



Executive Summary Third Quarter 2022

Arkansas Public Employees
Retirement System

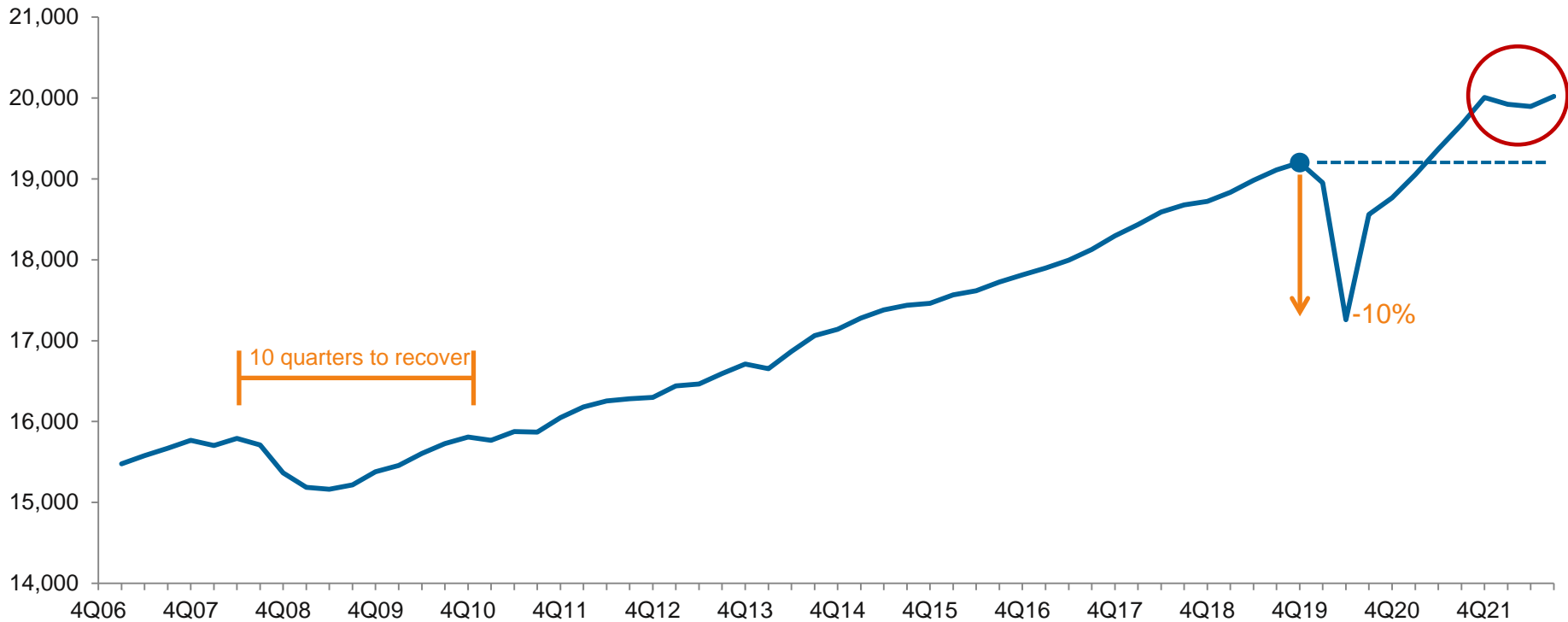
Brianne Weymouth, CAIA
Senior Vice President

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Senior Vice President

GDP Dropped for Two Consecutive Quarters in 1Q and 2Q, Up 2.6% in 3Q

Recovered pre-pandemic level in 2Q21 after deepest drop in 75 years

Seasonally Adjusted Real GDP in Billions of Dollars



Consensus estimates for GDP growth in 2022 have been scaled back, from north of 4% at the start of the year to below 0%

- 3Q22 GDP rose 2.6%, after falling 1.6% in 1Q22, followed by a 0.9% drop in 2Q22.
- Loss of business and consumer confidence followed the start of the conflict in Ukraine.
- Consumer wealth hit by stock and bond market drop, and now a sharp slowdown in residential housing, as mortgage rates doubled from the start of the year.

Source: Federal Reserve Bank of St. Louis

Recession Watch

Common definition of recession: two consecutive quarters of decline in GDP

- Actual definition: The National Bureau of Economic Research (NBER) Business Cycle Dating Committee defines a recession as “a significant decline in economic activity that is spread across the economy and that lasts more than a few months.”

Indicators to watch

- GDP declined in 1Q and 2Q22, the proverbial two-quarters-in-a-row rule of thumb that often indicates recession.
 - However, GDP rose 2.6% in 3Q, reversing the trend, but consensus estimates show another modest decline in 4Q
- Housing market is weakening with more than a doubling of mortgage rates since the start of 2022.
- Job market remains strong, with substantial job creation year to date; job listings remain larger than the number of seekers.
 - Initial unemployment claims are creeping up: a leading indicator.
- PMI is showing initial signs of recession in the Business Activity and Output indices; PMI is also a leading indicator.
- Exports have weakened with slowing growth overseas, geopolitical uncertainty, and a strong dollar.
- Inflation remains historically high, sapping purchasing power and eroding confidence.
- Federal Reserve is committed to raising interest rates to combat inflation; median Fed Funds projection is 4.4% by end of 2022.
- Fed’s resolve may be tested if economy slows sharply in the fourth quarter or the first half of 2023.

Equity and Fixed Income Markets Both Fell Again in 3Q22

Negative returns for stocks and bonds at the same time for three quarters are extremely unusual

Global equity markets down sharply in each quarter, starting with Russian invasion

- Similar impact year-to-date across all equity market segments: developed, emerging, small cap

Fixed income down with sharply higher inflation and interest rates

- Bloomberg Aggregate: -14.6% year-to-date, worst 9 months ever for the index
- CPI-U: +8.2% for the year ended 3Q22

Number of times stocks and bonds have been down together

- 38 quarters in almost 100 years, about 10% of the quarters
- But just twice on annual basis

Inflation spiked to highest rate in decades

Economic data show growth hit 'pause'

- GDP rose 2.6% in 3Q22 after falling in both 2Q22 and 1Q22; expect another loss in 4Q
- Forecasters have cut growth estimates for 2022 to below 0%, and to 1.5% for 2023.

Returns for Periods ended 9/30/22

	1 Quarter	Year to Date	1 Year	5 Years	10 Years	25 Years
U.S. Equity						
Russell 3000	-4.46	-24.62	-17.63	8.62	11.39	7.48
S&P 500	-4.88	-23.87	-15.47	9.24	11.70	7.45
Russell 2000	-2.19	-25.10	-23.50	3.55	8.55	6.73
Global ex-U.S. Equity						
MSCI World ex USA	-9.20	-26.23	-23.91	-0.39	3.62	3.69
MSCI Emerging Markets	-11.57	-27.16	-28.11	-1.80	1.05	--
MSCI ACWI ex USA Small Cap	-8.37	-29.37	-28.93	-0.56	4.44	5.64
Fixed Income						
Bloomberg Aggregate	-4.75	-14.61	-14.60	-0.27	0.89	4.02
90-day T-Bill	0.46	0.61	0.62	1.15	0.68	1.92
Bloomberg Long Gov/Credit	-9.03	-28.94	-27.41	-1.17	1.35	5.51
Bloomberg Global Agg ex-US	-8.85	-23.88	-24.77	-4.03	-2.39	2.42
Real Estate						
NCREIF Property	0.57	9.35	16.08	8.62	9.48	9.40
FTSE Nareit Equity	-9.94	-28.13	-16.41	2.93	6.26	7.73
Alternatives						
CS Hedge Fund Index	0.35	0.14	1.08	4.53	4.35	5.87
Cambridge Private Equity*	-5.60	-2.04	3.34	18.22	15.90	14.75
Bloomberg Commodity	-4.11	13.57	11.80	6.96	-2.14	1.47
Gold Spot Price	-7.49	-8.56	-4.84	5.41	-0.59	6.62
Inflation - CPI-U	0.17	6.46	8.20	3.76	2.52	2.47

*Cambridge PE data through 06/30/22.

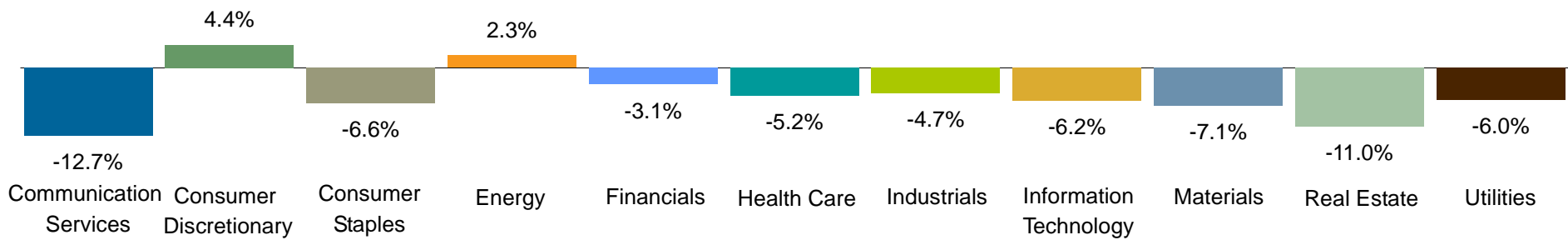
Sources: Bloomberg, Callan, Cambridge, Credit Suisse, FTSE Russell, MSCI, NCREIF, S&P Dow Jones Indices

U.S. Equity Performance: 3Q22

Worst Three-Quarter Start to Year in Decades

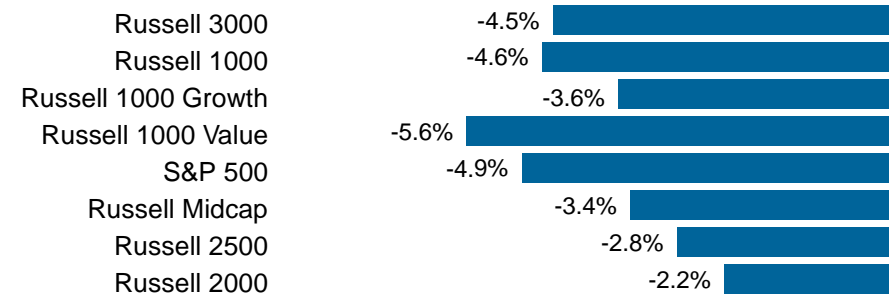
- The S&P 500 Index fell 4.9% in 3Q22; all major U.S. indices across styles and market cap ranges were negative except for the Russell 2000 Growth Index, which gained 0.24%.
- During the quarter, all sectors posted negative returns except for Energy (+2%) and Consumer Discretionary (+4%). Returns for Real Estate and Communication Services were the worst, down 11% and 13%, respectively.
- Small cap (Russell 2000) outpaced large cap (Russell 1000) and growth outperformed value during the quarter, a reversal from previous quarters this year.
- Continued concerns around inflation and a potential recession, along with geopolitical headlines, contributed to a volatile and risk-averse environment.
- High inflation and interest rates continued to pressure the markets. While some inflationary data (particularly around energy) seemed to soften, other data points around food, shelter, and services remained elevated.

Industry Sector Quarterly Performance (S&P 500)

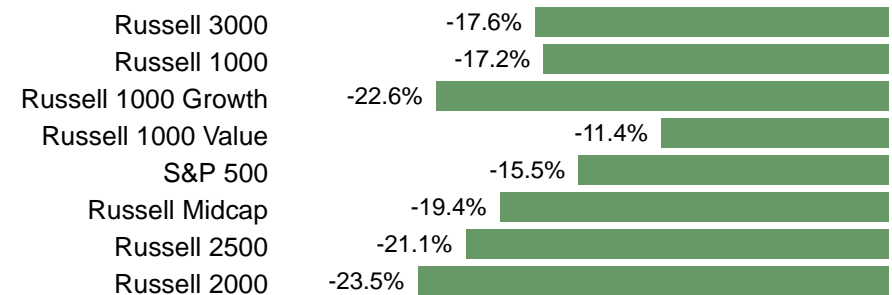


Sources: FTSE Russell, S&P Dow Jones Indices

U.S. Equity: Quarterly Returns



U.S. Equity: One-Year Returns



Global/Global ex-U.S. Equity Performance: 3Q22

Market Turmoil Around the World

- Global and global ex-U.S. equity markets waned for three straight quarters due to inflation, rising rates, and fears of global recession.

Geopolitical and macro factors plague market

- Political instability in Italy and the U.K. as a result of prime minister departures weighed on the market.
- U.K. equities lost confidence as its newly elected prime minister Liz Truss announced her economic policy.
- China's COVID-19 lockdowns and growing concerns around the property sector sapped sentiment and economic activity.

Growth vs value switch places globally

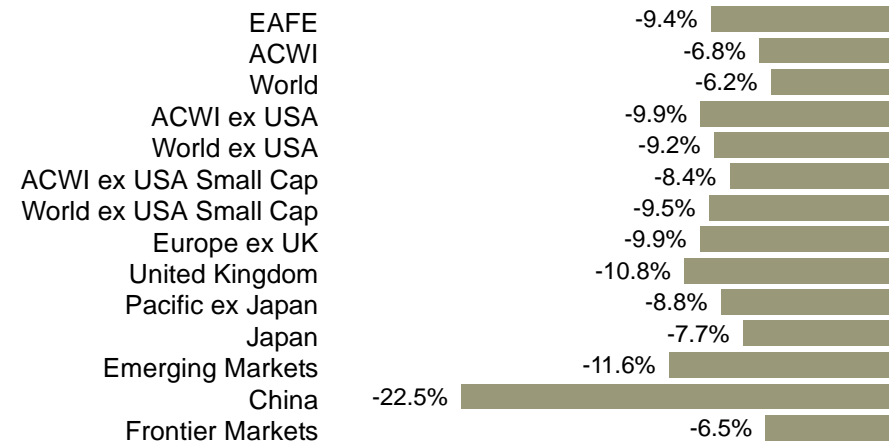
- Growth outpaced value in developed markets but lagged value in emerging markets.
- Rate-sensitive sectors in developed markets (e.g., Communication Services and Real Estate) were challenged given the tightening cycle by global central banks.
- The profitability of Chinese internet companies has compressed due to lockdowns and regulation, and a cyclical downturn in electronics weakened Taiwan and Korean semiconductors.

U.S. dollar vs. other currencies

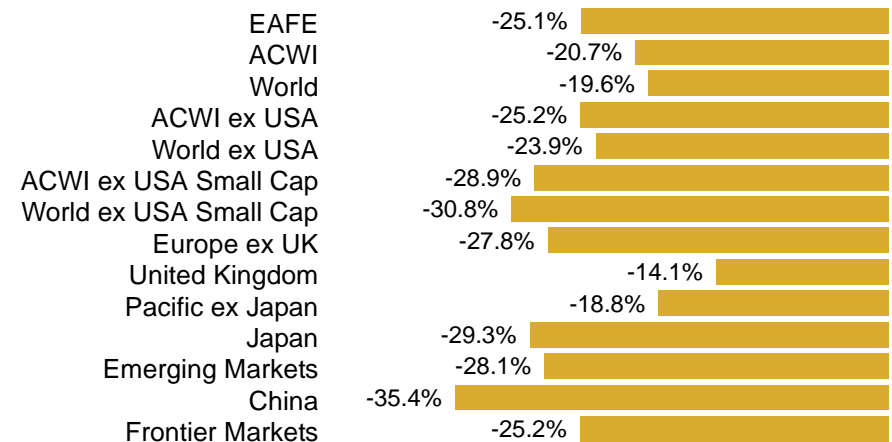
- Growth and the interest rate differential as well as its safe-haven status fueled the U.S. dollar to its highest level in decades.
- The dollar gained vs. the euro and the yen by about 6%.

Source: MSCI

Global Equity: Quarterly Returns



Global Equity: One-Year Returns



U.S. Fixed Income Performance: 3Q22

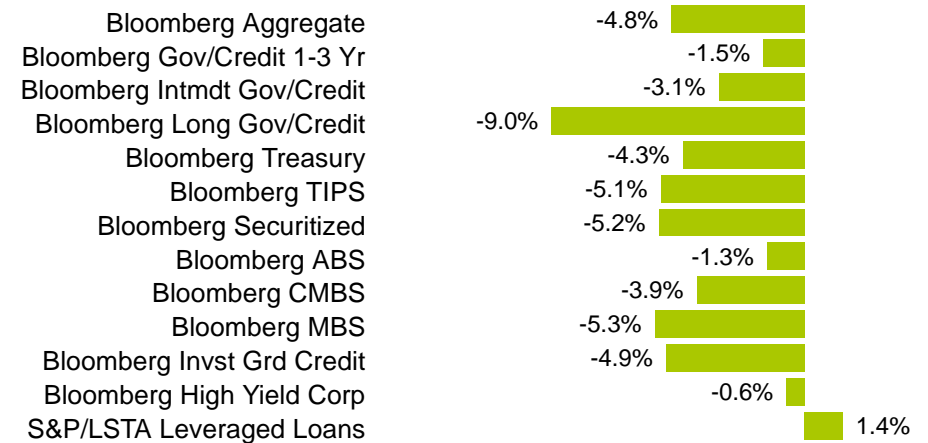
Bonds hit hard as rates rose sharply (again)

- Bloomberg U.S. Aggregate saw its worst nine-month return in its history—as did trailing 1-, 3-, 5- and 10-year returns!
- 10-year annualized return for Aggregate is a mere 0.9%.
- The yield curve was inverted at quarter-end; 10-year at 3.83% and 2-year at 4.22%.
- The 10-year jumped to 4% briefly in late September; first time since 2009.
- TIPS underperformed nominal Treasuries, and 10-year breakeven spreads fell to 2.11% from 2.33% as of 6/30/22.
- Fed raised rates by 150 bps during the quarter, bringing target from 3.0% to 3.25%.
- Median expectation from Fed is 4.4% at year-end and 4.6% at the end of 2023. Longer-term expectations are much lower.
- Volatility climbed to levels not seen since early 2020.

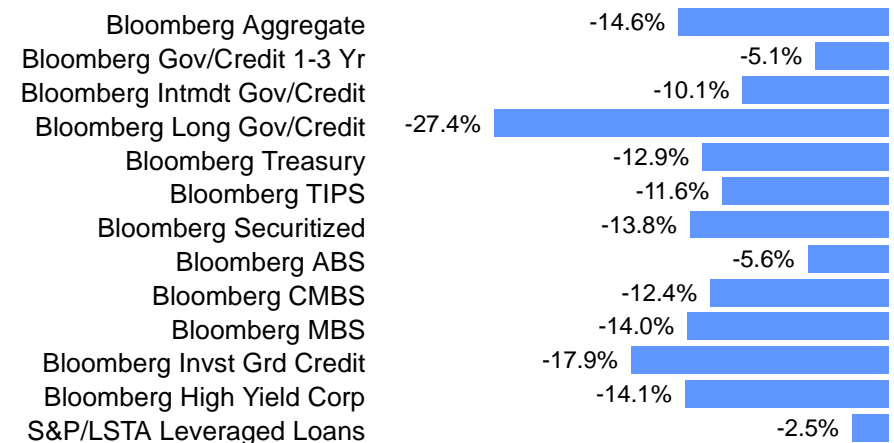
Spread sectors underperformed

- Mortgages had worst month ever vs. like-duration U.S. Treasuries in September; underperformed by 169 bps for 3Q.
- Corporates also underperformed: 33 bps of excess return; Bloomberg Corporate Bond Index yield-to-worst 5.7%.
- High yield fared better and loans posted a positive return.
- Bloomberg High Yield Corp yield-to-worst was 9.7%.

U.S. Fixed Income: Quarterly Returns



U.S. Fixed Income: One-Year Returns



Sources: Bloomberg, S&P Dow Jones Indices

U.S. Private Real Estate Performance: 3Q22

Appreciation returns turn negative, as sector returns are mixed

Another strong quarter for real estate

- Income returns were positive across sectors.
- Valuations are reflective of strong fundamentals in Industrial and Apartment and continued uncertainty in Office and Retail.
- Return dispersion by manager within the ODCE Index was due to the composition of underlying portfolios, and increased borrowing costs are impacting values.
- Niche sectors such as self-storage and life sciences continued to be accretive.

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
NCREIF ODCE	0.3%	21.0%	11.4%	9.3%	9.9%
Income	0.6%	2.7%	3.0%	3.1%	3.5%
Appreciation	-0.3%	17.9%	8.2%	6.0%	6.3%
NCREIF Property Index	0.6%	16.1%	9.9%	8.6%	9.5%
Income	0.9%	4.0%	4.2%	4.3%	4.7%
Appreciation	-0.4%	11.8%	5.6%	4.2%	4.6%

Returns are geometrically linked

NCREIF Property Index Quarterly Returns by Region and Property Type



Source: NCREIF, ODCE return is net

Multi-Asset Class (MAC) Performance: 3Q22

Significant market volatility caused MACs to end the quarter lower

Long biased MACs

- The median Callan Long Biased manager fell 4.6% in 3Q22, topping the 60% ACWI/40% Agg, which lost 5.9%, as both equities and fixed income exposure put downward pressure on the index.

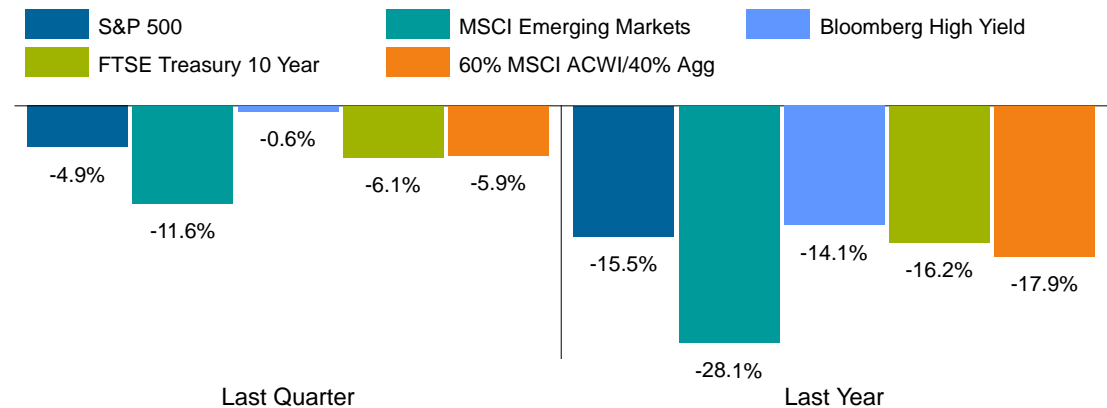
Risk parity MACs

- The median Callan Risk Parity manager fell 6.6%, as equities were the biggest drag on performance with the U.S. dollar slightly offsetting some of the negative return.

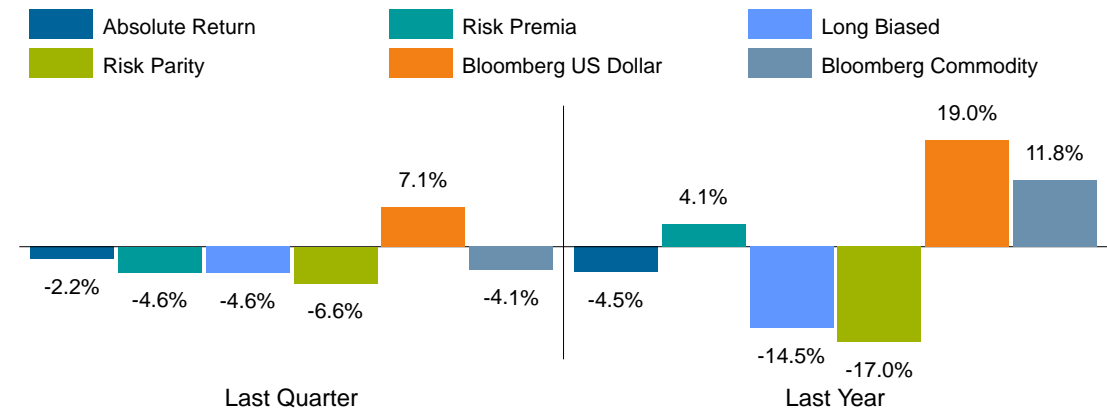
Absolute return MACs

- The median Callan Absolute Return manager fell 2.2%, as equity and fixed income volatility continued to pressure performance.
- The U.S. dollar was positive during the quarter, while the Japanese yen and Australian dollar were the biggest detractors.
- The Bloomberg GSAM Risk Premia 6% Vol moved up 2.9% in 3Q.
- The median Callan Risk Premia manager fell 4.6%, as a tilt toward equities and fixed income hurt performance.

Traditional Market Beta Returns

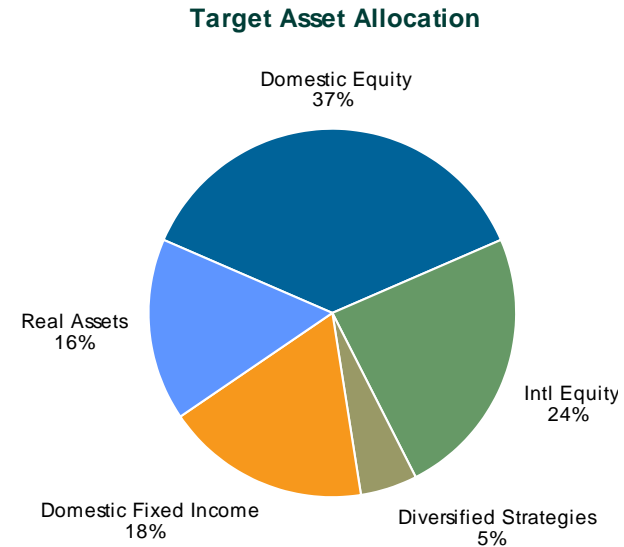
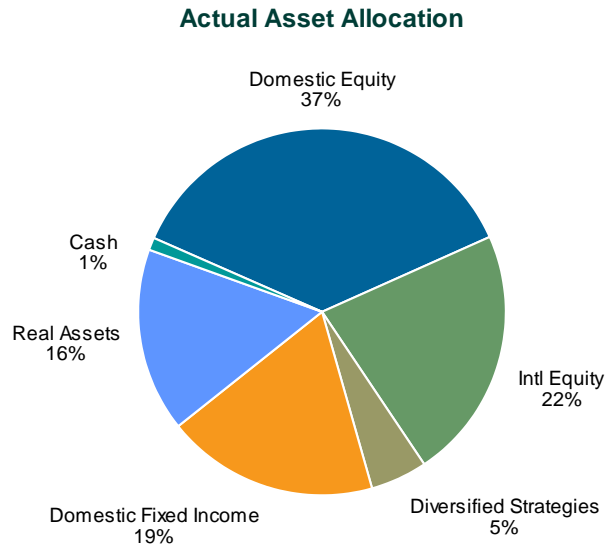


Callan MAC Style Group and Market Returns



Sources: Bloomberg, Bloomberg Goldman Sachs Asset Management, FTSE Russell, MSCI, S&P Dow Jones Indices

Actual vs. Target Asset Allocation



Asset Class	\$Millions Actual	Weight Actual	Target	Percent Difference	\$Millions Difference
Domestic Equity	3,525	36.7%	37.0%	(0.3%)	(25)
Intl Equity	2,139	22.3%	24.0%	(1.7%)	(163)
Diversified Strategies	482	5.0%	5.0%	0.0%	3
Domestic Fixed Income	1,792	18.7%	18.0%	0.7%	65
Real Assets	1,554	16.2%	16.0%	0.2%	19
Cash	102	1.1%	0.0%	1.1%	102
Total	9,595	100.0%	100.0%		

- The APERS Investment Policy states that rebalancing to the target asset allocation should take place when the actual asset allocation falls outside of a +/- 5% range from the target asset allocation. All asset classes are within their allowable ranges.

Investment Manager Asset Allocation

	September 30, 2022				June 30, 2022	
	Market Value	Weight	Net New Inv.	Inv. Return	Market Value	Weight
Domestic Equity	\$3,524,929,947	36.74%	\$(62,122,731)	\$(137,272,119)	\$3,724,324,798	36.88%
Lazard Asset Mgmt	417,630,211	4.35%	(334,210)	(28,114,324)	446,078,745	4.42%
CastleArk Mgmt. LLC	432,493,634	4.51%	(30,395,256)	(14,771,938)	477,660,827	4.73%
Mellon S&P 500 Index Fd	566,822,969	5.91%	(19,868)	(29,072,421)	595,915,258	5.90%
Horrell Capital Passive	176,675,043	1.84%	(73,395)	(2,410,319)	179,158,757	1.77%
Wellington Management	427,245,886	4.45%	(29,371,417)	(26,069,416)	482,686,719	4.78%
Intech	398,685,318	4.16%	(412,247)	(16,020,327)	415,117,893	4.11%
LSV Asset Management	301,179,455	3.14%	(448,116)	(12,108,767)	313,736,339	3.11%
Stephens Investment Mgmt.	407,129,542	4.24%	(668,287)	(5,675,423)	413,473,252	4.09%
Froley Revy Investment	397,067,889	4.14%	(399,935)	(3,029,183)	400,497,007	3.97%
International Equity	\$2,139,473,185	22.30%	\$(2,223,287)	\$(221,003,260)	\$2,362,699,733	23.40%
Artisan Partners	506,679,078	5.28%	(746,799)	(50,013,194)	557,439,071	5.52%
Mellon ACWI ex US Fund	484,128,501	5.05%	(84,735)	(52,914,217)	537,127,453	5.32%
Baillie Gifford Overseas	422,582,679	4.40%	(469,670)	(40,990,439)	464,042,789	4.59%
Lazard Asset Mgmt.	446,725,475	4.66%	(377,744)	(48,447,750)	495,550,969	4.91%
Acadian ACW ex US SmallCap	156,233,157	1.63%	(296,134)	(12,420,059)	168,949,350	1.67%
Franklin Templeton Intl SmallCap	122,874,682	1.28%	(247,511)	(16,200,838)	139,323,031	1.38%
Manning & Napier Advisors	249,614	0.00%	(694)	(16,763)	267,071	0.00%
Diversified Strategies	\$482,433,907	5.03%	\$(719,193)	\$(9,761,207)	\$492,914,307	4.88%
AQR Capital	137,856,666	1.44%	0	(7,848,150)	145,704,816	1.44%
Blackstone Alt. Asset Mgmt.	210,624,872	2.20%	(528,546)	2,596,295	208,557,123	2.07%
Newton Capital	133,952,369	1.40%	(190,647)	(4,509,352)	138,652,368	1.37%
Domestic Fixed Income	\$1,791,626,083	18.67%	\$(922,061)	\$(83,762,987)	\$1,876,311,131	18.58%
DoubleLine Capital	573,144,323	5.97%	(279,368)	(23,958,719)	597,382,409	5.92%
MacKay Shields	604,190,355	6.30%	(315,752)	(31,178,000)	635,684,108	6.29%
PGIM	614,291,405	6.40%	(326,942)	(28,626,268)	643,244,615	6.37%
Real Assets	\$1,554,360,032	16.20%	\$(45,038,789)	\$13,019,119	\$1,586,379,703	15.71%
Energy	\$14,849	0.00%	\$0	\$(60)	\$14,909	0.00%
CastleArk Glob Energy Fd	14,849	0.00%	0	(60)	14,909	0.00%
REITS	\$59,409,161	0.62%	\$(41,639,463)	\$(13,978,419)	\$115,027,044	1.14%
MCM EB DV Non-SL REIT Fd	59,409,161	0.62%	(41,639,463)	(13,978,419)	115,027,044	1.14%
Core Real Estate	\$1,066,973,164	11.12%	\$(3,842,062)	\$16,143,496	\$1,054,671,730	10.44%
Invesco Real Estate	652,628,000	6.80%	(508,450)	9,075,232	644,061,218	6.38%
Heitman Real Estate Trust LP	414,345,164	4.32%	(3,333,612)	7,068,264	410,610,512	4.07%
Value Add Real Estate	\$318,013,406	3.31%	\$(18,941,819)	\$6,655,379	\$330,299,846	3.27%
Harrison Street Fund VIII	30,484,637	0.32%	(187,500)	85,549	30,586,588	0.30%
Heitman Value Partners IV	56,338,332	0.59%	(11,437,276)	3,227,833	64,547,775	0.64%
LaSalle Inc & Growth VI LP	7,570,682	0.08%	(12,271)	(562,425)	8,145,379	0.08%
LaSalle Inc & Growth VII LP	34,178,267	0.36%	(5,875,795)	(501,238)	40,555,299	0.40%
Starwood SOF XII	17,416,894	0.18%	(233,733)	1,167,260	16,483,367	0.16%
TA Associates Realty Fund X	29,785	0.00%	(353)	1,456	28,682	0.00%
TA Associates Realty Fund XI	54,974,595	0.57%	(259,473)	(585,207)	55,819,275	0.55%
TA Associates Realty Fund XII	117,020,214	1.22%	(935,418)	3,822,151	114,133,481	1.13%
Farmland	\$22,913,870	0.24%	\$20,824,177	\$0	\$2,089,693	0.02%
IFC Core Farmland Fund	19,988,300	0.21%	19,988,300	0	-	-
PGIM Agriculture	2,925,570	0.03%	835,877	0	2,089,693	0.02%
Timber	\$87,035,582	0.91%	\$(1,439,622)	\$4,198,722	\$84,276,481	0.83%
Pinnacle	87,035,582	0.91%	(1,439,622)	4,198,722	84,276,481	0.83%
Cash	\$101,815,322	1.06%	\$45,445,303	\$129,161	\$56,240,859	0.56%
Total Fund	\$9,594,638,477	100.0%	\$(65,580,760)	\$(438,651,294)	\$10,098,870,531	100.0%

Asset Class Performance and Market Values

	Market Value \$(Dollars)	Ending Weight	Last Quarter	Last Year	Last 3 Years	Last 5 Years
Domestic Equity Russell 3000 Index	\$3,524,929,947 -	37.13% -	(3.80%) (4.46%)	(17.70%) (17.63%)	7.79% 7.70%	8.60% 8.62%
International Equity Benchmark***	\$2,139,473,185 -	22.54% -	(9.37%) (9.69%)	(27.17%) (25.72%)	(0.15%) (2.57%)	0.36% (1.28%)
Diversified Strategies Diversified Strategy Trgt**	\$482,433,907 -	5.08% -	(1.98%) (5.61%)	(6.35%) (17.43%)	2.39% 1.98%	4.40% 3.51%
Domestic Fixed Income Blmbg Aggregate	\$1,791,626,083 -	18.87% -	(4.47%) (4.75%)	(15.46%) (14.60%)	(2.67%) (3.26%)	0.37% (0.27%)
Real Assets CPIU + 4%	\$1,554,360,032 -	16.37% -	0.82% 1.15%	24.63% 12.21%	13.45% 8.95%	10.44% 7.76%
Total Fund*** Benchmark*	\$9,492,823,155 -	100.00% -	(4.41%) (4.93%)	(14.34%) (14.56%)	4.66% 3.74%	5.28% 4.68%

- **Domestic Equity** outperformed the benchmark in the third quarter, and nearly matches the benchmark over the last 5-year period.
- **International Equity** outperformed the benchmark in the third quarter and leads its benchmark over the last 3- and 5-year periods.
- **Diversified Strategies** outperformed the target return in the third quarter, and leads over longer time periods shown above.
- **Domestic Fixed Income** outperformed the benchmark in the third quarter, and leads the index over longer trailing time periods due to its Core Plus orientation.
- **Real Assets** trailed the benchmark in the third quarter, but has outperformed over longer periods.

* Benchmark consists of 37% Russell 3000 Index, 24% MSCI ACWI ex US IMI Index, 18% Blmbg Aggregate Index, 16% CPI All Urban Cons +4%, 3% MSCI World Index and 2% Blmbg Aggregate Index

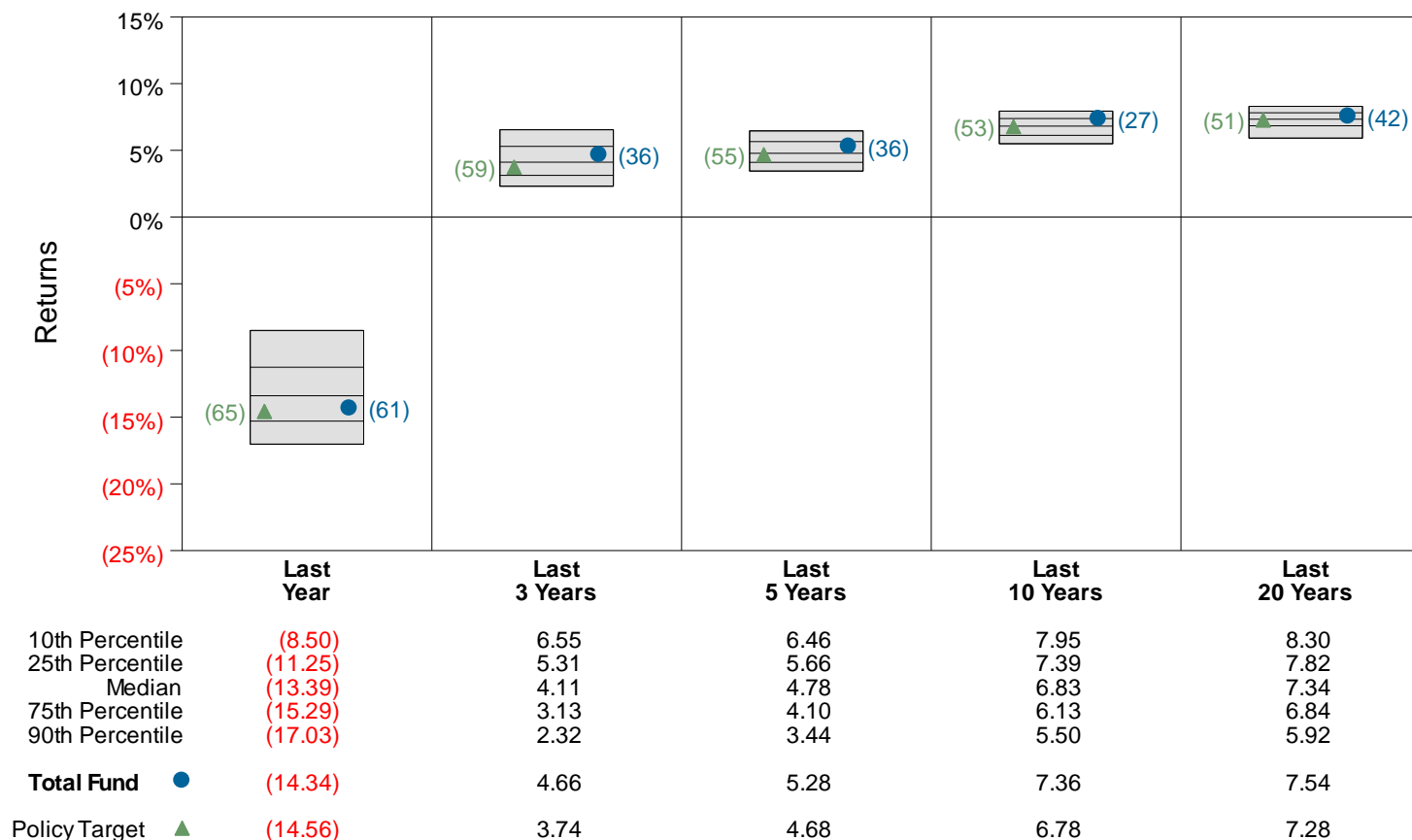
** 60% MSCI World and 40% Bloomberg Aggregate.

*** MSCI EAFE through 12/31/2020; MSCI ACWI ex US IMI (Net) thereafter

*** Performance excludes In-House.

Total Fund Performance

Callan Public Fund Sponsor Database



The Total Fund outperformed its policy target for the last year and ranked at the 61st percentile of its peer group. Over the remaining trailing periods, the fund has beaten the benchmark return and ranked in the top half of peers.

Policy Target consists of 37% Russell 3000 Index, 24% MSCI ACWI ex US IMI Index, 18% Blmbg Aggregate Index, 16% CPI All Urban Cons +4%, 3% MSCI World Index and 2% Blmbg Aggregate Index

Investment Manager Returns and Peer Group Rankings

	Last Quarter		Last Year		Last 3 Years		Last 5 Years	
Total Domestic Equity	(3.80%)	14	(17.70%)	66	7.79%	34	8.60%	29
Russell 3000 Index	(4.46%)	64	(17.63%)	66	7.70%	37	8.62%	28
Pub Pln- Dom Equity	(4.27%)		(16.94%)		7.38%		8.13%	
Lazard Asset Mgmt.	(6.31%)	88	(17.11%)	59	3.79%	85	7.84%	48
Russell 3000 Index	(4.46%)	51	(17.63%)	60	7.70%	44	8.62%	40
Callan All Cap Broad	(4.44%)		(13.74%)		7.12%		7.68%	
CastleArk	(3.51%)	23	(18.93%)	62	12.05%	6	11.76%	9
Russell 3000 Growth Index	(3.37%)	19	(23.01%)	79	10.16%	21	11.57%	10
Callan All Cap Broad	(4.44%)		(13.74%)		7.12%		7.68%	
Mellon S&P 500 Index Fd	(4.88%)	57	(15.47%)	49	7.65%	59	8.93%	50
S&P 500 Index	(4.88%)	57	(15.47%)	49	8.16%	53	9.24%	37
Callan Large Cap Core	(4.73%)		(15.54%)		8.40%		8.96%	
Horrell Capital - Passive	(1.35%)	1	(3.51%)	5	9.49%	25	10.42%	13
Bloomberg Arkansas Index	1.96%	1	9.28%	1	18.39%	1	14.41%	1
S&P 500 Index	(4.88%)	61	(15.47%)	57	8.16%	41	9.24%	33
Callan All Cap Broad	(4.44%)		(13.74%)		7.12%		7.68%	
Wellington Management	(5.79%)	61	(9.95%)	57	5.22%	69	5.84%	62
Russell 1000 Value Index	(5.62%)	56	(11.36%)	72	4.36%	88	5.29%	78
Callan Large Cap Value	(5.24%)		(9.37%)		5.97%		6.37%	
Intech	(3.87%)	43	(23.41%)	37	6.34%	70	9.42%	76
Russell 1000 Growth Index	(3.60%)	34	(22.59%)	30	10.67%	13	12.17%	16
Callan Large Cap Growth	(4.20%)		(25.84%)		7.85%		10.52%	
LSV Asset Management	(3.88%)	36	(9.84%)	21	7.25%	34	2.57%	81
Russell 2000 Value Index	(4.61%)	46	(17.69%)	82	4.72%	70	2.87%	77
Callan Small Cap Value	(4.73%)		(13.50%)		6.13%		3.78%	
Stephens Investment Mgmt.	(1.39%)	57	(27.56%)	39	6.01%	52	8.80%	38
Russell 2000 Growth Index	0.24%	31	(29.27%)	56	2.94%	89	3.60%	96
Callan Small Cap Growth	(0.98%)		(28.75%)		6.14%		8.37%	
Froley Revy Investment	(0.76%)	51	(21.26%)	88	9.62%	20	8.64%	28
ML All Conv	0.29%	6	(20.01%)	79	10.14%	15	9.29%	15
Callan Convert Bonds DB	(0.74%)		(15.97%)		5.75%		6.19%	

- Total **Domestic Equity** outpaced the Russell 3000 Index in the third quarter and finished in the 14th percentile of peers. The asset class is in line with its benchmark over the last 5-year period, and it ranked ahead of its peer group median over the trailing 3- and 5-year periods.
- LSV led its benchmark and ranked ahead of its peer group median for the quarter, and outperformed over the trailing 1- and 3-year periods.
- Intech and CastleArk trailed their respective benchmarks, but ranked in the top half of peers for the quarter. CastleArk leads the benchmark over longer periods, while Intech has underperformed.
- Lazard and Froley Revy (formerly SSI) lagged their respective benchmarks for the third quarter and ranked below median of peers. Froley Revy has outperformed relative to its benchmark and peers over longer periods, while Lazard trails the benchmark.

Investment Manager Returns and Peer Group Rankings

	Last Quarter		Last Year		Last 3 Years		Last 5 Years	
International Equity	(9.37%)	19	(27.17%)	52	(0.15%)	30	0.36%	26
Benchmark(1)	(9.69%)	29	(25.72%)	39	(2.57%)	87	(1.28%)	91
Pub Pln- Intl Equity	(10.02%)		(27.08%)		(0.76%)		(0.19%)	
Artisan Partners	(8.99%)	38	(16.34%)	2	4.01%	2	2.59%	8
MSCI EAFE	(9.36%)	52	(25.13%)	42	(1.83%)	70	(0.84%)	65
Callan NonUS Eq	(9.30%)		(25.79%)		(0.57%)		(0.13%)	
Mellon ACWI ex US Fund	(9.85%)	64	(24.98%)	40	(1.22%)	62	(0.48%)	57
MSCI ACWI ex US	(9.91%)	65	(25.17%)	43	(1.52%)	66	(0.81%)	64
Callan NonUS Eq	(9.30%)		(25.79%)		(0.57%)		(0.13%)	
Baillie Gifford Overseas	(8.85%)	35	(39.98%)	98	(2.36%)	78	(0.62%)	60
MSCI ACWixUS Gross	(9.80%)	63	(24.79%)	36	(1.07%)	60	(0.34%)	54
Callan NonUS Eq	(9.30%)		(25.79%)		(0.57%)		(0.13%)	
Lazard Asset Mgmt.	(9.79%)	63	(26.00%)	53	(1.68%)	68	0.23%	43
MSCI ACWixUS Gross	(9.80%)	63	(24.79%)	36	(1.07%)	60	(0.34%)	54
Callan NonUS Eq	(9.30%)		(25.79%)		(0.57%)		(0.13%)	
Acadian ACW ex US SmallCap	(7.37%)	11	(21.05%)	2	-	-	-	-
MSCI ACWI ex US Small Cap	(8.37%)	25	(28.93%)	30	0.38%	28	(0.56%)	30
Callan Intl Small Cap	(9.72%)		(31.16%)		(0.97%)		(1.75%)	
Franklin Templeton Intl SmallCap	(11.66%)	97	(32.03%)	61	-	-	-	-
MSCI ACWI ex US Small Cap	(8.37%)	25	(28.93%)	30	0.38%	28	(0.56%)	30
Callan Intl Small Cap	(9.72%)		(31.16%)		(0.97%)		(1.75%)	
Diversified Strategies	(1.98%)		(6.35%)		2.39%		4.40%	
Diversified Strategy Trgt**	(5.61%)		(17.43%)		1.98%		3.51%	
AQR Capital	(5.39%)	59	(17.80%)	75	(1.82%)	79	2.31%	48
Diversified Strategy Trgt**	(5.61%)	60	(17.43%)	71	1.98%	41	3.51%	26
Intl/Global Balanced DB	(4.89%)		(13.33%)		1.51%		2.26%	
Blackstone Alt. Asset Mgmt.	1.24%	1	2.82%	1	4.93%	10	5.67%	8
T-Bills + 4%	1.43%	1	4.62%	1	4.59%	12	5.15%	11
Intl/Global Balanced DB	(4.89%)		(13.33%)		1.51%		2.26%	
Newton Capital	(3.26%)	22	(6.10%)	7	3.31%	21	4.79%	13
LIBOR + 4%	1.65%	1	5.08%	1	4.70%	11	5.26%	11
Intl/Global Balanced DB	(4.89%)		(13.33%)		1.51%		2.26%	

- Total International Equity outperformed the benchmark and ranked at the 19th percentile of peers for the quarter. Artisan, Baillie Gifford, and Acadian led their benchmarks and ranked ahead of their respective peer group medians. Franklin Templeton was the largest detractor for the quarter.
- Over the last 3- and 5-year periods, Total International Equity leads the benchmark and ranks in the top third of peers.
- Diversified Strategies outperformed its target in the third quarter. AQR outpaced its target return and ranked in the third quartile of peers. BAAM trailed its benchmark but finished at the top of its peer group for the quarter. Newton trailed its benchmark but ranked in the top quartile of its peer group.
- The Diversified Strategies portfolio beat its benchmark over the last 3- and 5-year periods.

(1) MSCI EAFE through 12/31/2020; MSCI ACWI ex US IMI (Net) thereafter

**60% MSCI World/40% Blmbg Aggregate

Investment Manager Returns and Peer Group Rankings

	Last Quarter		Last Year		Last 3 Years		Last 5 Years	
Domestic Fixed Income	(4.47%)	77	(15.46%)	87	(2.67%)	79	0.37%	62
Blmbg Aggregate Index	(4.75%)	86	(14.60%)	75	(3.26%)	98	(0.27%)	97
Pub Pln- Dom Fixed	(3.45%)		(13.37%)		(1.69%)		0.60%	
DoubleLine Capital	(4.01%)	28	(13.73%)	20	(2.79%)	79	0.03%	91
MacKay Shields	(4.91%)	92	(16.61%)	91	(2.30%)	42	0.53%	38
PGIM	(4.45%)	64	(15.91%)	79	(2.97%)	89	0.51%	39
Blmbg Aggregate Index	(4.75%)	88	(14.60%)	43	(3.26%)	94	(0.27%)	96
Callan Core Plus FI	(4.30%)		(14.86%)		(2.45%)		0.41%	
Real Assets	0.82%		24.63%		13.45%		10.44%	
CPIU + 4%	1.15%		12.21%		8.95%		7.76%	
REITS	(10.35%)		(17.22%)		(3.59%)		-	
S&P DJ US Select REIT	(10.37%)		(17.15%)		(3.29%)		1.95%	
MCM EB DV Non-SL REIT Fd	(10.35%)	48	(17.22%)	63	(3.59%)	92	-	
S&P DJ US Select REIT	(10.37%)	50	(17.15%)	62	(3.29%)	87	1.95%	90
Callan Real Estate REIT	(10.37%)		(16.61%)		(0.41%)		4.49%	
Core Real Estate	1.54%		25.65%		11.90%		9.94%	
NCREIF NFI-ODCE Eq Wt Net	0.77%		21.68%		12.13%		9.87%	
Invesco Real Estate	1.41%	79	19.90%	65	11.36%	52	9.98%	29
Heitman Real Estate Trust LP***	1.74%	72	35.69%	2	12.82%	22	10.22%	27
NCREIF NFI-ODCE Eq Wt Net	0.77%	84	21.68%	54	12.13%	34	9.87%	37
Callan OE Core Cmngld RE	3.12%		22.26%		11.57%		9.24%	
Value Add Real Estate	2.03%		45.06%		23.15%		19.52%	
NCREIF Total Index	0.57%		16.08%		9.91%		8.62%	
Harrison Street Fund VIII	0.28%		6.19%		-		-	
Heitman Value Partners IV	5.01%		40.34%		20.36%		-	
LaSalle Inc & Growth VI LP	(6.91%)		(3.92%)		(3.94%)		(0.38%)	
LaSalle Inc & Growth VII LP	(1.28%)		36.95%		13.34%		13.15%	
Starwood SOF XII	7.18%		-		-		-	
TA Associates Realty Fund X	5.09%		33.78%		9.37%		16.75%	
TA Associates Realty Fund XI	(1.05%)		57.13%		33.98%		25.49%	
TA Associates Realty Fund XII	3.37%		60.87%		-		-	
NCREIF Total Index	0.57%		16.08%		9.91%		8.62%	
Farmland	0.00%		-		-		-	
PGIM Agriculture	0.00%		-		-		-	
NCREIF Farmland Index	1.98%		11.49%		6.91%		6.58%	
Timber	5.00%		20.54%		6.45%		3.23%	
Pinnacle	5.00%		20.54%		6.45%		3.23%	
NCREIF Timberland Index	2.38%		12.54%		5.80%		4.69%	
Total Fund	(4.41%)	59	(14.34%)	61	4.66%	36	5.28%	36
Benchmark*	(4.93%)	76	(14.56%)	65	3.74%	59	4.68%	55
Callan Public Fund Spr DB	(4.23%)		(13.39%)		4.11%		4.78%	

- **Domestic Fixed Income** outperformed the Bloomberg Aggregate Index in the third quarter and ranked in the bottom quartile of peers. PGIM and DoubleLine finished ahead of the benchmark, while Mackay Shields underperformed. The Fixed Income composite leads the index over longer periods.
- The **Real Assets** composite trailed its real return benchmark during the quarter. The Value-Add Real Estate, Core Real Estate, and Timber allocations outperformed their respective benchmarks. The composite leads the benchmark over longer periods.
- The **Total Fund** outperformed its benchmark and finished below its peer group median for the quarter. The Fund has delivered excess returns versus the benchmark and ranks near the top third of peers over the last 3- and 5-year periods.

*Policy Target consists of 37% Russell 3000 Index, 24% MSCI ACWI ex US IMI Index, 18% Blmbg Aggregate Index, 16% CPI All Urban Cons +4%, 3% MSCI World Index and 2% Blmbg Aggregate Index
 *** Funded July 8, 2015. Performance prior to October 1, 2015 represents fund composite returns.

Organizational Developments

Mackay Shields – On September 20th, 2022, Mackay Shields announced that John Loffredo, Co-Head of MacKay Municipal Managers has been named Vice Chairman of MacKay Shields with oversight responsibilities for investment teams across both Taxable and Tax-Exempt markets. Leveraging his deep investment knowledge and 30 plus years of experience and leadership across research, portfolio construction and risk management over multiple market cycles, John will work alongside Jeff Phlegar, CEO to ensure the investment platform and teams are fully resourced and well positioned to serve our clients.

John will retain his current responsibilities as Co-Head of MacKay Municipal Managers (MMM) as will the leaders of the other investment teams. There will be no changes to MacKay’s longstanding “boutique within a boutique” philosophy that combines the investment agility of autonomous investment teams with a strong institutional infrastructure.

Janelle Woodward, President of MacKay Shields, has decided to leave the firm to explore other opportunities. To ensure a smooth and seamless transition, she will remain with the firm through the end of the year.

Work Plan Update

Asset Liability Study

- Completed in February 2019. The Board decided to keep the current asset allocation unchanged

Investment Policy Review and Update – Completed in August 2019

Non-US Equity Structure Study

- The Board reviewed the Non-US Equity Structure Study at the November 2019 Board Meeting
- The Board selected a structure which included a new allocation to Non-US Small Cap Equity
- The Non-US Small Cap Equity search was concluded in November 2020 with the selection of Acadian Asset Management and Franklin Templeton Investments

Real Assets Structure Study

- The Board reviewed the Real Assets Structure at the February 2021 meeting. The Board chose to eliminate the Energy equity allocation, in favor of additional Core and Core Plus real estate, and Farmland. Additional Allocations to Value-add real estate were also approved
- At the May 2021 Board Meeting, the Board approved the Real Estate Pacing Study and new commitments to Starwood and Harrison Street Partners
- At the November 2021 Board Meeting, Farmland managers were interviewed and both IFC and PGIM were allocated \$50 million.
- Core Plus Real Estate Manager Interviews occurred at the February Board Meeting, all three managers, Carlyle, Principal, and Clarion, were hired to manage \$85 million.

Domestic Equity Structure Study

- Presented at the August 2022 Board Meeting. The Board decided to maintain the current Domestic Equity Structure.

Private Equity Education and Total Fund Asset Allocation Review

- Private equity education was provided at the Trustee Workshop in October 2022. In the November 2022 meeting the Board received an asset allocation review which included portfolios containing private equity.

Upcoming Projects:

- **Diversified Strategies Structure Study**
- **Fixed Income Structure Study**

Total Fund Relative Attribution

Relative Attribution Effects for Quarter ended September 30, 2022

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Domestic Equity	37%	37%	(3.80%)	(4.46%)	0.24%	(0.00%)	0.24%
Domestic Fixed Income	19%	18%	(4.47%)	(4.75%)	0.05%	0.00%	0.06%
International Equity	24%	24%	(9.37%)	(9.69%)	0.08%	0.02%	0.10%
Diversified Strategies	5%	5%	(1.98%)	(5.61%)	0.18%	0.00%	0.18%
Real Assets	16%	16%	0.82%	1.15%	(0.05%)	(0.00%)	(0.06%)
Total			(4.41%)	(4.93%)	+ 0.50%	+ 0.02%	0.52%

One Year Relative Attribution Effects

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Domestic Equity	39%	37%	(17.70%)	(17.63%)	(0.07%)	(0.12%)	(0.19%)
Domestic Fixed Income	18%	18%	(15.46%)	(14.60%)	(0.16%)	(0.03%)	(0.19%)
International Equity	25%	24%	(27.17%)	(25.72%)	(0.42%)	(0.06%)	(0.47%)
Diversified Strategies	5%	5%	(6.35%)	(17.43%)	0.51%	0.01%	0.52%
Real Assets	13%	16%	24.63%	12.21%	1.15%	(0.60%)	0.55%
Total			(14.34%)	(14.56%)	+ 1.01%	(0.79%)	0.22%

Five Year Annualized Relative Attribution Effects

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Domestic Equity	40%	37%	8.60%	8.62%	(0.02%)	0.07%	0.05%
Domestic Fixed Income	16%	18%	0.37%	(0.27%)	0.07%	(0.02%)	0.05%
International Equity	25%	24%	0.36%	(1.28%)	0.43%	(0.06%)	0.37%
Diversified Strategies	5%	5%	4.40%	3.51%	0.04%	0.00%	0.04%
Real Assets	14%	16%	10.44%	7.76%	0.23%	(0.14%)	0.09%
Total			5.28%	4.68%	+ 0.75%	(0.14%)	0.60%

- Active management was the driver of outperformance during the third quarter, while asset allocation decisions were modestly positive. Domestic Equity managers added the most value while Real Assets was the lone detractor.
- Over the last year, active management contributed to positive relative results. Managers within Diversified Strategies and Real Assets added the most value for the period. Variance from policy weights detracted, driven by an underweight to Real Assets.
- Outperformance over the last five years is attributable to positive active management. Domestic Fixed Income, International Equity, Diversified Strategies, and Real Assets managers added value during the period. An underweight to Real Assets was the largest detractor, as variance from policy weights was a headwind to relative results.

Policy Target consists of 37% Russell 3000 Index, 24% MSCI ACWI ex US IMI Index, 18% Blmbg Aggregate Index, 16% CPI All Urban Cons +4%, 3% MSCI World Index and 2% Blmbg Aggregate Index

Historical Market Values of the Total Fund

Fiscal Year-End Market Values

Fiscal Year Ending	Market Value
2000	\$4,236,749,732
2001	\$4,012,745,608
2002	\$3,739,381,695
2003	\$3,869,787,673
2004	\$4,307,589,827
2005	\$4,642,924,118
2006	\$5,136,985,259
2007	\$5,985,111,493
2008	\$5,633,155,289
2009	\$4,341,419,711
2010	\$4,907,734,835
2011	\$6,022,965,592
2012	\$5,896,862,618
2013	\$6,662,631,673
2014	\$7,800,291,923
2015	\$7,820,289,128
2016	\$7,624,665,446
2017	\$8,301,352,120
2018	\$8,904,393,859
2019	\$9,153,121,783
2020	\$9,093,497,703
2021	\$11,602,695,185
2022	\$10,042,629,672

