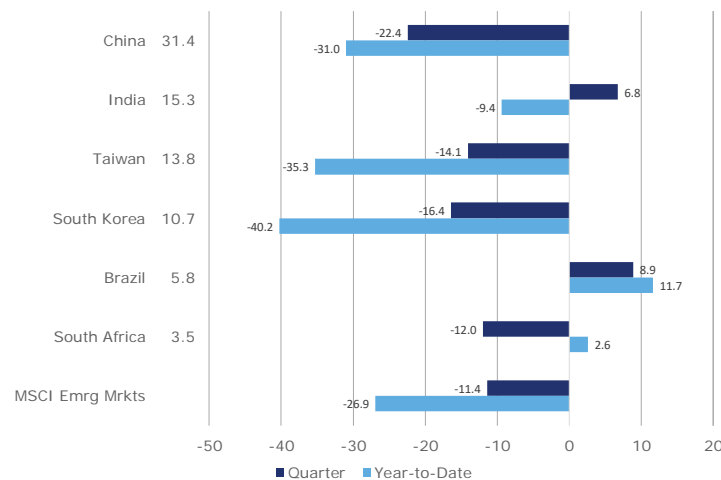
Non-U.S. Equity Market

As of 9/30/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
MSCI ACWI ex-US (\$G)	-9.8	-26.2	-24.8	-1.1	-0.3	3.5
MSCI EAFE (\$G)	-9.3	-26.8	-24.7	-1.4	-0.4	4.2
MSCI Emerging Markets (\$G)	-11.4	-26.9	-27.8	-1.7	-1.4	1.4
MSCI Frontier Markets (\$G)	-8.6	-24.8	-23.3	-6.4	-4.6	-0.1
MSCI ACWI ex-US Growth (\$G)	-9.3	-31.6	-30.0	-1.1	0.5	4.3
MSCI ACWI ex-US Value (\$G)	-10.1	-21.1	-20.1	-1.3	-1.4	2.8
MSCI ACWI ex-US Small (\$G)	-8.2	-29.1	-28.6	0.8	-0.2	4.8
MSCI ACWI Minimum Volatility	-5.9	-16.9	-11.6	0.4	4.5	7.4
MSCI EAFE Minimum Volatility	-9.3	-24.1	-22.2	-5.0	-1.1	3.9
FTSE RAFI Developed ex-US	-10.1	-23.1	-21.1	-0.4	-0.8	3.9
MSCI EAFE LC (G)	-3.5	-14.1	-10.7	3.0	3.3	7.9
MSCI Emerging Markets LC (G)	-8.0	-20.5	-21.1	1.4	1.5	4.8

Developed Markets Weight and Return (%)



Emerging Markets Weight and Return (%)

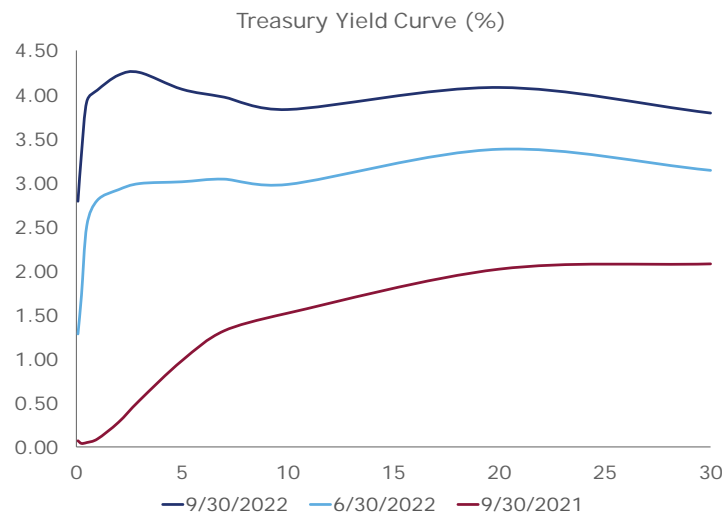
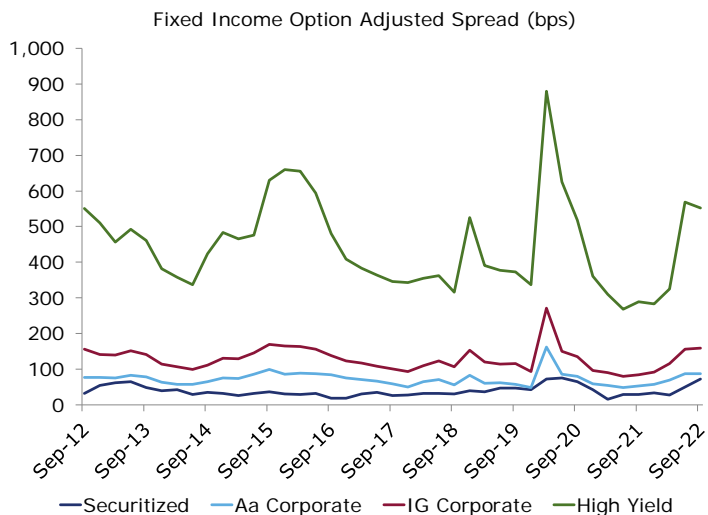


Data Sources: Bloomberg

U.S. Fixed Income

As of 9/30/2022	YTW	DUR.	QTR	YTD	1 YR	3 YR	5 YR	10 YR
Bloomberg Aggregate	4.8	6.2	-4.8	-14.6	-14.6	-3.3	-0.3	0.9
Bloomberg Treasury	4.1	6.1	-4.3	-13.1	-12.9	-3.1	-0.2	0.5
Bloomberg Gov't-Rel.	4.7	5.1	-3.9	-12.7	-12.7	-2.9	0.0	1.0
Bloomberg Securitized	4.9	5.8	-5.2	-13.4	-13.8	-3.5	-0.8	0.6
Bloomberg Corporate	5.7	7.1	-5.1	-18.7	-18.5	-3.7	0.0	1.7
Bloomberg LT Gov't/Credit	5.0	14.3	-9.0	-28.9	-27.4	-7.3	-1.2	1.4
Bloomberg LT Treasury	4.0	16.3	-9.6	-28.8	-26.6	-8.5	-1.6	0.6
Bloomberg LT Gov't-Rel.	5.7	11.6	-7.9	-25.8	-24.4	-7.2	-1.3	1.4
Bloomberg LT Corporate	5.9	12.8	-8.7	-29.4	-28.4	-7.0	-1.1	1.8
Bloomberg U.S. TIPS *	3.8	7.8	-5.1	-13.6	-11.6	0.8	2.0	1.0
Bloomberg High Yield	9.7	4.1	-0.6	-14.7	-14.1	-0.5	1.6	3.9
S&P/LSTA Leveraged Loan	8.0	0.3	1.4	-3.3	-2.5	2.2	3.0	3.5
Treasury Bills	3.2	0.3	0.4	0.4	0.4	0.6	1.1	0.7

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

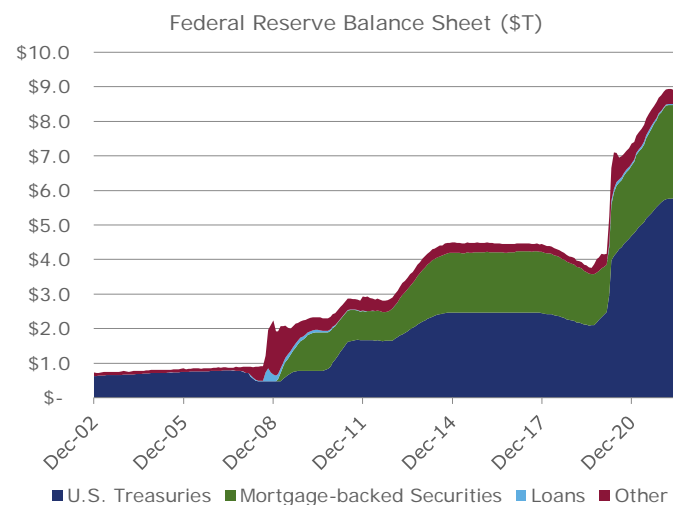
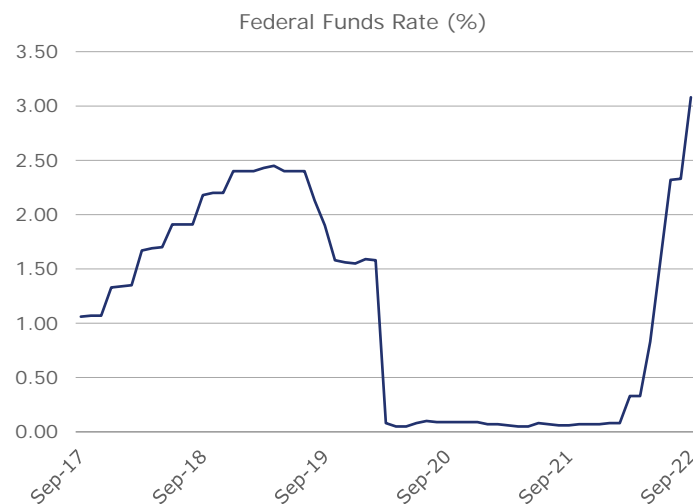


Data Sources: Bloomberg

Federal Reserve

- After 150 basis point increase in the Fed-funds rate through June, the FOMC increased the rate an additional 150 basis points during Q3
- Federal Reserve has added more than \$4.5 trillion in assets to their balance sheet during the past two years
- QE4 is now larger than the 3 phases of quantitative easing – combined – following the global financial crisis

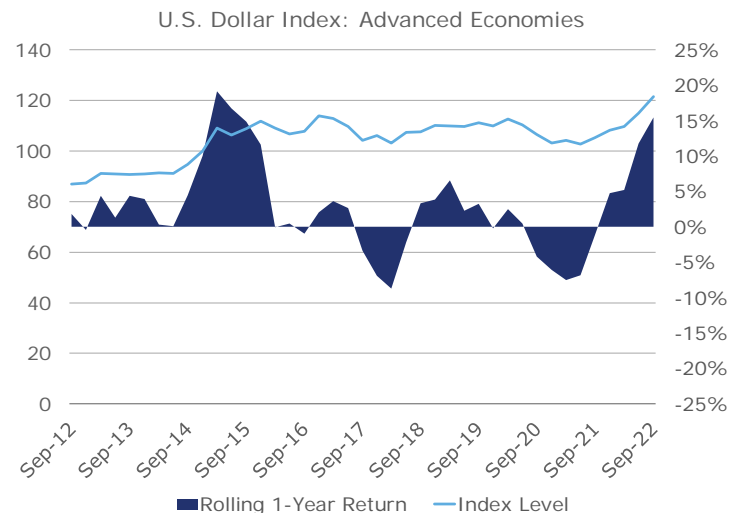
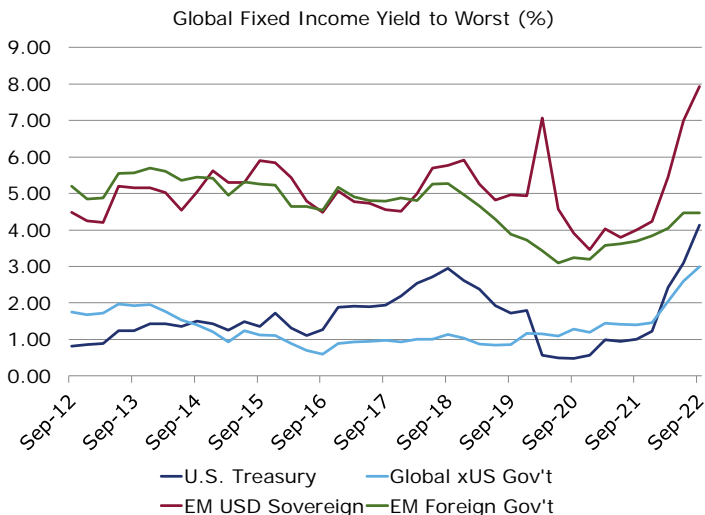
	Announced	Closed	Amount (bil)
QE1	11/25/2008	3/31/2010	\$1,403
QE2	11/3/2010	6/29/2012	\$568
QE3	9/13/2012	10/29/2014	\$1,674
QE4	3/23/2020	3/15/2022	\$4,779



Non-U.S. Fixed Income

As of 9/30/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
Developed Markets						
Bloomberg Global Aggregate xUS	-8.8	-23.9	-24.8	-7.8	-4.0	-2.4
Bloomberg Global Aggregate xUS *	-2.2	-9.9	-9.9	-3.0	0.7	2.2
Bloomberg Global Inflation Linked xUS	-13.4	-33.5	-31.5	-8.9	-4.3	-1.0
Bloomberg Global Inflation Linked xUS *	-5.9	-19.7	-16.9	-4.7	0.6	3.2
Emerging Markets (Hard Currency)						
Bloomberg EM USD Aggregate	-4.1	-20.5	-20.9	-5.3	-1.6	1.4
Emerging Markets (Foreign Currency)						
Bloomberg EM Local Currency Gov't	-5.0	-13.5	-13.2	-2.3	-0.6	0.0
Bloomberg EM Local Currency Gov't *	0.6	-4.5	-4.9	-0.8	1.6	1.9
Euro vs. Dollar	-6.5	-13.8	-15.4	-3.5	-3.7	-2.7
Yen vs. Dollar	-6.2	-20.5	-23.1	-9.3	-4.9	-6.0
Pound vs. Dollar	-8.3	-17.5	-17.1	-3.1	-3.6	-3.6

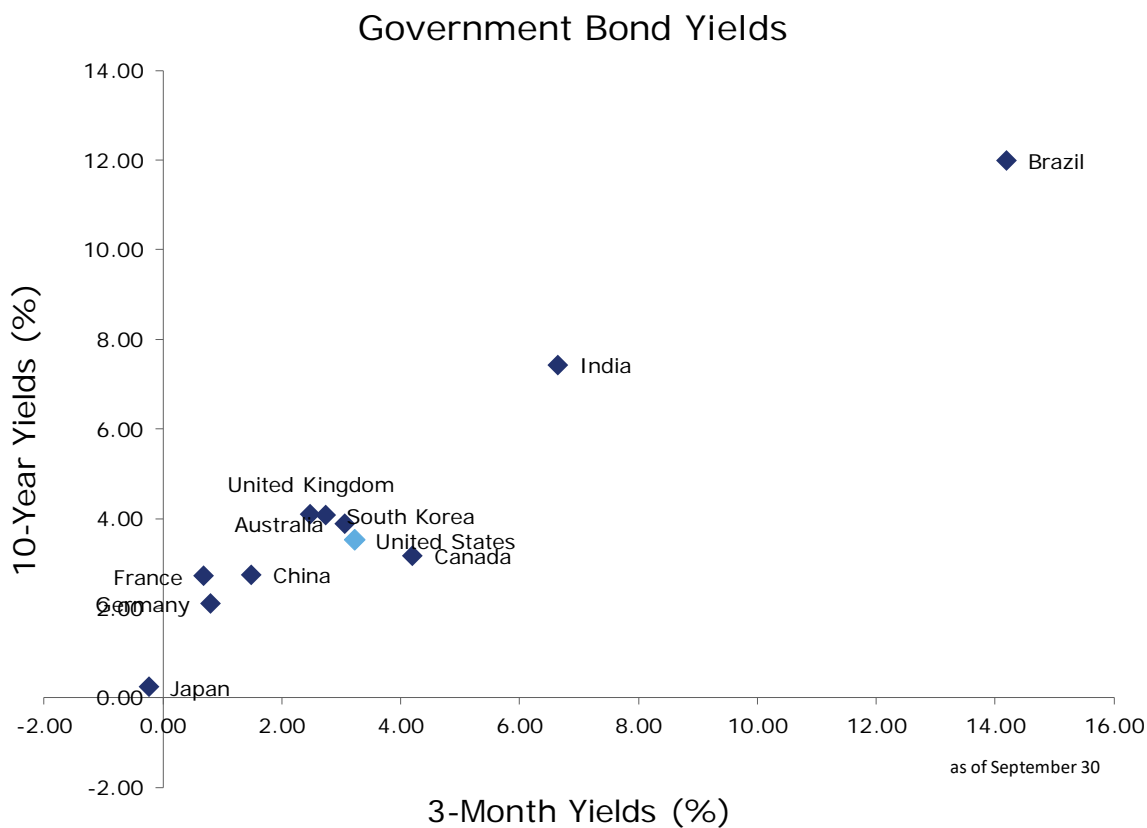
* Returns are reported in terms of local market investors, which removes currency effects.



Data Sources: Bloomberg

Global Interest Rates

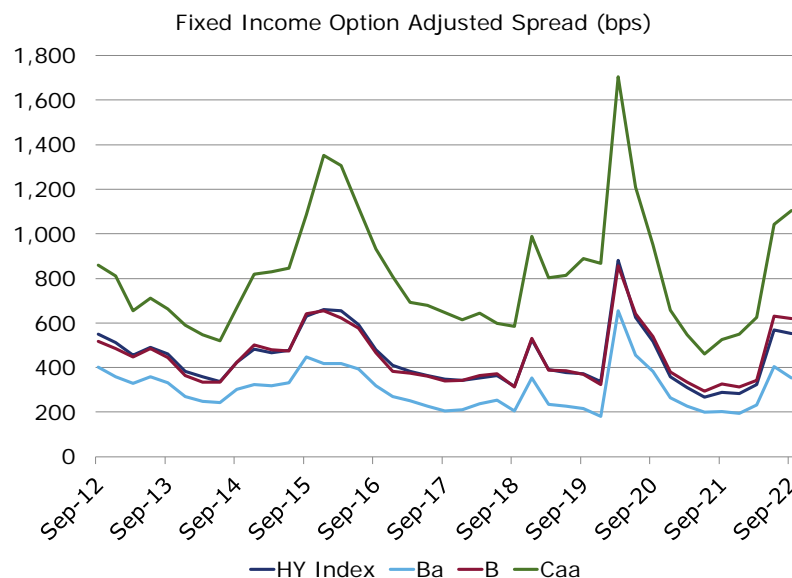
Short-term rates have turned positive in most larger countries; longer-term rates around 4% in the U.K., Australia, South Korea and the U.S.



Data Sources: Bloomberg

High Yield Bond Market

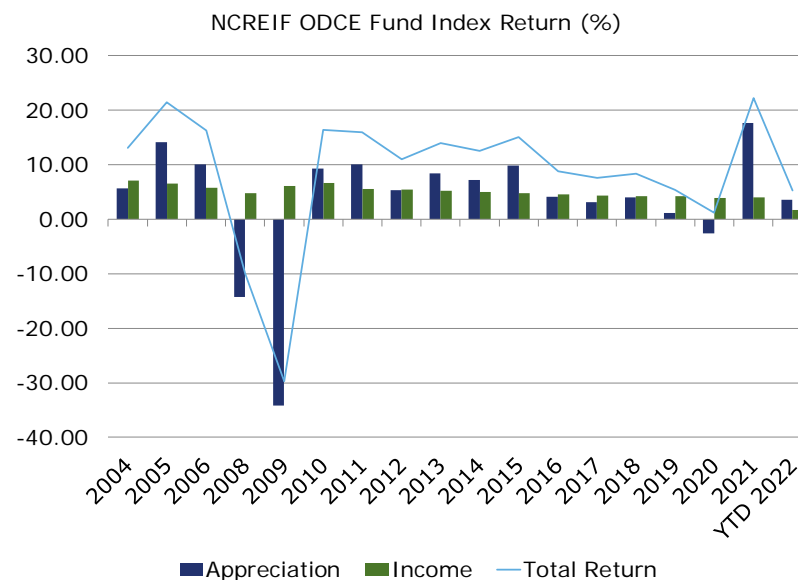
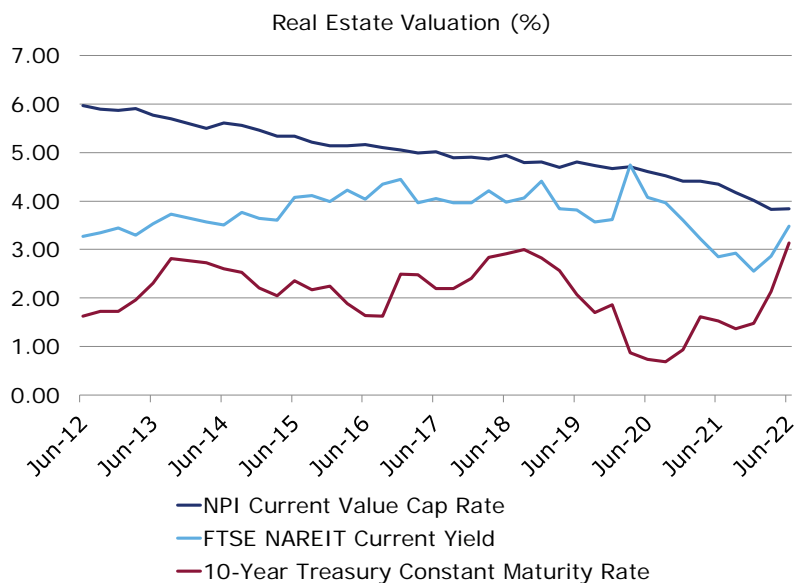
As of 9/30/2022		YTW	QTR	YTD	1 YR	3 YR	5 YR	10 YR
Bloomberg High Yield		9.7	-0.6	-14.7	-14.1	-0.5	1.6	3.9
S&P LSTA Leveraged Loan		8.0	1.3	-4.3	-3.9	1.4	2.5	3.0
High Yield Quality Distribution	Weight							
Ba U.S. High Yield	51.6%	7.8	-0.7	-14.5	-13.8	0.3	2.2	4.2
B U.S. High Yield	36.7%	10.2	-0.7	-14.5	-13.8	-1.3	1.3	3.5
Caa U.S. High Yield	10.9%	15.2	-0.4	-16.7	-16.3	-1.4	-0.3	3.7
Ca to D U.S. High Yield	0.7%	34.0	-3.0	-21.3	-31.5	-5.6	-2.0	-5.6



Data Sources: Bloomberg

Real Assets

As of 9/30/2022	Quarter	YTD	1 Year	3 Year	5 Year	10 Year
Bloomberg U.S. TIPS	-5.1	-13.6	-11.6	0.8	2.0	1.0
Bloomberg Commodity Index	-4.1	13.6	11.8	13.5	7.0	-2.1
Bloomberg Gold Index	-7.9	-9.3	-5.7	2.8	4.2	-1.5
Wilshire Global RESI Index	-11.2	-29.4	-20.1	-4.3	1.0	4.6
NCREIF ODCE Fund Index	0.5	13.1	22.1	12.4	10.2	10.9
FTSE Global Core Infrastructure 50/50	-8.9	-12.3	-5.5	0.6	4.1	7.3
Alerian Midstream Energy	-1.0	12.1	11.7	6.7	5.0	n.a.
Bitcoin	3.7	-58.1	-55.3	33.1	36.0	108.7



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 9/22
Emrg Mrkts 37.7%	T-Bills 1.9%	U.S. Equity 31.0%	U.S. Equity 20.8%	REITs 46.2%	Commodities 13.6%	U.S. Equity 8.8%
Developed 25.6%	Core Bond 0.0%	REITs 25.8%	Emrg Mrkts 18.7%	Commodities 27.1%	T-Bills 0.4%	Commodities 7.0%
U.S. Equity 21.0%	U.S. TIPS -1.3%	Developed 22.7%	U.S. TIPS 11.0%	U.S. Equity 26.7%	U.S. TIPS -13.6%	REITs 2.9%
High Yield 7.5%	High Yield -2.1%	Emrg Mrkts 18.9%	Developed 8.3%	Developed 11.8%	Core Bond -14.6%	U.S. TIPS 2.0%
REITs 4.2%	REITs -4.8%	High Yield 14.3%	Core Bond 7.5%	U.S. TIPS 6.0%	High Yield -14.7%	High Yield 1.6%
Core Bond 3.6%	U.S. Equity -5.3%	Core Bond 8.7%	High Yield 7.1%	High Yield 5.3%	U.S. Equity -24.4%	T-Bills 1.1%
U.S. TIPS 3.0%	Commodities -11.2%	U.S. TIPS 8.4%	T-Bills 0.7%	T-Bills 0.0%	Developed -26.8%	Core Bond -0.3%
Commodities 1.7%	Developed -13.4%	Commodities 7.7%	Commodities -3.1%	Core Bond -1.5%	Emrg Mrkts -26.9%	Developed -0.4%
T-Bills 0.8%	Emrg Mrkts -14.2%	T-Bills 2.3%	REITs -7.9%	Emrg Mrkts -2.2%	REITs -29.7%	Emrg Mrkts -1.4%

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

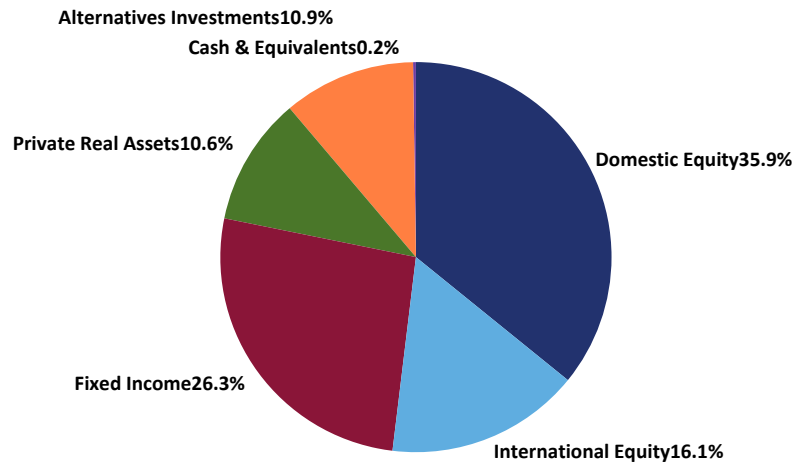
Total Fund

Asset Allocation

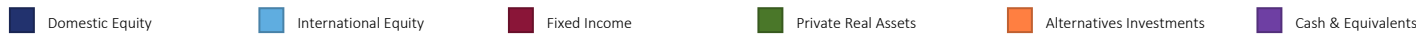
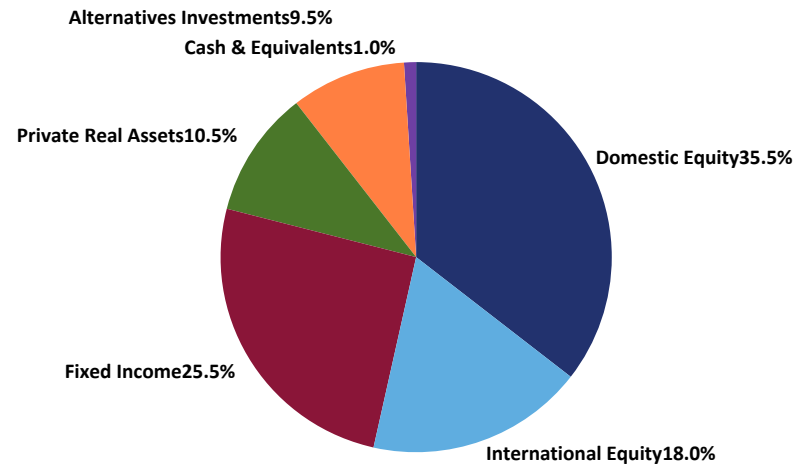
Total Fund

Periods Ended As of September 30, 2022

Actual Allocation



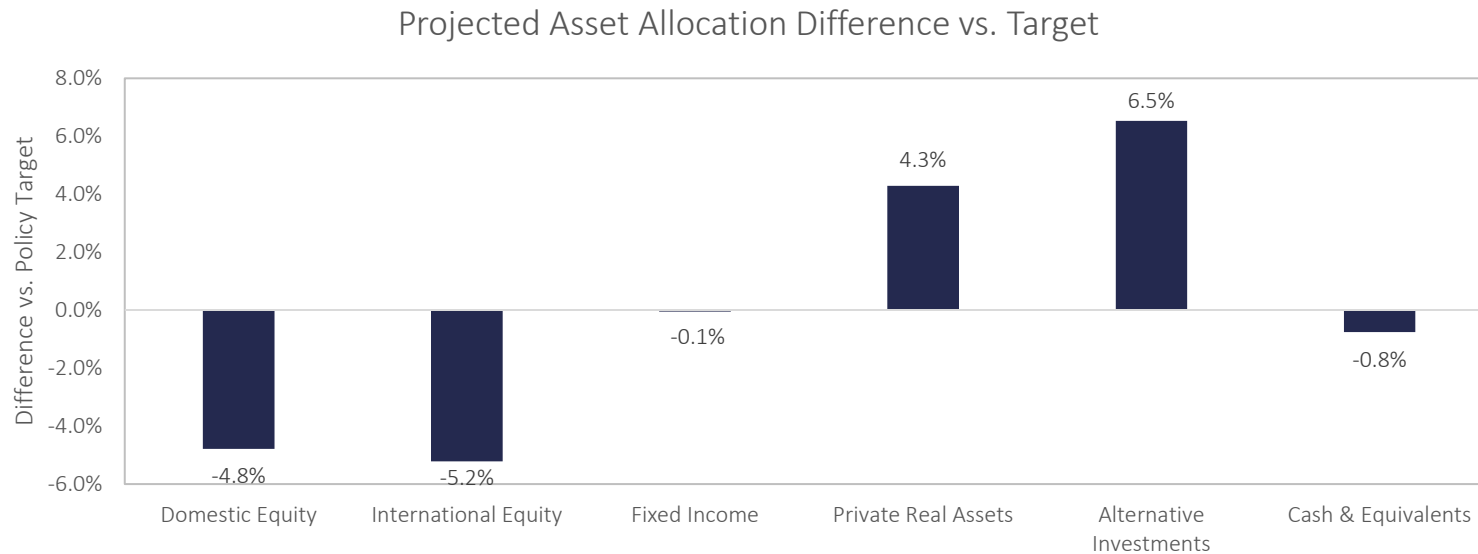
Target Allocation



	Actual Allocation \$Millions	Actual Allocation %	Target Allocation %	Differences %	Differences \$Millions
Total Fund	45,506	100.0	100.0	0.0	
Domestic Equity	16,316	35.9	35.5	0.4	161
International Equity	7,310	16.1	18.0	-1.9	-882
Fixed Income	11,957	26.3	25.5	0.8	353
Private Real Assets	4,842	10.6	10.5	0.1	64
Alternatives Investments	4,972	10.9	9.5	1.4	649
Cash & Equivalents	109	0.2	1.0	-0.8	-346

Projected Deviations from the Benchmark

As of September 30, 2022



- Includes committed, but unfunded amounts for Real Assets (\$1.88 billion) and Alternatives (\$2.32 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

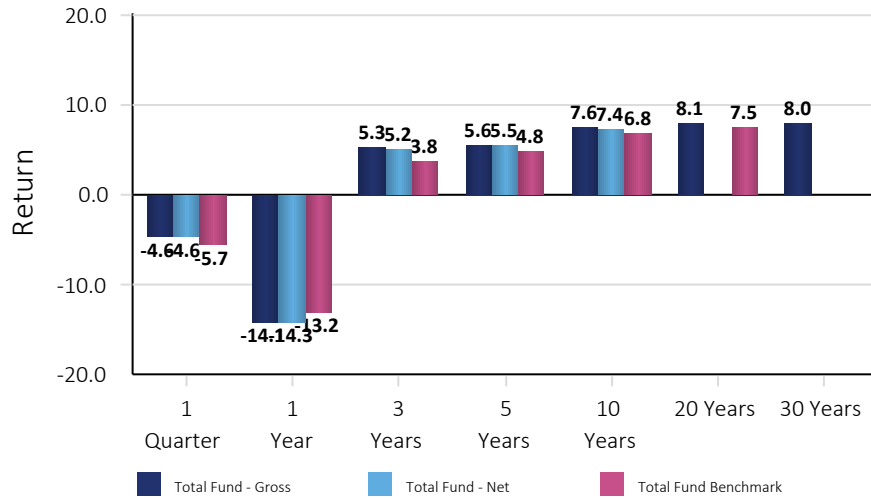
Real Assets Proxy: 50% Domestic Equity, 30% International Equity, 20% Fixed Income

Composite Performance Summary

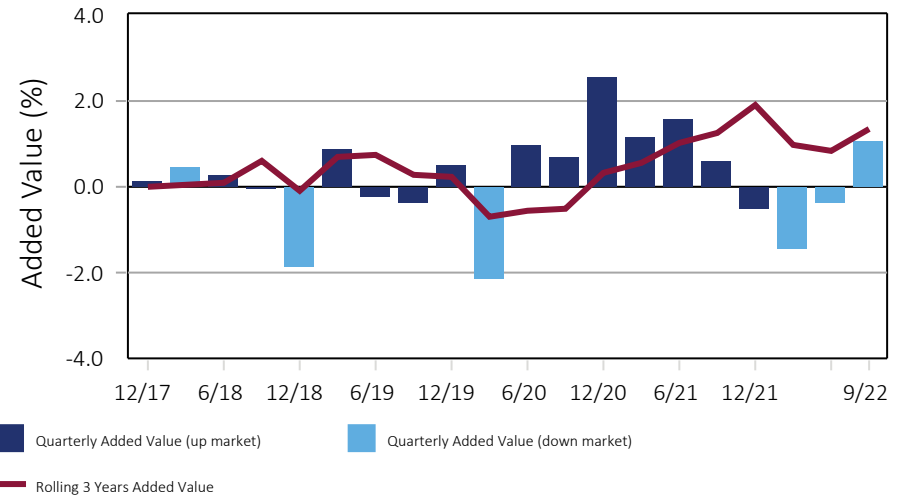
Total Fund

Periods Ended September 30, 2022

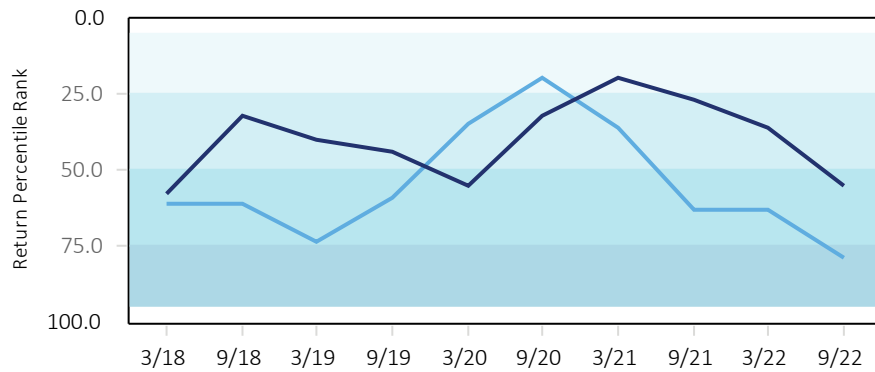
Comparative Performance



Added Value History

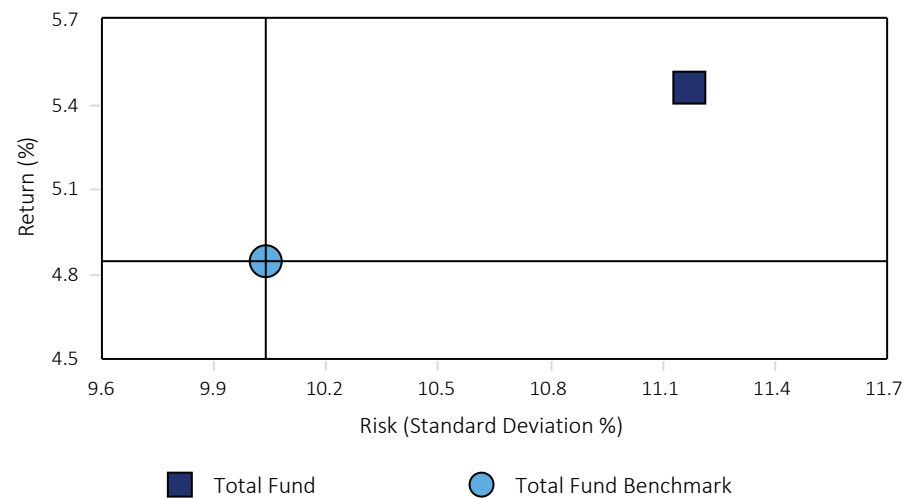


Rolling Percentile Rank : All Public Plans > \$1B - Total Fund



	Total Period	5-25 Count	25-Median Count	Median-75 Count	75-95 Count
— Total Fund	10	1 (10%)	6 (60%)	3 (30%)	0 (0%)
— Total Fund Benchmark	10	1 (10%)	2 (20%)	6 (60%)	1 (10%)

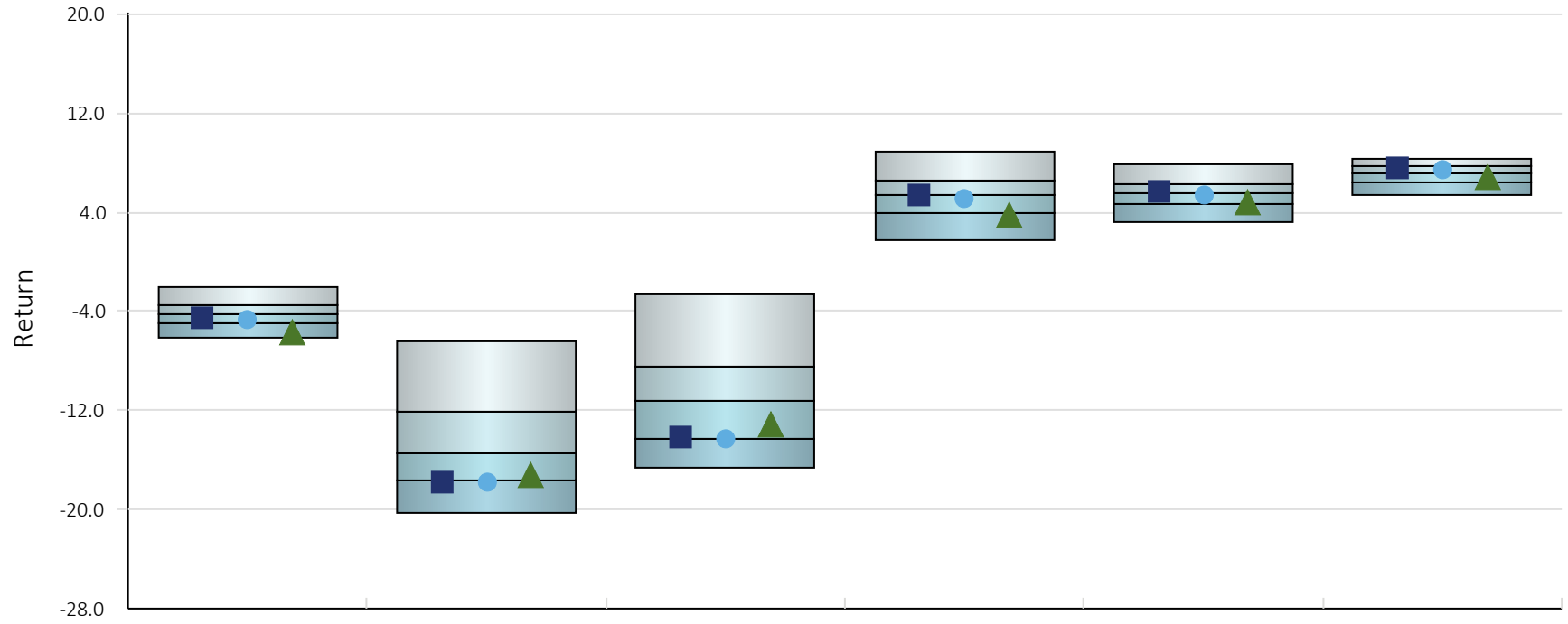
Risk and Return 10/01/17 - 09/30/22



Plan Sponsor Peer Group Analysis

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

Periods Ended September 30, 2022



	QTD	YTD	1 Year	3 Years	5 Years	10 Years
■ Total Fund	-4.57 (61)	-17.75 (76)	-14.12 (74)	5.35 (51)	5.64 (48)	7.59 (33)
● Total Fund - Net	-4.60 (65)	-17.84 (76)	-14.26 (75)	5.17 (55)	5.46 (57)	7.38 (43)
▲ Total Fund Benchmark	-5.66 (93)	-17.20 (70)	-13.15 (64)	3.82 (79)	4.84 (71)	6.80 (69)
5th Percentile	-2.06	-6.46	-2.58	8.91	7.84	8.38
1st Quartile	-3.52	-12.06	-8.46	6.58	6.31	7.78
Median	-4.21	-15.48	-11.28	5.35	5.58	7.12
3rd Quartile	-4.90	-17.69	-14.35	3.92	4.70	6.45
95th Percentile	-6.18	-20.24	-16.68	1.79	3.28	5.40
Population	109	106	104	103	102	98

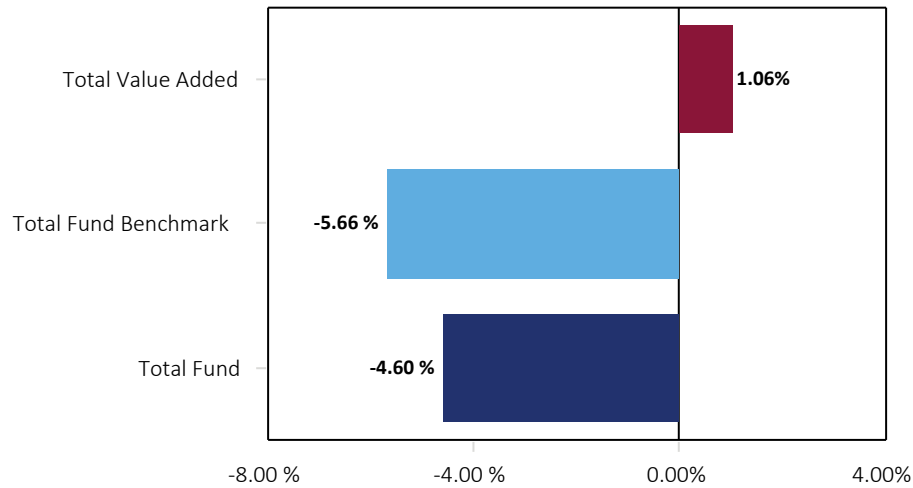
Total Fund Benchmark = 35.5% Domestic Equity Custom Benchmark, 25.5% Fixed Income Custom Benchmark, 18.0% MSCI ACWI ex USA (Net), 10.5% Private Real Assets Custom Benchmark, 9.5% Alternatives Custom Benchmark, 1.0% 90 Day US Treasury Bill.

Total Fund Attribution

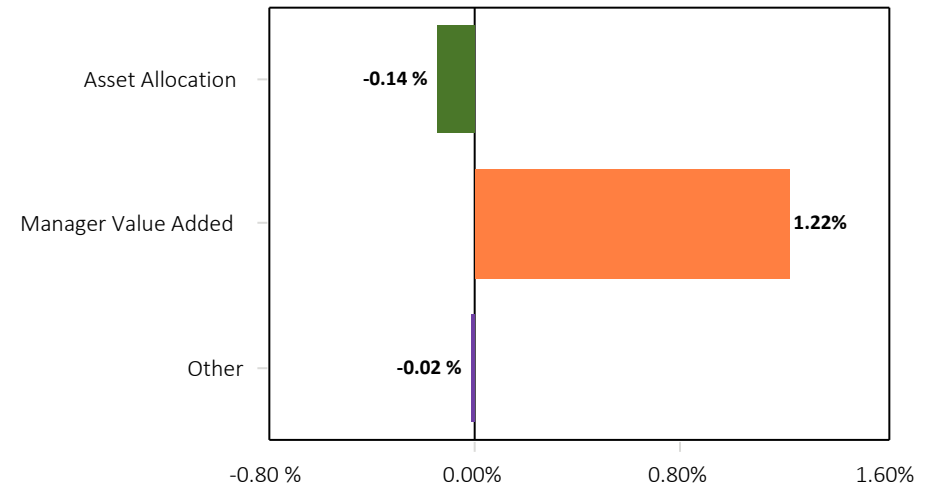
Total Fund

1 Quarter Ending September 30, 2022

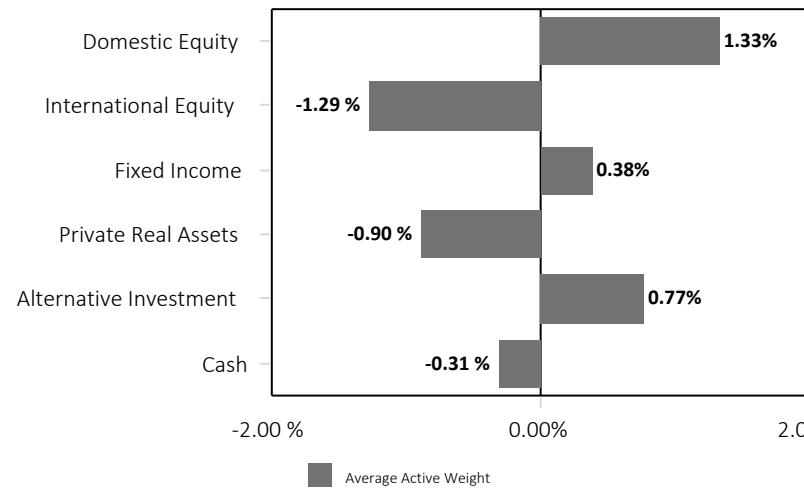
Total Fund Performance



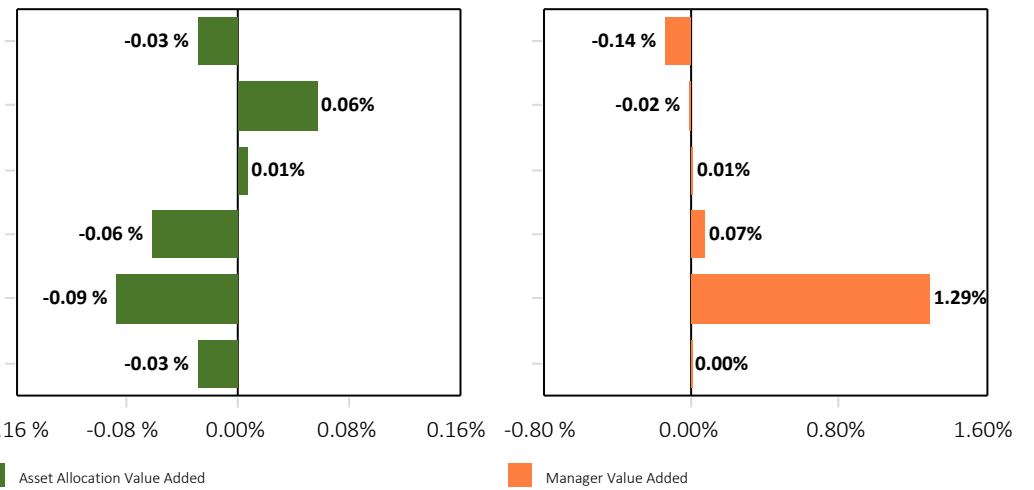
Total Value Added: 1.06%



Asset Class Under or Overweighting



Asset Allocation Value Added: -0.14% Total Manager Value Added: 1.22%

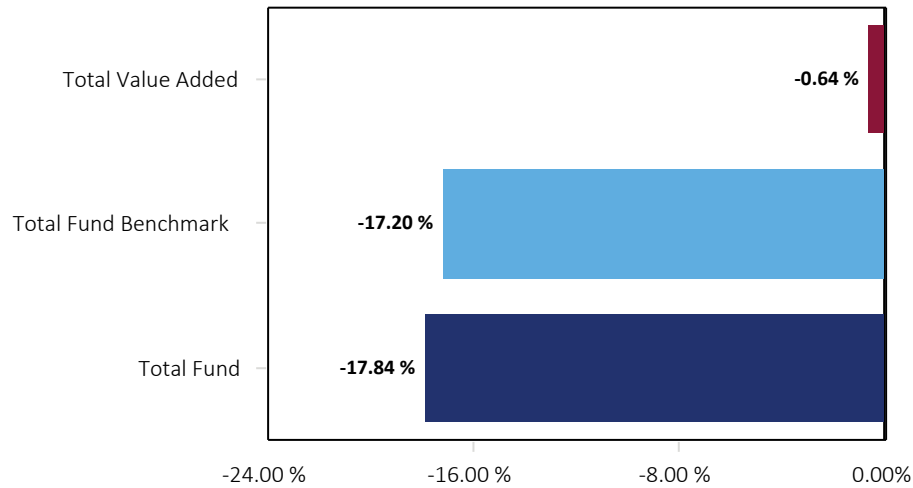


Total Fund Attribution

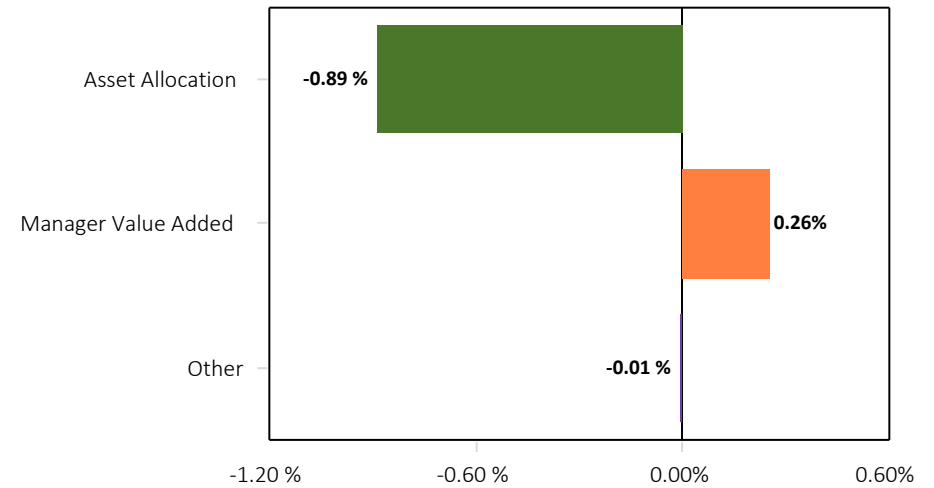
Total Fund

Year To Date Ending September 30, 2022

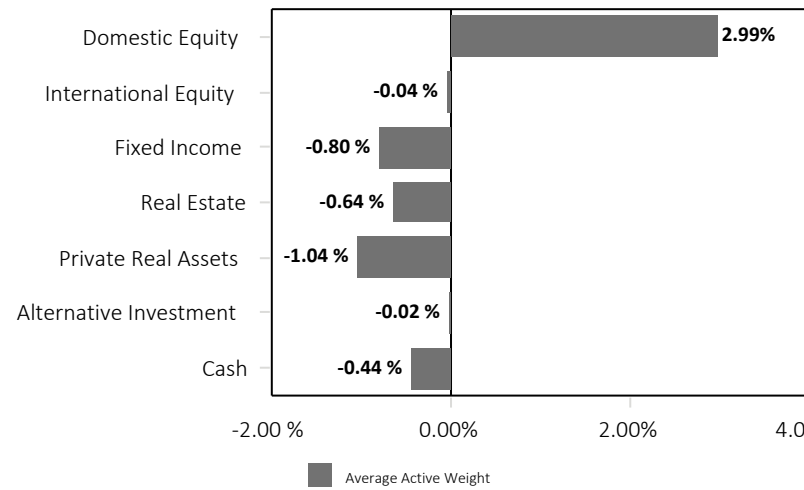
Total Fund Performance



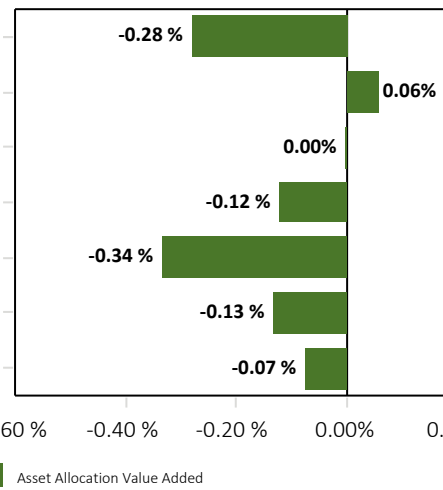
Total Value Added: -0.64 %



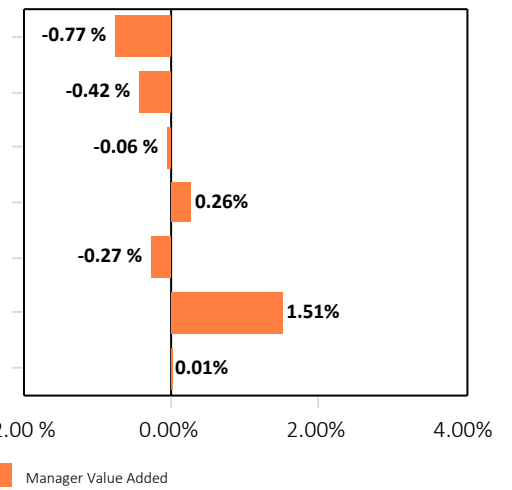
Asset Class Under or Overweighting



Asset Allocation Value Added: -0.89 %



Total Manager Value Added: 0.26 %



Asset Class Returns

Periods Ended September 30, 2022

	Performance (%)									
	1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	20 Years	30 Years	Since Inception	Inception Date
Total Fund	-4.57	-17.75	-14.12	5.35	5.64	7.59	8.10	8.04	9.47	1/1/1982
Total Fund - Net	-4.60	-17.84	-14.26	5.17	5.46	7.38				
Total Fund Benchmark	-5.66	-17.20	-13.15	3.82	4.84	6.80	7.48			
Domestic Equity	-5.11	-25.75	-20.33	7.28	7.72	10.97	10.03	9.85	11.18	1/1/1982
Domestic Equity - Net	-5.14	-25.84	-20.46	7.10	7.53	10.74				
Custom Benchmark (U.S. Equity)	-4.78	-24.09	-17.05	7.95	8.77	11.44	10.08	9.62		
U.S. Equity IMRF Custom Benchmark	-4.98	-24.51	-17.40	6.78	7.36					
International Equity	-9.92	-28.43	-28.00	-0.81	-0.14	4.35	7.38	6.75	6.91	9/1/1986
International Equity - Net	-9.99	-28.61	-28.29	-1.17	-0.49	4.00				
MSCI AC World ex USA (Net)	-9.91	-26.50	-25.17	-1.52	-0.81	3.01	6.37			
International Equity IMRF Custom Benchmark	-9.99	-26.75	-25.77	-1.51	-0.90					
Fixed Income	-3.53	-13.65	-13.66	-2.30	0.38	1.73	4.11	5.10	7.42	1/1/1982
Fixed Income - Net	-3.55	-13.71	-13.73	-2.40	0.26	1.59				
Custom Benchmark (Fixed Income)	-3.60	-13.45	-13.44	-2.82	0.00	1.03	3.15	4.54	6.90	
Fixed Income IMRF Custom Benchmark	-3.65	-13.85	-13.80	-2.72	0.08					
Private Real Assets	0.96								7.89	3/1/2022
Private Real Assets - Net	0.94								7.85	
Custom Benchmark (Private Real Assets)	0.35								12.09	
Real Estate	1.06	13.30	21.12	13.98	12.13	11.45	8.38	6.91	6.17	5/1/1985
Real Estate - Net	1.04	13.25	21.04	13.93	12.09	11.42				
Blended Benchmark (Real Estate)	0.31	12.35	20.96	11.38	9.26	9.99	8.03	7.83	8.00	
Agriculture	0.00	1.24	5.98	1.64	0.51	7.34	7.35		6.53	10/1/1997
NCREIF Farmland Index	1.98	6.18	10.21	6.50	6.33	9.47	12.54		11.18	
Timberland	2.85	1.18	4.53	1.13	0.59	2.45	2.93	6.74	6.74	10/1/1992
NCREIF Timberland Index	2.38	7.64	12.54	5.80	4.69	5.90	6.76	8.41	8.41	

Benchmark definitions are available in the appendix.

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

Asset Class Returns

Periods Ended September 30, 2022

	Performance (%)									
	1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	20 Years	30 Years	Since Inception	Inception Date
Unlisted Infrastruct	-1.92	6.80	8.72	12.38					11.61	4/1/2018
Blended Benchmark (Unlisted Infrastructure)	1.15	8.58	10.95	9.65					9.43	
Alternatives Investments	-2.28	4.02	13.07	20.62	17.92	13.46	10.47	13.01	11.63	2/1/1986
Alternatives Investments - Net	-2.28	4.02	13.06	20.60	17.85	13.25				
Custom Benchmark (Alternative Investments)	-14.73	-13.78	-11.90	1.53	4.46	6.70	9.07	11.01	11.73	
Private Equity	-1.99	4.96	14.77	24.19	21.30	16.22	12.85	15.76	13.94	2/1/1986
Blended Benchmark (Private Equity)	-15.56	-14.45	-12.58	1.27	4.29	6.62	9.03			
Cash	0.61	2.21	2.86	2.81	2.76	1.60	1.37	3.00	3.73	7/1/1986
90 Day US Treasury Bill	0.46	0.61	0.62	0.59	1.15	0.67	1.21	2.33	3.07	

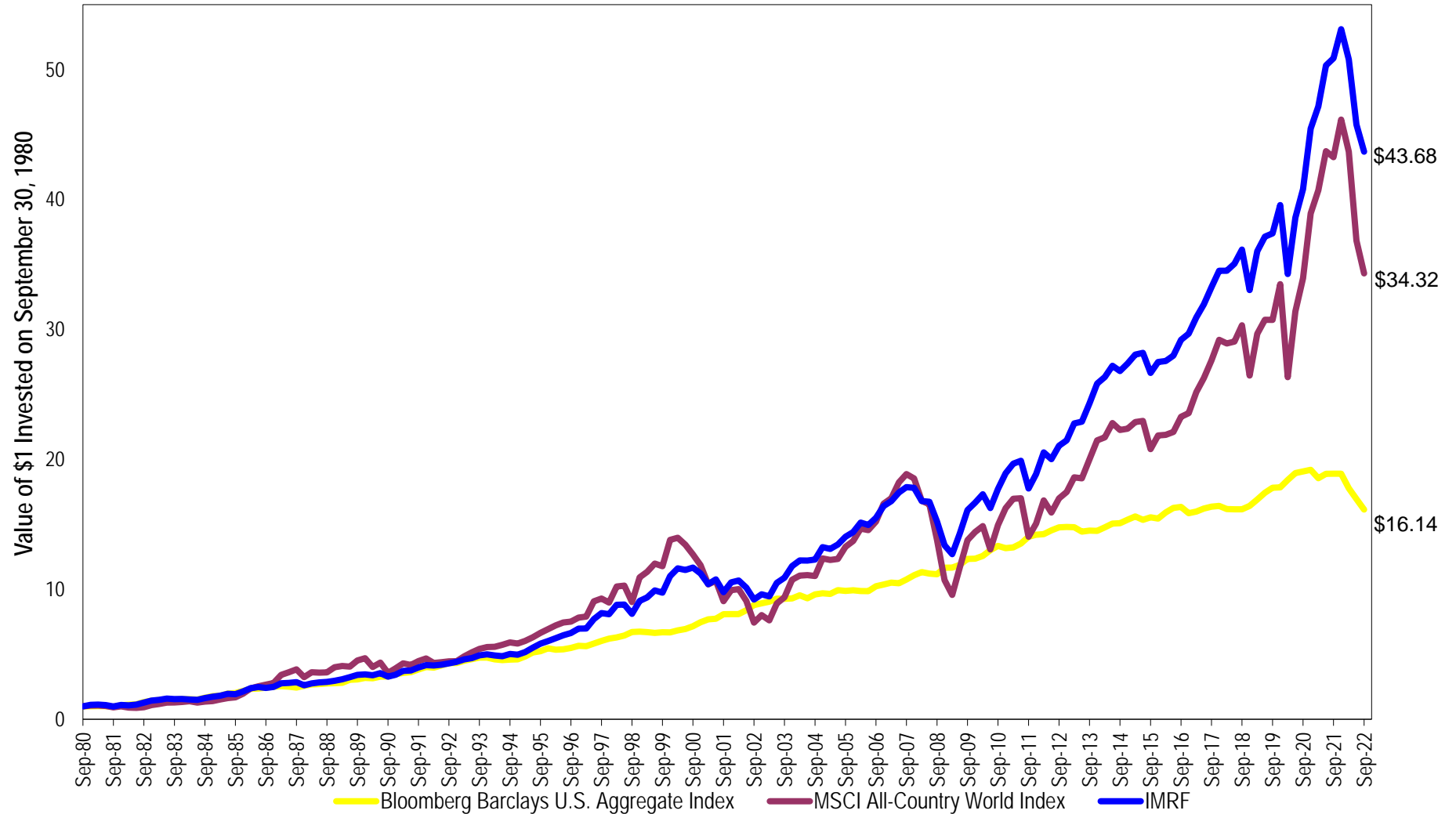
Benchmark definitions are available in the appendix.

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

Private Equity and Blended Benchmark (Private Equity) returns are 1 quarter lagged.

Total Fund Growth of a Dollar

Growth of a Dollar - As of September 30, 2022



Investment Manager Asset Allocation

Periods Ended September 30, 2022

	Jun-2022		Sep-2022	
	\$	%	\$	%
Domestic Equity	17,478,524,266	36.13	16,315,650,461	35.85
Large Cap Growth	2,986,752,178	6.17	2,888,613,741	6.35
NTGI S&P 500 Growth	24	0.00	1	0.00
Sands Capital	1,217,313,205	2.52	1,182,736,987	2.60
Xponance Russell 1000 G	1,769,438,949	3.66	1,705,876,754	3.75
Large Cap Value	4,410,505,368	9.12	4,097,277,619	9.00
Dodge & Cox	1,661,399,212	3.43	1,535,830,131	3.38
LSV Asset	1,343,852,447	2.78	1,246,140,802	2.74
NTGI S&P 500 Value	1,405,253,710	2.90	1,315,306,686	2.89
Large Cap Pass. Core	2,449,927,491	5.06	2,093,071,894	4.60
NTGI MarketCap Idx.	2,449,927,491	5.06	2,093,071,894	4.60
Factor Diversity Strategies	2,248,069,124	4.65	2,147,600,430	4.72
U.S. Large Cap FDP-GSAM	2,248,069,124	4.65	2,147,600,430	4.72
Quantitative Factor Strategies	2,038,744,701	4.21	1,934,901,790	4.25
Quantitative US Equity - SciBeta	2,038,744,701	4.21	1,934,901,790	4.25
Small Cap Growth	655,839,282	1.36	638,701,529	1.40
Frontier Capital	655,839,282	1.36	638,701,529	1.40
Small Cap Value	1,319,100,426	2.73	1,255,131,472	2.76
Channing	286,506,929	0.59	265,686,926	0.58
DFA Small Cap Val.	480,376,940	0.99	464,803,082	1.02
William Blair Small Cap Value	552,216,557	1.14	524,641,464	1.15

Investment Manager Asset Allocation

Periods Ended September 30, 2022

	Jun-2022		Sep-2022	
	\$	%	\$	%
Public Real Assets	1,369,585,697	2.83	1,260,351,986	2.77
Brookfield	377,827,136	0.78	353,567,055	0.78
Cohen & Steers	991,758,561	2.05	906,784,931	1.99
International Equity	8,115,909,029	16.78	7,309,519,862	16.06
Intl Large Cap Growth	1,330,080,566	2.75	1,229,245,744	2.70
EARNEST Part. Intl	539,979,699	1.12	496,145,739	1.09
William Blair	790,100,866	1.63	733,100,004	1.61
Intl Large Cap Value	1,233,039,325	2.55	1,074,693,959	2.36
Brandes Investment	543,601,392	1.12	473,217,973	1.04
Mondrian	569,367,070	1.18	493,323,935	1.08
Lazard	120,070,863	0.25	108,152,051	0.24
Intl Large Cap Core	3,887,729,559	8.04	3,524,619,326	7.75
Arrowstreet Capital	940,008,487	1.94	863,327,062	1.90
Brown Capital	457,201,092	0.95	417,000,087	0.92
GlobeFlex Capital	754,194,029	1.56	690,534,889	1.52
Xponance Intl EQ	83,708,989	0.17	76,323,694	0.17
Transition Account	185,688	0.00	187,888	0.00
Progress Intl Equity	612,099	0.00	556,193	0.00
NTGI ACWI ex US Index Fund	1,651,819,175	3.41	1,476,689,513	3.25
Intl All Cap Developed	139,527,682	0.29	125,967,378	0.28
Ativo International	139,527,682	0.29	125,967,378	0.28
International Small Cap	478,840,480	0.99	438,760,355	0.96
Franklin Templeton	195,292,848	0.40	173,675,228	0.38

Investment Manager Asset Allocation

Periods Ended September 30, 2022

	Jun-2022		Sep-2022	
	\$	%	\$	%
William Blair IntSC	283,547,632	0.59	265,085,127	0.58
Emerging Mkt Equity	1,046,691,417	2.16	916,233,100	2.01
Genesis Investment Management, LLP.	1,046,691,417	2.16	916,233,100	2.01

Investment Manager Asset Allocation

Periods Ended September 30, 2022

	Jun-2022		Sep-2022	
	\$	%	\$	%
Fixed Income	12,595,053,298	26.04	11,956,987,031	26.28
Global Bonds Transition	282,523	0.00		0.00
Domestic Fixed Core	3,879,734,948	8.02	3,708,036,365	8.15
Attucks Fixed Income	88,901,719	0.18	84,906,040	0.19
Brandes FI Core	340,436,090	0.70	328,443,611	0.72
EARNEST Partners	922,163,170	1.91	884,446,982	1.94
Garcia Hamilton	992,828,121	2.05	941,005,194	2.07
Ramirez Asset Management	538,104,493	1.11	514,073,825	1.13
Xponance Yield Advantage Agg.	997,301,354	2.06	955,160,714	2.10
Domestic Fixed Passive Core	3,047,806,463	6.30	2,727,981,673	5.99
NTGI Blmbg Agg.	1,397,657,603	2.89	1,155,912,468	2.54
BlackRock US Debt I	1,650,148,860	3.41	1,572,069,206	3.45
Domestic Fixed Core Plus	2,999,398,798	6.20	2,867,955,733	6.30
LM Capital Group FI	863,978,557	1.79	824,418,556	1.81
Progress Inv. FI	1,074	0.00	978	0.00
Loop Capital Management	581,034,022	1.20	557,579,547	1.23
Western Asset	970,642,799	2.01	927,123,840	2.04
Longfellow Core Plus	583,742,346	1.21	558,832,812	1.23
Bank Loans	1,624,457,781	3.36	1,612,323,391	3.54
Barings Global Loan Fund	1,624,457,781	3.36	1,612,323,391	3.54
Emerging Markets Debt	2,490,747	0.01	2,452,746	0.01
Standish-Mellon EMD	2,490,747	0.01	2,452,746	0.01

Investment Manager Asset Allocation

Periods Ended September 30, 2022

	Jun-2022		Sep-2022	
	\$	%	\$	%
High Yield	1,040,882,038	2.15	1,038,237,123	2.28
MacKay Shields	1,040,882,038	2.15	1,038,237,123	2.28

Investment Manager Asset Allocation

Periods Ended September 30, 2022

	Jun-2022		Sep-2022	
	\$	%	\$	%
Private Real Assets	4,732,017,175	9.78	4,842,223,932	10.64
Real Estate	4,318,598,041	8.93	4,426,977,194	9.73
Real Estate Core Cmp	2,310,739,338	4.78	2,428,952,037	5.34
TA Assoc. Buckhead	890,447,166	1.84	990,254,880	2.18
Barings Euro Core Property	140,031,894	0.29	131,454,529	0.29
Blackstone Property Euro	169,481,160	0.35	165,351,985	0.36
INVESCO Core Real Estate	251,394,301	0.52	261,713,524	0.58
INVESCO European real estate	56,988,468	0.12	54,542,157	0.12
AEW Core Property Tr	295,441,657	0.61	303,751,085	0.67
CBRE Core Partners	313,630,690	0.65	328,560,056	0.72
JPM Strategic Property Fund	193,324,002	0.40	193,323,821	0.42
RE Non-Core Cmp	2,007,858,703	4.15	1,998,025,157	4.39
Artemis MWBE Spruce	311,478,164	0.64	316,990,821	0.70
Franklin T. EMREFF	4,439,375	0.01	3,953,769	0.01
Security Capital	49,230,813	0.10	89,946,438	0.20
Dune II	7,378,667	0.02	8,031,504	0.02
Non-Core Real Estate Funds	1,407,127,015	2.91	1,354,225,599	2.98
Non-Core Intl Real Estate	228,121,679	0.47	224,795,201	0.49
Almanac ARS V	82,990	0.00	81,825	0.00
Agriculture	231,046,869	0.48	241,046,869	0.53
Premiere Partners IV	231,046,869	0.48	241,046,869	0.53
Timberland	62,951,641	0.13	57,865,591	0.13
Forest Investment	62,951,641	0.13	57,865,591	0.13
Unlisted Infrastructure	119,420,624	0.25	116,334,278	0.26
Unlisted Infrastructure Funds	119,420,624	0.25	116,334,278	0.26

Investment Manager Asset Allocation

Periods Ended September 30, 2022

	Jun-2022		Sep-2022	
	\$	%	\$	%
Alternatives Investments	5,055,633,051	10.45	4,972,045,500	10.93
Absolute Return	82,440	0.00	114,351	0.00
Aurora Investment	82,440	0.00	114,351	0.00
Private Equity	4,866,475,640	10.06	4,807,584,066	10.56
Abbott S/A Comp.	543,658,783	1.12	522,190,715	1.15
Muller Monroe MPEFF	552,890	0.00	1	0.00
Pantheon S/A Comp.	426,436,147	0.88	439,912,751	0.97
Private Equity Fund - Domestic	3,167,078,982	6.55	3,177,221,389	6.98
Private Equity Fund - International	536,172,977	1.11	465,331,972	1.02
Oakbrook Opportunities Fund	192,575,861	0.40	202,927,238	0.45
Private Credit	189,074,971	0.39	164,347,083	0.36
Private Credit Fund - Domestic	189,074,971	0.39	164,347,083	0.36
Cash & Equivalents	397,316,070	0.82	109,259,037	0.24
Total Fund	48,374,452,889	100.00	45,505,685,823	100.00

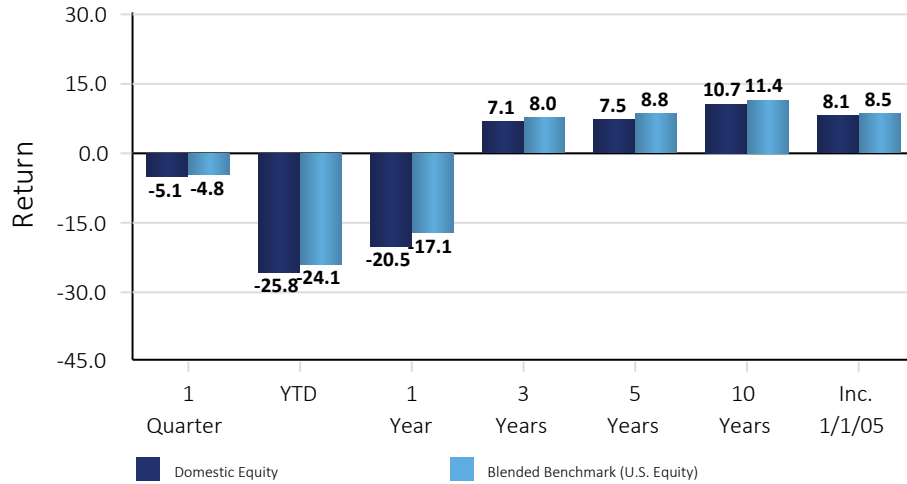
Domestic Equity

Composite Performance Summary

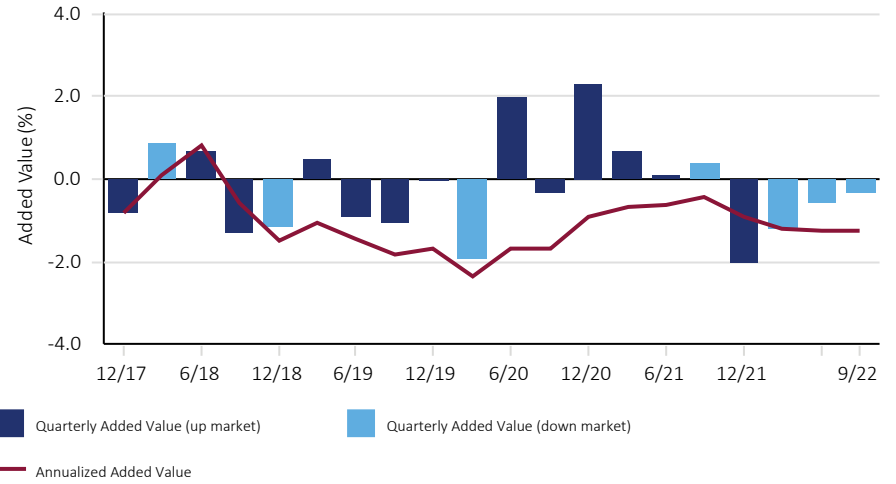
Domestic Equity

Periods Ended September 30, 2022

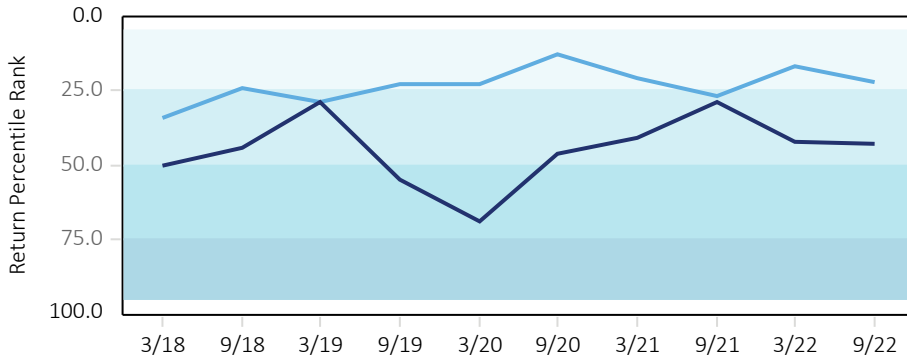
Comparative Performance



Added Value History

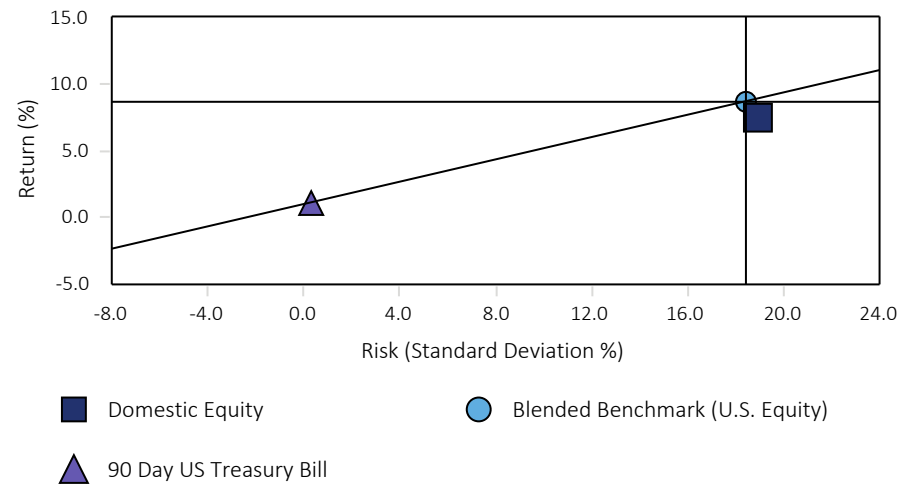


Rolling Percentile Rank: All Public Plans > \$1B-US Equity Segment



	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%)

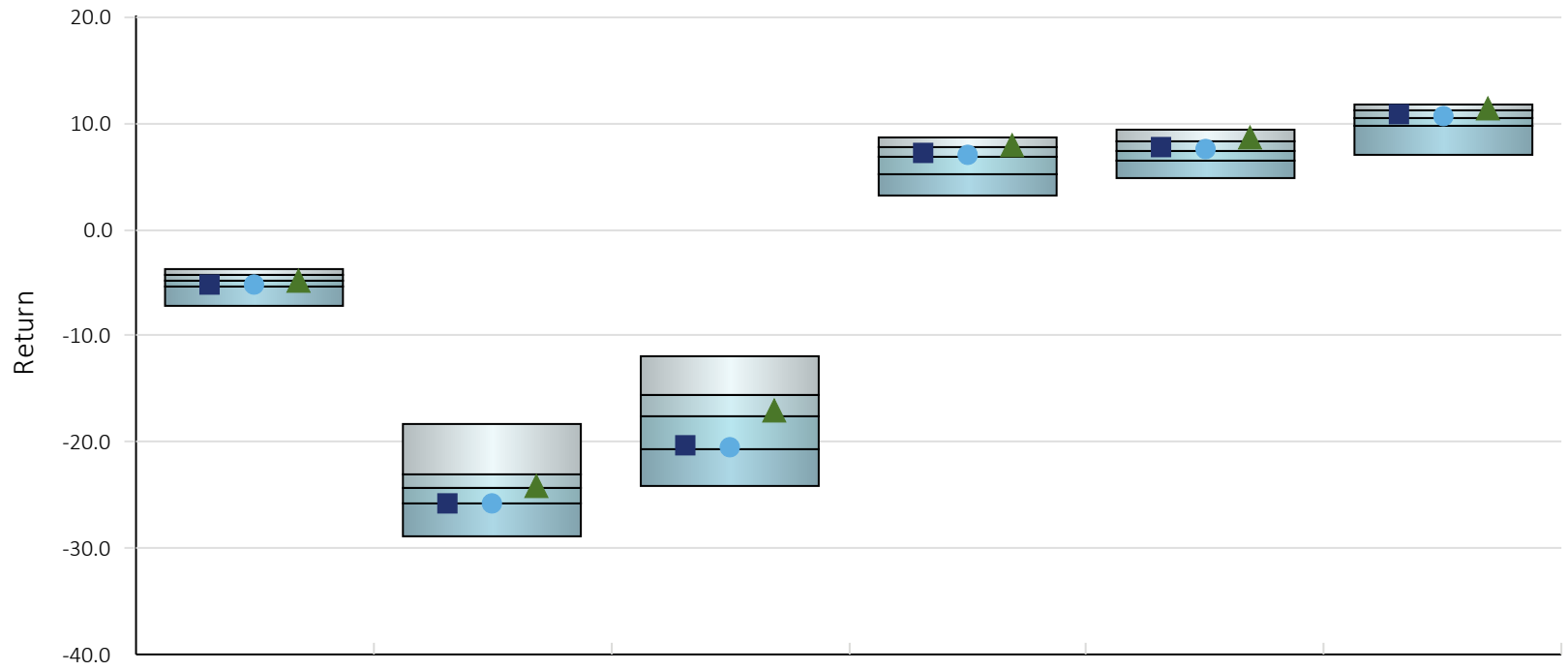
Risk and Return 10/1/17 - 09/30/22



Plan Sponsor Peer Group Analysis

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

Periods Ended September 30, 2022



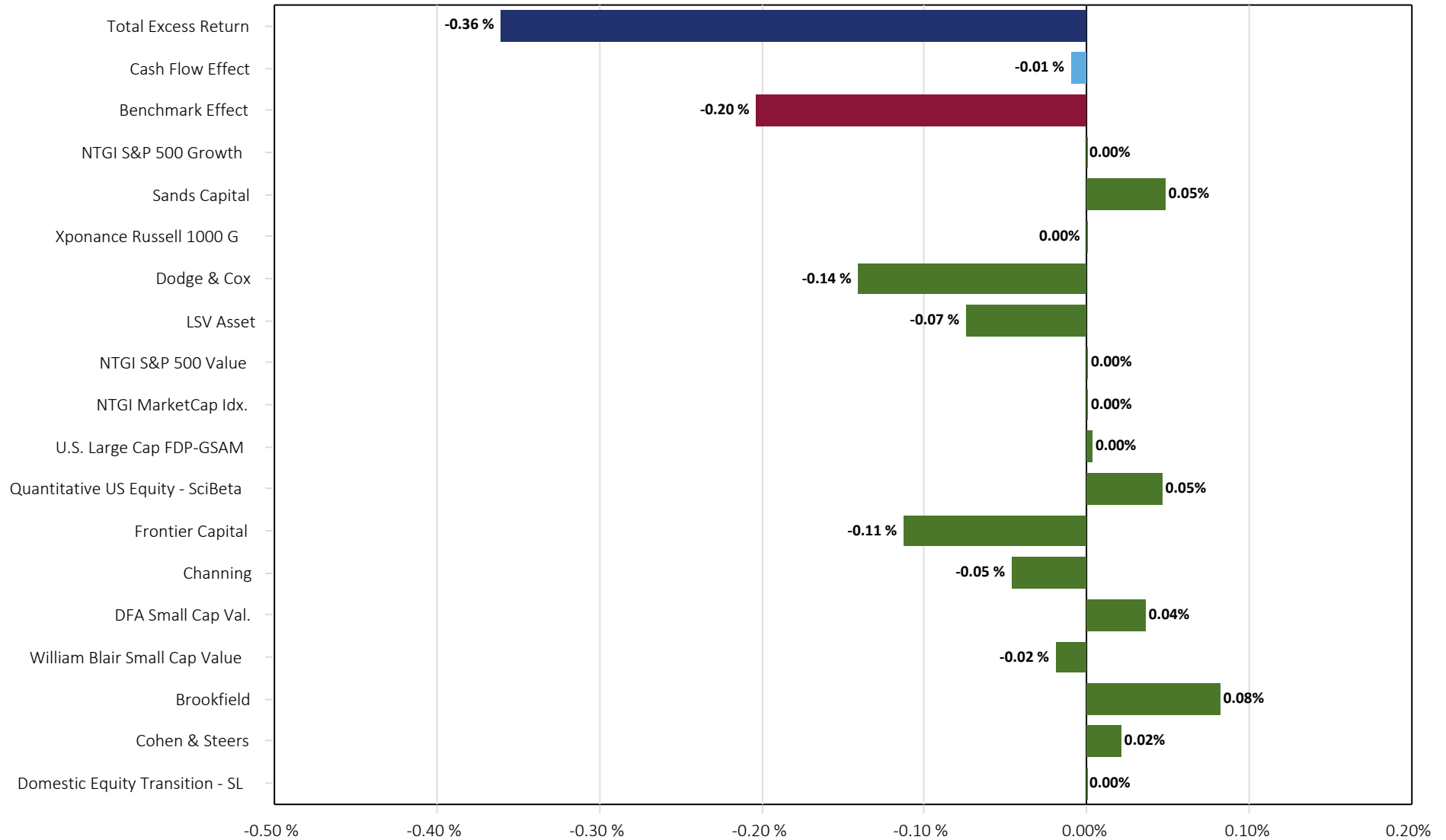
	QTD	YTD	1 Year	3 Years	5 Years	10 Years
■ Domestic Equity	-5.11 (67)	-25.75 (75)	-20.33 (73)	7.28 (39)	7.72 (46)	10.97 (35)
● Domestic Equity - Net	-5.14 (68)	-25.84 (76)	-20.46 (74)	7.10 (43)	7.53 (49)	10.74 (39)
▲ Blended Benchmark (U.S. Equity)	-4.78 (47)	-24.09 (44)	-17.05 (44)	7.95 (22)	8.77 (16)	11.44 (18)
5th Percentile	-3.73	-18.27	-11.86	8.62	9.50	11.79
1st Quartile	-4.23	-22.96	-15.57	7.69	8.40	11.16
Median	-4.86	-24.35	-17.52	6.80	7.44	10.56
3rd Quartile	-5.41	-25.81	-20.68	5.30	6.47	9.74
95th Percentile	-7.22	-28.80	-24.11	3.17	4.89	7.13
Population	48	47	47	40	38	29

Asset Class Attribution

Domestic Equity

Periods Ended 1 Quarter Ending September 30, 2022

1 Quarter



Performance

Domestic Equity

Periods Ended September 30, 2022

	Market Value \$	Performance (%)							
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
Domestic Equity	16,315,650,461	-5.11	-25.75	-20.33	7.28	7.72	10.97	11.18	1/1/1982
Domestic Equity - Net		-5.14	-25.84	-20.46	7.10	7.53	10.74		
Blended Benchmark (U.S. Equity)		-4.78	-24.09	-17.05	7.95	8.77	11.44		
Russell 3000 Index		-4.46	-24.62	-17.63	7.70	8.62	11.39	11.14	
U.S. Equity IMRF Custom Benchmark		-4.98	-24.51	-17.40	6.78	7.36			
Large Cap Equity	11,226,563,683	-4.95	-27.73	-22.34	7.22	8.10	11.25	10.87	1/1/1982
Large Cap Equity - Net		-4.97	-27.78	-22.41	7.13	8.00	11.12		
Russell 1000 Index		-4.61	-24.59	-17.22	7.95	9.00	11.60	11.29	
Large Cap Growth	2,888,613,741	-3.29	-35.84	-31.57	8.47	11.01	12.49	11.61	1/1/1982
Large Cap Growth - Net		-3.31	-35.89	-31.64	8.37	10.91	12.35		
LCG Blended Benchmark*		-3.60	-30.66	-22.59	10.67	12.16	13.70		
Russell 1000 Growth Index		-3.60	-30.66	-22.59	10.67	12.16	13.70	11.07	
NTGI S&P 500 Growth	1								
Xponance Russell 1000 G	1,705,876,754	-3.59	-30.64	-22.58	10.67			8.88	10/1/2018
Xponance Russell 1000 G - Net		-3.60	-30.66	-22.59	10.64			8.86	
Russell 1000 Growth Index		-3.60	-30.66	-22.59	10.67			8.89	
Sands Capital	1,182,736,987	-2.84	-49.72	-53.25	0.06	6.10	10.17	9.97	11/1/2003
Sands Capital - Net		-2.90	-49.82	-53.38	-0.17	5.86	9.93		
LCG Blended Benchmark*		-3.60	-30.66	-22.59	10.67	12.16	13.70	9.98	
Russell 1000 Growth Index		-3.60	-30.66	-22.59	10.67	12.16	13.70	10.02	

* 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 September 30, 2022

	Market Value \$	Performance (%)							Inception Date
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	
Large Cap Value	4,097,277,619	-6.50	-17.30	-11.54	6.09	5.95	10.37	9.92	10/1/1982
Large Cap Value - Net		-6.53	-17.40	-11.68	5.93	5.79	10.19		
LCV Blended Benchmark**		-5.62	-17.75	-11.36	4.36	5.29	9.17		
Russell 1000 Value Index		-5.62	-17.75	-11.36	4.36	5.29	9.17	11.22	
Dodge & Cox	1,535,830,131	-7.05	-17.73	-12.73	8.55	7.38	11.51	9.18	9/1/2003
Dodge & Cox - Net		-7.10	-17.86	-12.91	8.33	7.16	11.28		
LCV Blended Benchmark**		-5.62	-17.75	-11.36	4.36	5.29	9.17	7.67	
Russell 1000 Value Index		-5.62	-17.75	-11.36	4.36	5.29	9.17	7.81	
LSV Asset	1,246,140,802	-6.53	-17.46	-11.98	4.71	4.83	10.32	9.80	2/1/2003
LSV Asset - Net		-6.59	-17.61	-12.19	4.46	4.59	10.06		
LCV Blended Benchmark**		-5.62	-17.75	-11.36	4.36	5.29	9.17	8.46	
Russell 1000 Value Index		-5.62	-17.75	-11.36	4.36	5.29	9.17	8.47	
NTGI S&P 500 Value	1,315,306,686	-5.80	-16.65	-9.69	5.16	6.22	9.68	5.82	8/1/1999
NTGI S&P 500 Value - Net		-5.80	-16.65	-9.70	5.15	6.21	9.68		
S&P 500 Value		-5.82	-16.56	-9.63	5.11	6.17	9.63	5.79	
Large Cap Pass. Core	2,093,071,894	-4.56	-24.89	-18.00	7.53	8.51	11.35	10.81	1/1/1985
Large Cap Pass. Core - Net		-4.56	-24.90	-18.00	7.52	8.50	11.35		
Dow Jones US Total Stock Market Index		-4.56	-24.92	-18.05	7.51	8.48	11.28		
NTGI MarketCap Idx.	2,093,071,894	-4.56	-24.89	-18.00	7.53	8.51	11.35	10.60	2/1/1985
NTGI MarketCap Idx. - Net		-4.56	-24.90	-18.00	7.52	8.50	11.35		
Dow Jones US Total Stock Market Index		-4.56	-24.92	-18.05	7.51	8.48	11.28		
Factor Diversity Strategies	2,147,600,430	-4.47	-24.46	-16.93				3.63	8/18/2020

* 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 September 30, 2022

	Market Value \$	Performance (%)							
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
U.S. Large Cap FDP-GSAM	2,147,600,430	-4.47	-24.46	-16.93				3.63	8/18/2020
U.S. Large Cap FDP-GSAM - Net		-4.48	-24.48	-16.96				3.58	
Solactive GBS U.S. 1000 Index		-4.50	-24.88	-17.73				3.45	
GSAM Active Beta US. Large Cap FDC Index		-4.50	-24.45	-16.92				3.60	
Quantitative Factor Strategies	1,934,901,790	-5.09	-20.14	-12.58	4.86			4.86	9/17/2019
Quantitative US Equity - SciBeta	1,934,901,790	-5.09	-20.14	-12.58	4.86			4.86	9/17/2019
Quantitative US Equity - SciBeta - Net		-5.11	-20.17	-12.63	4.66			4.67	
SciBeta US Hi-Fctr-Intst Div Multi-Beta Multi-Strat Index		-5.51	-21.10	-13.47	3.93			3.83	

* 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 September 30, 2022

	Market Value \$	Performance (%)							Inception Date
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	
Small Cap	1,893,833,000	-4.10	-20.83	-16.91	8.04	6.22	10.09	11.57	7/1/1988
Small Cap Composite - Net		-4.23	-21.31	-17.54	7.35	5.61	9.47		
Russell 2000 Index		-2.19	-25.10	-23.50	4.29	3.55	8.55	8.79	
Small Cap Growth	638,701,529	-2.61	-25.75	-23.76	9.71	8.99	11.62	12.48	7/1/1988
Small Cap Growth - Net		-2.73	-26.56	-24.75	8.63	8.13	10.90		
Russell 2000 Growth Index		0.24	-29.28	-29.27	2.94	3.60	8.81	7.50	
Frontier Capital	638,701,529	-2.61	-25.75	-23.83	10.75	11.65	12.60	12.84	8/1/1988
Frontier Capital - Net		-2.73	-26.56	-24.76	9.58	10.67	11.80		
Russell 2000 Growth Index		0.24	-29.28	-29.27	2.94	3.60	8.81	7.58	
Small Cap Value	1,255,131,472	-4.85	-18.07	-12.89	7.43	4.75	9.67	11.17	9/1/1989
Small Cap Value - Net		-4.98	-18.35	-13.30	6.94	4.25	9.14		
Russell 2000 Value Index		-4.61	-21.12	-17.69	4.72	2.87	7.94	9.36	
Channing	265,686,926	-7.27	-22.51	-18.52	5.79	3.39	9.44	8.61	7/1/2011
Channing - Net		-7.39	-22.81	-18.93	5.28	2.88	8.89	8.04	
Russell 2000 Value Index		-4.61	-21.12	-17.69	4.72	2.87	7.94	7.42	
DFA Small Cap Val.	464,803,082	-3.24	-14.11	-8.37	10.86	5.50	10.06	11.46	2/1/1996
DFA Small Cap Val. - Net		-3.30	-14.32	-8.73	10.39	5.02	9.54		
Russell 2000 Value Index		-4.61	-21.12	-17.69	4.72	2.87	7.94	8.75	
William Blair Small Cap Value	524,641,464	-4.99	-19.04	-13.57	5.59	4.85	10.14	10.59	5/1/1999
Inv. Couns. Maryland - Net		-5.18	-19.36	-14.03	5.08	4.33	9.61		
Russell 2000 Value Index		-4.61	-21.12	-17.69	4.72	2.87	7.94	8.25	

* 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 September 30, 2022

	Market Value \$	Performance (%)							
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
Public Real Assets	1,260,351,986	-7.98	-11.46	-4.46	1.28	4.73		4.64	8/1/2017
Public Real Assets - Net		-8.04	-11.66	-4.75	0.91	4.31		4.23	
Public Real Assets Benchmark***		-9.42	-12.83	-6.50	-0.27	2.84		2.72	
Brookfield	353,567,055	-6.42	-8.17	-1.86	1.32	3.63		3.43	8/1/2017
Brookfield - Net		-6.51	-8.45	-2.28	0.82	3.11		2.93	
Dow Jones Brookfield Global Infrastructure Composi		-10.23	-13.07	-7.24	-0.70	1.88		1.70	
Cohen & Steers	906,784,931	-8.57	-12.16	-4.99	1.59	5.46		5.42	8/1/2017
Cohen & Steers - Net		-8.62	-12.34	-5.25	1.25	5.07		5.04	
FTSE GLOBAL CORE INFRASTRUCTURE 50/50 INDEX (Net)		-9.02	-12.73	-6.15	-0.09	3.29		3.21	

* 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.

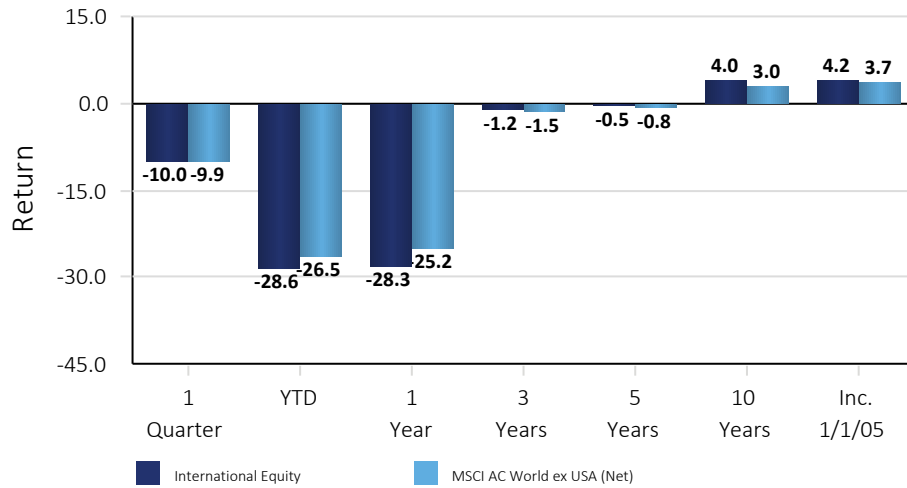
International Equity

Composite Performance Summary

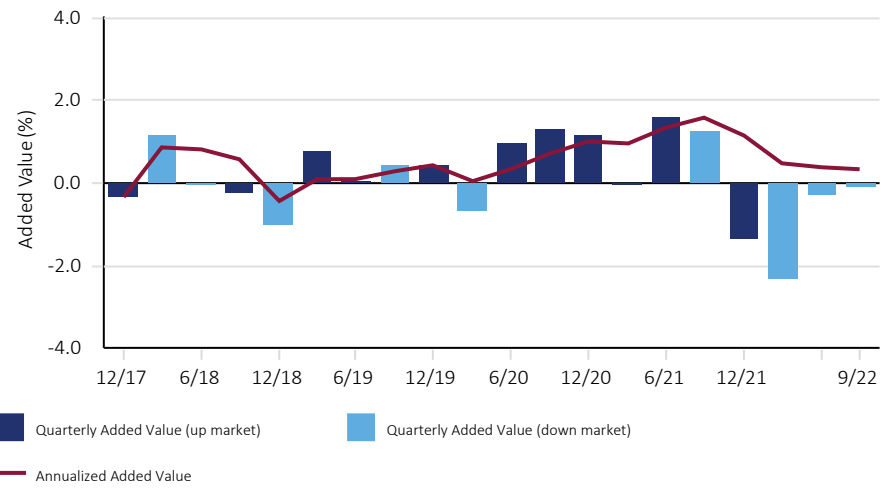
International Equity

Periods Ended September 30, 2022

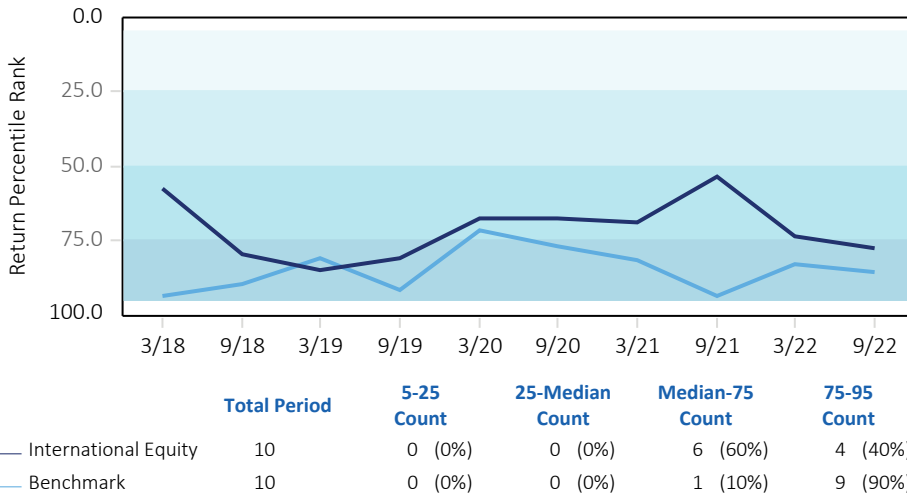
Comparative Performance



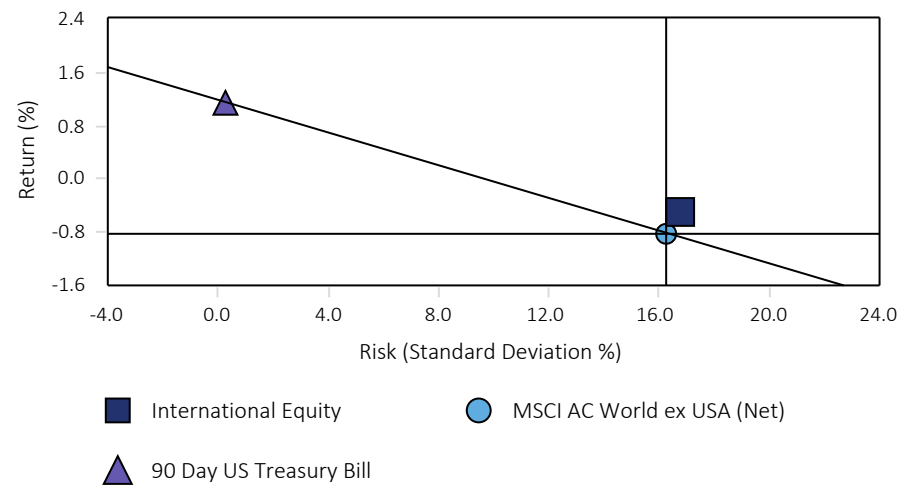
Added Value History



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



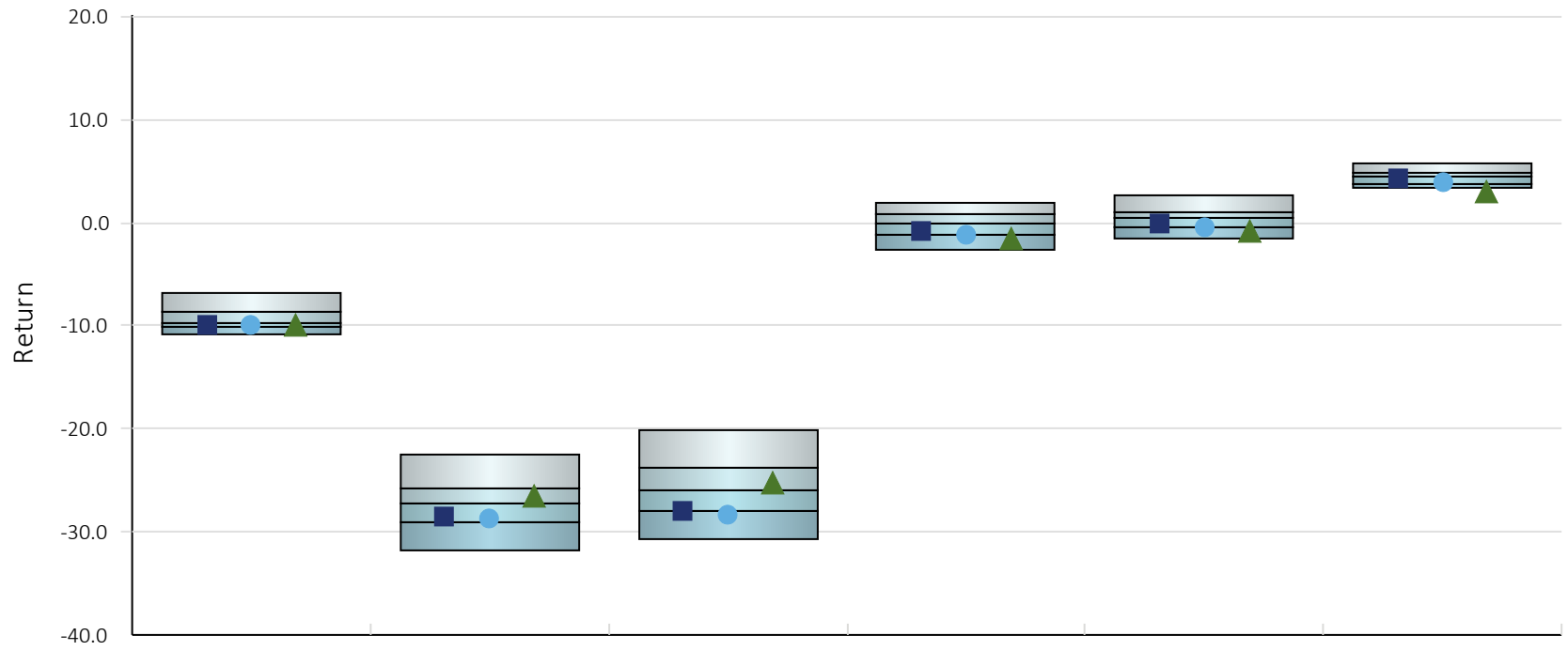
Risk and Return 10/1/17 - 09/30/22



Plan Sponsor Peer Group Analysis

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

Periods Ended September 30, 2022



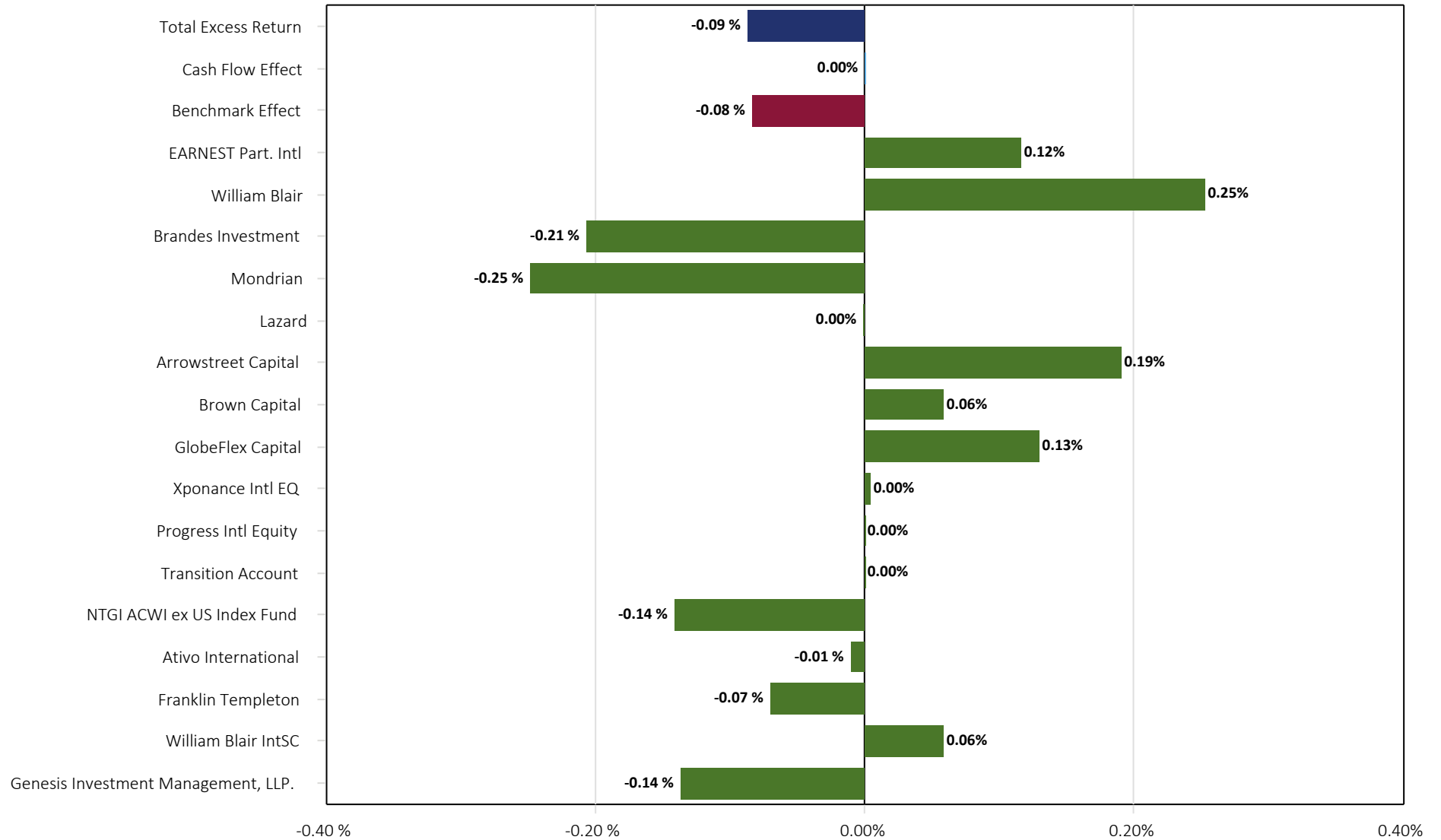
	QTD	YTD	1 Year	3 Years	5 Years	10 Years
■ International Equity	-9.92 (58)	-28.43 (68)	-28.00 (76)	-0.81 (63)	-0.14 (66)	4.35 (52)
● International Equity - Net	-9.99 (63)	-28.61 (70)	-28.29 (77)	-1.17 (78)	-0.49 (83)	4.00 (70)
▲ MSCI AC World ex USA (Net)	-9.91 (58)	-26.50 (35)	-25.17 (45)	-1.52 (86)	-0.81 (88)	3.01 (100)
5th Percentile	-6.83	-22.56	-20.10	1.95	2.67	5.76
1st Quartile	-8.63	-25.82	-23.77	0.86	1.05	4.91
Median	-9.67	-27.26	-25.97	-0.05	0.45	4.50
3rd Quartile	-10.09	-29.08	-27.99	-1.12	-0.38	3.75
95th Percentile	-10.90	-31.87	-30.69	-2.69	-1.52	3.44
Population	51	50	50	45	45	35

Asset Class Attribution

International Equity

Periods Ended 1 Quarter Ending September 30, 2022

1 Quarter



Performance

International Equity

Periods Ended September 30, 2022

	Market Value \$	Performance (%)							
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
International Equity	7,309,519,862	-9.92	-28.43	-28.00	-0.81	-0.14	4.35	6.91	9/1/1986
International Equity - Net		-9.99	-28.61	-28.29	-1.17	-0.49	4.00		
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01		
International Equity IMRF Custom Benchmark		-9.99	-26.75	-25.77	-1.51	-0.90			
Intl Large Cap Equity	5,828,559,029	-9.64	-26.78	-25.72	0.27	0.46	4.78	7.00	9/1/1986
Intl LargeCap Equity - Net		-9.70	-26.93	-25.97	-0.02	0.17	4.49		
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01		
Intl Large Cap Grwth	1,229,245,744	-7.58	-30.77	-30.02	1.95	1.29	4.96	7.17	9/1/2002
Intl Large Cap Grwth - Net		-7.65	-30.93	-30.27	1.62	1.01	4.64		
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01	5.75	
EARNEST Part. Intl	496,145,739	-8.11	-21.64	-20.79	2.49	0.97	4.42	7.61	10/1/2004
EARNEST Part. Intl - Net		-8.16	-21.76	-20.95	2.26	0.77	4.18		
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01	4.43	
MSCI AC World ex USA Growth (Net)		-9.37	-31.84	-30.22	-1.38	0.18	3.95	5.05	
William Blair	733,100,004	-7.21	-35.84	-35.13	1.58	1.66	5.48	8.18	10/1/2002
William Blair - Net		-7.30	-36.02	-35.43	1.20	1.29	5.10		
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01	6.37	
MSCI AC World ex USA Growth (Net)		-9.37	-31.84	-30.22	-1.38	0.18	3.95	6.52	
Intl Large Cap Val.	1,074,693,959	-12.84	-22.74	-22.30	-2.22	-1.21	3.48	7.24	10/1/1995
Intl Large Cap Val. - Net		-12.91	-22.92	-22.54	-2.52	-1.52	3.11		
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01	4.32	
Brandes Investment	473,217,973	-12.95	-22.01	-21.97	-1.86	-1.18	3.95	7.41	1/1/1996
Brandes Investment - Net		-13.00	-22.13	-22.13	-2.07	-1.39	3.71		
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01	4.23	
MSCI AC World ex USA Value		-10.29	-20.53	-19.46	-1.54	-1.51	2.47		

* 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 September 30, 2022

	Market Value \$	Performance (%)							
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
Mondrian	493,323,935	-13.35	-23.14	-22.24	-2.40	-1.21	3.07	2.86	4/1/2012
Mondrian - Net		-13.45	-23.30	-22.48	-2.76	-1.63	2.60	2.39	
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01	2.79	
MSCI AC World ex USA Value		-10.29	-20.53	-19.46	-1.54	-1.51	2.47	2.32	
Lazard	108,152,051	-9.92	-24.04	-23.96	-2.11	-0.44	3.61	3.70	4/1/2012
Lazard - Net		-9.98	-24.14	-24.11	-2.33	-0.68	3.16	3.26	
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01	2.79	
MSCI AC World ex USA Value		-10.29	-20.53	-19.46	-1.54	-1.51	2.47	2.32	
Intl Large Cap Active Core	2,047,929,813	-8.40	-26.35	-25.19	2.27	1.77	6.29	4.10	2/1/2008
Intl Large Cap Active Core - Net		-8.49	-26.56	-25.61	1.73	1.27	5.74		
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01	1.34	
Arrowstreet Capital	863,327,062	-8.15	-22.54	-21.43	7.53	5.22	8.27	5.36	3/1/2008
Arrowstreet Capital - Net		-8.26	-22.81	-21.81	7.04	4.73	7.77	4.87	
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01	1.15	
Brown Capital	417,000,087	-8.79	-37.54	-36.80	-3.01	-0.51	5.38	5.86	10/1/2004
Brown Capital - Net		-8.85	-37.67	-37.41	-3.68	-1.13	4.54		
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01	4.43	
GlobeFlex Capital	690,534,889	-8.43	-22.25	-20.74	1.75	0.09	5.25	4.02	3/1/2006
GlobeFlex Capital - Net		-8.51	-22.45	-21.00	1.37	-0.29	4.84	3.59	
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17	-1.52	-0.81	3.01	2.56	
Xponance Intl EQ	76,323,694	-8.82	-29.95	-28.44				-12.84	2/1/2021
Xponance Intl EQ - Net		-8.97	-30.30	-28.91				-13.33	
MSCI EAFE Index (Net)		-9.36	-27.09	-25.13				-11.23	
Progress Intl Equity*	556,193								

* 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 September 30, 2022

	Market Value \$	Performance (%)							
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
Intl Large Cap Passive Core	1,476,689,513	-10.60	-26.67	-25.02	-1.51	-0.50	4.05	2.99	2/1/2000
Intl Large Cap Passive Core - Net		-10.60	-26.68	-25.02	-1.52	-0.51	4.04		
International Large Cap Passive Core Benchmark		-9.91	-26.50	-25.17	-1.85	-0.85	3.66	2.61	
NTGI ACWI ex US Index Fund	1,476,689,513	-10.60	-26.67	-25.03				-25.03	10/1/2021
NTGI ACWI ex US Index Fund - Net		-10.60	-26.68	-25.03				-25.03	
MSCI AC World ex USA (Net)		-9.91	-26.50	-25.17				-25.17	
Intl All Cap Developed	125,967,378	-9.71	-29.53	-25.69	-2.99			-0.65	2/1/2019
Intl All Cap Developed - Net		-9.83	-29.81	-26.07	-3.47			-1.11	
MSCI EAFE + Canada (Net)		-9.20	-26.23	-23.91	-1.21			0.59	
Ativo International	125,967,378	-9.72	-29.54	-25.69	-2.99			-0.65	2/1/2019
Ativo International - Net		-9.83	-29.81	-26.07	-3.47			-1.11	
MSCI EAFE + Canada (Net)		-9.20	-26.23	-23.91	-1.21			0.59	
Intl Small Cap Eqty	438,760,355	-8.35	-39.16	-39.17	-1.70	-1.65	4.57	3.33	12/1/2005
Intl Small Cap Eqty - Net		-8.53	-39.53	-39.65	-2.44	-2.39	3.79		
MSCI AC World ex USA Small Cap (Net)		-8.37	-29.37	-28.93	0.38	-0.56	4.44	4.69	
Custom Benchmark (Intl Small Cap)		-8.37	-29.37	-28.93	0.38	-0.56	4.44	4.09	
Franklin Templeton	173,675,228	-11.07	-32.44	-32.03	-2.66	-1.86	4.23	3.44	8/1/2011
Franklin Templeton - Net		-11.23	-32.83	-32.54	-3.36	-2.57	3.47	2.70	
MSCI AC World ex USA Small Cap (Net)		-8.37	-29.37	-28.93	0.38	-0.56	4.44	3.06	
William Blair IntSC	265,085,127	-6.49	-42.88	-43.08	-1.05	-1.54	4.83	6.02	9/1/2010
William Blair IntSC - Net		-6.67	-43.25	-43.56	-1.81	-2.29	4.02	5.21	
MSCI AC World ex USA Small Cap (Net)		-8.37	-29.37	-28.93	0.38	-0.56	4.44	4.84	
Custom Benchmark (Intl Small Cap)		-8.37	-29.37	-28.93	0.38	-0.56	4.44	5.08	

* 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 September 30, 2022

	Market Value \$	Performance (%)							
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
Emerging Mkt Equity	916,233,100	-12.34	-32.22	-35.23	-6.00	-2.34	1.32	7.38	2/1/1992
Emerging Mkt Equity - Net		-12.46	-32.51	-35.59	-6.54	-2.90	0.74		
MSCI Emerging Markets Index		-11.42	-26.89	-27.80	-1.71	-1.44	1.42	5.96	
Genesis Investment Management, LLP.**	916,233,100	-12.35	-32.23	-35.24	-6.01	-2.34	1.32	7.98	5/1/2004
Genesis Investment Management, LLP - Net		-12.46	-32.51	-35.59	-6.54	-2.90	0.74		
MSCI Emerging Markets Index		-11.42	-26.89	-27.80	-1.71	-1.44	1.42	6.69	

* 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.

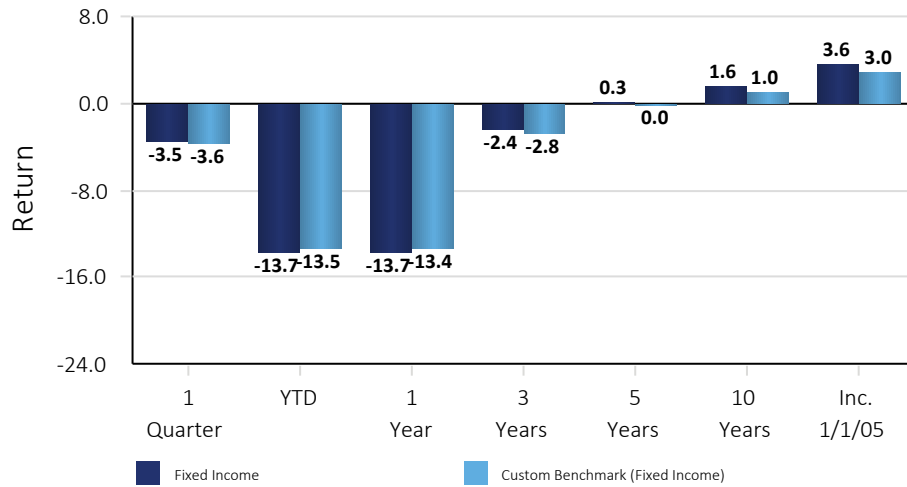
Fixed Income

Composite Performance Summary

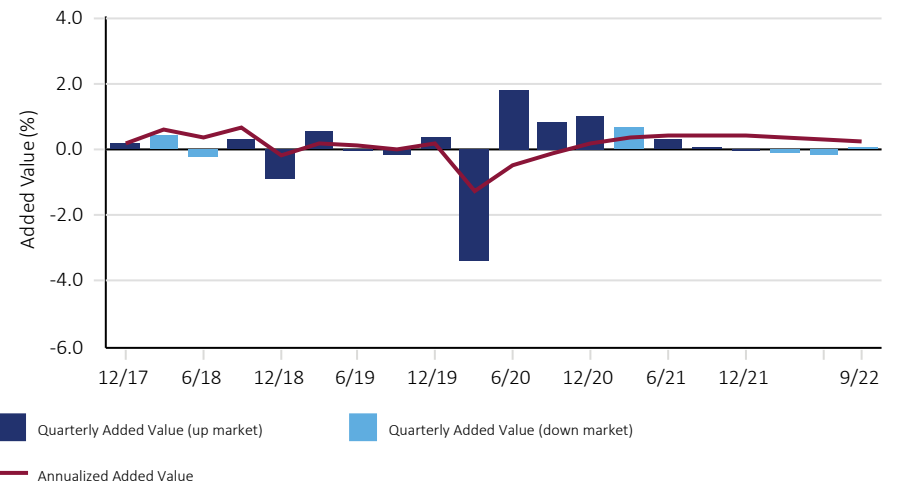
Fixed Income

Periods Ended September 30, 2022

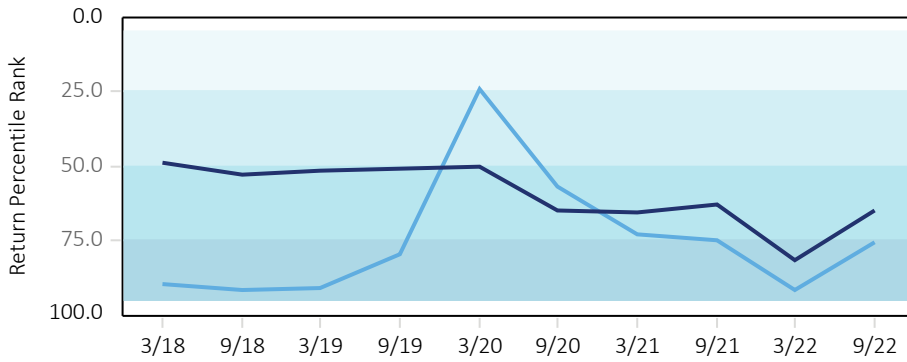
Comparative Performance



Added Value History

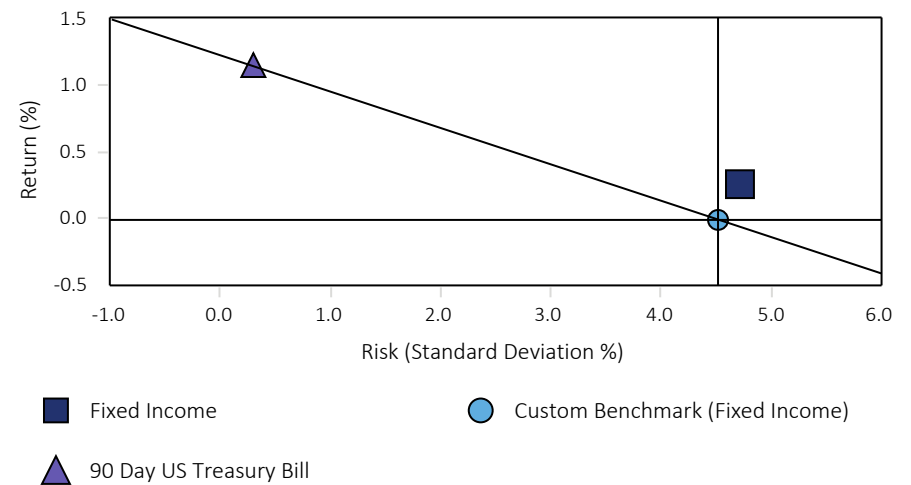


Rolling Percentile Rank: All Public Plans > \$1B-US Fixed Income Segment



	Total Period	5-25 Count	25-Median Count	Median-75 Count	75-95 Count
Fixed Income	10	0 (0%)	2 (20%)	7 (70%)	1 (10%)
Benchmark	10	1 (10%)	0 (0%)	3 (30%)	6 (60%)

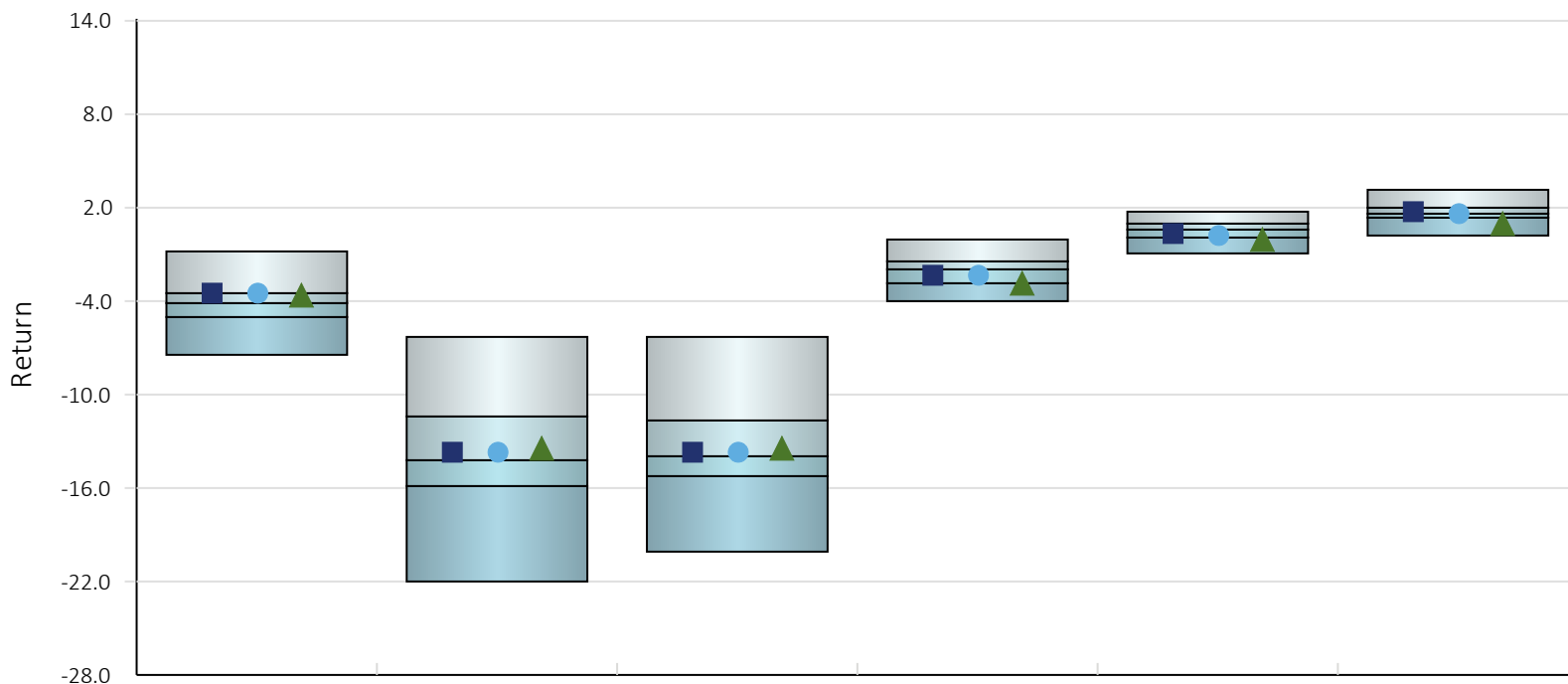
Risk and Return 10/1/17 - 09/30/22



Plan Sponsor Peer Group Analysis

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

Periods Ended September 30, 2022



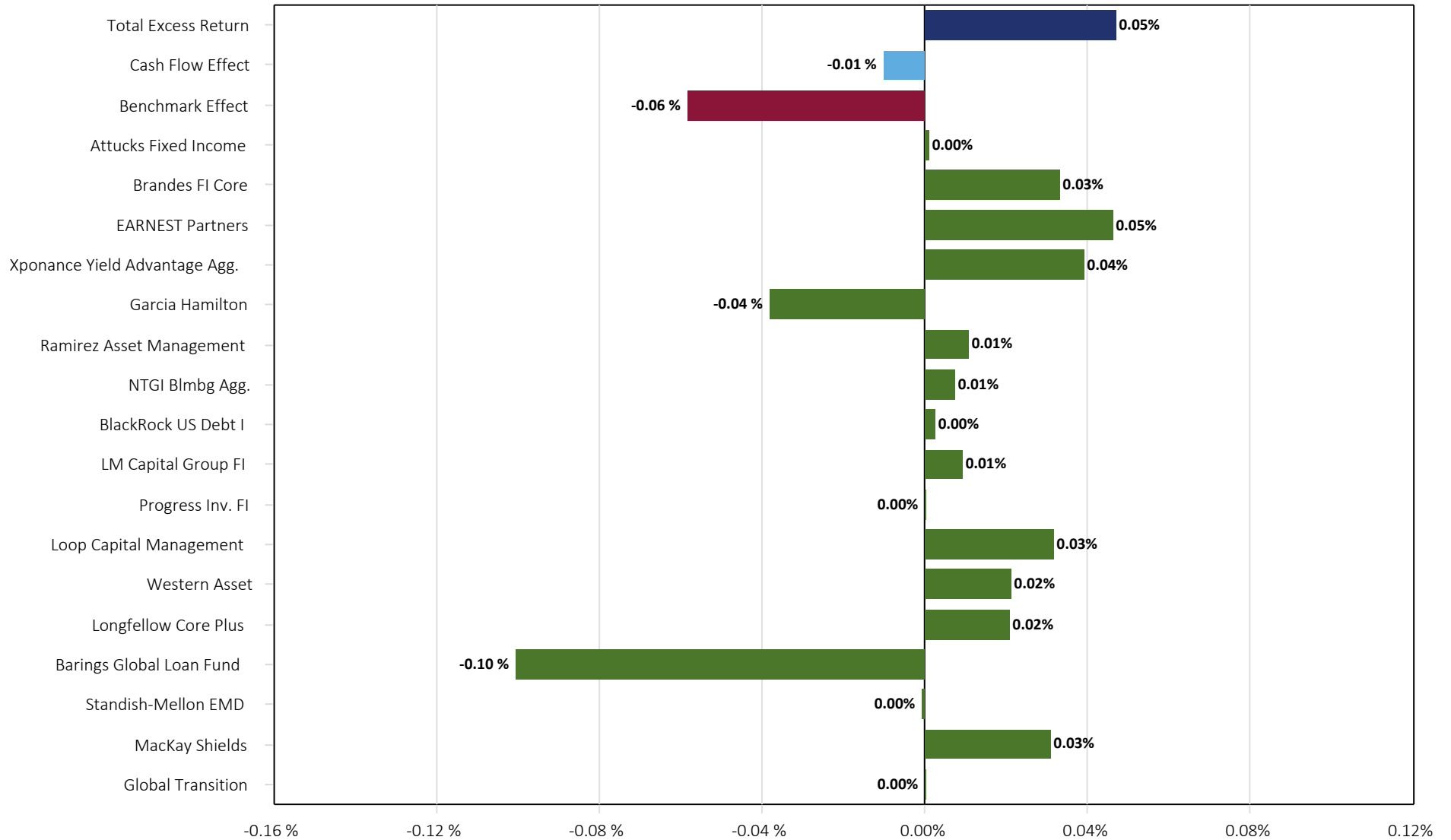
	QTD	YTD	1 Year	3 Years	5 Years	10 Years
■ Fixed Income	-3.53 (29)	-13.65 (41)	-13.66 (43)	-2.30 (64)	0.38 (60)	1.73 (36)
● Fixed Income - Net	-3.55 (30)	-13.71 (42)	-13.73 (44)	-2.40 (65)	0.26 (69)	1.59 (52)
▲ Custom Benchmark (Fixed Income)	-3.60 (31)	-13.45 (39)	-13.44 (42)	-2.82 (76)	0.00 (82)	1.03 (89)
5th Percentile	-0.84	-6.27	-6.30	0.00	1.71	3.09
1st Quartile	-3.44	-11.34	-11.71	-1.48	0.92	2.05
Median	-4.16	-14.17	-13.91	-1.98	0.56	1.61
3rd Quartile	-5.01	-15.87	-15.22	-2.81	0.04	1.30
95th Percentile	-7.42	-22.04	-20.05	-3.97	-0.91	0.16
Population	53	53	52	44	43	34

Asset Class Attribution

Fixed Income

Periods Ended 1 Quarter Ending September 30, 2022

1 Quarter



Performance

Fixed Income

Periods Ended September 30, 2022

	Market Value \$	Performance (%)							
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
Fixed Income	11,956,987,031	-3.53	-13.65	-13.66	-2.30	0.38	1.73	7.42	1/1/1982
Fixed Income - Net		-3.55	-13.71	-13.73	-2.40	0.26	1.59		
Custom Benchmark (Fixed Income)		-3.60	-13.45	-13.44	-2.82	0.00	1.03	6.90	
Fixed Income IMRF Custom Benchmark		-3.65	-13.85	-13.80	-2.72	0.08			
Active Fixed Core	3,708,036,365	-4.42	-13.77	-13.72	-2.62	0.21	1.38	3.60	4/1/2001
Active Fixed Core - Net		-4.45	-13.84	-13.82	-2.72	0.11	1.24		
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60	-3.26	-0.27	0.89	3.51	
Attucks Fixed Income	84,906,040	-4.49	-14.90	-14.88				-9.31	2/1/2021
Attucks Fixed Income - Net		-4.57	-15.12	-15.16				-9.58	
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60				-9.50	
Brandes FI Core	328,443,611	-3.52	-12.27	-12.34	-2.34	0.08		0.54	3/1/2016
Brandes FI Core - Net		-3.53	-12.29	-12.37	-2.35	0.07		0.54	
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60	-3.26	-0.27		0.35	
EARNEST Partners	884,446,982	-4.09	-13.63	-13.63	-2.65	0.27	1.43	3.39	5/1/2005
EARNEST Partners - Net		-4.12	-13.71	-13.75	-2.77	0.14	1.27	3.21	
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60	-3.26	-0.27	0.89	2.92	
Xponance Yield Advantage Agg.	955,160,714	-4.22	-14.20	-14.03	-2.38	0.23	1.40	3.24	6/1/2005
Xponance Yield Advantage Agg. - Net		-4.26	-14.28	-14.15	-2.50	0.10	1.25	3.07	
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60	-3.26	-0.27	0.89	2.87	
Garcia Hamilton	941,005,194	-5.22	-13.52	-13.41	-2.89	0.14		0.95	6/1/2015
Garcia Hamilton - Net		-5.24	-13.57	-13.48	-2.96	0.06		0.87	
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60	-3.26	-0.27		0.53	

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 September 30, 2022

	Market Value \$	Performance (%)							
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
Ramirez Asset Management	514,073,825	-4.47	-14.39	-14.61				-3.92	5/1/2020
Ramirez Asset Management - Net		-4.50	-14.48	-14.70				-4.04	
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60				-6.01	
Pass. Core Fixed Income	2,727,981,673	-4.71	-14.48	-14.52	-3.19	-0.20	0.94	5.10	1/1/1990
Pass. Core Fixed Income - Net		-4.71	-14.49	-14.52	-3.19	-0.21	0.93		
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60	-3.26	-0.27	0.89	5.08	
BlackRock US Debt I	1,572,069,206	-4.73	-14.47	-14.51	-3.16	-0.18		1.30	10/1/2013
BlackRock US Debt I - Net		-4.73	-14.47	-14.52	-3.17	-0.19		1.29	
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60	-3.26	-0.27		1.18	
NTGI Blmbg Agg.	1,155,912,468	-4.68	-14.49	-14.52	-3.21	-0.23	0.92	5.14	2/1/1990
NTGI Blmbg Agg. - Net		-4.68	-14.50	-14.52	-3.22	-0.23	0.91		
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60	-3.26	-0.27	0.89	5.13	
Core Plus Fixed Income	2,867,955,733	-4.37	-15.82	-15.85	-2.70	0.13	1.61	7.26	1/1/1982
Core Plus Fixed Income - Net		-4.41	-15.91	-15.98	-2.85	-0.04	1.44		
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60	-3.26	-0.27	0.89	6.87	
LM Capital Group FI	824,418,556	-4.58	-14.04	-14.14	-1.97	0.38	1.60	3.71	5/1/2005
LM Capital Group FI - Net		-4.62	-14.14	-14.28	-2.12	0.22	1.44	3.55	
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60	-3.26	-0.27	0.89	2.92	
Progress Inv. FI	978								
Loop Capital Management	557,579,547	-4.04	-15.77	-15.82	-2.85	-0.01	1.75	3.67	5/1/2005
Loop Capital Management - Net		-4.07	-15.85	-15.94	-2.98	-0.14	1.61	3.54	
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60	-3.26	-0.27	0.89	2.92	

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 September 30, 2022

	Market Value \$	Performance (%)							
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
Western Asset	927,123,840	-4.45	-18.01	-18.05	-3.50	-0.21	1.73	4.22	11/1/2001
Western Asset - Net		-4.49	-18.10	-18.17	-3.63	-0.33	1.60		
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60	-3.26	-0.27	0.89	3.25	
Longfellow Core Plus	558,832,812	-4.27	-14.72	-14.44				-4.05	5/1/2020
Longfellow Core Plus - Net		-4.30	-14.81	-14.55				-4.19	
Blmbg. U.S. Aggregate		-4.75	-14.61	-14.60				-6.01	
Bank Loans	1,612,323,391	0.43	-5.29	-4.58	1.58	2.64		3.45	8/1/2014
Bank Loans - Net		0.46	-5.25	-4.52	1.60	2.48		3.12	
Barings Custom Benchmark		1.25	-3.65	-2.89	2.07	3.07		3.38	
Barings Global Loan Fund	1,612,323,391	0.43	-5.29	-4.58	1.58	2.64		3.45	8/1/2014
Barings Global Loan Fund - Net		0.46	-5.25	-4.52	1.60	2.48		3.12	
Barings Custom Benchmark*		1.25	-3.65	-2.89	2.07	3.07		3.38	
Emerging Markets Debt	2,452,746								
Standish-Mellon EMD	2,452,746								
High Yield	1,038,237,123	-0.25	-10.98	-10.56	1.34	3.03	4.90	8.85	4/1/1986
High Yield - Net		-0.32	-11.18	-10.83	1.00	2.70	4.55		
ICE BofAML US High Yield, Cash Pay Index		-0.70	-14.61	-14.02	-0.69	1.39	3.84	7.53	
MacKay Shields	1,038,237,123	-0.25	-10.97	-10.56	1.35	3.03	4.96	7.79	11/1/2000
MacKay Shields - Net		-0.32	-11.16	-10.83	1.00	2.70	4.60		
ICE BofAML US High Yield, Cash Pay Index		-0.70	-14.61	-14.02	-0.69	1.39	3.84	6.40	

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

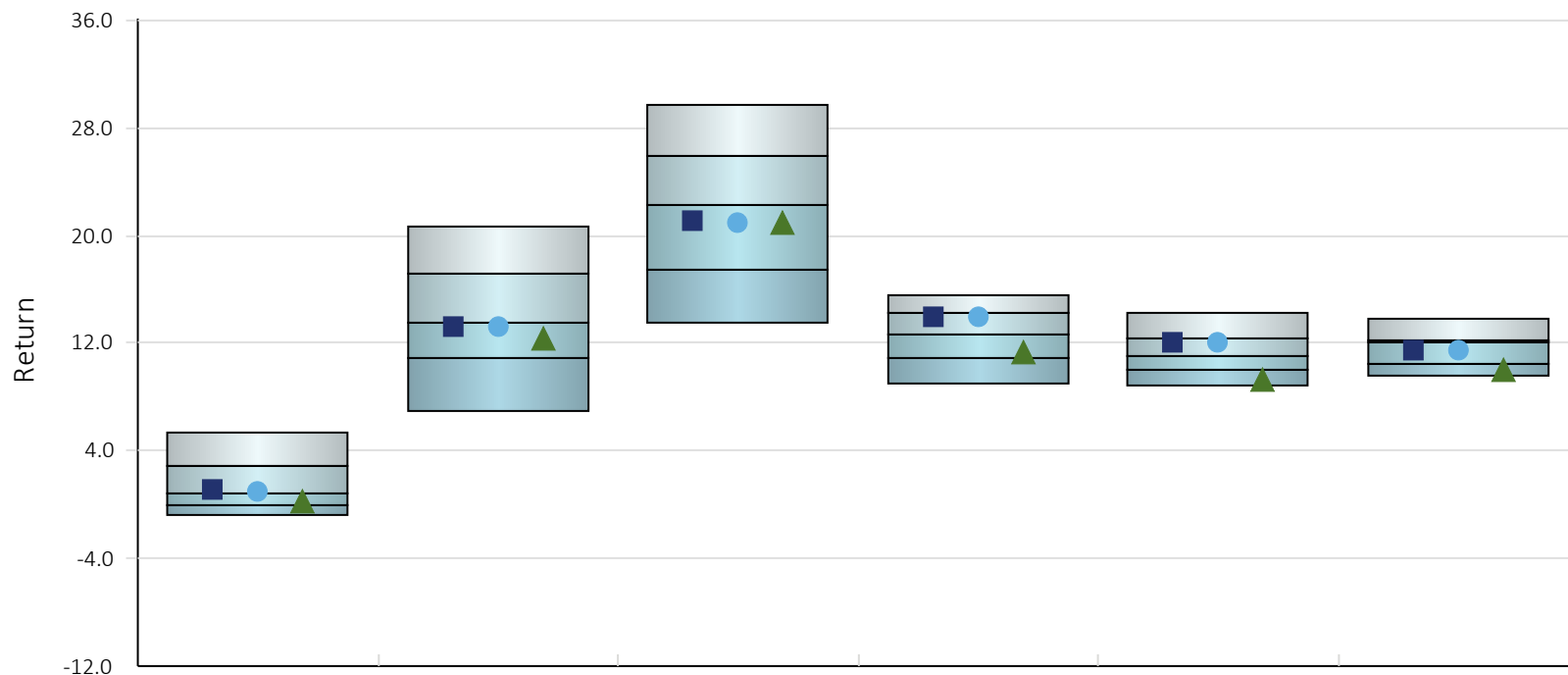
* Custom Benchmark is Credit Suisse US Leveraged Loan Index and the Credit Suisse Western European Leveraged Loan Index, weighted by the portfolio's market value to each sector.

Private Real Assets

Plan Sponsor Peer Group Analysis

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

Periods Ended September 30, 2022



	QTD	YTD	1 Year	3 Years	5 Years	10 Years
■ Real Estate	1.06 (46)	13.30 (54)	21.12 (64)	13.98 (27)	12.13 (33)	11.45 (68)
● Real Estate - Net	1.04 (46)	13.25 (55)	21.04 (64)	13.93 (27)	12.09 (34)	11.42 (68)
▲ Blended Benchmark (Real Estate)	0.31 (61)	12.35 (61)	20.96 (64)	11.38 (67)	9.26 (81)	9.99 (81)
5th Percentile	5.31	20.67	29.77	15.58	14.27	13.79
1st Quartile	2.82	17.11	25.94	14.23	12.33	12.27
Median	0.78	13.56	22.30	12.65	11.03	12.01
3rd Quartile	0.01	10.91	17.54	10.96	10.06	10.43
95th Percentile	-0.74	6.91	13.51	8.94	8.90	9.55
Population	41	39	38	29	23	13

Asset Allocation & Performance

Private Real Assets

Periods Ended September 30, 2022

	Market Value \$	Performance (%)							
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
Private Real Assets	4,842,223,932	0.96						7.89	3/1/2022
Private Real Assets- Net		0.94						7.85	
Custom Benchmark (Private Real Assets)		0.35						12.09	
Real Estate	4,426,977,194	1.06	13.30	21.12	13.98	12.13	11.45	6.17	5/1/1985
Real Estate - Net		1.04	13.25	21.04	13.93	12.09	11.42		
Blended Benchmark (Real Estate)		0.31	12.35	20.96	11.38	9.26	9.99	8.00	
Real Estate Core Cmp	2,428,952,037	5.65	15.49	25.18	16.24	13.61	11.80	8.47	4/1/1999
TA Assoc. Buckhead	990,254,880	12.15	23.01	34.62	24.99	20.23	15.52	12.20	8/1/1995
Blended Benchmark (Real Estate)		0.31	12.35	20.96	11.38	9.26	9.99	7.85	
Barings Euro Core Property	131,454,529	-6.13	-9.62	-9.83	3.06	8.99		9.92	3/1/2017
Blended Benchmark (Real Estate)		0.31	12.35	20.96	11.38	9.26		8.96	
Blackstone Property Euro	165,351,985	-2.44	2.02	2.52	10.16			7.07	12/1/2017
Blended Benchmark (Real Estate)		0.31	12.35	20.96	11.38			9.32	
INVESCO Core Real Estate	261,713,524	4.69	11.12	26.29	10.45	8.98	9.44	9.70	4/1/2011
Blended Benchmark (Real Estate)		0.31	12.35	20.96	11.38	9.26	9.99	10.43	
INVESCO European real estate	54,542,157	-4.29	-6.16	-5.87	-0.11			-1.94	4/1/2018
Blended Benchmark (Real Estate)		0.31	12.35	20.96	11.38			9.42	
AEW Core Property Tr	303,751,085	3.62	23.03	29.00	12.20	9.96		9.71	10/1/2013
Blended Benchmark (Real Estate)		0.31	12.35	20.96	11.38	9.26		9.69	
CBRE Core Partners	328,560,056	4.76	16.29	43.02	18.50	14.65		12.67	12/1/2013
Blended Benchmark (Real Estate)		0.31	12.35	20.96	11.38	9.26		9.64	

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 September 30, 2022

	Market Value \$	Performance (%)							Inception Date
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	
JPM Strategic Property Fund Blended Benchmark (Real Estate)	193,323,821	0.00 0.31	14.72 12.35	14.72 20.96				15.60 19.19	1/1/2021
RE Non-Core Cmp	1,998,025,157	-4.12	10.74	16.50	11.44	10.45	11.19	11.73	1/1/2010
Artemis MWBE Spruce Blended Benchmark (Real Estate)	316,990,821	2.32 0.31	14.20 12.35	15.87 20.96	11.41 11.38	9.23 9.26		6.71 8.77	6/1/2016
Franklin T. EMREFF Blended Benchmark (Real Estate)	3,953,769	-3.98 0.31	-10.77 12.35	-13.62 20.96	-14.94 11.38	-6.06 9.26	4.92 9.99	3.22 10.20	9/1/2011
Security Capital Blended Benchmark (Real Estate)	89,946,438	-7.33 0.31	-20.79 12.35	-20.99 20.96	3.47 11.38	6.35 9.26	5.38 9.99		7/1/1997
Dune II Blended Benchmark (Real Estate)	8,031,504	8.85 0.31	7.32 12.35	8.80 20.96	3.74 11.38	4.85 9.26	11.01 9.99	6.08 8.85	2/1/2009
Non-Core Real Estate Funds Blended Benchmark (Real Estate)	1,354,225,599	-4.81 0.31	14.98 12.35	24.53 20.96	14.12 11.38	12.82 9.26	11.92 9.99	12.02 10.17	10/1/2011
Almanac ARS V	81,825								
Non-Core Intl Real Estate Blended Benchmark (Real Estate)	224,795,201	-5.78 0.31	-4.40 12.35	-6.82 20.96	2.57 11.38	1.50 9.26		-1.59 9.54	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 September 30, 2022

	Market Value \$	Performance (%)							
		1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
Agriculture	241,046,869	0.00	1.24	5.98	1.64	0.51	7.34	6.53	10/1/1997
NCREIF Farmland Index		1.98	6.18	10.21	6.50	6.33	9.47	11.18	
Premiere Partners IV	241,046,869	0.00	1.24	5.98	1.64	0.51		2.15	3/1/2015
Timberland	57,865,591	2.85	1.18	4.53	1.13	0.59	2.45	6.74	10/1/1992
NCREIF Timberland Index		2.38	7.64	12.54	5.80	4.69	5.90	8.41	
Forest Investment	57,865,591	2.85	1.18	4.53	1.13	0.59	2.63	6.89	10/1/1992
Blended Benchmark (Timberland)		1.15	7.04	11.91	5.60	4.57	5.84	8.39	
Unlisted Infrastructure	116,334,278	-1.92	6.80	8.72	12.38			11.61	4/1/2018
Blended Benchmark (Unlisted Infrastructure)		1.15	8.58	10.95	9.65			9.43	
Unlisted Infrastructure Funds	116,334,278	-1.92	6.80	8.72	12.38			11.61	4/1/2018
Blended Benchmark (Unlisted Infrastructure)		1.15	8.58	10.95	9.65			9.43	

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 September 30, 2022

	Allocation	Performance (%)							
	Market Value \$	1 Quarter	YTD	1 Year	3 Years	5 Years	10 Years	Since Inception	Inception Date
Alternatives Investments	4,972,045,500	-2.28	4.02	13.07	20.62	17.92	13.46	11.63	2/1/1986
Custom Benchmark (Alternative Investments)		-14.73	-13.78	-11.90	1.53	4.46	6.70	11.73	
Absolute Return	114,351								
Aurora Investment	114,351								
Private Equity	4,807,584,066	-1.99	4.96	14.77	24.19	21.30	16.22	13.94	2/1/1986
Blended Benchmark (Private Equity)		-15.56	-14.45	-12.58	1.27	4.29	6.62		
Abbott S/A Comp.	522,190,715	-3.68	2.12	12.33	27.98	22.26	16.87	14.88	6/1/1987
Muller Monroe MPEFF	1								
Pantheon S/A Comp.	439,912,751	3.61	4.94	14.43	27.34	22.32	16.85	12.06	10/1/2000
Private Equity Fund - Domestic	3,177,221,389	-1.28	8.30	19.45	25.70	23.73	16.77	15.87	6/1/2012
Private Equity Fund - International	465,331,972	-10.00	-10.60	-6.97	10.69	11.39		-3.47	7/1/2015
Oakbrook Opportunities Fund	202,927,238	-0.02	6.91	18.76	13.00			11.63	6/1/2019
Private Credit	164,347,083	-9.88	-15.35	-11.06	-1.74			-1.74	10/1/2019
Private Credit Fund - Domestic	164,347,083	-9.88	-15.35	-11.06	-1.74			-1.74	10/1/2019

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 September 30, 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 September 30, 2022

	Performance (%)										
	YTD	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Total Fund	-17.75	16.82	14.98	19.77	-4.23	16.02	8.01	0.53	6.15	20.20	13.84
Total Fund - Net	-17.84	16.63	14.79	19.57	-4.40	15.78	7.77	0.29	5.90	19.94	13.58
Total Fund Benchmark	-17.20	13.48	13.16	18.68	-3.12	14.37	7.89	1.37	7.33	15.84	12.19
Domestic Equity	-25.75	24.89	22.07	29.23	-6.08	19.83	12.62	0.04	9.81	37.65	17.39
Domestic Equity - Net	-25.84	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)	-24.09	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	-24.51	25.68	18.00	29.67	-6.79	18.08	15.43				
International Equity	-28.43	9.78	13.52	23.76	-14.13	27.95	3.56	-1.90	-2.80	20.24	19.11
International Equity - Net	-28.61	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)	-26.50	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	-26.75	7.30	11.30	21.37	-14.36	27.79	3.92				
Fixed Income	-13.65	-0.44	7.87	9.50	-0.24	4.82	4.87	0.25	5.97	-0.59	7.41
Fixed Income - Net	-13.71	-0.53	7.75	9.37	-0.39	4.66	4.71	0.10	5.81	-0.75	7.24
Blmbg. U.S. Aggregate	-14.61	-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	-13.85	-0.85	7.29	9.14	-0.08	3.98	3.89				
Private Real Assets											
Custom Benchmark (Private Real Assets)											
Real Estate	13.30	21.95	4.20	9.81	8.36	10.03	8.97	12.54	13.02	10.82	12.85
Real Estate - Net	13.25	21.88	4.16	9.76	8.36	10.03	8.97	12.46	13.02	10.82	12.85
Blended Benchmark (Real Estate)	12.35	21.02	0.34	4.39	7.36	6.66	7.79	13.95	11.46	12.90	11.54
Agriculture	1.24	2.69	4.69	-5.82	0.28	-4.58	-0.47	20.18	24.73	25.68	13.55
NCREIF Farmland Index	6.18	7.83	3.08	4.81	6.74	6.19	7.09	10.35	12.63	20.91	18.58
Timberland	1.18	-2.72	4.51	1.00	-3.62	4.68	-4.58	4.99	12.83	9.14	-3.59
NCREIF Timberland Index	7.64	9.17	0.81	1.30	3.21	3.63	2.59	4.97	10.48	9.69	7.75
Unlisted Infrastruct	6.80	11.68	15.90	9.65							
Blended Benchmark (Unlisted Infrastructure)	8.58	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 September 30, 2022

	Performance (%)										
	YTD	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012
Alternatives Investments	4.02	46.46	12.31	9.48	17.32	12.09	5.32	6.90	11.63	12.11	6.24
Alternative Investments - Net	4.02	46.44	12.27	9.43	17.14	11.91	5.00	6.47	11.16	11.86	6.00
Custom Benchmark (Alternative Investments)	-13.78	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Private Equity	4.96	54.15	14.50	11.78	21.46	15.61	8.60	8.41	13.72	14.13	5.61
Blended Benchmark (Private Equity)	-14.45	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Cash	2.21	2.44	2.56	3.59	2.36	1.67	0.63	0.29	0.17	0.11	0.23
90 Day US Treasury Bill	0.61	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.

Private Equity and Blended Benchmark (Private Equity) returns are 1 quarter lagged.

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	1/1/2013	Present	100% NCREIF Fund Index-ODCE (VW) (Net)**
Benchmark	1/1/2007	12/31/2012	100% NPI + 1%
	1/1/2005	12/31/2016	100% Consumer Price Index + 5%
Alternatives Custom	3/1/2022	Present	95% MSCI World World Index (Net) 1 Qtr Lagged +3%, 5% S&P LSTA Leveraged Loan 100 Index +2%
Benchmark	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.