

PUBLIC SCHOOL FUND INVESTMENT BOARD
MEETING AGENDA, FEBRUARY 27, 2023

VIDEO CONFERENCE VIA ZOOM LINK:

<https://us02web.zoom.us/j/89524573099?pwd=SWNwODVMb0tsRE1jQlNhVFJ0TFNDdz09>

Meeting ID: 895 2457 3099

Passcode: J60Z0M

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Public School Fund Investment Board Members

Dave Young	- Colorado State Treasurer – Board Chair
Peter Calamari	- Platte River Equity
Jerome DeHerrera, Esq.	- Achieve Law Group
Wendy Dominguez	- Innovest Portfolio Solutions
Christine Scanlan	- State Land Board Commissioners

- | | | |
|-------|--|---------------------------|
| I. | Call to Order | D. Young Noon |
| II. | Roll Call | D. Young |
| III. | Approval of Minutes from November 14, 2022 | D. Young 12:05 |
| IV. | House Bill 1146 update | D. Young 12:10 (10 min) |
| V. | In-House Bond Portfolio Discussion/Analysis | Callan 12:20 (15 min) |
| VI. | Market Update (Quarter 4 – Ending Dec. 31, 2022) | Callan 12:35 (10 min) |
| VII. | Performance Report (Fiscal Year Quarter 2 – Ending 12/31/22) | Callan 12:45 (15 min) |
| VIII. | Asset Allocation & Cash deployment discussion | Callan 1:00 (10 min) |
| IX. | Review of unrealized gains/losses | S. Zimbelman 1:10 (5 min) |
| X. | Yearly Education Item/Callan College | Callan 1:15 (15 min) |
| XI. | Fund Manager Presentation: Parametric | Parametric 1:30 (20 min) |
| XII. | Other Business | 1:50 (5 min) |
| | - Poll on Future in-person meetings | |
| | - Short Duration Portfolio RFP | |
| XIII. | Public Comment | 1:55 (5 min) |

XIV. Board Adjournment

2:00

Future Meeting Dates:

May 15, 2023	Noon
August 14, 2023	Noon



Public School Fund Investment Board Meeting
Meeting Minutes November 14, 2022
Held Via Zoom

Board Members in Attendance:

Dave Young
Peter Calamari - Excused
Wendy Dominguez
Christine Scanlan - Joined at 12:06
Jerome DeHerrera

12:02 – 12:04 PM Welcome, roll call

12:04 – 12:05 PM Meeting minutes from the August 15, 2022 Board Meeting

Ms. Dominguez made a motion to approve the August 15, 2022 meeting minutes.
Mr. DeHerrera seconded the motion. The motion passed at 12:05 pm.

- Dave Young – Yes
- Peter Calamari – Excused
- Jerome DeHerrera – Yes
- Wendy Dominguez – Yes
- Christine Scanlan – Excused

12:05 – 12:08 PM Meeting minutes from the October 4, 2022 Board Meeting

Mr. DeHerrera made a motion to approve the October 4, 2022 meeting minutes.
Treasurer Young seconded the motion. The motion passed at 12:06 pm.

- Dave Young – Yes
- Peter Calamari – Excused
- Jerome DeHerrera – Yes
- Wendy Dominguez – Yes
- Christine Scanlan – Yes

12:08 – 12:10 PM Meeting minutes from the October 12, 2022 Board Meeting

Ms. Dominguez made a motion to approve the October 12, 2022 meeting minutes. Jerome DeHerrera seconded the motion. The motion passed at 12:10 pm.

- Dave Young – Yes
- Peter Calamari – Excused
- Jerome DeHerrera – Yes
- Wendy Dominguez – Yes
- Christine Scanlan – Yes

12:10 – 12:20 PM Market Update (Qtr. 3 – Ending September 30, 2022)

Presentation by Mr. Alex Browning (Callan)

12:20 – 12:35 PM Performance Report (FY Qtr. 1 – Ending September 30, 2022)
Presentation by Ms. Janet Becker-Wold (Callan)

12:35 – 12:45 PM Cash Deployment Update and Allocation Discussion

Presentation by Mr. Browning (Callan). Ms. Wendy Dominguez asked a follow-up question of Mr. Maruti More on where he plans to allocate the new funds allocated to the Treasury Portfolio. Mr. More replied that he would be investing in Treasury Bonds primarily and some municipals and that currently Treasuries are yielding high rates of return.

12:45 – 12:50 PM Equity Portfolio Manager RFP Update

Ms. Zimbelman (PSPF Portfolio Administrator) gave an update on the Equity Portfolio Manager search. Ms. Zimbelman informed the Board that Parametric provided an updated fee proposal that was within the acceptable range requested at the October 12, 2022 Board meeting. Ms. Zimbelman is drafting a new contract for Parametric's consideration. The two-month extension provision in Parametric's current contract was executed, extending the current contract thru December 31, 2022.

12:50 – 12:55 PM Conflict of Interest Policy Acknowledgement & Disclosure

Presentation by Mr. Grant Sullivan (Attorney General's Office)

12:55 – 1:00 PM Other Business Item – Maruti More Proposed Change to IPS

Mr. Maruti More (Colorado Department of the Treasury, Chief Investment Officer) asked that the Board make an update to the IPS in Appendix I, Section A Colorado State Treasury Managed Market Duration Portfolio. Specifically Mr. More is requesting a change so that securities with less than 1 year to final maturity can be held in the portfolio. This was discussed at the August 15, 2022 Board Meeting but an official Board vote is needed to make a change to the IPS. The update would add a second bullet under the "Additional Investment Opportunities" section stating "the ability to hold securities with less than 1 year to final maturity". Ms. Dominguez asked Mr. More if the Treasury planned on buying anything with less than 1 year to final maturity. Mr. More responded they are, the amendment request is to ensure the Treasury Portfolio stays within the guidelines without having to sell an asset at a potential loss because it is within 1 year to final maturity. Ms. Dominguez moved to approve the requested change to the IPS. Mr. DeHerrera seconded the motion. This motion passed at 1:00pm with a vote of 4-0 with 1 excused.

- Dave Young – Yes
- Peter Calamari – Excused
- Jerome DeHerrera – Yes
- Wendy Dominguez – Yes
- Christine Scanlan – Yes

1:00 – 1:20 PM Fund Manager Presentation: High Yield Portfolio - MacKay Shields

Presentation by Joseph Maietta, CFA Managing Director High Yield Team

1:20 – 1:38 PM Fund Manager Presentation: Preferred Securities Portfolio – Spectrum Securities

Presentation by Steven Solmonson, Sr. Vice President

1:39 – 1:51 PM Other Business

Mr. Eric Rothaus (Deputy State Treasurer) gave an update on the working group created by HB 1146. Mr. Rothaus told the Board that there had been a couple of failed searches for people to write the working group's report and to facilitate the working group, and that they are in the midst of their third search now. The goal is to begin meetings at the beginning of December and to ensure there is good committee representation. They have a good starting point from a report Callan put together a couple years ago at the request of the State Land Board. That report addresses some of the issues in the HB 1146 legislative charge. If they are unable to locate someone to lead the group than Mr. Rothaus will take on this role.

Ms. Zimbelman reviewed the schedule for the 2023 meetings.

1:51 – 1:52 PM Public comments

- Written Comments
 - There were no written comments.
- Verbal Comments
 - There were no verbal comments.

The meeting was adjourned at 1:53 pm.

Next Meeting

- February 27, 2023 at Noon

February 27, 2023



**Colorado
Public School Permanent Fund**

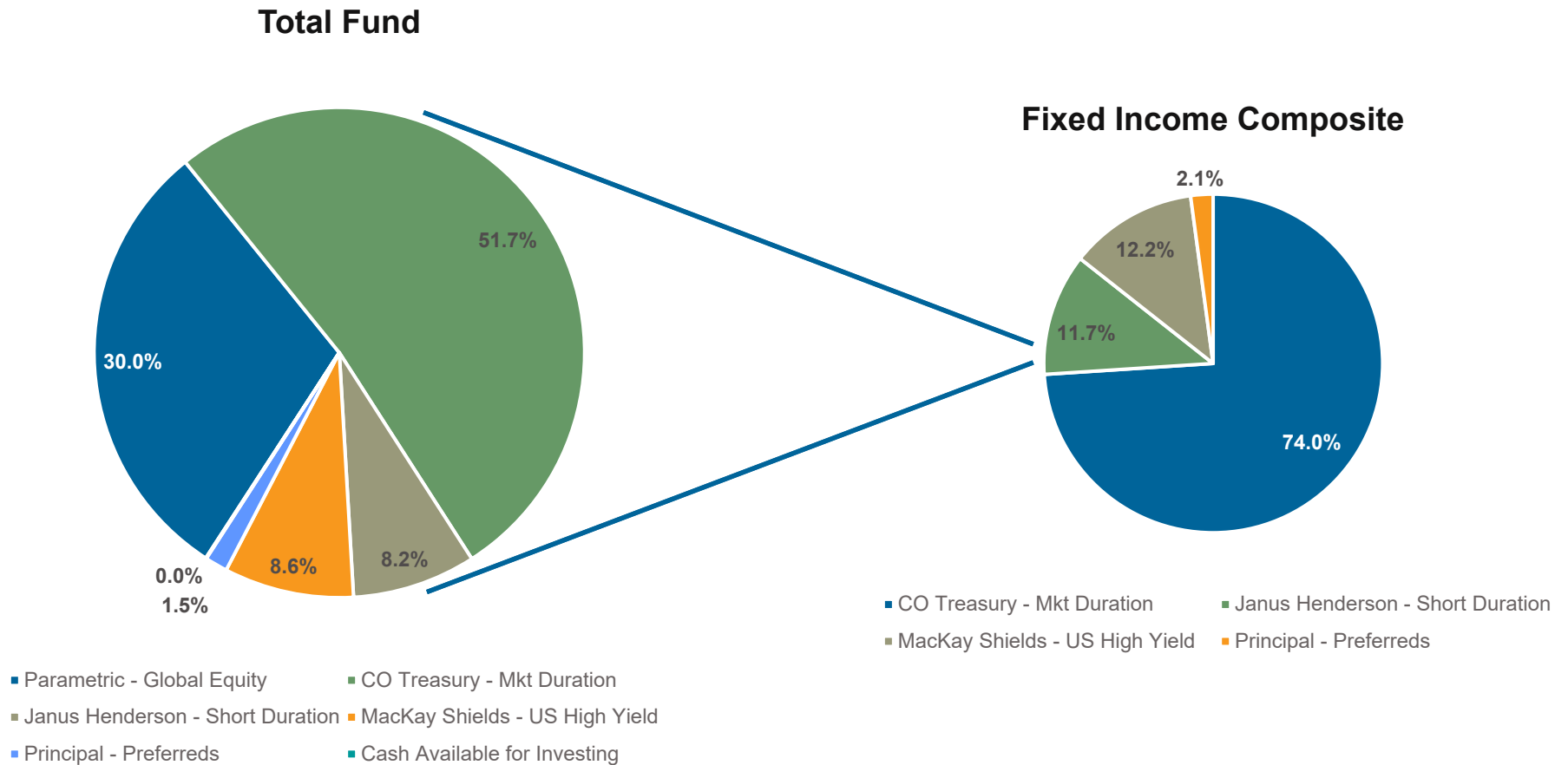
Market Duration Fixed Income
Implementation

Alex Browning
Senior Vice President

Janet Becker-Wold, CFA
Senior Vice President

CO PSPF Asset Allocation & Fixed Income Implementation

As of 12/31/2022



- The PSPF Total Fund is broadly allocated to 70% Fixed Income and 30% Global Equity
- The PSPF Fixed Income Composite is composed of 74% market duration bonds with the remainder allocated to short duration, high yield bonds, and preferred securities.

Market Duration Fixed Income Structure

Evaluation and Construction

- What's the role of market duration (aka Core) fixed income?
 - Produce income to support School Finance Act annual distribution.
 - Market duration should act as the ballast to portfolio growth exposures, i.e. global equity.
 - Credit strategies are distinct from allocations to market duration fixed income and, add diversification and higher yields.
- What are the prospects for active management net of fees?
 - Market duration managers, at competitive fee levels, have generally performed favorably against their benchmarks.
- How many managers should be employed?
 - No more than is necessary to achieve the objectives and no fewer than to adequately diversify specific manager return contribution and organizational risk.
- Are there sufficient funds available to pay separate account investment management fees?
 - The PSPF has \$1.76MM in total appropriated fees to pay investment related expenses.
 - The PSPF spent \$1.12MM in total investment related fees in FY 2022.
 - The PSPF has approximately \$640K in unspent appropriated fees which, after accounting for variation in expenses due to rising investment values and unforeseen costs, might conservatively be estimated at \$500K in available funds.

Market Duration Fixed Income Structure

Overview

PSPF Market Duration Portfolio

- The PSPF Fixed Income Composite is allocated 74% to market duration fixed income representing \$650MM or 52% of total fund assets.
- The current \$650MM allocation is managed by the CO Treasury under the management of Maruti More and his team.
- In keeping with the maxim of implementing an asset class structure as simple as possible given the circumstances:
 - How many managers should be employed to manage the market duration fixed income allocation?

Pros of Current Structure

- CO Treasury does not charge the PSPF an investment management fee.
- Single manager leads to lower monitoring costs and high customization.

Cons of Current Structure

- Manager and key man concentration risk.
- Single source for profitable ideas.
- Fewer investment resources than larger third-party investment managers.

Active Core Bond Managers vs. Bloomberg Aggregate

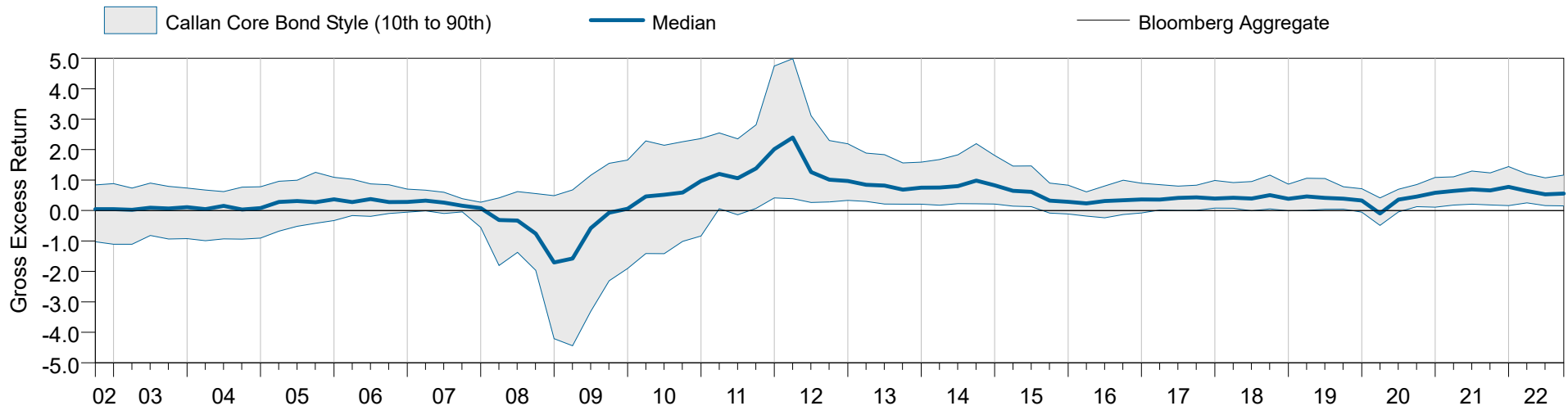
As of 09/30/2022

How often Manager Beat Benchmark by more than Fee Hurdle in Rolling 3-Year Periods over last 20 Years

Fee Hurdle	0.20%	0.25%	0.30%	0.35%	0.40%	0.45%	0.50%	0.55%	0.60%	0.65%
Median	75%	74%	65%	58%	46%	41%	38%	34%	30%	26%
45th Percentile	78%	76%	73%	63%	58%	45%	41%	39%	35%	31%
40th Percentile	83%	79%	76%	73%	66%	58%	45%	40%	38%	35%
35th Percentile	86%	83%	78%	74%	73%	65%	59%	50%	44%	38%
30th Percentile	91%	88%	83%	78%	75%	73%	68%	64%	55%	51%
25th Percentile	95%	93%	89%	84%	79%	79%	75%	71%	66%	60%

Average Annualized 3-Year Excess Return (gross) – Median Manager: **0.41%**

Rolling 3-Year Gross Excess Return relative to Bloomberg Aggregate for 20 Years ended September 30, 2022



Active Core Plus Bond Managers vs. Bloomberg Aggregate

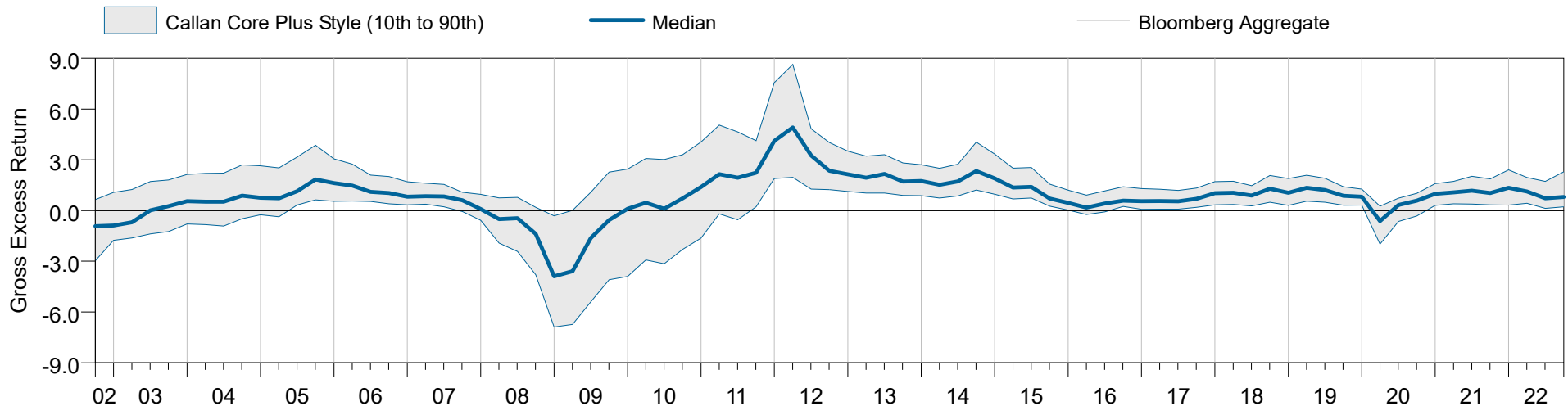
As of 09/30/2022

How often Manager Beat Benchmark by more than Fee Hurdle in Rolling 3-Year Periods over last 20 Years

Fee Hurdle	0.20%	0.25%	0.30%	0.35%	0.40%	0.45%	0.50%	0.55%	0.60%	0.65%
Median	81%	81%	80%	79%	79%	78%	75%	71%	65%	64%
45th Percentile	85%	83%	80%	80%	79%	78%	78%	76%	73%	66%
40th Percentile	86%	85%	85%	83%	83%	81%	80%	80%	79%	76%
35th Percentile	88%	88%	86%	85%	84%	83%	83%	83%	81%	79%
30th Percentile	89%	89%	89%	88%	88%	85%	85%	84%	84%	81%
25th Percentile	90%	90%	90%	90%	89%	88%	86%	86%	85%	85%

Average Annualized 3-Year Excess Return (gross) – Median Manager: 0.86%

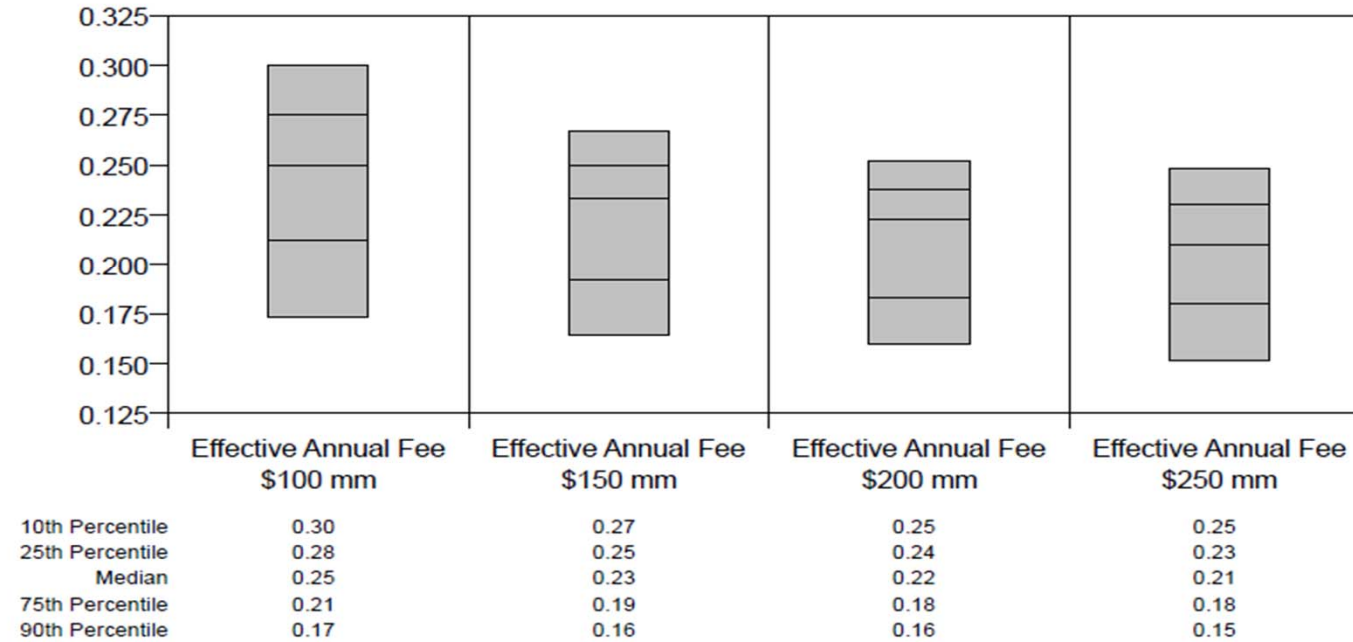
Rolling 3-Year Gross Excess Return relative to Bloomberg Aggregate for 20 Years ended September 30, 2022



Market Duration Investment Management Fees

Scaled by assets allocated

Effective Annual Fee
for 1 Quarter Ended December 31, 2022
Group: Callan Core Bond Fixed Income



- Active management fees display a fairly tight range between the 10th and 90th percentiles by mandate size.
- Low end fees range from 15-17 basis points and 25-30 basis points on the high end.
- The \$500K in unspent appropriated funds would imply a mandate range between \$150MM to \$300MM dependent on assets allocated.
- Fees are lower for higher amounts invested. Median fee for \$150MM is 25 pbs while it is 21 bps for \$250MM.

CO Treasury Annual Peer Relative Performance

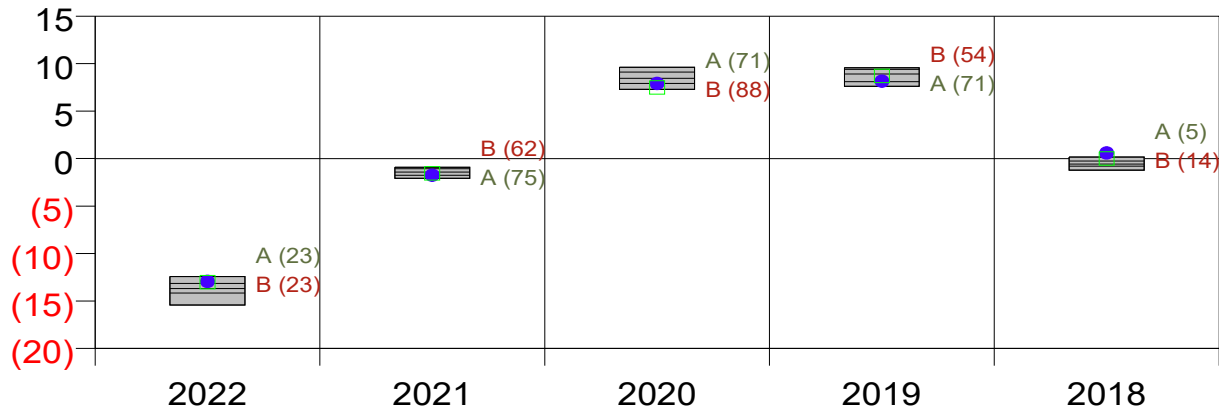
Net of Fees

Returns

for Calendar Years

5 Years Ended December 31, 2022

Group: Callan Core Bond Mutual Funds



	2022	2021	2020	2019	2018
10th Percentile	(12.43)	(0.91)	9.63	9.58	0.18
25th Percentile	(13.16)	(1.05)	9.12	9.40	(0.24)
Median	(13.67)	(1.41)	8.48	8.93	(0.57)
75th Percentile	(14.17)	(1.74)	7.92	8.12	(0.79)
90th Percentile	(15.42)	(2.07)	7.30	7.62	(1.21)
Fixed Income ● A	(12.93)	(1.75)	7.94	8.17	0.60
Blmbg:Aggregate □ B	(13.01)	(1.54)	7.51	8.72	0.01

- On an annual basis, the market duration portfolio has ranked as high the top fifth percentile (2018) and as low as the 75th percentile (2021).
- The range of active management returns (from 10th to 90th percentile) is generally 2-3% over these time periods.

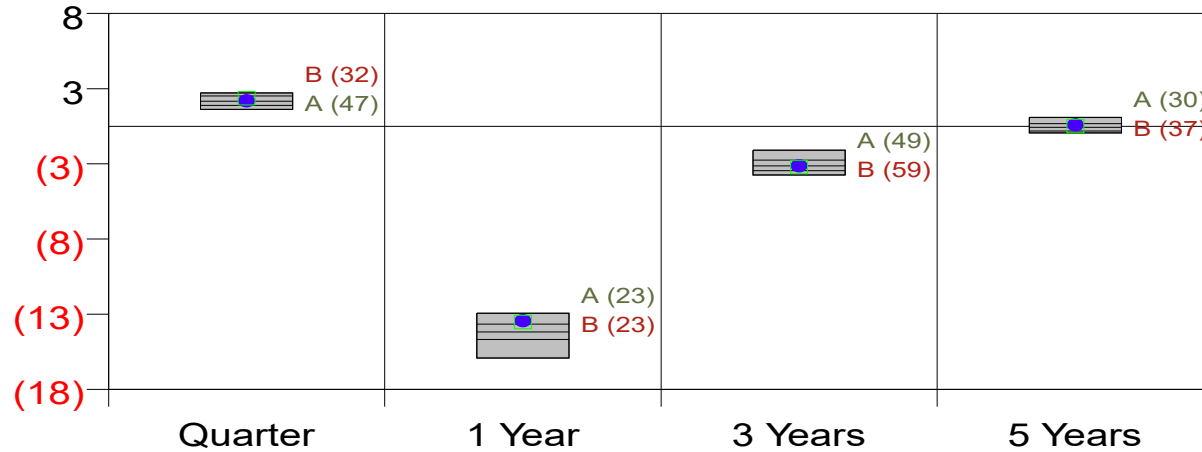
CO Treasury Cumulative Peer Relative Performance

Net of Fees

Returns

for Periods Ended December 31, 2022

Group: Callan Core Bond Mutual Funds



	Quarter	1 Year	3 Years	5 Years
10th Percentile	2.22	(12.43)	(1.59)	0.60
25th Percentile	2.01	(13.16)	(2.25)	0.18
Median	1.68	(13.67)	(2.63)	(0.07)
75th Percentile	1.39	(14.17)	(2.95)	(0.30)
90th Percentile	1.13	(15.42)	(3.24)	(0.43)

PSF Treasury Bond Portfolio	● A	1.70	(12.93)	(2.62)	0.10
Blmbg:Agg Idx	□ B	1.87	(13.01)	(2.71)	0.02

- For cumulative periods, on an annualized basis, the market duration portfolio has ranked above median and in, or just below, the first quartile.
- The biggest detractor for active managers has been duration.

Summary Observations

- The PSPF Market Duration portfolio has provided a high quality income producing investment for the Fund
- Advantages of the CO Treasury managing the market duration portfolio are:
 - The absence of an investment management fee drag on investment returns;
 - The high level of investment customization; and,
 - The low monitoring costs of a single manager.
- Disadvantages of the CO Treasury managing the market duration portfolio are:
 - Key Man risk represented by the investment team management focused under Maruti More;
 - A single source of profitable investment ideas; and,
 - Fewer resources than larger third-party investment managers.
- Performance relative to peers on a cumulative net of fees basis has been good
- Unspent appropriated fees for investment related expenses could allow room for an additional manager(s)
- The complexity of an additional manager to monitor is low (contracting and monitoring)
- Potential for greater return differentiation between active managers is expected to be wider given higher starting yields in the market

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Callan

February 27, 2023



**Colorado Public School Fund
Investment Board**

Fourth Quarter 2022

Janet Becker-Wold, CFA
Senior Vice President

Alexander Browning
Senior Vice President

Callan

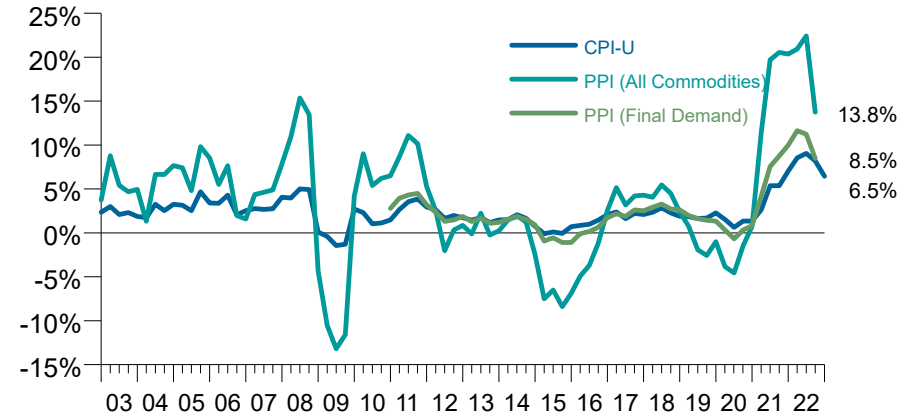
Economic and Market Update

U.S. Economy—Summary

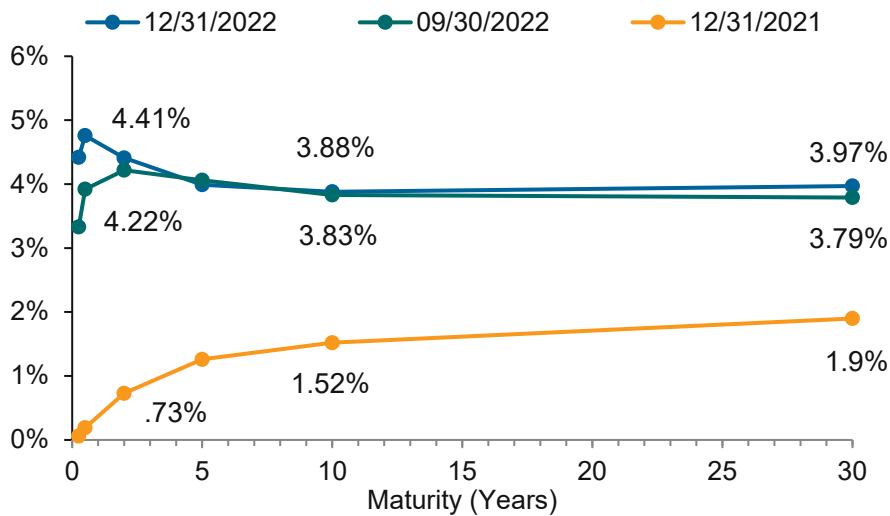
Fourth Quarter 2022

- Following an increase of 3.2% in Q3, the Advance Estimate of Q4 GDP came in at 2.9%.
- Headline inflation softened to 6.5% year-over-year in Q4, down from 8.2% in Q3.
- The Federal Reserve made its fourth consecutive 75 basis point rate hike on November 2, followed by a 50 basis point rate hike on December 14 (to a target range of 4.25-4.50%).
- The labor market continues to be a source of strength with unemployment remaining at 3.5% in December.

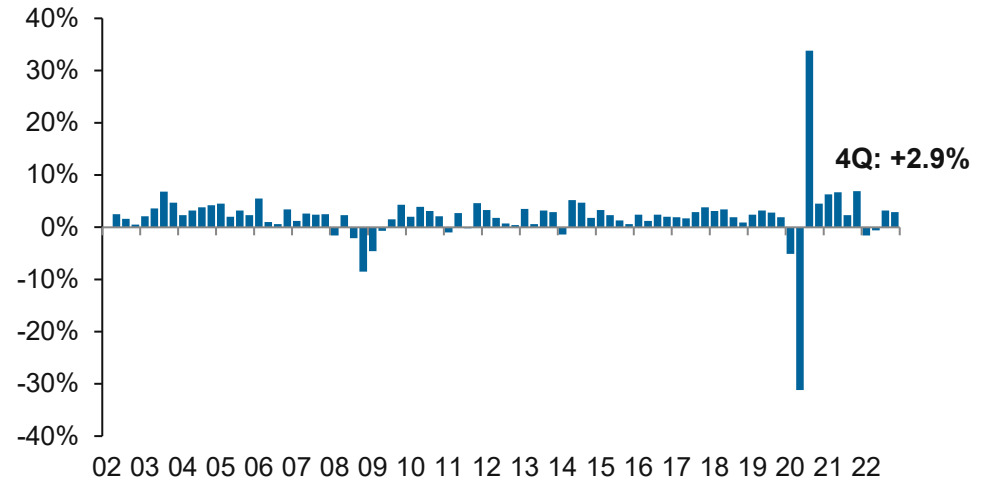
Inflation Year-Over-Year



U.S. Treasury Yield Curves



Quarterly Real GDP Growth



Sources: Bloomberg, Bureau of Labor Statistics, Callan. GDP reflective of 4Q22 Estimate.

Equity and Fixed Income Markets Down Together in 2022

Declines for both stocks and bonds for three straight quarters are extremely unusual

Global equity markets down sharply in 2022 despite rebound in 4Q

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

Fixed income down with sharply higher inflation and interest rates

- Bloomberg Aggregate: -13% for the year, worst year ever for the index by a wide margin
- CPI-U: +6.5% for the year ended Dec. 2022
- ▶ 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 at highest rate in decades
- ▶ Economic data show growth hit ‘pause’
 - GDP rose 2.9% in 4Q22, after a 3.2% rise in 3Q, a 0.6% drop in 2Q, and a 1.6% decline in 1Q.

Returns for Periods ended 12/31/22

	Quarter	1 Year	5 Years	10 Years	25 Years
U.S. Equity					
Russell 3000	7.18	-19.21	8.79	12.13	7.68
S&P 500	7.56	-18.11	9.42	12.56	7.64
Russell 2000	6.23	-20.44	4.13	9.01	7.13
Global ex-U.S. Equity					
MSCI World ex USA	16.18	-14.29	1.79	4.59	4.65
MSCI Emerging Markets	9.70	-20.09	-1.39	1.44	--
MSCI ACWI ex USA Small Cap	13.31	-19.97	0.67	5.24	6.87
Fixed Income					
Bloomberg Aggregate	1.87	-13.01	0.02	1.06	3.97
90-day T-Bill	0.84	1.46	1.26	0.76	1.91
Bloomberg Long Gov/Credit	2.61	-27.09	-1.21	1.57	5.38
Bloomberg Global Agg ex-US	6.81	-18.70	-3.07	-1.64	2.71
Real Estate					
NCREIF Property	-3.50	5.53	7.46	8.82	9.04
FTSE Nareit Equity	5.24	-24.37	3.68	6.53	7.87
Alternatives					
CS Hedge Fund Index	0.92	1.06	4.25	4.24	5.81
Bloomberg Commodity	2.22	16.09	6.44	-1.28	1.87
Gold Spot Price	9.22	-0.13	6.88	0.86	7.64
Inflation - CPI-U	0.00	6.45	3.78	2.60	2.47

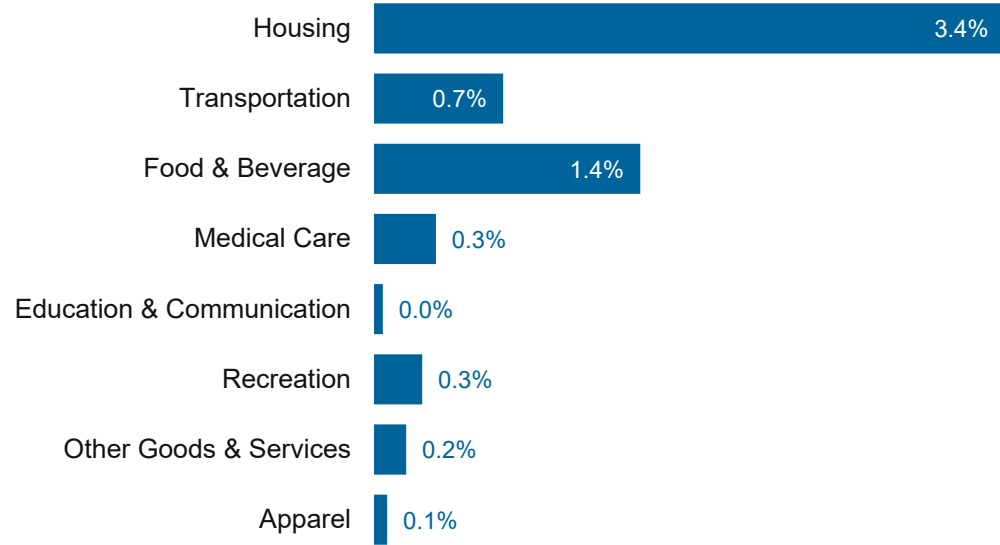
*Cambridge PE data through 09/30/22.

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

Contributors to Recent Inflation: Primary Categories

- ▶ Transportation inflation has finally begun to trend downward.
- ▶ Housing took over as the biggest weighted contributor to headline inflation due to the category's high weight in the index (42.4%).
- ▶ Transportation's downward trend in inflation has been somewhat offset by an upward trend for Food & Beverage and Housing.

Contribution to December 2022 Year-Over-Year Inflation



Primary Category	Primary Category Weight	Year-over-Year Change											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
All Items	100.0%	7.5%	7.9%	8.5%	8.3%	8.6%	9.1%	8.5%	8.3%	8.2%	7.7%	7.1%	6.5%
Housing	42.4%	5.7%	5.9%	6.4%	6.5%	6.9%	7.3%	7.4%	7.8%	8.0%	7.9%	7.8%	8.1%
Transportation	18.2%	20.8%	21.1%	22.6%	19.9%	19.4%	19.7%	16.4%	13.4%	12.6%	11.2%	7.8%	3.9%
Food & Bev	14.3%	6.7%	7.6%	8.5%	9.0%	9.7%	10.0%	10.5%	10.9%	10.8%	10.6%	10.3%	10.1%
Medical Care	8.5%	2.5%	2.4%	2.9%	3.2%	3.7%	4.5%	4.8%	5.4%	6.0%	5.0%	4.2%	4.0%
Education & Communication	6.4%	1.6%	1.6%	1.5%	1.0%	0.8%	0.8%	0.5%	0.5%	0.2%	0.0%	0.7%	0.7%
Recreation	5.1%	4.7%	5.0%	4.8%	4.3%	4.5%	4.6%	4.4%	4.1%	4.1%	4.1%	4.7%	5.1%
Other Goods & Svcs	2.7%	4.9%	5.6%	5.5%	5.7%	6.3%	6.7%	6.3%	6.6%	6.9%	6.5%	7.0%	6.4%
Apparel	2.5%	5.3%	6.6%	6.8%	5.4%	5.0%	5.2%	5.1%	5.1%	5.5%	4.1%	3.6%	2.9%

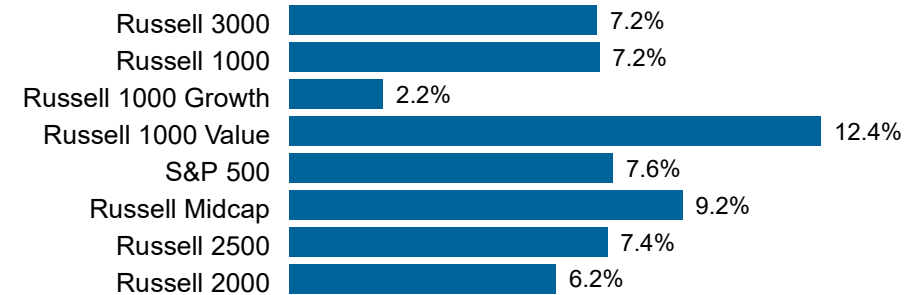
Source: U.S. Bureau of Labor Statistics

U.S. Equity Performance: 4Q22

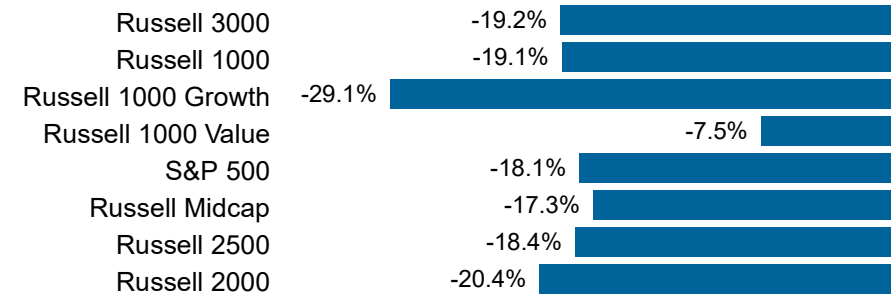
Markets retrace in December after gains in the prior two months

- ▶ The S&P 500 Index posted positive returns in both October and November but fell in December. The index was up 7.6% during 4Q22 but ended 2022 down 18.1%.
- ▶ Energy was the best-performing sector during the quarter and 2022, returning 23% and 66% respectively. Consumer Discretionary and Communication Services were the only two sectors that posted negative returns in 4Q.
- ▶ Value stocks outperformed growth across the market capitalization spectrum, and for both 4Q and the full year.
- ▶ Large cap stocks (Russell 1000) outperformed small caps (Russell 2000) last quarter and for the year.
- ▶ Continued macroeconomic concerns (e.g., inflation, potential recession, geopolitical issues) led to higher volatility and a down-year for U.S. equities.

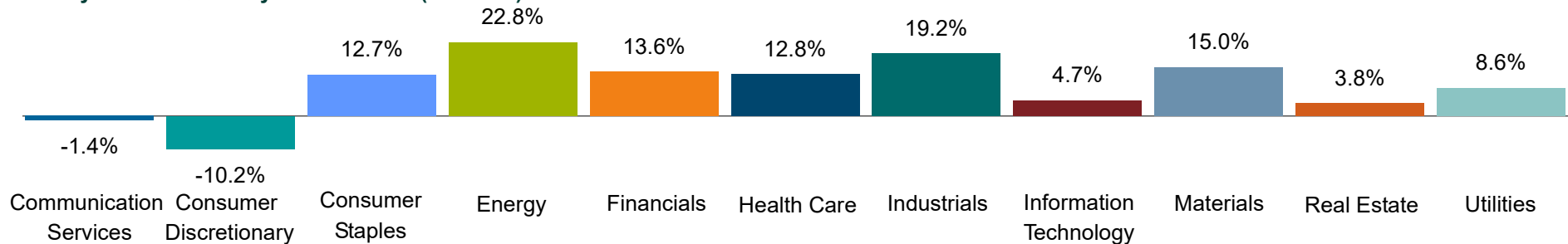
U.S. Equity Returns: Quarter Ended 12/31/22



U.S. Equity Returns: One Year Ended 12/31/22



Industry Sector Quarterly Performance (S&P 500) as of 12/31/22



Sources: FTSE Russell, S&P Dow Jones Indices

Global/Global ex-U.S. Equity Performance: 4Q22

Ending on a high note

4Q22 was a bright spot during a tough calendar year in global and global ex-U.S. equity markets.

Encouraging signs

- ▶ Lower-than-expected U.S. inflation data buoyed market optimism at the end of the year.
- ▶ The Fed slowed its pace of tightening with further slowing expected in 2023.
- ▶ China reversed its zero-COVID policies, prompting exuberance from investors.

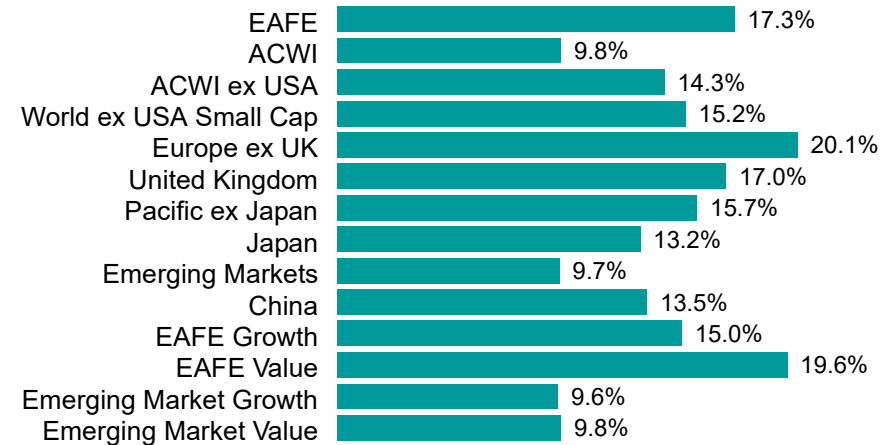
Growth vs. value

- ▶ Value outpaced growth across developed and emerging markets.
 - Economically sensitive sectors (e.g., Financials and Industrials) benefited from the anticipation of improved growth; Energy was the largest outperformer.

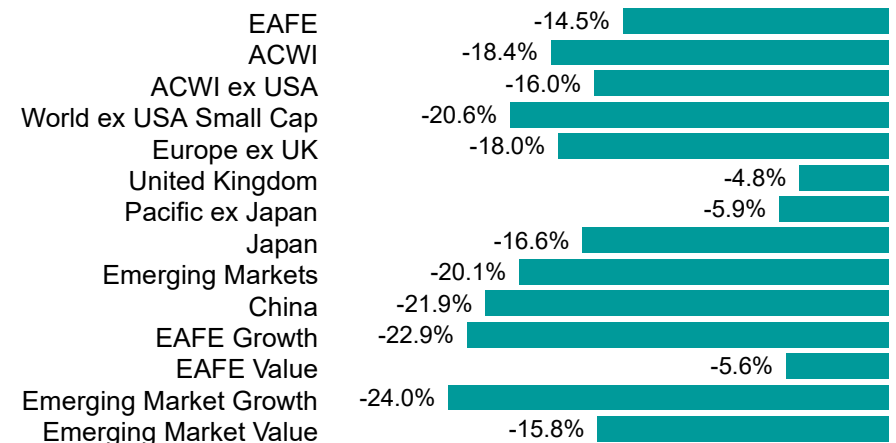
U.S. dollar vs. other currencies

- ▶ After reaching a multi-decade high, the dollar fell against all major currencies with signs of inflation easing.
 - Despite the 7.7% decline in 4Q22, the dollar still gained nearly 8% over the full year.

Global Equity Returns: Quarter Ended 12/31/22



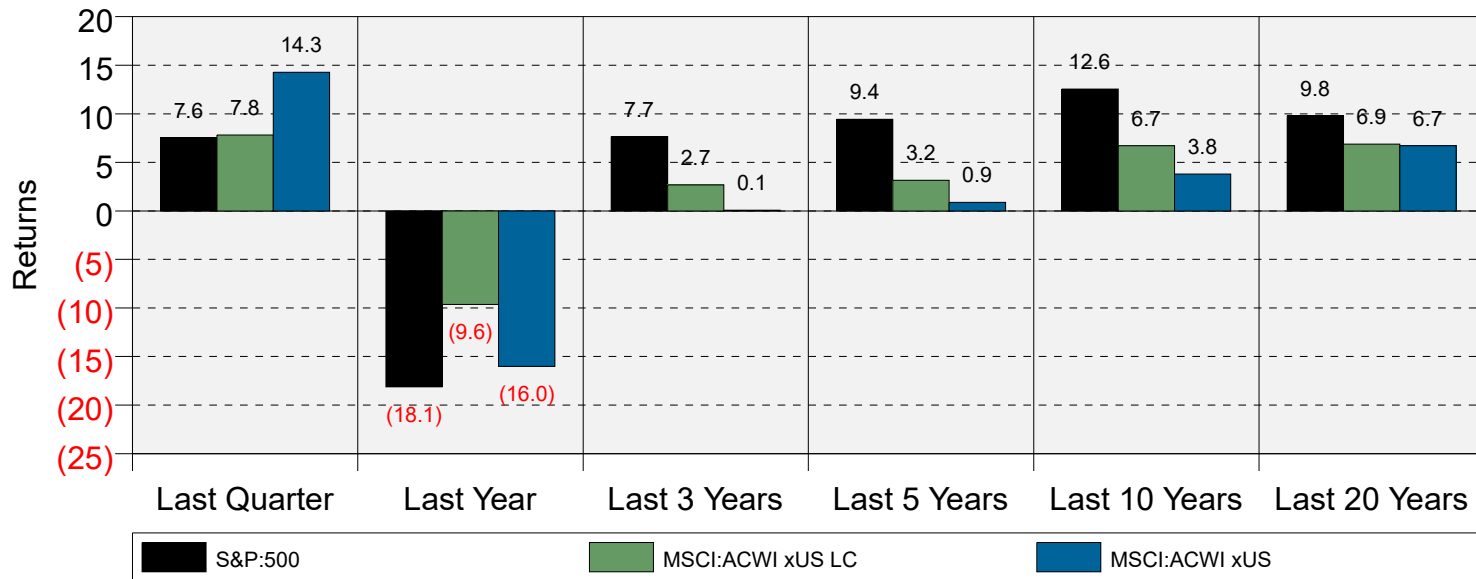
Global Equity Returns: One Year Ended 12/31/22



Source: MSCI

Global ex-U.S. Equity Performance

Returns
for Various Periods
Current Quarter Ending December 31, 2022



- Despite weakening in the fourth quarter, dollar strength in the earlier part of the year dragged on global ex-U.S. equity performance in 2022.

U.S. Fixed Income Performance: 4Q22

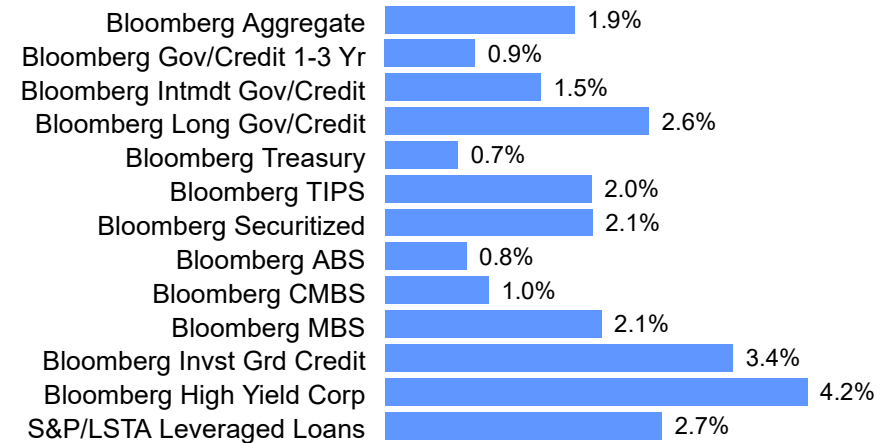
Bonds were up in 4Q but 2022 results remain negative

- ▶ Aggregate: positive return driven by coupon income and spread tightening; interest rates rose modestly
- ▶ Rates were volatile intra-quarter
 - UST 10-year yield: high 4.22% on 11/7; low 3.42% on 12/7
 - Curve remained inverted at quarter-end; 10-year yield 3.88% and 2-year yield 4.41%; most since 1981
- ▶ Fed raised rates, bringing target to 4.25%-4.50%
 - Median expectation from Fed is 5.1% for year-end 2023
 - Inflation showed signs of moderating but job market remained tight with solid wage growth

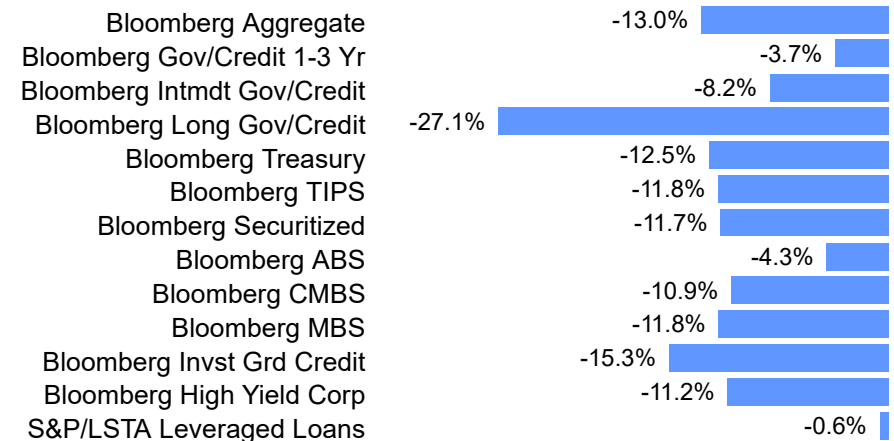
Valuations fair

- ▶ While absolute yields are higher, spreads have not widened materially and most are close to historical averages.
- ▶ An economic slowdown/recession could impact credit spreads.
- ▶ Higher yields boosting forward-looking return outlooks across sectors

U.S. Fixed Income Returns: Quarter Ended 12/31/22



U.S. Fixed Income Returns: One Year Ended 12/31/22

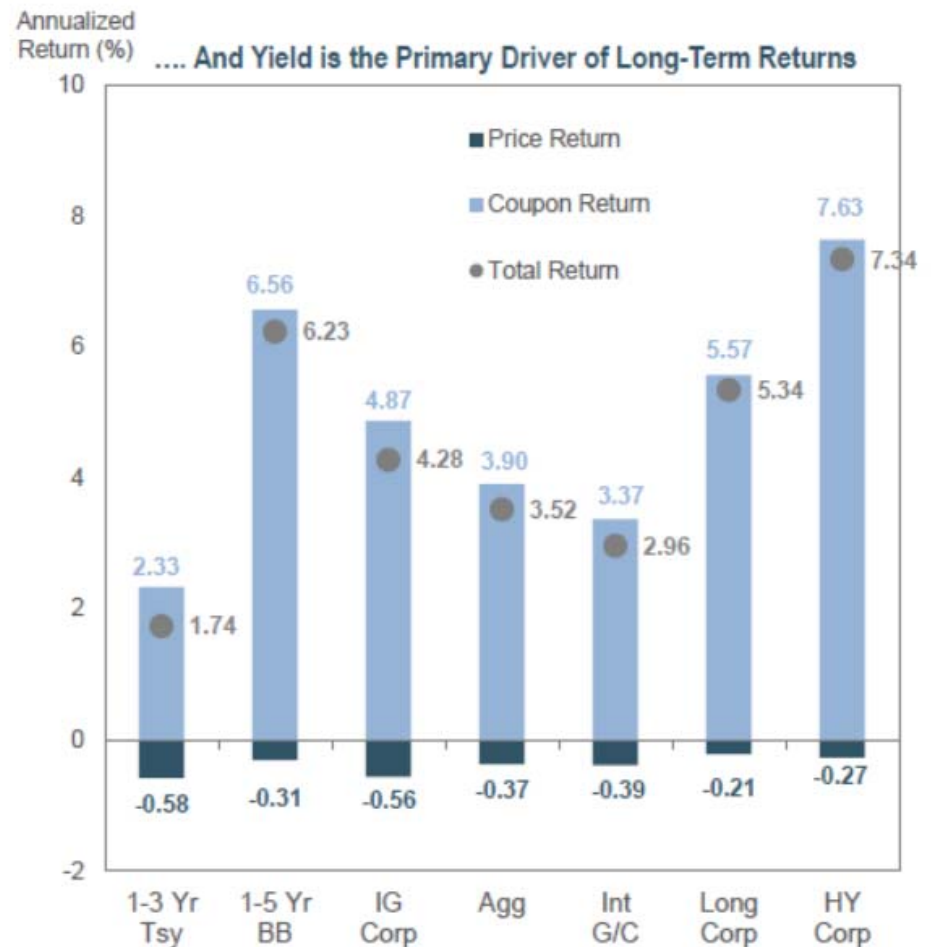
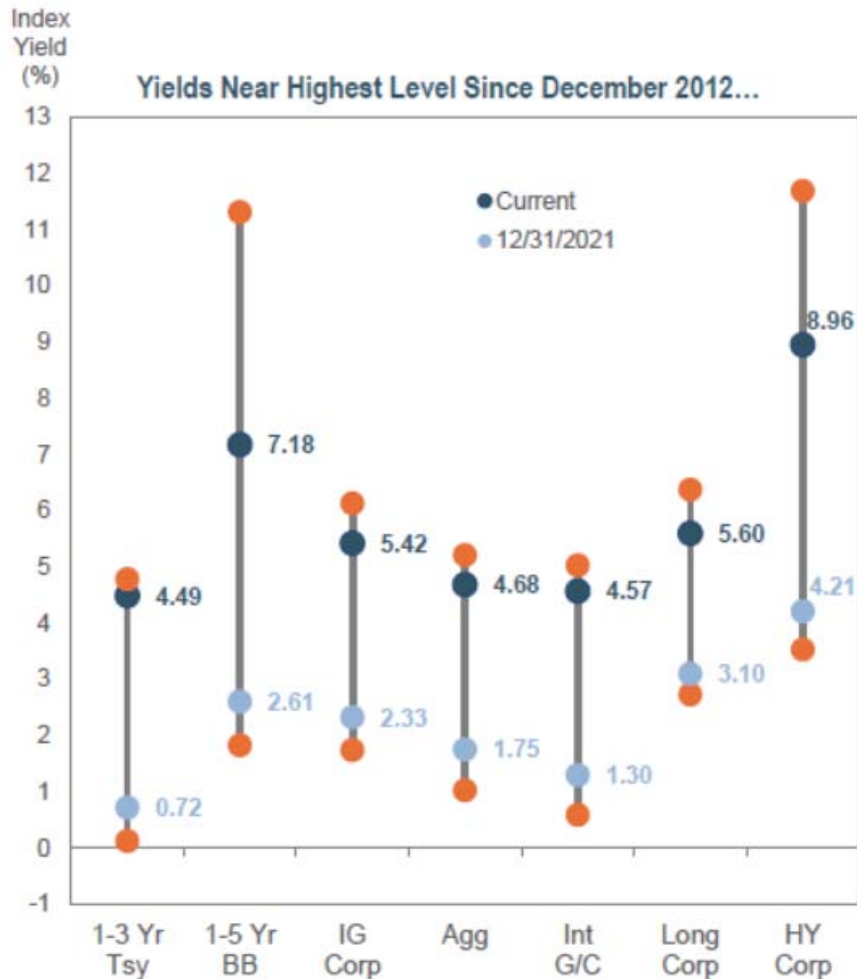


Sources: Bloomberg, S&P Dow Jones Indices

Fixed Income Themes

Yields rose in 2022, but the increase may bode well for investors in 2023

- ▶ Yields across fixed income rose to near 10-year highs in 2022
- ▶ Higher starting yield is a benefit to fixed income investors, as it is a major contributor to long-term results for fixed income



Sources: Bloomberg, Income Research + Management.
Yield range is from 12/31/12 to 12/30/22. Returns in the right chart are annualized from 12/30/02 to 12/30/22.

U.S. Private Real Estate Performance: 4Q22

Appreciation returns negative once again

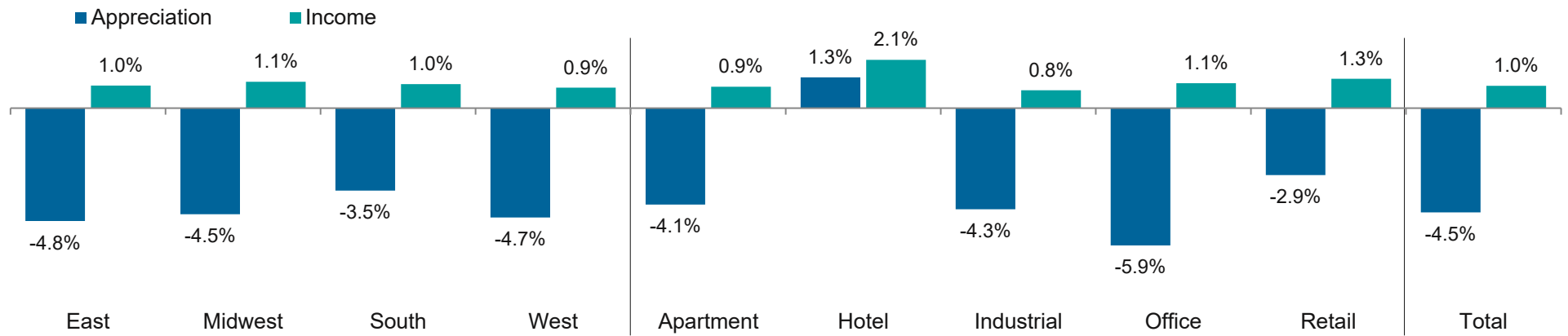
Negative appreciation in four major sectors

- Income returns were positive across sectors and regions.
- All property sectors and regions, except for Hotel, experienced negative appreciation.
- Valuations are reflective of higher interest rates, which have put upward pressure on capitalization rate and discount rate assumptions.
- Return dispersion by manager within the ODCE Index was due to the composition of underlying portfolios.

	Last Quarter	Last Year	Last 3 Years	Last 5 Years	Last 10 Years
NCREIF ODCE	-5.2%	6.6%	9.0%	7.7%	9.1%
Income	0.6%	2.6%	2.9%	3.0%	3.4%
Appreciation	-5.8%	3.9%	6.0%	4.6%	5.5%
NCREIF Property Index	-3.5%	5.5%	8.1%	7.5%	8.8%
Income	1.0%	3.9%	4.1%	4.3%	4.7%
Appreciation	-4.5%	1.6%	3.8%	3.1%	4.0%

Returns are geometrically linked

NCREIF Property Index Quarterly Returns by Region and Property Type

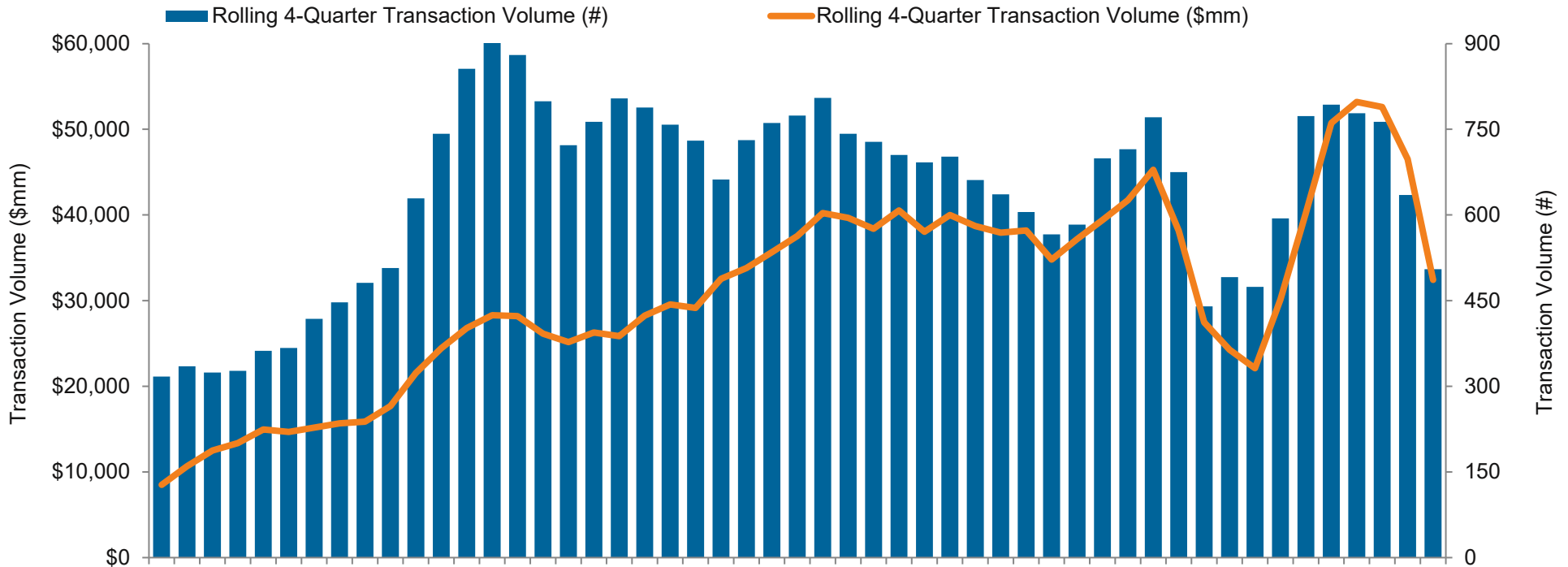


Source: NCREIF, ODCE return is net

U.S. Private Real Estate Market Trends

Pricing and transaction volumes decline through 4Q22

NCREIF Rolling 4-Quarter Transaction Totals Through 12/31/22



- ▶ Transaction volume continues to decrease on a rolling four-quarter basis and is now below five-year averages.
- ▶ In 4Q22 transaction volume increased on a quarter-over-quarter basis; however, transaction volume is significantly lower compared to 4Q21.
- ▶ The rise in interest rates is the driving force behind the slowdown in transactions. A bid-ask spread remains and price discovery continues to occur among market participants. Sectors that are in favor, such as multi-family and industrial, are more liquid.

Source: NCREIF

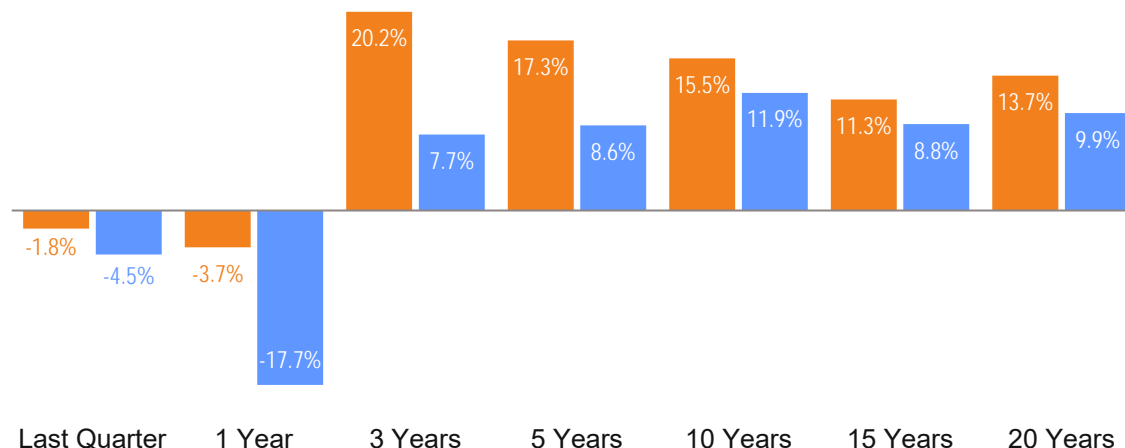
Private Equity Performance

Smoothing effect in 3Q22 private equity returns

- ▶ As is typical for the asset class, private equity returns have experienced a smoothing effect in 2022 compared to the sharp declines seen in the public markets.
- ▶ Private equity was only down about a third as much as the public markets during 2022, on a PME basis.
- ▶ Portfolio companies are typically valued internally by the manager on a quarterly basis. Valuations are based on the operating metrics of the company, recent comparable transactions, and public market comps.
- ▶ Venture capital and growth equity experienced the sharpest declines so far this year, given their technology focus as well as post-IPO public equity holdings.

Net IRRs as of 09/30/22

■ Private Equity ■ Russell 3000 PME



Net IRRs by Strategy as of 09/30/22

Strategy	Last Quarter	1 Year	3 Years	5 Years	10 Years	20 Years
Venture Capital	-2.7%	-9.1%	28.4%	23.8%	19.4%	12.4%
Growth Equity	-1.8%	-9.4%	20.8%	18.4%	15.7%	14.3%
Buyouts	-1.9%	-1.4%	18.5%	16.1%	15.2%	14.7%
Mezzanine	0.2%	5.0%	11.8%	11.1%	11.3%	11.1%
Credit Opportunities	0.7%	3.9%	8.4%	7.2%	8.3%	9.9%
Control-Oriented Distressed	-0.2%	11.3%	19.4%	13.8%	12.7%	11.9%
Total Private Equity	-1.8%	-3.7%	20.2%	17.3%	15.5%	13.7%

Source: Refinitiv/Cambridge

Recent Activity and Plan Performance

Quarterly Total Fund Highlights

As of December 31, 2022

CO PSPF ended the quarter with \$1.3 billion in assets, up \$72.5 million from Q3 2022 after income, distributions and net new investments.

- Investment gains were \$52.0 million while cash inflows were \$40.6 million over the quarter

The Total Fund gained 4.4% for the quarter and fell 13.2% for the trailing year. Ahead of the benchmark in both periods.

The Total Equity Composite gained 10.1% and fell 18.0% for the quarter and year, respectively.

- U.S Equity underperformed International Equity for the quarter and year, with gains of 10.1% and losses of 18.0%, versus 14.5% and -16.2% respectively.

The Fixed Income Composite trailed its benchmark by 9 basis points with a return of 1.7%. For the year, the portfolio lost 11.7%, ahead of the benchmark by 15 basis points.

- The Market Duration bond portfolio underperformed its benchmark by 17 basis points with a return of 1.7% in the quarter. For the year, the portfolio was down 12.9%.
- The Janus Short Duration bond portfolio exceeded its benchmark by 44 basis points with a return of 1.33%. The portfolio lost 3.7% for the year.

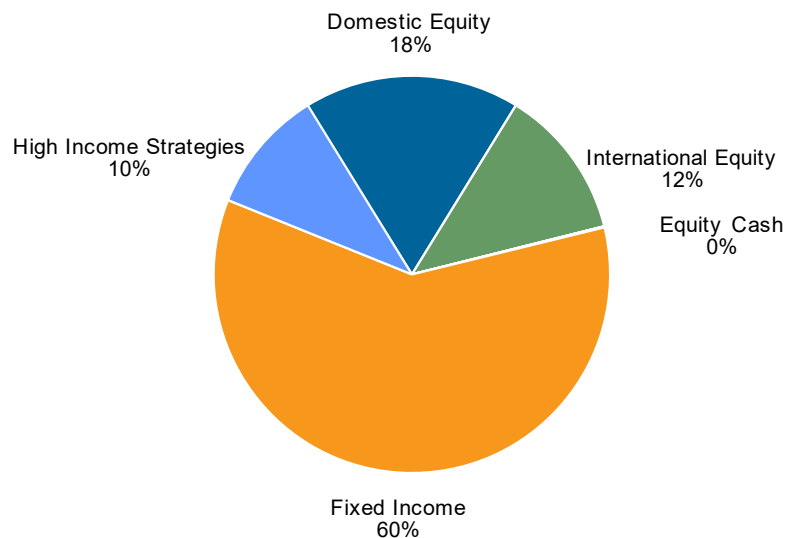
The High Income Strategies Composite outperformed its benchmark for the quarter by 60 basis points with a return of 4.15%. For the year, the Composite was down 7.7%, 4.1% ahead of the benchmark.

- The MacKay Shields' high yield bond portfolio rose 4.3% and fell 7.3% for the quarter and year, respectively.
- The Principal Spectrum preferred securities portfolio returned 3.3% and -9.9% for the quarter and year, respectively.

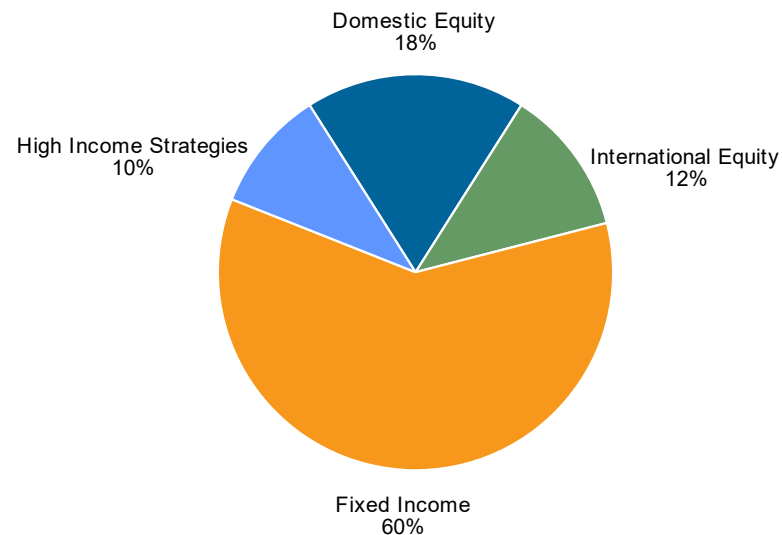
Total Fund Asset Allocation

December 31, 2022

Actual Asset Allocation



Target Asset Allocation



Asset Class	\$000s Actual	Weight Actual	Target	Percent Difference	\$000s Difference
Domestic Equity	221,553	17.7%	18.0%	(0.3%)	(3,929)
International Equity	154,026	12.3%	12.0%	0.3%	3,704
Equity Cash	911	0.1%	0.0%	0.1%	911
Fixed Income	750,250	59.9%	60.0%	(0.1%)	(1,357)
High Income Strategies	125,939	10.1%	10.0%	0.1%	671
Total	1,252,679	100.0%	100.0%		

Asset Distribution

	December 31, 2022			Inv. Return	September 30, 2022	
	Market Value	Weight	Net New Inv.		Market Value	Weight
Total Equity (1)	\$375,979,198	30.01%	\$(3,466,799)	\$34,542,833	\$344,903,165	29.22%
Domestic Equity	\$221,553,491	17.69%	\$559,898	\$14,654,184	\$206,339,409	17.48%
iShares S&P 1500 ETF	221,553,491	17.69%	559,898	14,654,184	206,339,409	17.48%
International Equity	\$154,025,745	12.30%	\$(2,870,268)	\$19,886,266	\$137,009,748	11.61%
iShares MSCI Emerging ETF	42,469,541	3.39%	(599,200)	3,982,213	39,086,528	3.31%
iShares MSCI Canada ETF	15,357,800	1.23%	(230,621)	1,154,999	14,433,423	1.22%
iShares Core MSCI EAFE ETF	96,198,404	7.68%	(2,040,447)	14,749,054	83,489,798	7.07%
Equity Cash	399,962	0.03%	(1,156,429)	2,383	1,554,007	0.13%
Total Fixed Income	\$750,250,020	59.89%	\$34,221,709	\$11,965,917	\$704,062,393	59.66%
Market Duration	\$648,055,056	51.73%	\$34,801,280	\$10,622,130	\$602,631,645	51.06%
Colorado Treasurer's Portfolio	648,055,056	51.73%	34,801,280	10,622,130	602,631,645	51.06%
Short Duration	\$102,194,964	8.16%	\$(579,571)	\$1,343,787	\$101,430,748	8.59%
Janus Henderson (2)	102,194,964	8.16%	(579,571)	1,343,787	101,430,748	8.59%
High Income Strategies	\$125,938,875	10.05%	\$(1,795,350)	\$5,029,902	\$122,704,323	10.40%
High Yield Fixed Income	\$107,219,906	8.56%	\$(1,477,809)	\$4,455,674	\$104,242,042	8.83%
Mackay Shield US High Yield (3)	107,219,906	8.56%	(1,477,809)	4,455,674	104,242,042	8.83%
Preferred Securities	\$18,718,969	1.49%	\$(317,540)	\$574,228	\$18,462,282	1.56%
Principal Preferred Securities (3)	18,718,969	1.49%	(317,540)	574,228	18,462,282	1.56%
Cash Available For Investing	\$510,753	0.04%	\$(8,097,764)	\$64,793	\$8,543,724	0.72%
Total Fund	\$1,252,678,846	100.0%	\$20,861,796	\$51,603,444	\$1,180,213,605	100.0%

The Fund ended the quarter at \$1.3 billion, an increase of \$72.5 million from the third quarter.

There were net new investments of \$20.9 million and \$51.6 million in investment gains.

(1) Funded in December 2017.

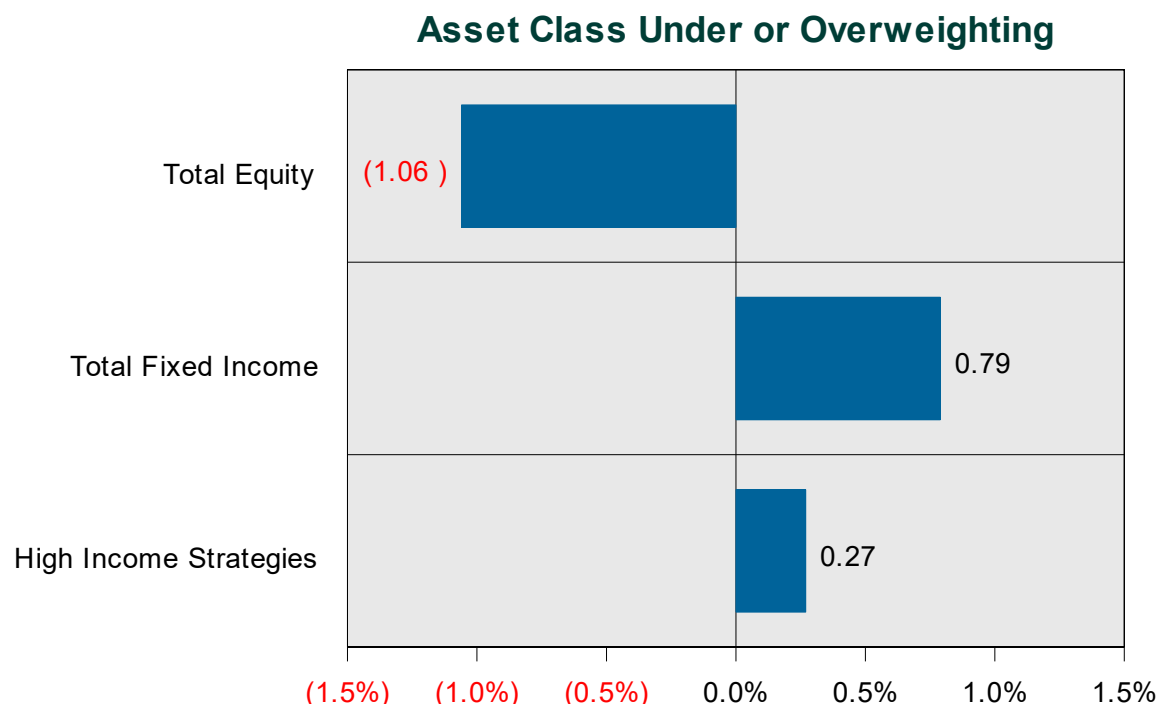
(2) Funded in November 2018.

(3) Funded in July 2020.

(4) Funded in July 2020.

One-Quarter Performance Attribution

As of December 31, 2022



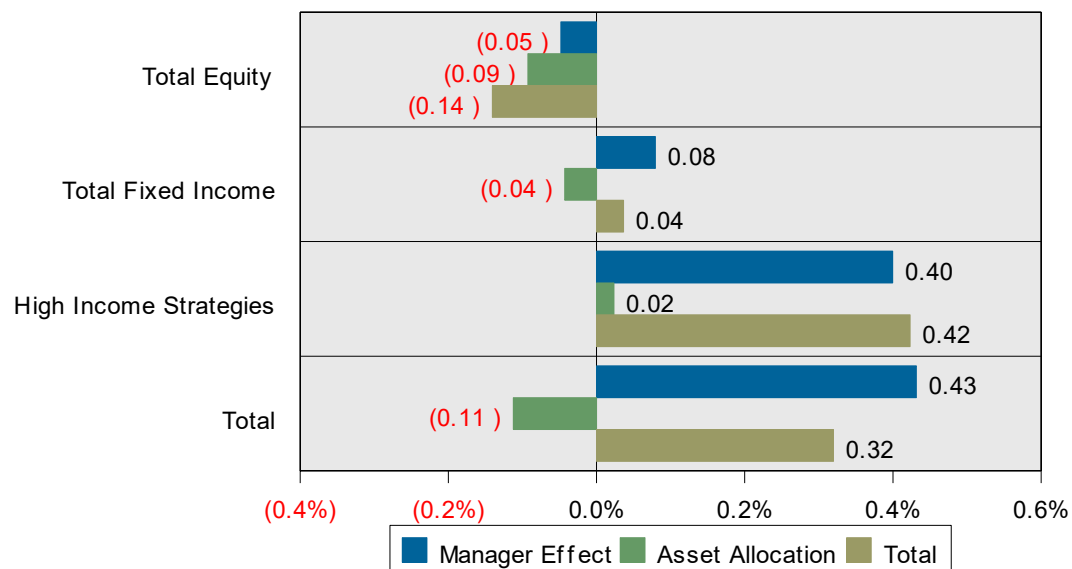
Relative Attribution Effects for Quarter ended December 31, 2022

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Total Equity	29%	30%	10.05%	10.02%	0.01%	0.00%	0.01%
Total Fixed Income	61%	60%	1.66%	1.75%	(0.06%)	0.00%	(0.06%)
High Income Strategies	10%	10%	4.15%	3.55%	0.06%	0.00%	0.06%
Total			4.43%	4.41%	+ 0.01%	+ 0.00%	0.01%

One Year Performance Attribution

As of December 31, 2022

One Year Relative Attribution Effects



One Year Relative Attribution Effects

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Total Equity	30%	30%	(18.00%)	(17.85%)	(0.05%)	(0.09%)	(0.14%)
Total Fixed Income	60%	60%	(11.73%)	(11.88%)	0.08%	(0.04%)	0.04%
High Income Strategies	10%	10%	(7.65%)	(11.73%)	0.40%	0.02%	0.42%
Total			(13.18%)	(13.50%)	+ 0.43%	+ (0.11%)	0.32%

Manager & Composite Cumulative Returns

As of December 31, 2022

	Last Quarter	Year to Date	Last 5 Years	Last 10 Years
Total Equity	10.05%	(18.00%)	5.66%	-
60% Russell 3000/40% ACWI ex US	10.02%	(17.85%)	5.63%	8.81%
Domestic Equity	7.11%	(19.36%)	8.63%	-
Russell 3000 Index	7.18%	(19.21%)	8.79%	12.13%
International Equity	14.49%	(16.29%)	1.11%	-
MSCI ACWI ex US	14.28%	(16.00%)	0.88%	3.80%
Total Fixed Income	1.66%	(11.73%)	0.27%	1.24%
Total Fixed Income Benchmark (1)	1.75%	(11.88%)	0.13%	0.94%
Market Duration	1.70%	(12.93%)	0.10%	1.15%
Colorado Treasurer's Portfolio (2)	1.70%	(12.93%)	0.10%	1.15%
PSPF Custom Benchmark (3)	1.87%	(13.01%)	0.02%	0.88%
Short Duration	1.33%	(3.68%)	-	-
Janus Henderson Short Duration	1.33%	(3.68%)	-	-
Blmbg Gov/Cred 1-3 Yr	0.89%	(3.69%)	0.92%	0.88%
85% 1-3YR G/C; 15% 1-3YR BB (4)	1.16%	(3.58%)	1.26%	1.33%
High Income Strategies	4.15%	(7.65%)	-	-
High Income Strategies Benchmark (5)	3.55%	(11.73%)	2.18%	-
High Yield Fixed Income	4.29%	(7.26%)	-	-
Mackay Shield US High Yield	4.29%	(7.26%)	-	-
Blmbg High Yield	4.17%	(11.19%)	2.31%	4.03%
Preferred Securities	3.34%	(9.94%)	-	-
Principal Preferred Securities	3.34%	(9.94%)	-	-
ICE BofA US All Cap Secs	0.03%	(14.85%)	1.41%	-
Total Fund w/o CAI (6)	4.43%	(13.18%)	1.58%	1.91%
Total Fund Benchmark (6)	4.41%	(13.50%)	1.70%	1.72%

Performance footnotes are detailed on page 21.

Manager & Composite Fiscal Year Returns

	6/2022- 12/2022	FY 2022	FY 2021	FY 2020	FY 2019
Total Equity	2.28%	(15.85%)	41.59%	1.82%	5.64%
60% Russell 3000/40% ACWI ex US	2.72%	(16.06%)	40.77%	1.90%	5.92%
Domestic Equity	2.26%	(13.95%)	44.30%	6.40%	8.85%
Russell 3000 Index	2.40%	(13.87%)	44.16%	6.53%	8.98%
International Equity	2.08%	(18.97%)	37.78%	(4.71%)	0.67%
MSCI ACWI ex US	2.96%	(19.42%)	35.72%	(4.80%)	1.29%
Total Fixed Income	(2.33%)	(9.76%)	(0.27%)	8.79%	7.38%
Total Fixed Income Benchmark (1)	(2.67%)	(9.46%)	(0.26%)	8.28%	7.52%
Market Duration	(2.82%)	(10.55%)	(0.55%)	9.26%	7.77%
Colorado Treasurer's Portfolio (2)	(2.82%)	(10.55%)	(0.55%)	9.26%	7.77%
PSPF Custom Benchmark (3)	(2.97%)	(10.29%)	(0.33%)	8.74%	7.87%
Short Duration	0.66%	(4.33%)	2.33%	4.41%	-
Janus Henderson Short Duration	0.66%	(4.33%)	2.33%	4.41%	-
Blmbg Gov/Cred 1-3 Yr	(0.60%)	(3.56%)	0.44%	4.20%	4.27%
85% 1-3YR G/C; 15% 1-3YR BB (4)	(0.01%)	(3.83%)	1.70%	3.94%	4.59%
High Income Strategies	3.61%	(9.38%)	-	-	-
High Income Strategies Benchmark (5)	2.80%	(12.89%)	15.13%	0.46%	7.58%
High Yield Fixed Income	3.89%	(9.09%)	-	-	-
Mackay Shield US High Yield	3.89%	(9.09%)	-	-	-
Blmbg High Yield	3.50%	(12.81%)	15.37%	0.03%	7.48%
Preferred Securities	2.03%	(11.11%)	-	-	-
Principal Preferred Securities	2.03%	(11.11%)	-	-	-
ICE BofA US All Cap Secs	(1.17%)	(13.33%)	13.67%	2.86%	8.12%
Total Fund w/o CAI (6)	(0.31%)	(11.58%)	8.30%	7.37%	6.94%
Total Fund Benchmark (6)	(0.47%)	(11.64%)	7.98%	7.87%	7.49%

Performance Footnotes

- (1) Current quarter's Total Fixed Income Benchmark consists of 87.5% Bloomberg U.S. Aggregate and 12.5% Bloomberg Gov/Credit 1-3 Yrs.
 - (2) Includes cash returns starting July 2017.
 - (3) The PSPF Fixed Income Portfolio Custom Benchmark consisted of 37% U.S. Treasury 1-10 Year Index, 34% Mortgages 0-10 Year WAL Index, 19% AAA U.S. Agencies 1-10 Year Index and 10% U.S. Corporates AAA Rated 1-10 Years Index through March 31, 2017, 100% Bloomberg U.S. Aggregate, thereafter.
 - (4) Benchmark consists of 85% Bloomberg 1-3 Year Government/Credit Index and 15% BofAML 1-3 Year BB US Cash Pay High Yield Index.
 - (5) Benchmark consists of 85% Blmbg High Yield Index and 15% ICE BofA US All Cap Secs Index.
 - (6) Current quarter's Total Fund Benchmark consists of 18.0% Russell 3000, 12.0% MSCI ACWI ex US, 52.5% Bloomberg U.S. Aggregate, 7.5% Bloomberg Gov/Credit 1-3 Yrs, 8.5% Bloomberg US High Yield and 1.5% ICE BofA U.S. All Capital Securities Index.
- *All composites and manager returns are shown gross-of-fees.

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Callan Updates

Published Research Highlights from 4Q22

Webinar: Rebalancing During this Unusual Market Environment



Considering Currency: A Guide for Institutional Investors



2022 Nuclear Decommissioning Funding Study



2022 ESG Survey



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Mark Andersen

Emerging Managers in Private Equity: A Guide for Success

David Smith

Additional Reading

Alternatives Focus quarterly newsletter

Active vs. Passive quarterly charts

Capital Markets Review quarterly newsletter

Monthly Updates to the Periodic Table

Market Pulse Flipbook quarterly markets update

Real Estate Indicators market outlook

Callan Institute Events

Upcoming conferences, workshops, and webinars

Callan College

Intro to Alternatives

This course is for institutional investors, including trustees and staff members of public plans, corporate plans, and nonprofits. This session familiarizes trustees and staff with alternative investments like private equity, hedge funds, and real estate and how they can play a key role in any portfolio. You will learn about the importance of allocations to alternatives and how to consider integrating, evaluating, and monitoring them.

– February 15-16, 2023 – Virtual Session via Zoom

Intro to Investments—Learn the Fundamentals

This course is for institutional investors, including trustees and staff members of public plans, corporate plans, and nonprofits. This session familiarizes trustees and staff with basic investment theory, terminology, and practices.

– March 1–2, 2023 – In-Person Session – Chicago

– May 23–25, 2023 – Virtual Session via Zoom

Please visit our website at callan.com/events-education as we add dates to our 2023 calendar!

Mark Your Calendar

2023 National Conference

April 2–4, 2023

Scottsdale, Arizona

2023 Regional Workshops

June 27, 2023 – Denver

June 29, 2023 – San Francisco

October 24, 2023 – New York

October 26, 2023 - Chicago

Watch your email for further details and an invitation.

Webinars & Research Café Sessions

Research Café: ESG Interview Series

February 23, 2023 – 9:30am (PT)

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Past performance is no guarantee of future results.

December 31, 2022

CO Public School Permanent Fund



**Investment Measurement Service
Quarterly Review**

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December 31, 2022

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Is a Recession Inevitable in 2023?

ECONOMY

2 The bond market is convinced a recession is inevitable in 2023, as shown by an inverted yield curve. Perhaps bond investors do not believe that we will achieve a “soft landing” from the current economic expansion. Robust current economic indicators conflict with this market expectation.

Rebound in 4Q for U.S., Global Bonds

FIXED INCOME

8 Bonds rose in 4Q but 2022 results remained negative. The gain for the Aggregate was driven by coupon income and spread tightening. The Municipal Bond Index 2022 return was the worst since 1981. Global fixed income 4Q gains were driven largely by U.S. dollar weakness.

Appetite Continues, but Strategies Shift

PRIVATE CREDIT

12 Investors took a new look at upper-middle-market direct lending as all-in spreads have widened and lenders are able to get tighter terms. On average, the asset class has generated net IRRs of 8% to 10% for trailing periods ended Sept. 30, 2022.

First Full-year Drop in Returns Since 2018

INSTITUTIONAL INVESTORS

4 All investor types finished 2022 with steep declines. The S&P 500 and Bloomberg Aggregate were down together for three straight quarters (through 3Q22), and for the year, the first time since 1969. But most investors performed better than a 60% stocks/40% bonds benchmark.

NPI Falls 3.5% and REITs Lag Equities

REAL ESTATE/REAL ASSETS

10 The NCREIF Property Index fell 3.5% during 4Q. The NCREIF ODCE Index dropped 5.2%. The FTSE EPRA Nareit Developed REIT Index rose 6.9% compared to a 9.8% gain for MSCI World. The FTSE Nareit Equity REITs Index increased 5.2%, compared to 7.6% for the S&P 500.

Year Ends on a High Note After Tough Start

HEDGE FUNDS/MACs

13 The median Callan Institutional Hedge Fund Peer rose 1.3%. Within the HFRI indices, the best-performing strategy was the emerging market index (+5.1%). Across the Callan Hedge FOF Database, all managers showed gains. The Callan MAC Style Groups also rose.

4Q Gains Can't Stem Big Losses in 2022

EQUITY

6 Stocks gained in 4Q but saw sharp drops over the full year. The drop for U.S. equities was broad-based, and almost every sector experienced negative returns. Global equities also rose in 4Q, as lower-than-expected U.S. inflation data buoyed market optimism at year-end.

Deceleration in 2022; 2023 Very Unclear

PRIVATE EQUITY

11 After a record-shattering 2021, private equity activity fell throughout 2022. On average, year-over-year transaction activity fell by about 20% and dollar volumes by 30%. However, fundraising and company investment and exit activity remain comparable to pre-pandemic levels.

DC Index Falls 4.6%, Third Straight Decline

DEFINED CONTRIBUTION

15 The Callan DC Index™ fell 4.6% in 3Q22 and 16.7% for the trailing one year. Balances within the Index declined by 4.7% after a 12.3% decrease the previous quarter. TDFs reclaimed the top spot in terms of quarterly net flows, garnering 73.6% of flows.

Broad Market Quarterly Returns

U.S. Equity Russell 3000



Global ex-U.S. Equity MSCI ACWI ex USA



U.S. Fixed Income Bloomberg Agg



Global ex-U.S. Fixed Income Bloomberg Global Agg ex US



Sources: Bloomberg, FTSE Russell, MSCI

Is a Recession Inevitable in 2023?

ECONOMY | Jay Kloepfer

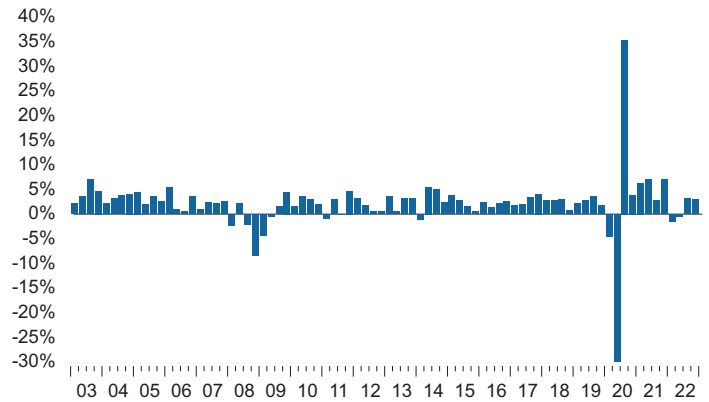
The bond market is convinced a recession is inevitable in 2023. The yield curve is inverted, and this phenomenon has preceded every recession in modern history. This inversion occurs when yields on the short end of the curve are higher than yields on the long end. A normal yield curve is upward sloping, with higher yields offered for taking on debt with greater maturities. An inverted yield curve implies that investors expect interest rates to fall, and that holding longer-dated debt will provide a greater return as rates drop. Why would investors expect interest rates to fall? They believe that a recession is coming, and the Federal Reserve will cut interest rates to stimulate economic growth.

Last year was anything but normal for almost all measures of the capital markets, interest rates, inflation, and the economy. It may be reasonable to be a bit skeptical that the bond market has called this recession correctly. First, the U.S. economy suffered two quarters in a row of GDP loss “way back” in 1Q and 2Q22! A consecutive quarterly decline in GDP is often the rule of thumb used to invoke recession, but last year, such was not the case. The economy resumed robust growth with a solid 3.2% annualized gain in 3Q, and a 2.9% increase in 4Q. As a result, GDP advanced 2.1% for the year, following a strong 5.9% jump in 2021. Where was the growth in 4Q22 and for the year? Consumer spending on services, led by international travel, food services, accommodation, and health care. We also re-built inventories and increased investment in software and equipment. The one large drag was a decline in home construction, as mortgage rates shot up from the low 2% range to over 7% in a matter of months.

Inflation burned out of control by mid-year 2022. Faced with huge increases in the price of daily staples and durable goods like autos, consumers quickly redirected their spending away from goods suffering steep inflation, and spending on such goods within GDP actually declined during the year. This wasn't always captured in the CPI; one of its failings as a measure of inflation is that it assumes a certain basket of goods will continue to be purchased at fixed weights even when prices shoot up. Clearly, higher prices for food staples and rent are impossible to avoid, but consumers substitute budget expenditures with great skill to

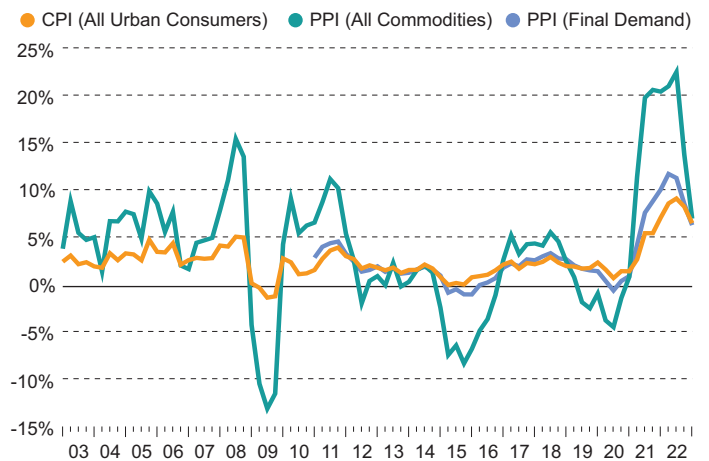
Quarterly Real GDP Growth

(20 Years)



Source: Bureau of Economic Analysis

Inflation Year-Over-Year



Source: Bureau of Labor Statistics

counter price hikes. Inflation measured by the CPI-U rose sharply year-over-year, cresting at 9% by June, but the rate of increase in prices flattened completely in the second half of the year. So while the year-over-year increase for 4Q CPI hit 6.5%, the quarterly CPI for 4Q came in at 0% (change over 3Q). The problem for consumers and businesses is that even though CPI has stopped rising, prices are now “permanently” higher.

While a disconnect remains in the job market between those looking for work and the jobs offered by employers, the job market notched serious gains in net new jobs throughout the year, adding over 4.5 million. The level of employment finally surpassed the

pre-pandemic peak in August 2022. Additions to the unemployment roll measured by weekly jobless claims continued to stay historically low, while continuing unemployment claims dropped from over 5 million at the start of 2021 to 1.7 million in December. Calendar year 2022 saw the lowest level of continuing claims in more than two decades.

With continued economic strength suggested by the robust job market and solid GDP growth, where is the concern over recession coming from in the bond market? The answer is a logic puzzle that can seem like a circular argument. The Fed raised rates quickly and by a large amount starting last March to battle the surge in inflation. The surge stemmed from supply chain dislocations as we emerged from the pandemic lockdown; from a surge in demand for workers, which drove wage growth; from a surge in demand from consumers; and then layered on top of these trends the disruption from the Russian invasion of Ukraine. The bond market suddenly “believed” in the Fed’s stated plans for interest rates through 2022, and yields moved quickly toward long-term equilibrium by mid-year 2022. The Fed’s primary tool to battle inflation is the Fed Funds rate. The premise is that higher rates cool demand for goods and services from all actors in the economy and wring inflation out of the economy. The reality is that higher rates appear to be working as advertised, as demand has lessened and inflation stopped rising month-to-month in the summer of 2022. The inverted yield curve says the bond market believes the very success of the Fed’s inflation policy is now certain to cause recession, and then a reversal of interest rate policy to fight said recession. Perhaps the bond market does not believe that we will achieve the holy grail of Fed policy, which is to engineer a “soft landing” from the current economic expansion.

Recent Quarterly Economic Indicators

	4Q22	3Q22	2Q22	1Q22
Employment Cost: Total Compensation Growth	5.1%	5.0%	5.1%	4.5%
Nonfarm Business: Productivity Growth	3.0%	1.4%	-4.1%	-5.9%
GDP Growth	2.9%	3.2%	-0.9%	-1.6%
Manufacturing Capacity Utilization	78.5%	79.2%	79.5%	79.1%
Consumer Sentiment Index (1966=100)	58.8	56.1	57.8	63.1

Sources: Bureau of Economic Analysis, Bureau of Labor Statistics, Federal Reserve, IHS Economics, Reuters/University of Michigan

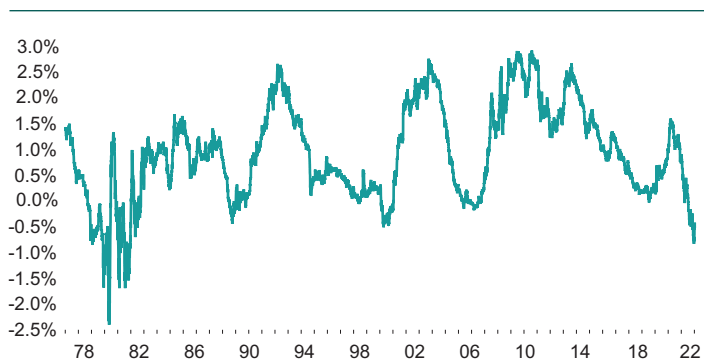
The Long-Term View

Index	4Q22	Periods Ended 12/31/22			
		1 Yr	5 Yrs	10 Yrs	25 Yrs
U.S. Equity					
Russell 3000	7.2	-19.2	8.8	12.1	7.7
S&P 500	7.6	-18.1	9.4	12.6	7.6
Russell 2000	6.2	-20.4	4.1	9.0	7.1
Global ex-U.S. Equity					
MSCI EAFE	17.3	-14.5	1.5	4.7	4.5
MSCI ACWI ex USA	14.3	-16.0	0.9	3.8	--
MSCI Emerging Markets	9.7	-20.1	-1.4	1.4	--
MSCI ACWI ex USA Small Cap	13.3	-20.0	0.7	5.2	6.9
Fixed Income					
Bloomberg Agg	1.9	-13.0	0.0	1.1	4.0
90-Day T-Bill	0.8	1.5	1.3	0.8	1.9
Bloomberg Long G/C	2.6	-27.1	-1.2	1.6	5.4
Bloomberg GI Agg ex US	6.8	-18.7	-3.1	-1.6	2.7
Real Estate					
NCREIF Property	-3.5	5.5	7.5	8.8	9.0
FTSE Nareit Equity	5.2	-24.4	3.7	6.5	7.9
Alternatives					
CS Hedge Fund	0.9	1.1	4.2	4.2	5.8
Cambridge PE*	-1.8	-3.8	16.8	15.3	14.3
Bloomberg Commodity	2.2	16.1	6.4	-1.3	1.9
Gold Spot Price	9.2	-0.1	6.9	0.9	7.6
Inflation – CPI-U	0.0	6.5	3.8	2.6	2.5

*Data for most recent period lags. Data as of 9/30/22. Sources: Bloomberg, Bureau of Economic Analysis, Credit Suisse, FTSE Russell, MSCI, NCREIF, Refinitiv/Cambridge, S&P Dow Jones Indices

It is true that we have never achieved a soft landing in the past, so the bond market may be justified in expecting that the Fed will overshoot and tip the U.S. into recession. Robust current economic indicators, especially in the labor market outside of technology, conflict with this market expectation.

10-Year Treasury vs. 2-Year Treasury Spread



Source: Federal Reserve Bank of St. Louis

Worst Year Since 2018 as Both Stocks and Bonds Fall

INSTITUTIONAL INVESTORS

Double-digit declines mark the end of a tough year

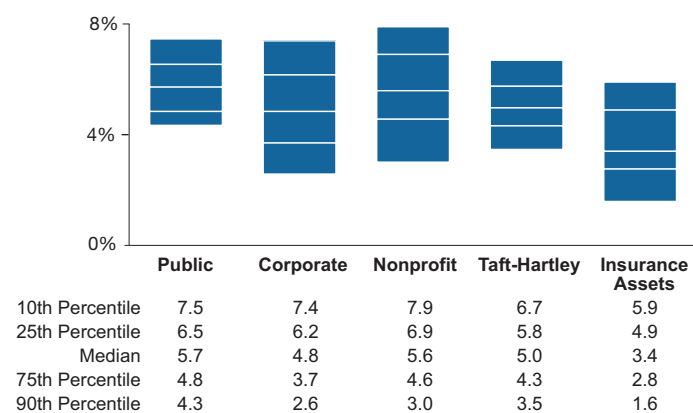
- All investor types finished 2022 with double-digit declines, as both equities and fixed income fell.
- Insurance assets fared the best during the year, while corporate plans saw the lowest returns.
- Most plan types performed better than a benchmark consisting of 60% S&P 500/40% Bloomberg Aggregate, but they had a harder time matching that benchmark over longer time periods.
- The declines in 2022 were far higher than those in 2018, which was the last year that saw drops in the value of portfolios for institutional investors.

Inflation and interest rates are top client concerns

- CPI-U was up more than 8% year-over-year in each month from March through September.
- The Fed has raised rates 425 bps since March, from 0.0%-0.25% to 4.25%-4.50% in December 2022.
- The S&P 500 and Bloomberg Aggregate were down together for three consecutive quarters (through 3Q22), and for the year, the first time since 1969.
- And there was no place to hide in 2022; every asset class except cash was down. It was the worst year for a 60/40 portfolio in decades.

- However, lower asset values but higher returns expected going forward is a silver lining for investors.
- Institutional investors have a greater chance of hitting return targets and can even reduce risk, after years of risking up to chase return.
- There are rising expectations for a recession; the yield curve is inverted.
- Geopolitical risk surrounding China was another area of focus as institutional investors try to understand how its COVID re-opening and tensions regarding Taiwan could impact markets.

Quarterly Returns, Callan Database Groups (12/31/22)



Source: Callan

Callan Database Median and Index Returns* for Periods Ended 12/31/22

Database Group	Quarter	1 Year	3 Years	5 Years	10 Years	20 Years
Public Database	5.7	-12.7	4.3	5.3	7.3	7.5
Corporate Database	4.8	-17.4	0.5	3.0	5.8	7.0
Nonprofit Database	5.6	-13.1	3.6	4.8	6.8	7.4
Taft-Hartley Database	5.0	-10.6	4.7	5.7	7.7	7.3
Insurance Assets Database	3.4	-10.0	1.0	2.6	4.0	5.0
All Institutional Investors	5.2	-13.3	3.4	4.7	6.9	7.3
Large (>\$1 billion)	4.9	-12.4	4.1	5.1	7.0	7.6
Medium (\$100mm - \$1bn)	5.2	-13.8	3.3	4.7	7.0	7.2
Small (<\$100 million)	5.5	-13.6	3.2	4.5	6.7	7.0
60% S&P 500/40% Bloomberg Agg	5.3	-15.9	4.0	6.1	8.1	7.4

*Returns less than one year are not annualized.

Source: Callan. Callan's database includes the following groups: public defined benefit (DB) plans, corporate DB plans, nonprofits, insurance assets, and Taft-Hartley plans. Approximately 10% to 15% of the database constituents are Callan's clients. All database group returns presented gross of fees. Past performance is no guarantee of future results. Reference to or inclusion in this report of any product, service, or entity should not be construed as a recommendation, approval, affiliation, or endorsement of such product, service, or entity by Callan.

Return to normal in bonds

- The role of core bonds in portfolios was restored; cash is viable again as a liquidity tool.
- A 4.5% yield may change the demand for yield substitutes: IG credit, bank loans, high yield, private credit, even real estate and infrastructure?

Private markets: now over target allocations

- Downward marks are coming, gradually.
- Interest remains strong in all private assets.

Public defined benefit (DB) plan priorities

- Public DB plans are analyzing how the changes to Callan’s Capital Markets Assumptions will affect their portfolios.
- Returns in 2022 gave back some of the funded status gains from 2020-21. But downward pressure on actuarial discount rates may now abate as capital markets expectations are higher following the market decline.

Corporate DB plan priorities

- Corporate DB plans focused on de-risking.
- The experience of 2022 has these plans questioning what they are doing with LDI, and why. Funded status no longer translates directly to contributions, or expense.

- Higher interest rates may increase discussions about pension risk transfer. Corporate DB plans appear to be inclined to keep the plan on the balance sheet.

Defined contribution (DC) plan priorities

- New regulations such as SECURE 2.0 and the U.S. Department of Labor’s environmental, social, and governance (ESG) rule were on the minds of many sponsors.
- In investment manager searches, DC-friendly vehicles with competitive pricing are a key criterion.

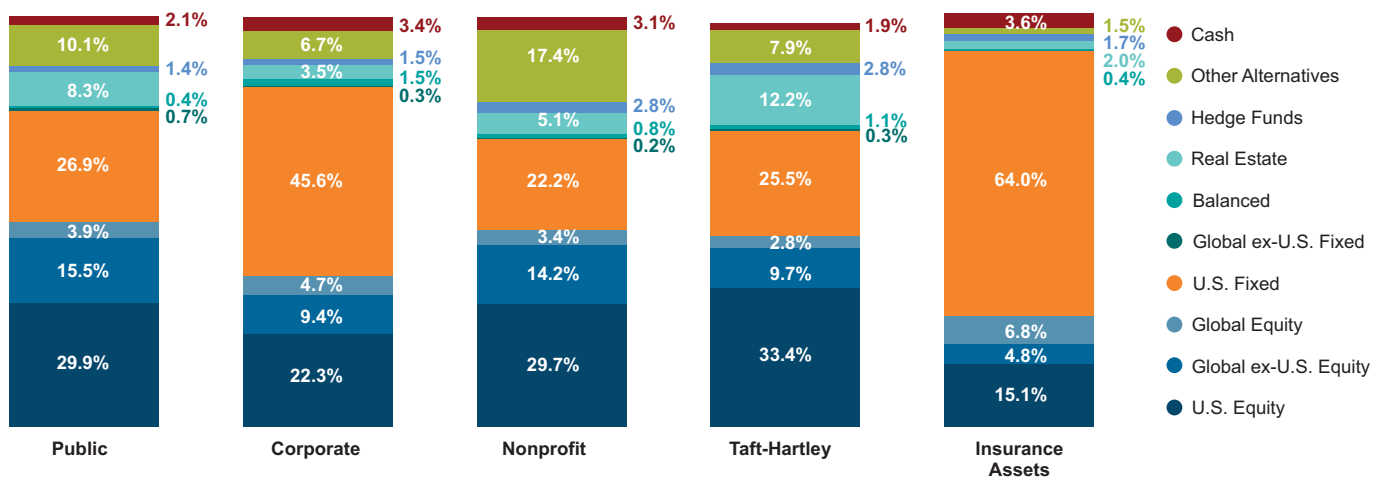
Nonprofit priorities

- Reviews of asset-allocation structures were likely in light of the changed market environment.

Insurance companies’ priorities

- They are one of the few investors that “enjoyed” the spike in yields during 2022. Typically invested to match short-term liabilities, they are focused on investment income and use it to offset operating expenses.
- As interest rates rose, insurers sold bonds with lower book yields and took losses, then re-invested at much higher book yields.

Average Asset Allocation, Callan Database Groups



Note: charts may not sum to 100% due to rounding. Other alternatives include but is not limited to: diversified multi-asset, private credit, private equity, and real assets. Source: Callan

Equity

U.S. Equities

Markets fall in final month of quarter after gains

- The S&P 500 Index posted positive returns in both October and November but fell in December. The index was up 7.6% during 4Q22 but ended 2022 down 18.1%.
- Energy was the best-performing sector during the quarter and 2022, returning 23% and 66% respectively. Consumer Discretionary and Communication Services were the only two sectors that posted negative returns in 4Q.
- Value stocks outperformed growth across the market capitalization spectrum, and for both 4Q and the full year.
- Large cap stocks (Russell 1000) outperformed small caps (Russell 2000) last quarter and for the year.
- Continued macroeconomic concerns (e.g., inflation, potential recession, geopolitical issues) led to higher volatility and a down-year for U.S. equities.

Market valuations have reset with the broad-based sell-off

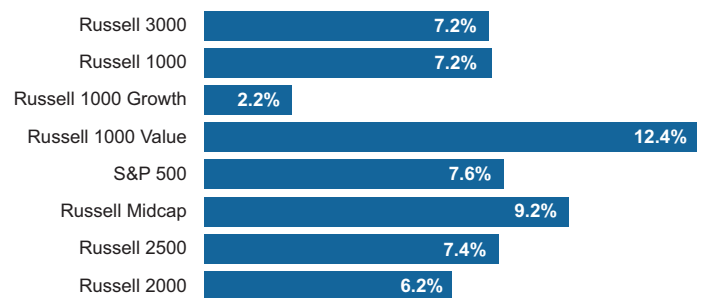
- The drop for equities in 2022 was broad-based, and almost every sector experienced negative returns. Higher interest rates impacted the growth-oriented sectors the most (e.g., Technology, Communication Services).
- Mega-cap technology stocks have underperformed, ending an extended period of market leadership.
- Large cap stocks are now trading around their average P/E ratio, but they are not yet “cheap.”
- Despite the recent outperformance of value stocks, value still looks attractive relative to growth heading into 2023.

Small cap valuations are attractive relative to large cap

- During 4Q22, the Russell 2000 was trading at a 30% discount to its historical P/E average.
- Relative to large caps, the Russell 2000's forward 12 months P/E is trading at the lowest level versus large cap stocks since the Dot-Com Bubble.
- Relative to large and mid caps, small caps have looked significantly cheaper on various valuation metrics recently.

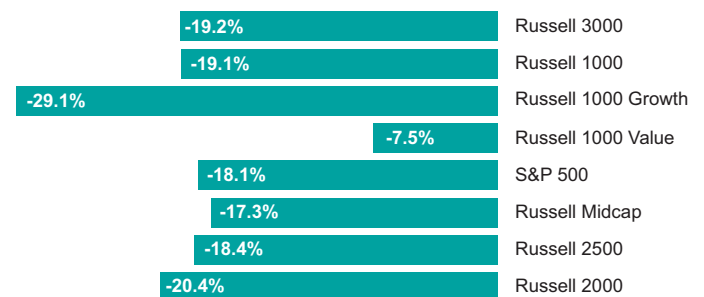
U.S. Equity: Quarterly Returns

(12/31/22)



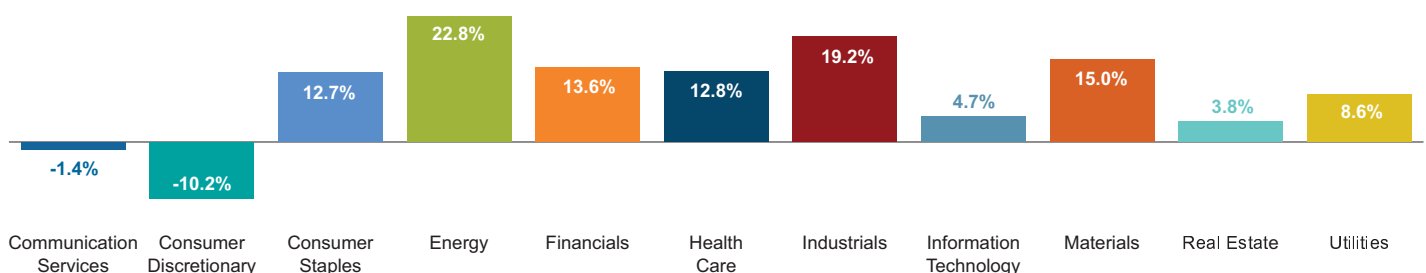
U.S. Equity: One-Year Returns

(12/31/22)



Sources: FTSE Russell and S&P Dow Jones Indices

Quarterly Performance of Industry Sectors (12/31/22)



Source: S&P Dow Jones Indices

Global Equity

Ending on a high note

4Q22 was a bright spot during a tough calendar year in global and global ex-U.S. equity markets.

Encouraging signs

- Lower-than-expected U.S. inflation data buoyed market optimism at the end of the year.
- The Fed slowed its pace of tightening, with further slowing expected in 2023.
- China reversed its zero-COVID policies, prompting exuberance from investors.

Value outpaces growth

- Value outpaced growth in developed and emerging markets.
- Economically sensitive sectors (e.g., Financials and Industrials) benefited from the anticipation of improved growth; Energy was the largest outperformer.

U.S. dollar vs. other currencies

- After reaching a multi-decade high, the dollar fell against all major currencies with signs of inflation easing.
- Despite the 7.7% decline in 4Q22, the dollar still gained nearly 8% over the full year.
- Global central banks' rate hikes and the U.S. Federal Reserve's slowing pace of tightening could prolong U.S. dollar decline.
- Continued weakening of the U.S. dollar would be a tailwind for non-U.S. equities.

What about style?

- A sustained shift to value after the recent prolonged growth cycle would likely favor non-U.S. equities over U.S. equities given the higher representation of traditional value sectors in global ex-U.S. equity universes.

China's reopening spurs hopes for emerging markets

- In addition to pivoting from its zero-COVID policy, Chinese regulators shifted to supportive policies to stabilize the property sector and tech/platform industry.

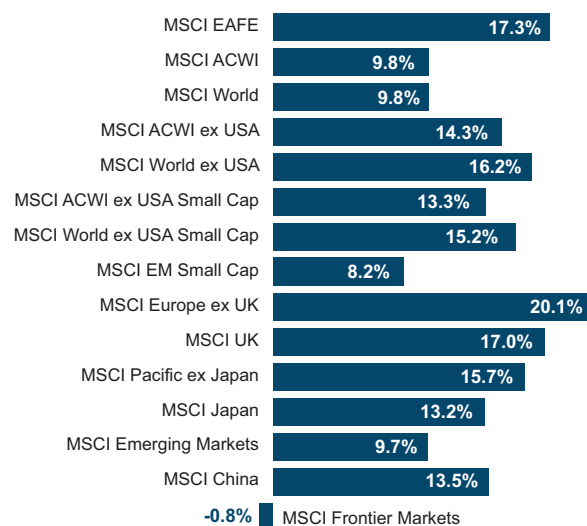
Reopening is expected to jump-start Chinese economy

- China's real GDP growth is estimated to reach 5.5% in 2023 and nearly 7% on a 4Q/4Q basis.
- Real consumption is projected to grow by 8.5% in 2023 as Chinese households have amassed \$2.6 trillion in savings.

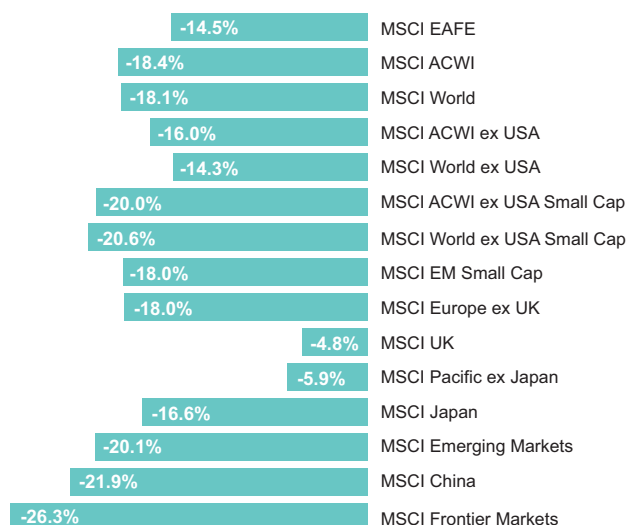
Recovery in China will spill over to other EM regions

- Growth in Chinese consumption is expected to have positive impact on tourism in Southeast Asia; goods exports in Europe, the Middle East, and Africa; and commodities in Latin America.

Global ex-U.S. Equity: Quarterly Returns (U.S. Dollar, 12/31/22)



Global ex-U.S. Equity: One-Year Returns (U.S. Dollar, 12/31/22)



Source: MSCI

Fixed Income

U.S. Fixed Income

Bonds were up in 4Q but 2022 results remain negative

- Gain for the Bloomberg US Aggregate Bond Index driven by coupon income and spread tightening; interest rates rose modestly

Rates were volatile intra-quarter

- U.S. Treasury 10-year yield: high 4.22% on 11/7; low 3.42% on 12/7
- Curve remained inverted at quarter-end: 10-year yield 3.88% and 2-year yield 4.41%; most since 1981

Fed raised rates bringing target to 4.25%-4.50%

- Median expectation from Fed is 5.1% for year-end 2023.
- Inflation showed signs of moderating but job market remained tight with solid wage growth.

Corporates and mortgages outperformed Treasuries in 4Q

- 4Q: Corporates +289 bps excess return; residential mortgage-backed securities (RMBS) +110 bps
- 2022: Corporates -125 bps excess return; RMBS -223 bps
- RMBS had worst month ever (September: -191 bps) and best month ever (November: +135 bps) in excess returns

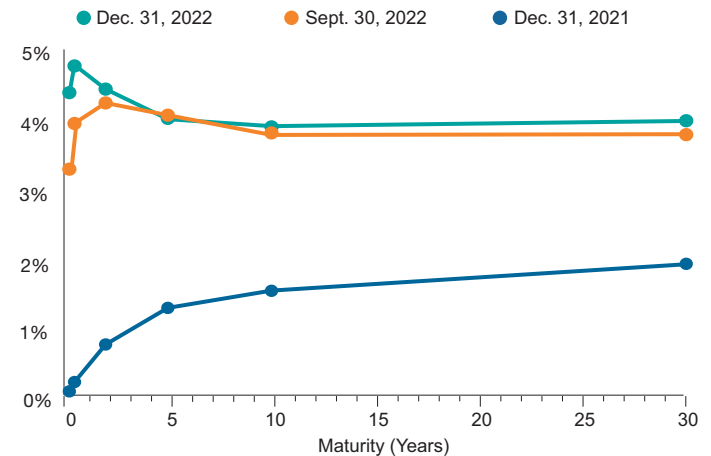
Valuations fair

- While absolute yields are higher, spreads have not widened materially, and most are close to historical averages.
- An economic slowdown could impact credit spreads.
- Higher yields have boosted forward-looking returns across sectors.

Economic slowdown clouds the corporate credit picture

- Despite prospects for an economic slowdown in 2023, fundamental credit metrics for many issuers are strong.
- Default rates are expected to tick up, albeit not to the same extent as in previous recessions.
- Investors may be biased toward higher-quality investment grade issuers as they weigh the threat of a looming recession and potential implications for increased volatility in lower-quality corporate credit markets.

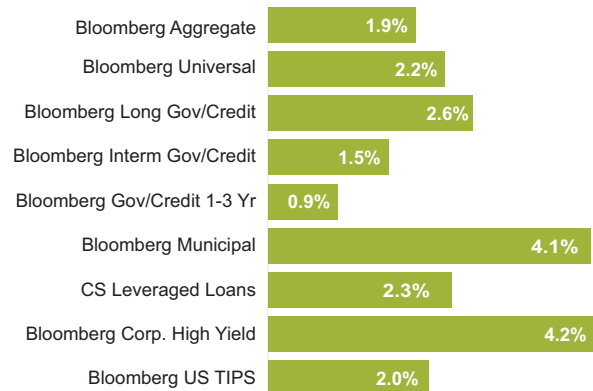
U.S. Treasury Yield Curves



Source: Bloomberg

U.S. Fixed Income: Quarterly Returns

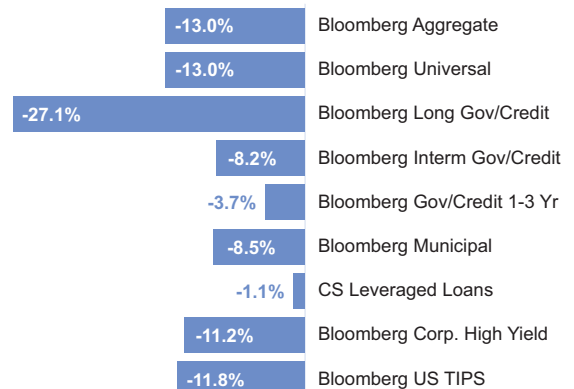
(12/31/22)



Sources: Bloomberg and Credit Suisse

U.S. Fixed Income: One-Year Returns

(12/31/22)



Sources: Bloomberg and Credit Suisse

FIXED INCOME (Continued)

TIPS: Beware of duration

- Despite a rise in inflation, TIPS saw marked declines in 2022 amid rising interest rates.
- TIPS, like nominal Treasuries, are sensitive to changes in interest rates, and as a result, shorter-duration TIPS fared better than full spectrum TIPS in 2022.
- Shorter-term TIPS exhibit a higher correlation to realized inflation but also provide a similar risk-adjusted return as that of full spectrum TIPS.

Municipal Bonds

Gains in 4Q but most 2022 results remain negative

- Municipal Bond Index calendar year return worst since 1981
- Higher quality outperformed in 4Q (AAA: +4.3%; AA: +4.1%; A: +4.0%; BBB: +3.9%; High Yield: +3.5%) and in 2022
- Munis outperformed most other fixed income sectors in 4Q and in 2022

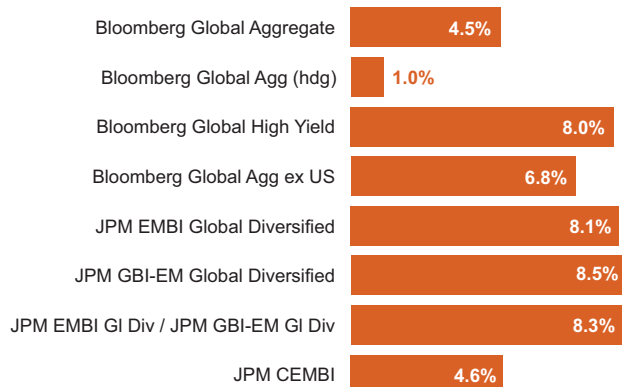
Valuations relative to U.S. Treasuries on the rich side

- 10-year AAA Muni/10-year U.S. Treasury yield ratio 68%; below 10-year average of 88%
- After-tax yield of Muni Bond Index = 6.0% (Source: Eaton Vance)

Supply/demand

- Mutual fund outflows hit a record \$122 billion in 2022, with tax loss harvesting being a key driver.
- ETFs saw inflows as some investors reinvested in them.
- Supply also down; \$71 billion in 4Q and the lowest in 13 years; 2022 issuance off roughly 20% from 2021

Global Fixed Income: Quarterly Returns (12/31/22)



Sources: Bloomberg and JPMorgan Chase

Credit quality remained stable

- State and local tax collections robust and reserves elevated; state revenues up 16% on average vs. 2021

Global Fixed Income

4Q returns driven largely by U.S. dollar weakness

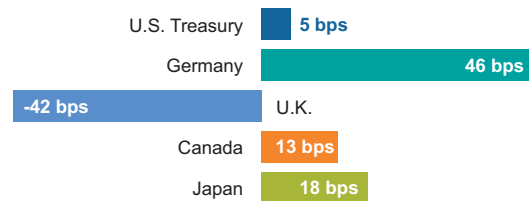
- U.S. dollar down 9% vs. euro, 10% vs. yen, 8% vs. pound
- For the year, dollar up 6% vs. euro, 13% vs. yen, and 11% vs. pound
- Rates up across most of Europe and in Japan
- Rates fell in the U.K.

Emerging market debt also did well

- Returns varied across countries but most were positive

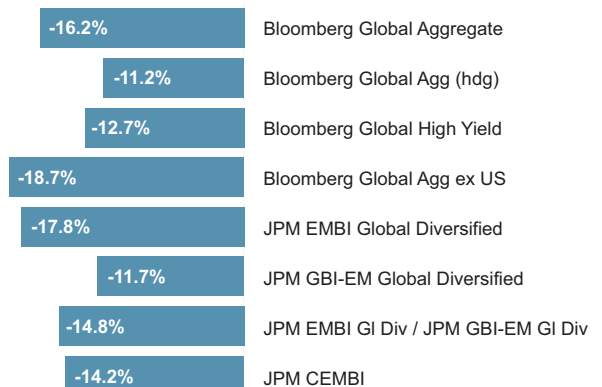
Change in 10-Year Global Government Bond Yields

3Q22 to 4Q22



Source: Bloomberg

Global Fixed Income: One-Year Returns (12/31/22)



Sources: Bloomberg and JPMorgan Chase

NPI Falls 3.5% and REITs Lag Equities

REAL ESTATE/REAL ASSETS | Kristin Bradbury, Munir Iman, and Aaron Quach

Negative appreciation in four major sectors

- The NCREIF Property Index, a measure of U.S. institutional real estate assets, fell 3.5% during 4Q22. The income return was 1.0% while the appreciation return was -4.5%.
- Hotels, which represent a small portion of the index, led property sector performance with a gain of 3.4%. Office finished last with a loss of 4.8%.
- Regionally, the South led with a loss of 2.5%, while the East was the worst performer with a loss of 3.9%.
- All major property sectors and regions, except for Hotel, experienced negative appreciation.
- The NCREIF Open-End Diversified Core Equity (ODCE) Index, representing equity ownership positions in U.S. core real estate, fell 5.2% during 4Q, with an income return of 0.59% and an appreciation return of -5.76%.

REITs lagged equity indices

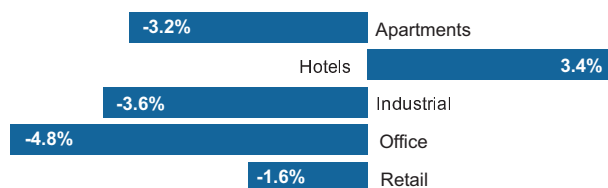
- The FTSE EPRA Nareit Developed REIT Index, a measure of global real estate securities, rose 6.9% during 4Q22 compared to a 9.8% rise for global equities (MSCI World).
- U.S. REITs, as measured by the FTSE Nareit Equity REITs Index, rose 5.2%, in contrast with the S&P 500 Index, which gained 7.6%.
- Despite strong earnings, forward REIT earnings estimates continued to weaken, reflecting the potential for an economic slowdown as well as financing cost pressures.

Callan Database Median and Index Returns* for Periods Ended 12/31/22

Private Real Assets	Quarter	Year to Date	1 Year	3 Years	5 Years	10 Years	15 Years
Real Estate ODCE Style	1.1	11.3	11.3	10.2	8.3	9.5	5.4
NFI-ODCE (value-weighted, net)	-5.2	6.5	6.5	9.0	7.7	9.1	5.3
NCREIF Property	-3.5	5.5	5.5	8.1	7.5	8.8	6.5
NCREIF Farmland	2.0	9.5	9.5	6.8	6.4	8.8	10.1
NCREIF Timberland	4.9	12.9	12.9	7.5	5.4	5.8	4.7
Public Real Estate							
Global Real Estate Style	7.0	-25.1	-25.1	-2.3	2.3	5.1	4.1
FTSE EPRA Nareit Developed	6.9	-25.1	-25.1	-4.9	-0.2	3.0	2.1
Global ex-U.S. Real Estate Style	11.0	-25.9	-25.9	-6.8	-0.9	3.9	2.1
FTSE EPRA Nareit Dev ex US	10.3	-24.3	-24.3	-8.7	-3.0	0.9	0.1
U.S. REIT Style	4.3	-24.9	-24.9	1.0	5.0	7.4	7.2
FTSE EPRA Nareit Equity REITs	5.2	-24.4	-24.4	-0.1	3.7	6.5	6.2

*Returns less than one year are not annualized. Sources: Callan, FTSE Russell, NCREIF

Sector Quarterly Returns by Property Type (12/31/22)



Source: NCREIF

- The FTSE EPRA Nareit Asia Index (USD), representing the Asia/Pacific region, rose 9.0%, lifted by a rally in rate-sensitive Australian REITs.
- European REITs, as measured by the FTSE EPRA Nareit Europe Index (USD), rose 13.9%, driven by currency tailwinds in both the euro and the pound.

Real assets held up in the quarter

- Real assets as a group performed well in 4Q.
- The S&P GSCI Index rose 3.4%; Gold (S&P Gold Spot Price Index: +9.2%), REITs (MSCI US REIT: +5.2%), infrastructure (DJB Global Infrastructure: +9.6%), and TIPS (Bloomberg TIPS: +2.0%) all posted solid returns.
- Full year results remained poor, however, for most real assets outside of those related to energy. The Alerian MLP Index gained 30.9% as it benefited from higher energy prices.

Deceleration in 2022, with Trends for 2023 Very Unclear

PRIVATE EQUITY | Gary Robertson

Private equity showed a gradual decline in 2022, but fundraising and company investment and exit activity remain comparable to the pre-pandemic levels seen in 2018 and 2019.

Fundraising ► In 2022 private equity partnerships holding final closes raised \$870 billion across 2,211 partnerships (unless otherwise noted, all data is from PitchBook and 4Q numbers are very preliminary). The dollar amount is 16% lower than 2021, but partnerships plunged by 47%. 4Q had final closes totaling \$166 billion, down 21% from 3Q. The number of funds totaled 407, down 20%.

Buyouts ► New buyout investments for 2022 totaled 12,985, down 14% from 2021. Dollar volume fell 9% to \$837 billion. 4Q saw 2,625 new investments, a 20% decrease from 3Q, but dollar volume rose 27% to \$239 billion.

VC Investments ► The year produced 51,020 rounds of new investment in venture capital (VC) companies, down 16% from 2021. Announced volume of \$509 billion was down 31%. 4Q saw 9,280 new rounds, a 20% decline from 3Q, and dollar volume fell 21% to just \$81 billion.

Exits ► Last year saw 2,901 buyout-backed private M&A exits, down 23% from 2021, with proceeds of \$590 billion, down 26%. 4Q had 551 private exits, down 22% from 3Q, with proceeds

of \$132 billion, down 2%. The year's 201 buyout-backed IPOs dropped 55% from 2021, with proceeds of \$33 billion, down 75%. 4Q IPOs numbered 50, down 21% from 3Q, and proceeds of \$8 billion declined 27%. Venture-backed M&A exits for the year totaled 2,625, down 24% from 2021. Announced dollar volume of \$110 billion fell 57%. The final quarter had 462 exits, down 20% from 3Q, and value of only \$7 billion, plunging 72%. The year's 317 venture-backed IPOs sank 51% from 2021, with proceeds of \$41 billion, falling 75%. There were 106 in 4Q, up 33% from 3Q, but the \$8 billion of proceeds fell 47%.

Returns ► In 3Q, and in the two prior quarters, private equity fell by only about 35% of the public equity market's decline. With the upcoming 4Q valuations being subject to annual audits, continued moderate declines are likely.

Funds Closed 1/1/22 to 12/31/22

Strategy	No. of Funds	Amt (\$mm)	Share
Venture Capital	1,369	259,199	30%
Growth Equity	156	117,800	14%
Buyouts	477	362,629	42%
Mezzanine Debt	17	26,998	3%
Distressed/Special Credit	40	50,955	6%
Energy	7	2,340	0%
Secondary and Other	116	41,703	5%
Fund-of-funds	29	8,808	1%
Totals	2,211	870,432	100%

Source: PitchBook (Figures may not total due to rounding.)

Private Equity Performance (%) (Pooled Horizon IRRs through 9/30/22*)

Strategy	Quarter	1 Year	3 Years	5 Years	10 Years	15 Years	20 Years	25 Years
All Venture	-2.7	-9.1	28.4	23.8	19.4	13.6	12.4	20.6
Growth Equity	-1.8	-9.4	20.8	18.4	15.7	12.8	14.3	14.5
All Buyouts	-1.9	-1.5	18.5	16.1	15.3	10.6	14.7	13.1
Mezzanine	0.2	5.0	11.8	11.1	11.3	10.3	11.1	10.0
Credit Opportunities	0.7	3.9	8.4	7.2	8.3	8.6	9.9	9.5
Control Distressed	-0.2	11.3	19.4	13.8	12.7	10.5	11.9	11.9
All Private Equity	-1.8	-3.7	20.2	17.3	15.5	11.3	13.7	13.8
S&P 500	-4.9	-15.5	8.2	9.2	11.7	8.0	9.8	7.5
Russell 3000	-4.5	-17.6	7.7	8.6	11.4	7.9	9.9	7.5

Note: Private equity returns are net of fees. Sources: Refinitiv/Cambridge and S&P Dow Jones Indices

*Most recent data available at time of publication

Note: Transaction count and dollar volume figures across all private equity measures are preliminary figures and are subject to update in subsequent versions of the *Capital Markets Review* and other Callan publications.

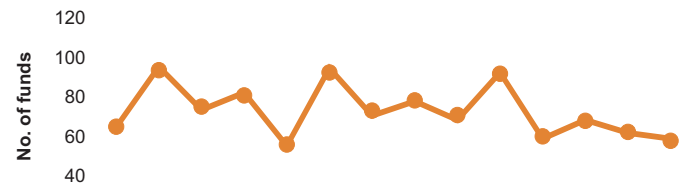
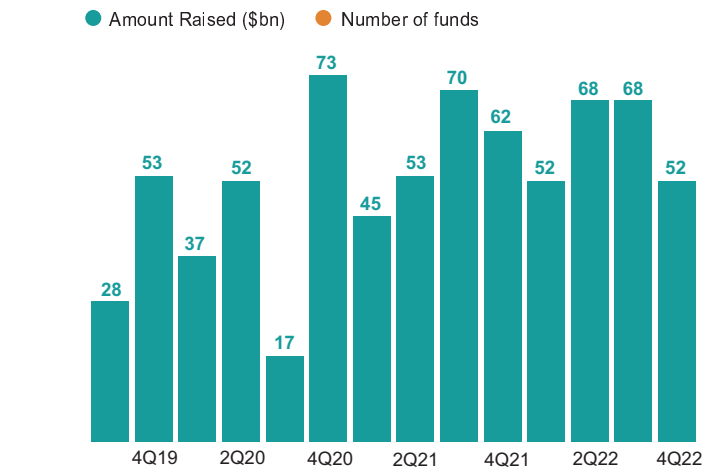
Investor Appetite Continues, but Strategies of Interest Shift

PRIVATE CREDIT | Catherine Beard

Upper-middle-market direct lending gets a new look

- During 4Q22, clients took a new look at upper-middle-market direct lending as all-in spreads have widened by over 400 bps and lenders are able to get tighter terms. Strong deal volume was driven partially by a shift from public to private market debt financings in the recent market environment.
- As economic headwinds are expected to create stress on over-levered companies, there is a renewed interest in stressed and distressed investment opportunities.
- Demand continued to be strong for less-competitive areas of private credit with high barriers to entry and attractive risk/reward opportunities such as specialty finance, non-sponsor, lower-middle-market, and opportunistic lending.
- LPs are seeking alternative structures designed to streamline the investment process while improving underlying liquidity. A number of GPs are launching evergreen structures and private, non-tradeable business development companies as a response to LP interest.
- Private credit performance varies across sub-asset class and underlying return drivers. On average, the asset class has generated net IRRs of 8% to 10% for trailing periods ended Sept. 30, 2022. Higher-risk strategies performed better than lower-risk strategies.
- As interest rates declined after the GFC, private credit attracted increased interest from institutional investors.
- Private credit fundraising was robust leading into the COVID dislocation, with a particular focus on direct lending, asset-based lending, and distressed strategies.
- In the current rising rate environment, a renewed focus has been placed on relative value, downside protection, and managers' internal workout resources.

Private Credit Fundraising (\$bn)



Source: Preqin

- There is also interest in strategies with strong collateral protection such as asset-based lending as well as capital solutions and distressed strategies.
- Larger sponsor-backed lending is seeing a new focus due to the disintermediation of high yield/broadly syndicated loans by private debt

Private Credit Performance (%) (Pooled Horizon IRRs through 9/30/22*)

Strategy	Quarter	1 Year	3 Years	5 Years	8 Years	10 Years	15 Years	20 Years
Senior Debt	-2.4	-3.5	4.6	5.1	5.7	5.9	6.3	6.1
Mezzanine	0.2	5.0	11.8	11.1	10.8	11.3	10.5	11.3
Credit Opportunities	0.7	3.9	8.4	7.2	6.6	8.3	8.6	9.7
Total Private Credit	-0.1	2.6	8.4	7.7	7.4	8.6	8.8	9.7

Source: Refinitiv/Cambridge

*Most recent data available at time of publication

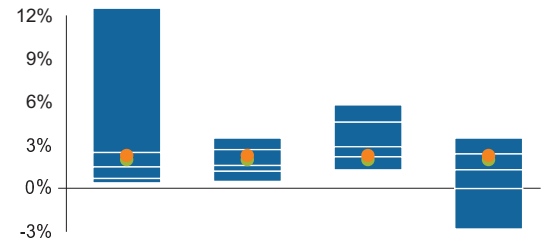
Managers See Declines but Outpace Benchmarks

HEDGE FUNDS/MACs | Joe McGuane

- Risk assets rallied in 4Q22, as U.S. inflation showed a steady decline from the peak over summer, boosting hopes for fewer rate increases heading into 2023. In addition, corporate earnings were generally better than expected, and China announced the lifting of its zero-COVID policy.
- As the quarter wore on, the Federal Reserve remained committed to tighter monetary conditions, signaling more rate hikes in 2023 in addition to the 50 basis point increase at its December meeting.
- Despite a December sell-off, the S&P 500 gained 8% for the quarter. Value significantly outperformed growth, and stocks across most sectors rebounded, with the energy sector notably higher for the quarter. Global ex-U.S. equities outperformed U.S. equities, as cooling energy prices dragged down inflation. China's reopening and easing of the zero-COVID policy led to Asian equities recovering their initial losses from October.

Hedge Fund Style Group Returns

(12/31/22)



	Absolute Return FOF	Core Div. FOF	Long/Short Equity FOF	Institutional Hedge Funds
10th Percentile	12.5	3.5	5.8	3.5
25th Percentile	2.5	2.7	4.6	2.4
Median	1.5	1.6	2.9	1.3
75th Percentile	0.7	1.2	2.2	0.0
90th Percentile	0.4	0.5	1.3	-2.8
HFRI Fund Weighted	2.3	2.3	2.3	2.3
90-Day T-Bill + 5%	2.0	2.0	2.0	2.0

Sources: Callan, Credit Suisse, Federal Reserve

Callan Peer Group Median and Index Returns* for Periods Ended 12/31/22

Hedge Fund Universe	Quarter	1 Year	3 Years	5 Years	10 Years	15 Years
Callan Institutional Hedge Fund Peer Group	1.3	4.8	6.4	6.0	6.2	6.7
Callan Fund-of-Funds Peer Group	1.9	-1.3	4.9	4.2	4.7	3.5
Callan Absolute Return FOF Style	1.5	4.0	5.6	4.8	5.1	3.9
Callan Core Diversified FOF Style	1.6	-1.2	5.0	4.1	4.4	3.4
Callan Long/Short Equity FOF Style	2.9	-10.4	2.2	3.5	4.8	3.6
HFRI Fund-Weighted Index	2.3	-4.2	5.7	4.4	4.7	3.6
HFRI Fixed Convertible Arbitrage	3.1	-1.2	6.3	5.1	5.1	4.9
HFRI Distressed/Restructuring	2.0	-3.1	7.8	4.9	4.8	4.2
HFRI Emerging Markets	5.1	-12.7	1.7	0.9	2.9	1.4
HFRI Equity Market Neutral	1.1	1.6	2.8	1.9	3.0	1.9
HFRI Event-Driven	3.3	-4.6	5.4	4.3	4.9	4.2
HFRI Relative Value	1.3	-0.8	3.3	3.4	4.0	4.3
HFRI Macro	-1.3	9.0	7.3	4.8	3.1	2.9
HFRI Equity Hedge	4.2	-10.2	5.7	4.5	5.6	3.6
HFRI Multi-Strategy	1.1	-9.8	3.7	1.8	2.9	2.8
HFRI Merger Arbitrage	2.5	2.9	6.2	5.7	4.6	4.0
90-Day T-Bill + 5%	2.0	6.5	5.7	6.3	5.8	5.7

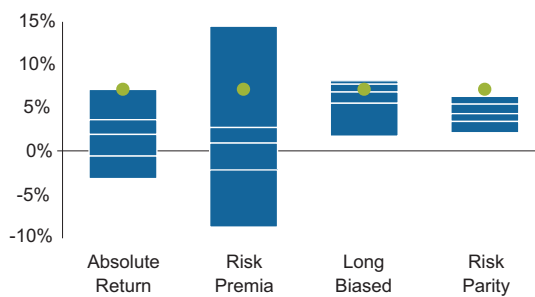
*Net of fees. Sources: Callan, Credit Suisse, Hedge Fund Research

- Hedge funds ended the final quarter on a positive note, as equity hedge managers clawed back some of their negative performance. Those with a focus on real estate, energy, and industrials saw positive gains while growth-focused managers continued to lag.
- Event-driven strategies had a nice quarter, driven primarily by their event equities that moved higher with the broader markets.
- Relative value strategies finished out the year on a strong note, as managers continued to benefit from elevated rate volatility levels, the convergence of key relative value relationships, global quantitative tightening, and uncertainty surrounding central bank actions.
- Macro strategies ended the quarter slightly lower, as losses were taken in short U.S. equities themes, along with short positions in the Chinese renminbi versus the U.S. dollar.
- The median Callan Institutional Hedge Fund Peer Group rose 1.3%.
- Within the HFRI indices, the best-performing strategy last quarter was the emerging market index (+5.1%), as Asian equities rallied in November and December.
- Across the Callan Hedge FOF Database, the median Absolute Return FOF rose 1.5%, as their allocations to multi-strategy managers put up solid returns on the year.

- The median Callan Long-Short Equity FOF increased 2.9%, as managers benefited from an equity rally in October and November.
- The Callan Core Diversified FOF gained 1.6%, as equity hedge exposure drove performance, offsetting some negative performance from macro managers.
- Within Callan’s database of liquid alternative solutions, the median Long Biased MAC manager generated a gain of 6.9%, as long equity exposure drove performance for the peer group.
- The Callan Risk Parity MAC index, which typically targets an equally risk-weighted allocation to the major asset classes with leverage, was up 4.4%.
- The Callan Absolute Return MAC peer returned a positive 2.0%, as a bias toward value equities and credit helped performance on the quarter.
- The Callan Risk Premia MAC peer rose 1.0%, as equity performance was slightly offset by currency exposure.

MAC Style Group Returns

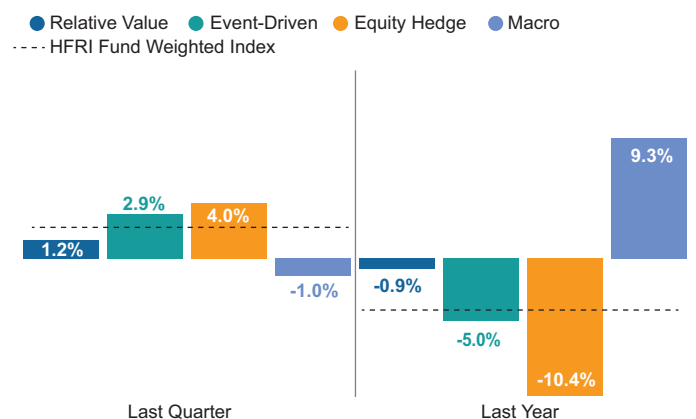
(12/31/22)



10th Percentile	7.2	14.5	8.2	6.4
25th Percentile	3.7	2.8	7.8	5.5
Median	2.0	1.0	6.9	4.4
75th Percentile	-0.5	-2.1	5.6	3.5
90th Percentile	-3.1	-8.7	1.8	2.2
60% MSCI ACWI/ 40% Bloomberg Agg	6.6	6.6	6.6	6.6

HFRI Hedge Fund-Weighted Strategy Returns

(12/31/22)



Source: HFRI

Sources: Bloomberg, Callan, Eurekahedge, S&P Dow Jones Indices

Third Straight Drop for DC Index

DEFINED CONTRIBUTION | Patrick Wisdom

Performance: Index dips for third straight quarter

- The Callan DC Index™ fell 4.6% in 3Q22, its third straight quarterly decline, which brought the Index's trailing one-year loss to 16.7%.
- The Age 45 Target Date Fund fell 6.1% in the quarter.

Growth Sources: Another decline in balances

- Balances within the DC Index declined by 4.7% after a 12.3% decrease the second quarter.

Turnover: Net transfers well below average

- Turnover (i.e., net transfer activity levels within DC plans) in the DC Index decreased to 0.14% from the previous quarter's 0.37%. With the decrease, the Index's historical average (0.56%) fell slightly.

Net Cash Flow Analysis: TDFs reclaim top spot

- After taking a back seat to stable value in 2Q22, TDFs reclaimed the top spot, garnering 73.6% of net flows.
- Investors withdrew assets from U.S. large cap equity (-33.1%); global ex-U.S. equity saw net inflows (+9.2%).

Equity Allocation: Drop in exposure

- The Index's overall allocation to equity (69.3%) fell slightly from the previous quarter's level (69.8%).

Asset Allocation: Capital preservation gains

- Stable value (10.0%) and U.S. fixed income (5.9%) were among the asset classes with the largest percentage increases in allocation.

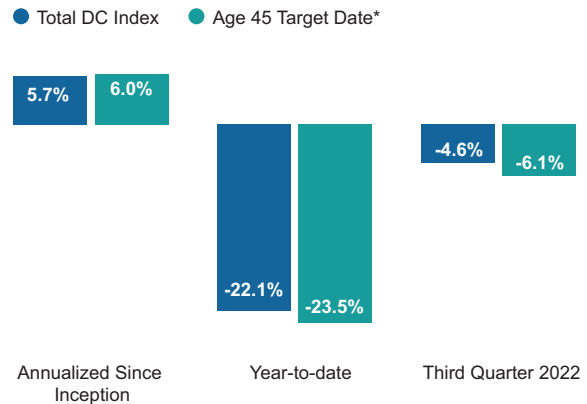
Prevalence of Asset Class: Balanced funds dip

- The prevalence of a balanced fund (40.9%) decreased again to its lowest level since the inception of the Index in 2006.

Underlying fund performance, asset allocation, and cash flows of more than 100 large defined contribution plans representing approximately \$400 billion in assets are tracked in the Callan DC Index.

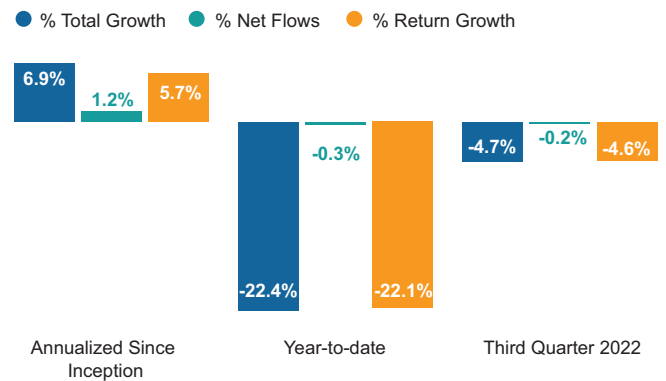
Investment Performance

(9/30/22)



Growth Sources

(9/30/22)



Net Cash Flow Analysis (3Q22)

(Top Two and Bottom Two Asset Gatherers)

Asset Class	Flows as % of Total Net Flows
Target Date Funds	73.6%
Brokerage Window	13.8%
U.S. Small/Mid Cap	-25.3%
U.S. Large Cap	-33.1%
Total Turnover**	0.1%

Data provided here is the most recent available at time of publication.

Source: Callan DC Index

Note: DC Index inception date is January 2006.

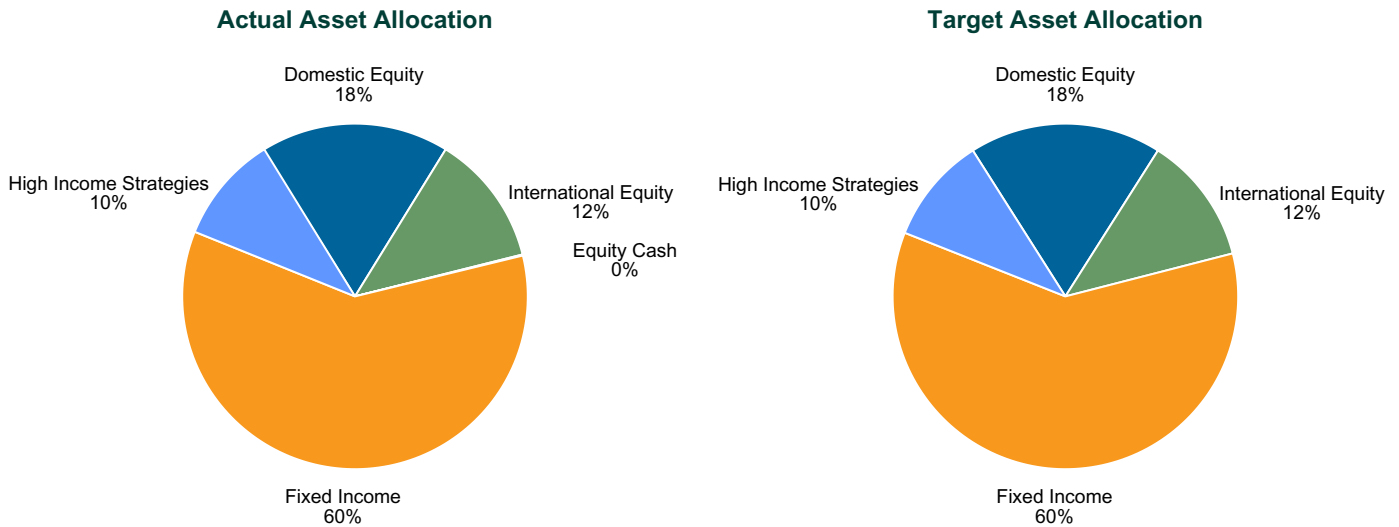
* The Age 45 Fund transitioned from the average 2035 TDF to the 2040 TDF in June 2018.

** Total Index "turnover" measures the percentage of total invested assets (transfers only, excluding contributions and withdrawals) that moved between asset classes.

Actual vs. Target
Asset Allocation

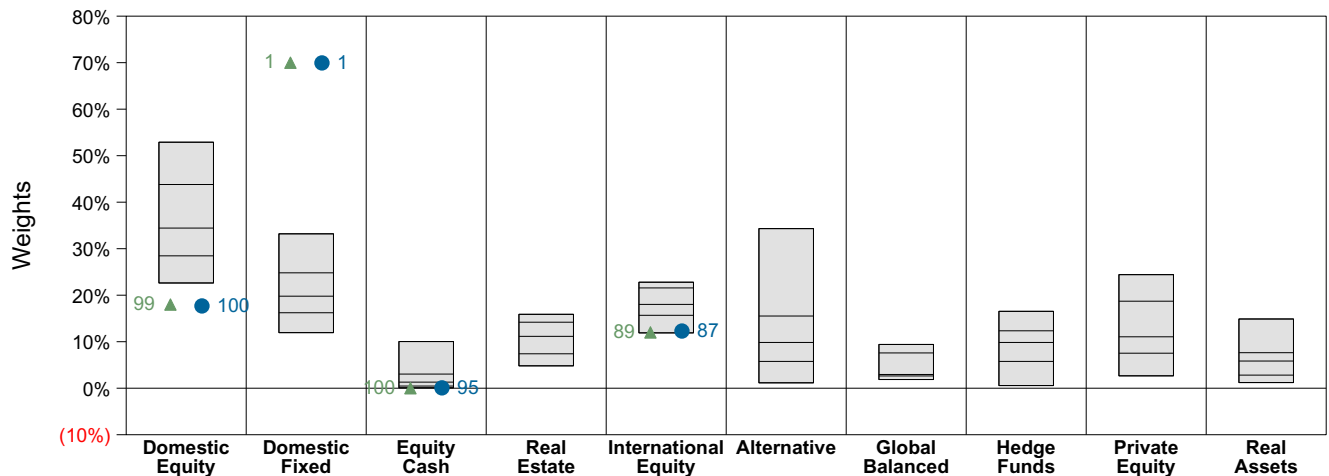
Actual vs Target Asset Allocation As of December 31, 2022

The top left chart shows the Fund's asset allocation as of December 31, 2022. The top right chart shows the Fund's target asset allocation as outlined in the investment policy statement. The bottom chart ranks the fund's asset allocation and the target allocation versus the Callan Endow/Foundation - Mid (100M-1B).



Asset Class	\$000s Actual	Weight Actual	Target	Percent Difference	\$000s Difference
Domestic Equity	221,553	17.7%	18.0%	(0.3%)	(3,929)
International Equity	154,026	12.3%	12.0%	0.3%	3,704
Equity Cash	911	0.1%	0.0%	0.1%	911
Fixed Income	750,250	59.9%	60.0%	(0.1%)	(1,357)
High Income Strategies	125,939	10.1%	10.0%	0.1%	671
Total	1,252,679	100.0%	100.0%		

Asset Class Weights vs Callan Endow/Foundation - Mid (100M-1B)



	Domestic Equity	Domestic Fixed	Equity Cash	Real Estate	International Equity	Alternative	Global Balanced	Hedge Funds	Private Equity	Real Assets
10th Percentile	52.90	33.20	10.03	15.89	22.79	34.32	9.41	16.53	24.42	14.89
25th Percentile	43.80	24.81	3.04	14.19	21.57	15.52	7.59	12.35	18.71	7.64
Median	34.43	19.79	1.31	11.15	18.02	9.84	2.95	9.84	11.06	5.85
75th Percentile	28.46	16.22	0.47	7.40	15.68	5.76	2.64	5.76	7.53	2.81
90th Percentile	22.63	11.95	0.09	4.81	11.90	1.16	1.87	0.57	2.66	1.22
Fund ●	17.69	69.95	0.07	-	12.30	-	-	-	-	-
Target ▲	18.00	70.00	0.00	-	12.00	-	-	-	-	-
% Group Invested	95.24%	92.86%	76.19%	59.52%	95.24%	66.67%	14.29%	38.10%	52.38%	28.57%

* Current Quarter Target = 52.5% Blmbg Aggregate, 18.0% Russell 3000 Index, 12.0% MSCI ACWI xUS, 8.5% Blmbg HY Corp, 7.5% Blmbg Gov/Cred 1-3 Yr and 1.5% ICE All US Cap Secs.

Investment Manager Asset Allocation

The table below contrasts the distribution of assets across the Fund's investment managers as of December 31, 2022, with the distribution as of September 30, 2022. The change in asset distribution is broken down into the dollar change due to Net New Investment and the dollar change due to Investment Return.

Asset Distribution Across Investment Managers

	December 31, 2022			Inv. Return	September 30, 2022	
	Market Value	Weight	Net New Inv.		Market Value	Weight
Total Equity (1)	\$375,979,198	30.01%	\$(3,466,799)	\$34,542,833	\$344,903,165	29.22%
Domestic Equity	\$221,553,491	17.69%	\$559,898	\$14,654,184	\$206,339,409	17.48%
iShares S&P 1500 ETF	221,553,491	17.69%	559,898	14,654,184	206,339,409	17.48%
International Equity	\$154,025,745	12.30%	\$(2,870,268)	\$19,886,266	\$137,009,748	11.61%
iShares MSCI Emerging ETF	42,469,541	3.39%	(599,200)	3,982,213	39,086,528	3.31%
iShares MSCI Canada ETF	15,357,800	1.23%	(230,621)	1,154,999	14,433,423	1.22%
iShares Core MSCI EAFE ETF	96,198,404	7.68%	(2,040,447)	14,749,054	83,489,798	7.07%
Equity Cash	399,962	0.03%	(1,156,429)	2,383	1,554,007	0.13%
Total Fixed Income	\$750,250,020	59.89%	\$34,221,709	\$11,965,917	\$704,062,393	59.66%
Market Duration	\$648,055,056	51.73%	\$34,801,280	\$10,622,130	\$602,631,645	51.06%
Colorado Treasurer's Portfolio	648,055,056	51.73%	34,801,280	10,622,130	602,631,645	51.06%
Short Duration	\$102,194,964	8.16%	\$(579,571)	\$1,343,787	\$101,430,748	8.59%
Janus Henderson (2)	102,194,964	8.16%	(579,571)	1,343,787	101,430,748	8.59%
High Income Strategies	\$125,938,875	10.05%	\$(1,795,350)	\$5,029,902	\$122,704,323	10.40%
High Yield Fixed Income	\$107,219,906	8.56%	\$(1,477,809)	\$4,455,674	\$104,242,042	8.83%
Mackay Shield US High Yield (3)	107,219,906	8.56%	(1,477,809)	4,455,674	104,242,042	8.83%
Preferred Securities	\$18,718,969	1.49%	\$(317,540)	\$574,228	\$18,462,282	1.56%
Principal Preferred Securities (3)	18,718,969	1.49%	(317,540)	574,228	18,462,282	1.56%
Cash Available For Investing	\$510,753	0.04%	\$(8,097,764)	\$64,793	\$8,543,724	0.72%
Total Fund	\$1,252,678,846	100.0%	\$20,861,796	\$51,603,444	\$1,180,213,605	100.0%

(1) Funded in December 2017.

(2) Funded in November 2018.

(3) Funded in July 2020.

Investment Manager Returns

The table below details the rates of return for the Fund's investment managers over various time periods ended December 31, 2022. Negative returns are shown in red, positive returns in black. Returns for one year or greater are annualized. The first set of returns for each asset class represents the composite returns for all the fund's accounts for that asset class.

Returns for Periods Ended December 31, 2022

	Last Quarter	Year to Date	Last 5 Years	Last 10 Years
Total Equity	10.05%	(18.00%)	5.66%	-
60% Russell 3000/40% ACWI ex US	10.02%	(17.85%)	5.63%	8.81%
Domestic Equity	7.11%	(19.36%)	8.63%	-
Russell 3000 Index	7.18%	(19.21%)	8.79%	12.13%
International Equity	14.49%	(16.29%)	1.11%	-
MSCI ACWI ex US	14.28%	(16.00%)	0.88%	3.80%
Total Fixed Income	1.66%	(11.73%)	0.27%	1.24%
Total Fixed Income Benchmark (1)	1.75%	(11.88%)	0.13%	0.94%
Market Duration	1.70%	(12.93%)	0.10%	1.15%
Colorado Treasurer's Portfolio (2)	1.70%	(12.93%)	0.10%	1.15%
PSPF Custom Benchmark (3)	1.87%	(13.01%)	0.02%	0.88%
Short Duration	1.33%	(3.68%)	-	-
Janus Henderson Short Duration	1.33%	(3.68%)	-	-
Blmbg Gov/Cred 1-3 Yr	0.89%	(3.69%)	0.92%	0.88%
85% 1-3YR G/C; 15% 1-3YR BB (4)	1.16%	(3.58%)	1.26%	1.33%
High Income Strategies	4.15%	(7.65%)	-	-
High Income Strategies Benchmark (5)	3.55%	(11.73%)	2.18%	-
High Yield Fixed Income	4.29%	(7.26%)	-	-
Mackay Shield US High Yield	4.29%	(7.26%)	-	-
Blmbg High Yield	4.17%	(11.19%)	2.31%	4.03%
Preferred Securities	3.34%	(9.94%)	-	-
Principal Preferred Securities	3.34%	(9.94%)	-	-
ICE BofA US All Cap Secs	0.03%	(14.85%)	1.41%	-
Total Fund w/o CAI (6)	4.43%	(13.18%)	1.58%	1.91%
Total Fund Benchmark (6)	4.41%	(13.50%)	1.70%	1.72%

(1) Current quarter's Total Fixed Income Benchmark consists of 88.4% Bloomberg U.S. Aggregate and 11.6% Bloomberg Gov/Credit 1-3 Yrs.

(2) Includes cash returns starting July 2017.

(3) The PSPF Fixed Income Portfolio Custom Benchmark consisted of 37% U.S. Treasury 1-10 Year Index, 34% Mortgages 0-10 Year WAL Index, 19% AAA U.S. Agencies 1-10 Year Index and 10% U.S. Corporates AAA Rated 1-10 Years Index through March 31, 2017, 100% Bloomberg U.S. Aggregate, thereafter.

(4) Benchmark consists of 85% Bloomberg 1-3 Year Government/Credit Index and 15% BofAML 1-3 Year BB US Cash Pay High Yield Index.

(5) Benchmark consists of 85% Blmbg High Yield Index and 15% ICE BofA US All Cap Secs Index.

(6) Current quarter's Total Fund Benchmark consists of 18% Russell 3000, 12% MSCI ACWI ex US, 52.5% Bloomberg U.S. Aggregate, 7.5% Bloomberg Gov/Credit 1-3 Yrs, 8.5% Bloomberg US High Yield and 1.5% ICE BofA U.S. All Capital Securities Index. See pg. 22 for full benchmark history.

The Total Fund return calculations do not include Cash Available for Investing.

*All composites and manager returns are shown gross-of-fees.

Investment Manager Returns

The table below details the rates of return for the Fund's investment managers over various time periods ended June 30. Negative returns are shown in red, positive returns in black. Returns for one year or greater are annualized. The first set of returns for each asset class represents the composite returns for all the fund's accounts for that asset class.

	6/2022- 12/2022	FY 2022	FY 2021	FY 2020	FY 2019
Total Equity	2.28%	(15.85%)	41.59%	1.82%	5.64%
60% Russell 3000/40% ACWI ex US	2.72%	(16.06%)	40.77%	1.90%	5.92%
Domestic Equity	2.26%	(13.95%)	44.30%	6.40%	8.85%
Russell 3000 Index	2.40%	(13.87%)	44.16%	6.53%	8.98%
International Equity	2.08%	(18.97%)	37.78%	(4.71%)	0.67%
MSCI ACWI ex US	2.96%	(19.42%)	35.72%	(4.80%)	1.29%
Total Fixed Income	(2.33%)	(9.76%)	(0.27%)	8.79%	7.38%
Total Fixed Income Benchmark (1)	(2.67%)	(9.46%)	(0.26%)	8.28%	7.52%
Market Duration	(2.82%)	(10.55%)	(0.55%)	9.26%	7.77%
Colorado Treasurer's Portfolio (2)	(2.82%)	(10.55%)	(0.55%)	9.26%	7.77%
PSPF Custom Benchmark (3)	(2.97%)	(10.29%)	(0.33%)	8.74%	7.87%
Short Duration	0.66%	(4.33%)	2.33%	4.41%	-
Janus Henderson Short Duration	0.66%	(4.33%)	2.33%	4.41%	-
Blmbg Gov/Cred 1-3 Yr	(0.60%)	(3.56%)	0.44%	4.20%	4.27%
85% 1-3YR G/C; 15% 1-3YR BB (4)	(0.01%)	(3.83%)	1.70%	3.94%	4.59%
High Income Strategies	3.61%	(9.38%)	-	-	-
High Income Strategies Benchmark (5)	2.80%	(12.89%)	15.13%	0.46%	7.58%
High Yield Fixed Income	3.89%	(9.09%)	-	-	-
Mackay Shield US High Yield	3.89%	(9.09%)	-	-	-
Blmbg High Yield	3.50%	(12.81%)	15.37%	0.03%	7.48%
Preferred Securities	2.03%	(11.11%)	-	-	-
Principal Preferred Securities	2.03%	(11.11%)	-	-	-
ICE BofA US All Cap Secs	(1.17%)	(13.33%)	13.67%	2.86%	8.12%
Total Fund w/o CAI (6)	(0.31%)	(11.58%)	8.30%	7.37%	6.94%
Total Fund Benchmark (6)	(0.47%)	(11.64%)	7.98%	7.87%	7.49%

(1) Current quarter's Total Fixed Income Benchmark consists of 88.4% Bloomberg U.S. Aggregate and 11.6% Bloomberg Gov/Credit 1-3 Yrs.

(2) Includes cash returns starting July 2017.

(3) The PSPF Fixed Income Portfolio Custom Benchmark consisted of 37% U.S. Treasury 1-10 Year Index, 34% Mortgages 0-10 Year WAL Index, 19% AAA U.S. Agencies 1-10 Year Index and 10% U.S. Corporates AAA Rated 1-10 Years Index through March 31, 2017, 100% Bloomberg U.S. Aggregate, thereafter.

(4) Benchmark consists of 85% Bloomberg 1-3 Year Government/Credit Index and 15% BofAML 1-3 Year BB US Cash Pay High Yield Index.

(5) Benchmark consists of 85% Blmbg High Yield Index and 15% ICE BofA US All Cap Secs Index.

(6) Current quarter's Total Fund Benchmark consists of 18% Russell 3000, 12% MSCI ACWI ex US, 52.5% Bloomberg U.S. Aggregate, 7.5% Bloomberg Gov/Credit 1-3 Yrs, 8.5% Bloomberg US High Yield and 1.5% ICE BofA U.S. All Capital Securities Index. See pg. 22 for full benchmark history.

The Total Fund return calculations do not include Cash Available for Investing.

*All composites and manager returns are shown gross-of-fees.

Total Fund Benchmark Definition

Inception to Dec 31, 2017		
Market Duration	PFSF Fixed Income Benchmark	100%

January 1st, 2018 - December 31th, 2018		
US Equity	Russell 3000 Index	12.00%
International Equity	MSCI ACWI ex US	8.00%
Market Duration	Bloomberg Barclays Aggregate	72.00%
Short Duration	Bloomberg Barclays Gov/Cred 1-3 Yr	8.00%

January 1st, 2019 - September 30th, 2020		
US Equity	Russell 3000 Index	12.00%
International Equity	MSCI ACWI ex US	8.00%
Market Duration	Bloomberg Barclays Aggregate	72.00%
Short Duration	Bloomberg Barclays Gov/Cred 1-3 Yr	8.00%

October 1st, 2020 - March 31st, 2021		
US Equity	Russell 3000 Index	12.00%
International Equity	MSCI ACWI ex US	8.00%
Market Duration	Bloomberg Barclays Aggregate	67.50%
Short Duration	Bloomberg Barclays Gov/Cred 1-3 Yr	7.50%
High Yield	Bloomberg Barclays US High Yield	4.25%
Preferred Securities	ICE BofA U.S. All Capital Securities Index	0.75%

April 1st, 2021 - June 30th, 2021		
US Equity	Russell 3000 Index	14.70%
International Equity	MSCI ACWI ex US	9.80%
Market Duration	Bloomberg Barclays Aggregate	61.50%
Short Duration	Bloomberg Barclays Gov/Cred 1-3 Yr	7.50%
High Yield	Bloomberg Barclays US High Yield	5.50%
Preferred Securities	ICE BofA U.S. All Capital Securities Index	1.00%

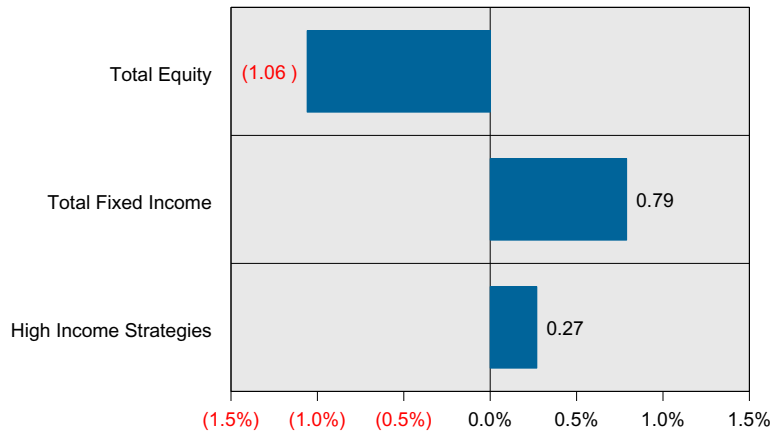
July 1st, 2021 - September 30, 2021		
US Equity	Russell 3000 Index	16.35%
International Equity	MSCI ACWI ex US	10.90%
Market Duration	Bloomberg Barclays Aggregate	57.00%
Short Duration	Bloomberg Barclays Gov/Cred 1-3 Yr	7.50%
High Yield	Bloomberg Barclays US High Yield	7.00%
Preferred Securities	ICE BofA U.S. All Capital Securities Index	1.25%

October 1st, 2021 - Current		
US Equity	Russell 3000 Index	18.00%
International Equity	MSCI ACWI ex US	12.00%
Market Duration	Bloomberg Barclays Aggregate	52.50%
Short Duration	Bloomberg Barclays Gov/Cred 1-3 Yr	7.50%
High Yield	Bloomberg Barclays US High Yield	8.50%
Preferred Securities	ICE BofA U.S. All Capital Securities Index	1.50%

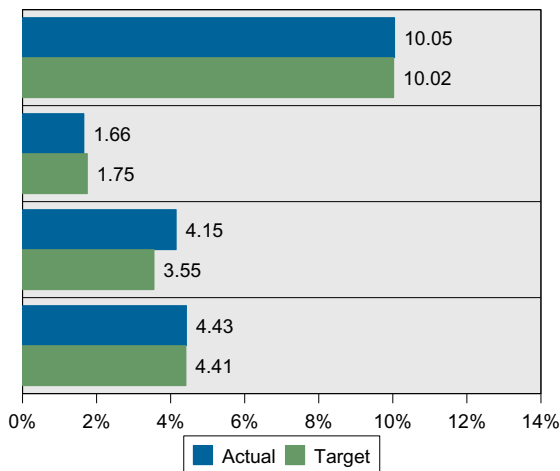
Quarterly Total Fund Relative Attribution - December 31, 2022

The following analysis approaches Total Fund Attribution from the perspective of relative return. Relative return attribution separates and quantifies the sources of total fund excess return relative to its target. This excess return is separated into two relative attribution effects: Asset Allocation Effect and Manager Selection Effect. The Asset Allocation Effect represents the excess return due to the actual total fund asset allocation differing from the target asset allocation. Manager Selection Effect represents the total fund impact of the individual managers excess returns relative to their benchmarks.

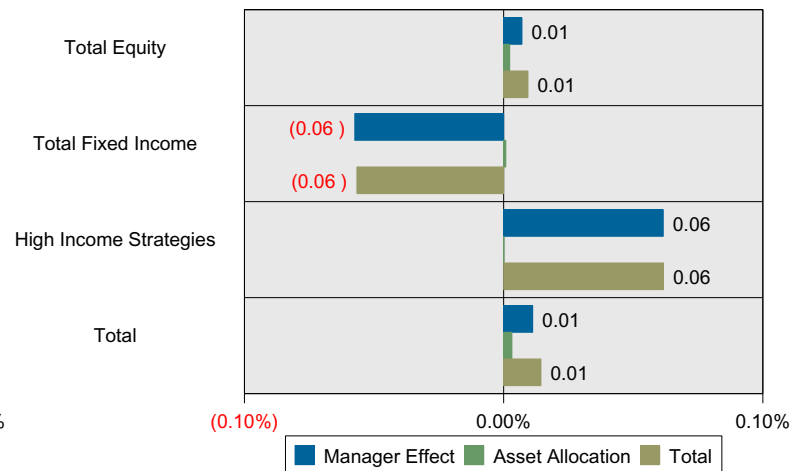
Asset Class Under or Overweighting



Actual vs Target Returns



Relative Attribution by Asset Class



Relative Attribution Effects for Quarter ended December 31, 2022

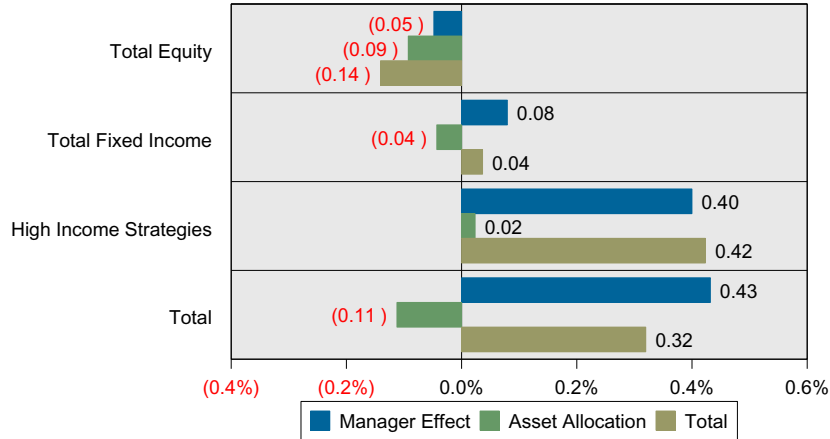
Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Total Equity	29%	30%	10.05%	10.02%	0.01%	0.00%	0.01%
Total Fixed Income	61%	60%	1.66%	1.75%	(0.06%)	0.00%	(0.06%)
High Income Strategies	10%	10%	4.15%	3.55%	0.06%	0.00%	0.06%
Total			4.43%	4.41%	+ 0.01%	+ 0.00%	0.01%

* Current Quarter Target = 52.5% Blmbg Aggregate, 18.0% Russell 3000 Index, 12.0% MSCI ACWI xUS, 8.5% Blmbg HY Corp, 7.5% Blmbg Gov/Cred 1-3 Yr and 1.5% ICE All US Cap Secs.

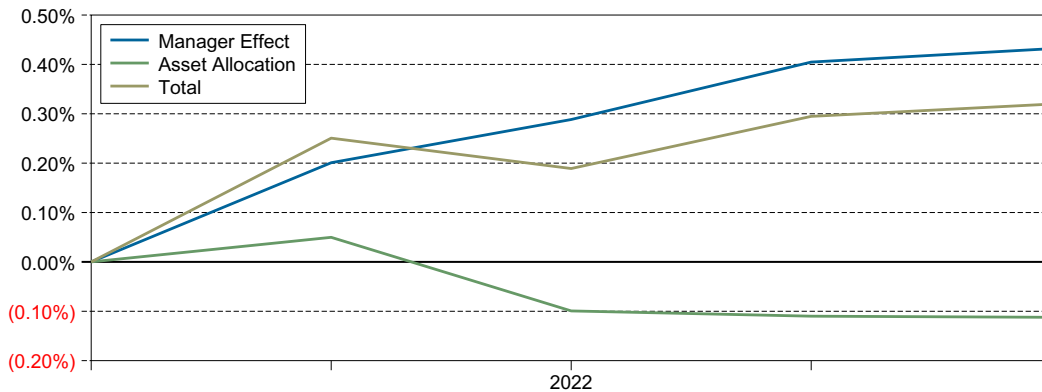
Cumulative Total Fund Relative Attribution - December 31, 2022

The charts below accumulate the Total Fund Attribution Analysis (shown earlier) over multiple periods to examine the cumulative sources of excess total fund performance relative to target. These cumulative results quantify the longer-term sources of total fund excess return relative to target by asset class. These relative attribution effects separate the cumulative sources of total fund excess return into Asset Allocation Effect and Manager Selection Effect.

One Year Relative Attribution Effects



Cumulative Relative Attribution Effects



One Year Relative Attribution Effects

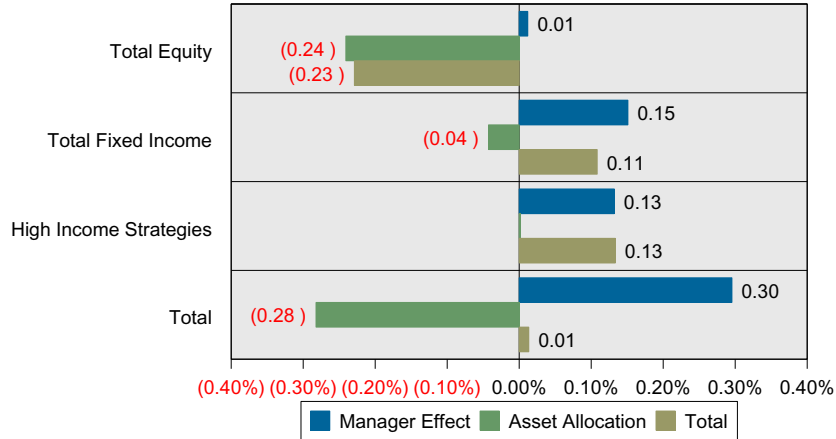
Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Total Equity	30%	30%	(18.00%)	(17.85%)	(0.05%)	(0.09%)	(0.14%)
Total Fixed Income	60%	60%	(11.73%)	(11.88%)	0.08%	(0.04%)	0.04%
High Income Strategies	10%	10%	(7.65%)	(11.73%)	0.40%	0.02%	0.42%
Total			(13.18%)	(13.50%)	+ 0.43%	+ (0.11%)	0.32%

* Current Quarter Target = 52.5% Blmbg Aggregate, 18.0% Russell 3000 Index, 12.0% MSCI ACWI xUS, 8.5% Blmbg HY Corp, 7.5% Blmbg Gov/Cred 1-3 Yr and 1.5% ICE All US Cap Secs.

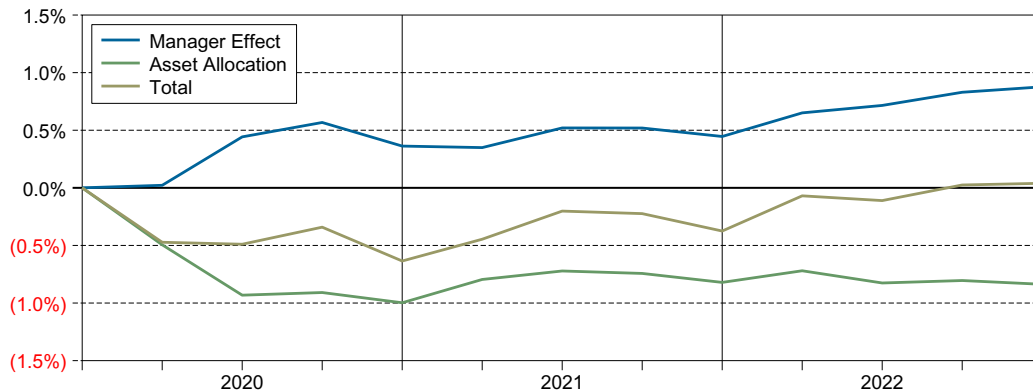
Cumulative Total Fund Relative Attribution - December 31, 2022

The charts below accumulate the Total Fund Attribution Analysis (shown earlier) over multiple periods to examine the cumulative sources of excess total fund performance relative to target. These cumulative results quantify the longer-term sources of total fund excess return relative to target by asset class. These relative attribution effects separate the cumulative sources of total fund excess return into Asset Allocation Effect and Manager Selection Effect.

Three Year Annualized Relative Attribution Effects



Cumulative Relative Attribution Effects



Three Year Annualized Relative Attribution Effects

Asset Class	Effective Actual Weight	Effective Target Weight	Actual Return	Target Return	Manager Effect	Asset Allocation	Total Relative Return
Total Equity	25%	25%	4.36%	4.30%	0.01%	(0.24%)	(0.23%)
Total Fixed Income	68%	69%	(2.20%)	(2.39%)	0.15%	(0.04%)	0.11%
High Income Strategies	7%	6%	-	-	0.13%	0.00%	0.13%
Total					0.39%	(0.41%)	0.01%

* Current Quarter Target = 52.5% Blmbg Aggregate, 18.0% Russell 3000 Index, 12.0% MSCI ACWI xUS, 8.5% Blmbg HY Corp, 7.5% Blmbg Gov/Cred 1-3 Yr and 1.5% ICE All US Cap Secs.

Total Equity

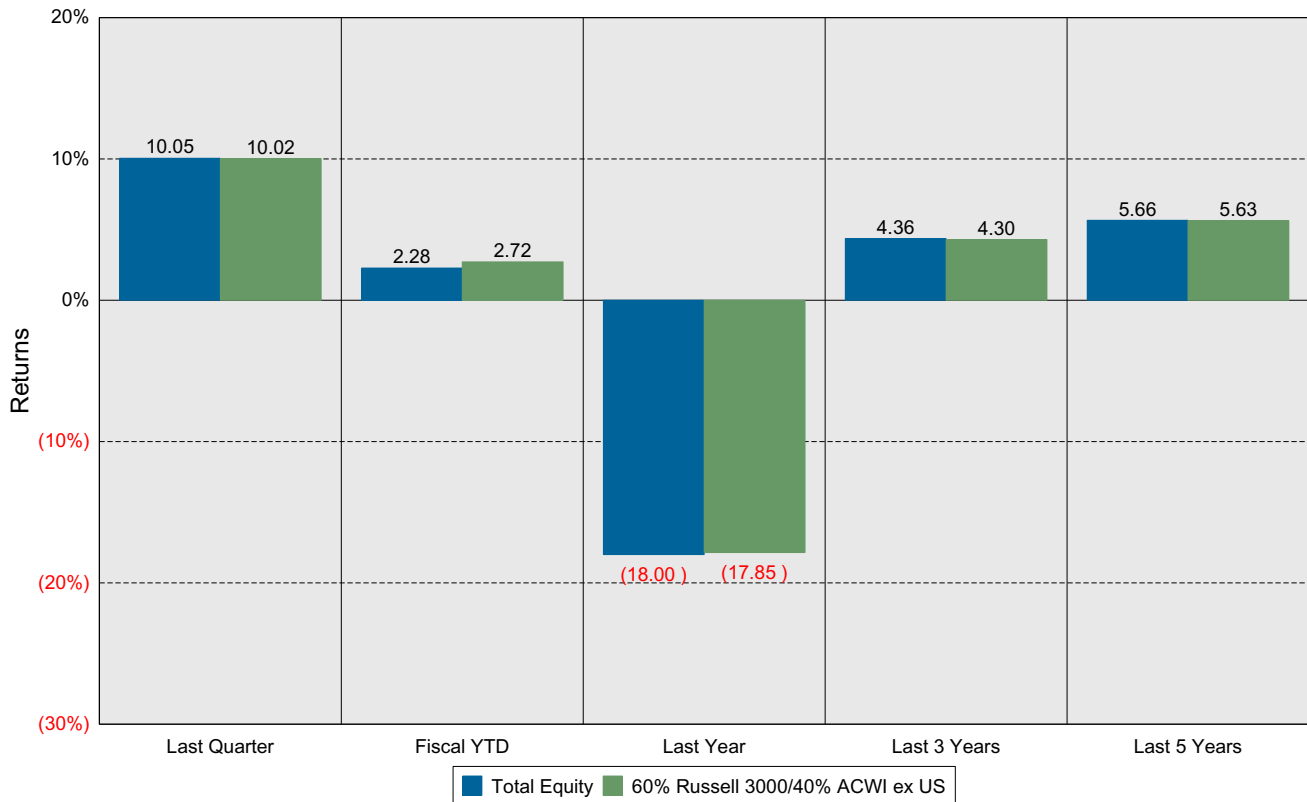
Period Ended December 31, 2022

Inception Date

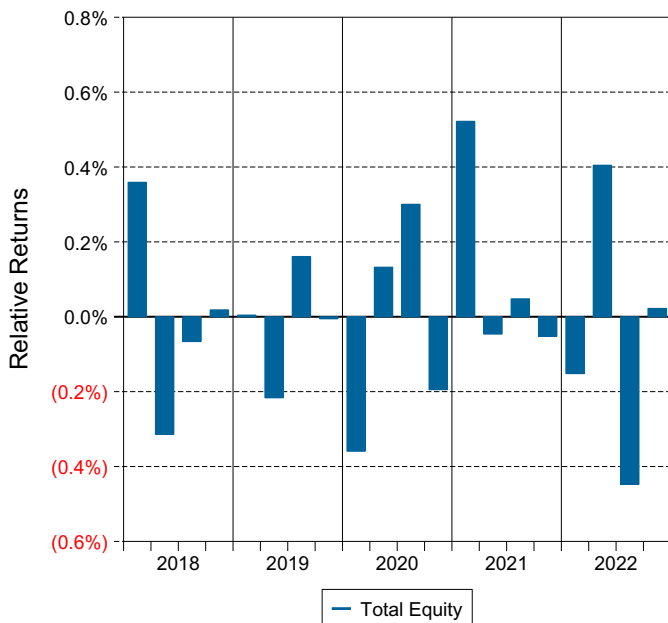
Parametric was funded December 12th, 2017.

Quarterly Summary and Highlights

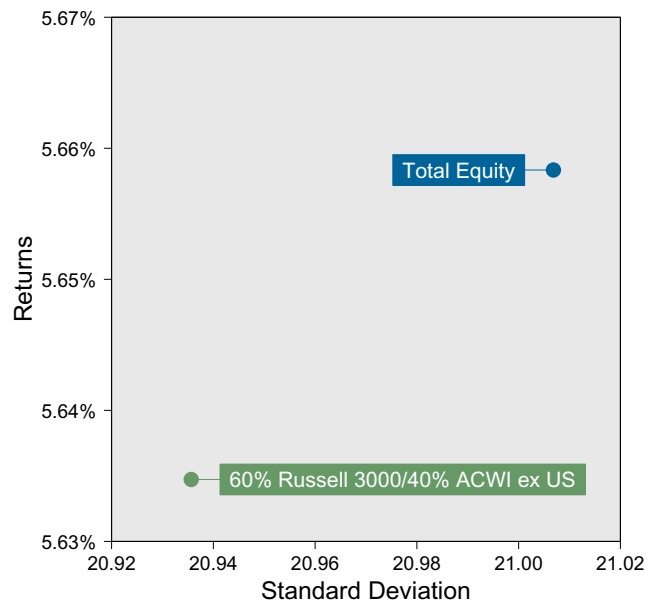
- Total Equity's portfolio outperformed the 60% Russell 3000/40% ACWI ex US by 0.02% for the quarter and underperformed the 60% Russell 3000/40% ACWI ex US for the year by 0.14%.



Relative Returns vs 60% Russell 3000/40% ACWI ex US



Annualized Five Year Risk vs Return

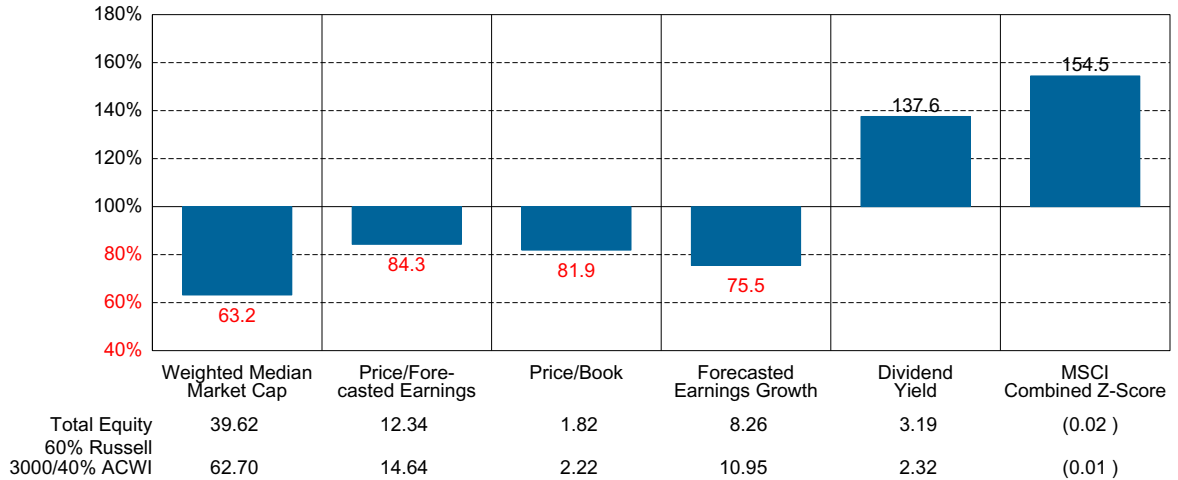


Total Equity Equity Characteristics Analysis Summary

Portfolio Characteristics

This graph compares the manager's portfolio characteristics relative to the benchmark's portfolio characteristics.

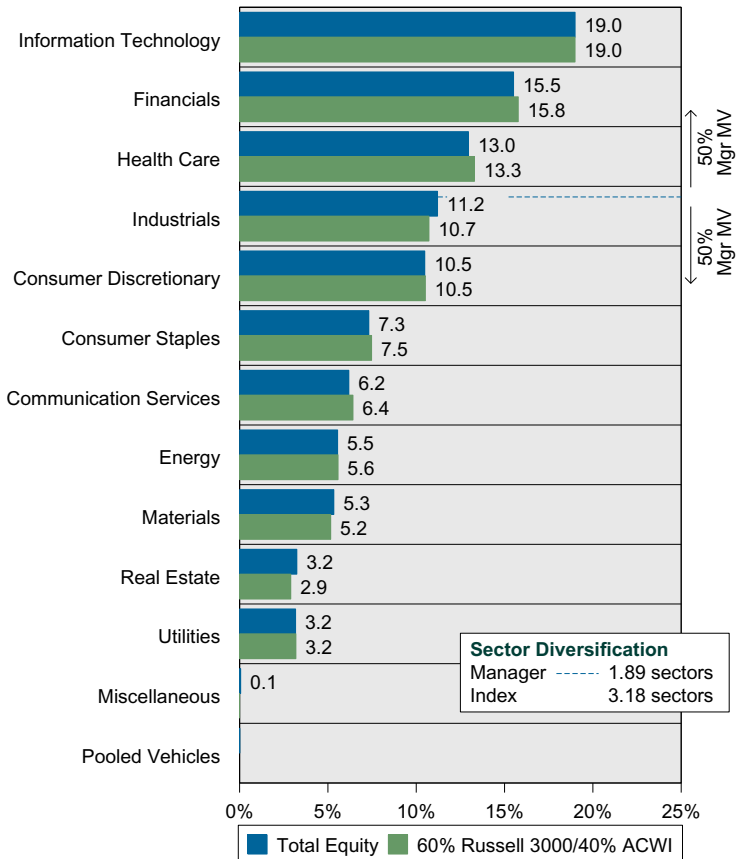
Portfolio Characteristics Relative to 60% Russell 3000/40% ACWI as of December 31, 2022



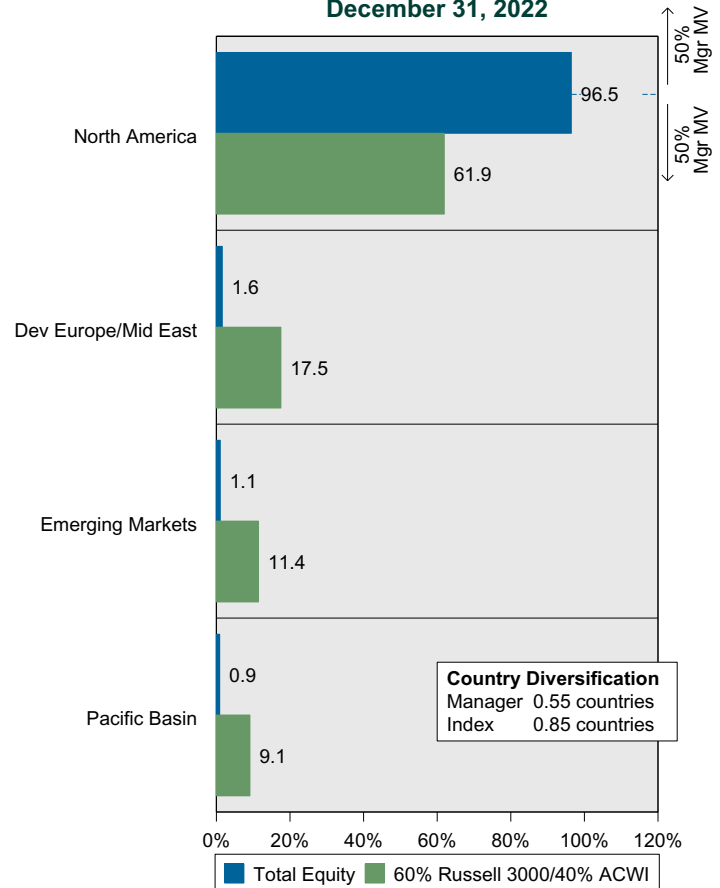
Sector Weights

The graph below contrasts the manager's sector weights for the most recent quarter with those of the benchmark. The regional allocation chart also compares the manager's geographical region weights with those of the benchmark.

Sector Allocation December 31, 2022



Regional Allocation December 31, 2022



Domestic Equity

Period Ended December 31, 2022

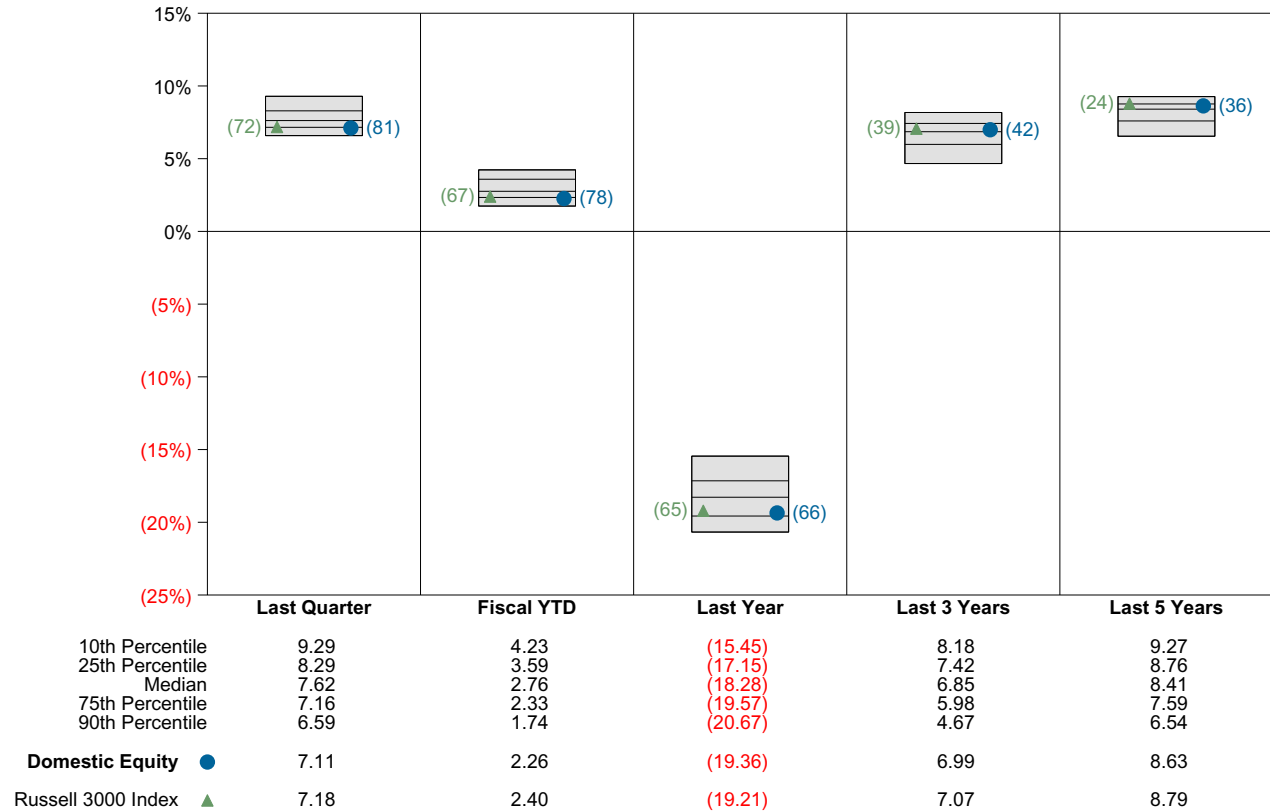
Inception Date

Parametric was funded December 12th, 2017.

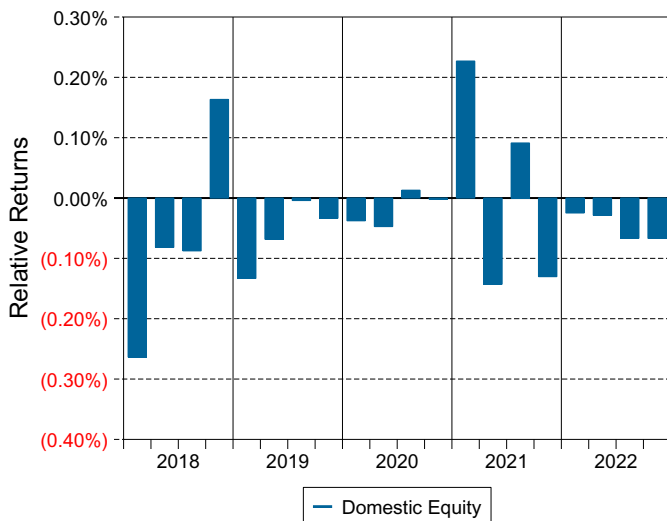
Quarterly Summary and Highlights

- Domestic Equity's portfolio posted a 7.11% return for the quarter placing it in the 81 percentile of the EF- Domestic Equity group for the quarter and in the 66 percentile for the last year.
- Domestic Equity's portfolio underperformed the Russell 3000 Index by 0.07% for the quarter and underperformed the Russell 3000 Index for the year by 0.15%.

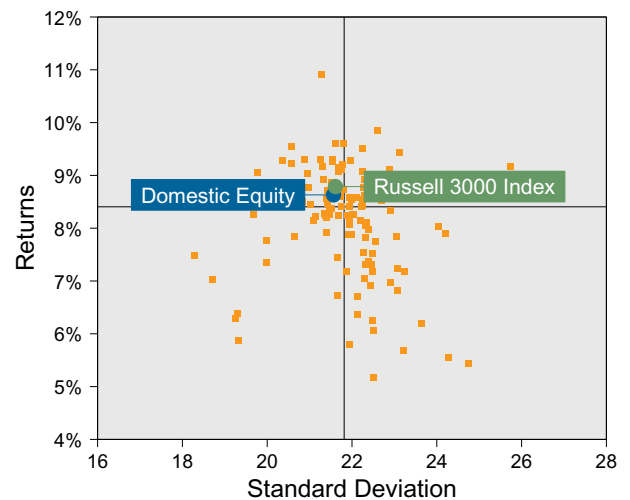
Performance vs EF- Domestic Equity (Gross)



Relative Return vs Russell 3000 Index



EF- Domestic Equity (Gross) Annualized Five Year Risk vs Return

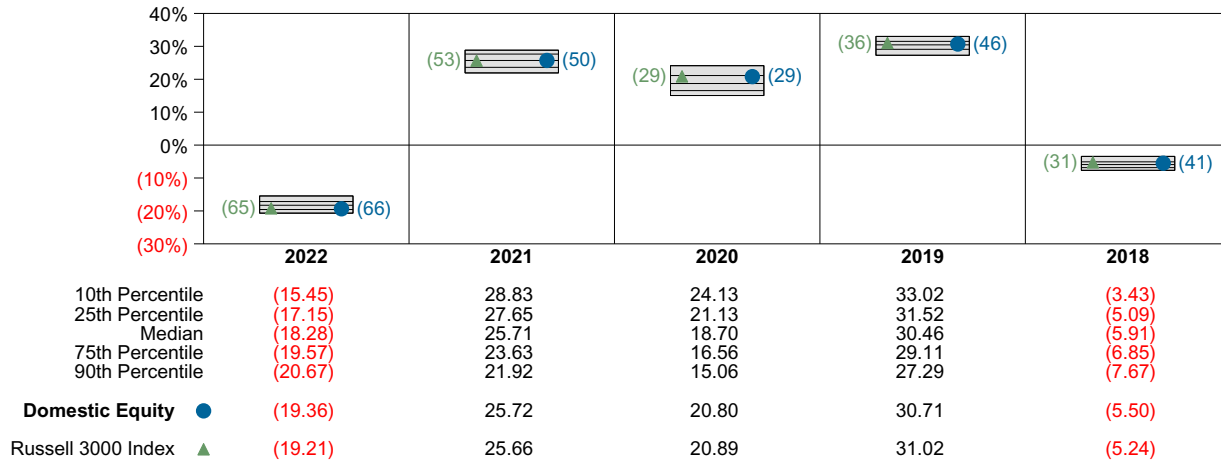


Domestic Equity Return Analysis Summary

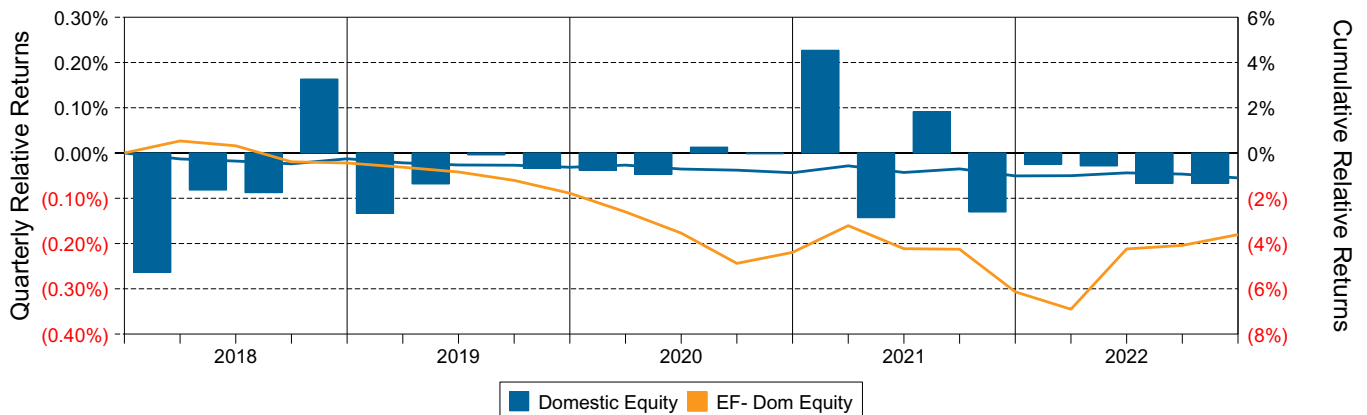
Return Analysis

The graphs below analyze the manager's return on both a risk-adjusted and unadjusted basis. The first chart illustrates the manager's ranking over different periods versus the appropriate style group. The second chart shows the historical quarterly and cumulative manager returns versus the appropriate market benchmark. The last chart illustrates the manager's ranking relative to their style using various risk-adjusted return measures.

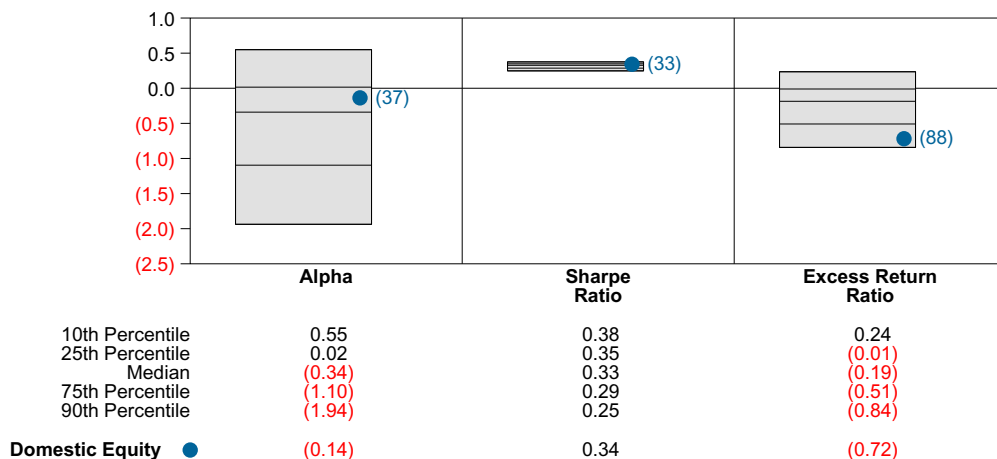
Performance vs EF- Domestic Equity (Gross)



Cumulative and Quarterly Relative Returns vs Russell 3000 Index



Risk Adjusted Return Measures vs Russell 3000 Index Rankings Against EF- Domestic Equity (Gross) Five Years Ended December 31, 2022

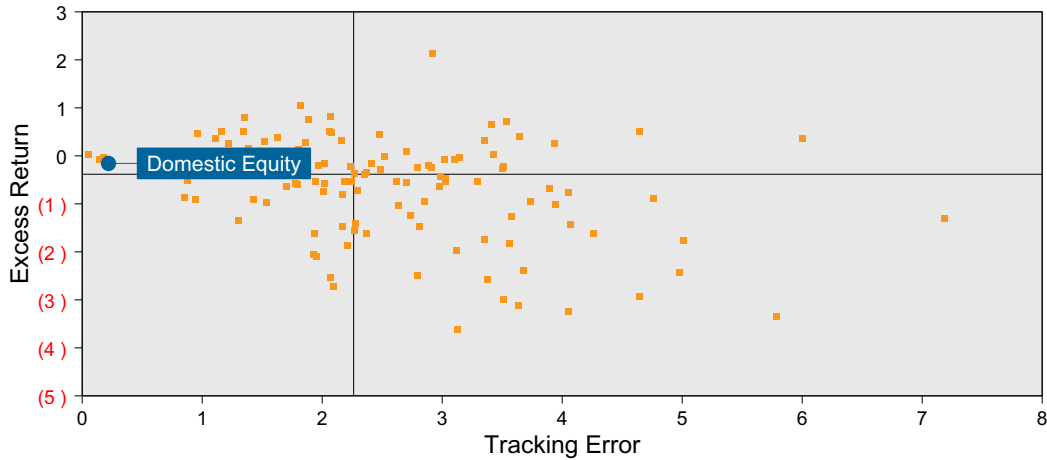


Domestic Equity Risk Analysis Summary

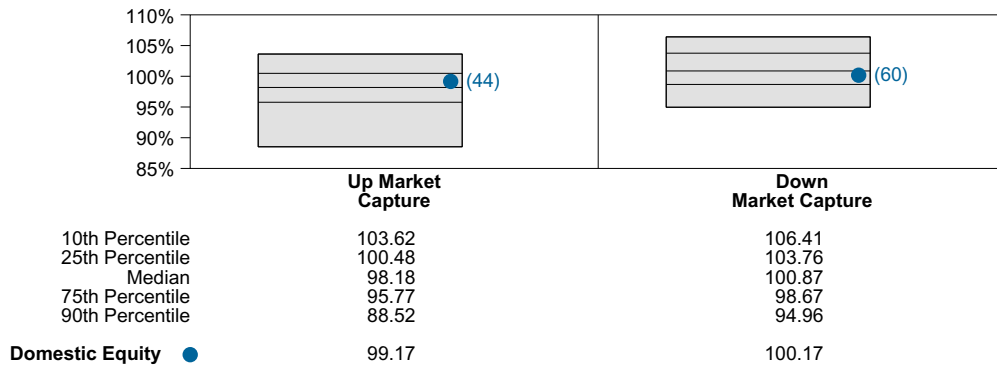
Risk Analysis

The graphs below analyze the risk or variation of a manager's return pattern. The first scatter chart illustrates the relationship, called Excess Return Ratio, between excess return and tracking error relative to the benchmark. The second chart shows Up and Down Market Capture. The last two charts show the ranking of the manager's risk statistics versus the peer group.

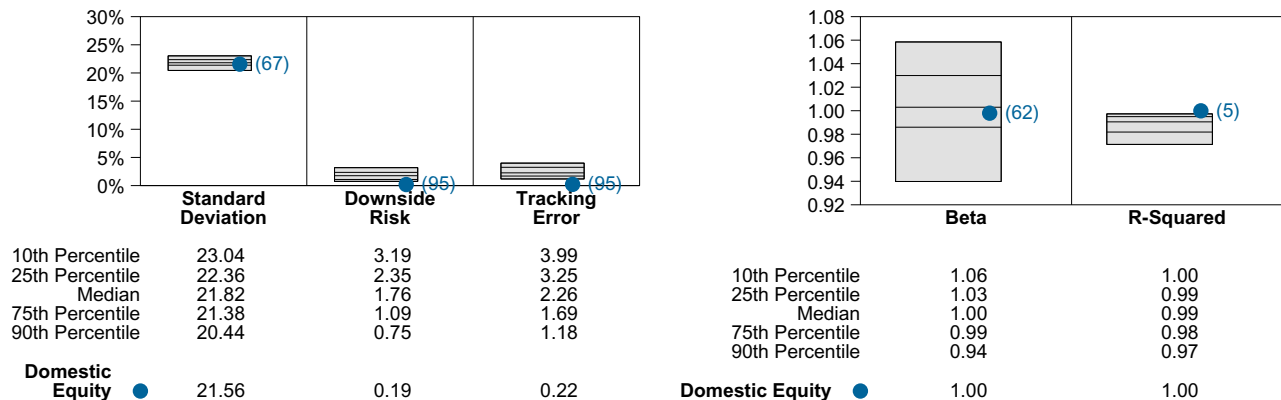
Risk Analysis vs EF- Domestic Equity (Gross) Five Years Ended December 31, 2022



Market Capture vs Russell 3000 Index Rankings Against EF- Domestic Equity (Gross) Five Years Ended December 31, 2022



Risk Statistics Rankings vs Russell 3000 Index Rankings Against EF- Domestic Equity (Gross) Five Years Ended December 31, 2022

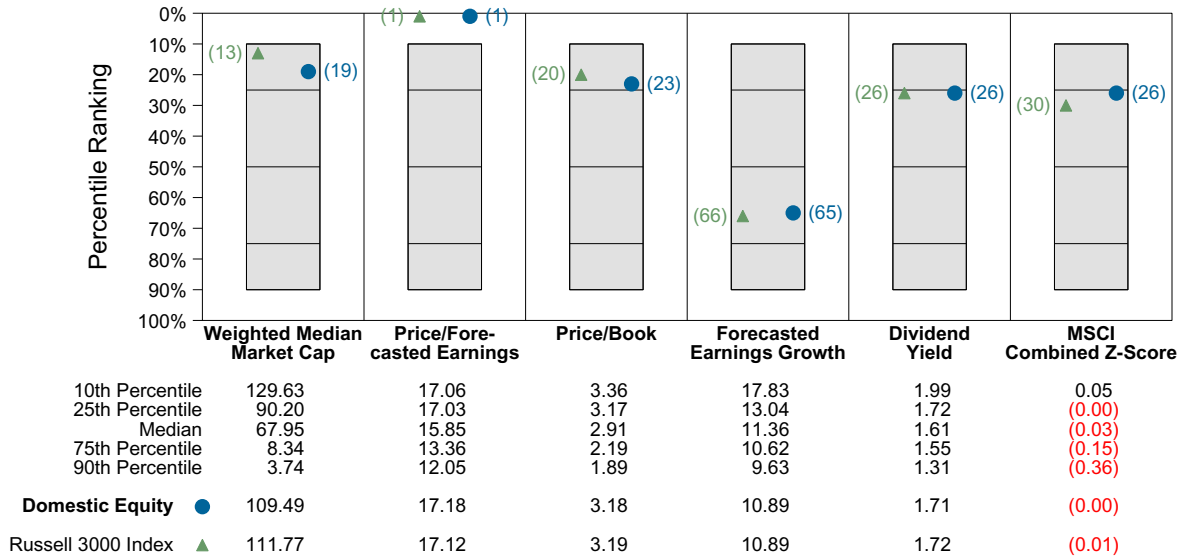


Domestic Equity Equity Characteristics Analysis Summary

Portfolio Characteristics

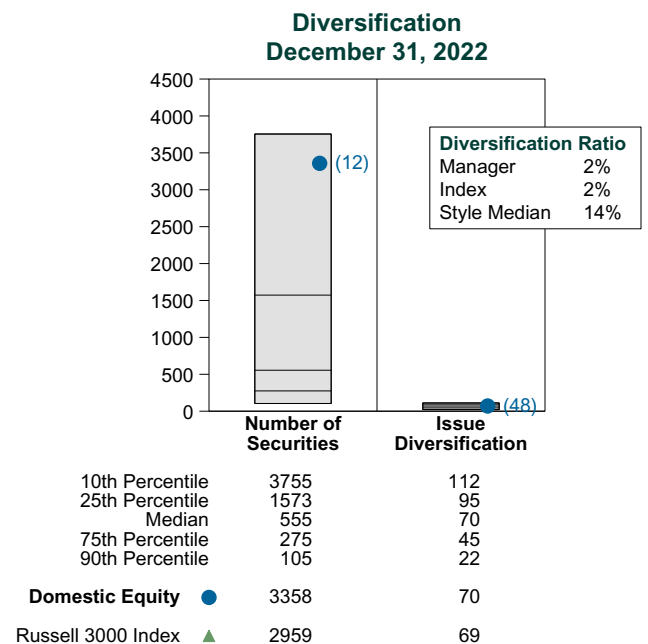
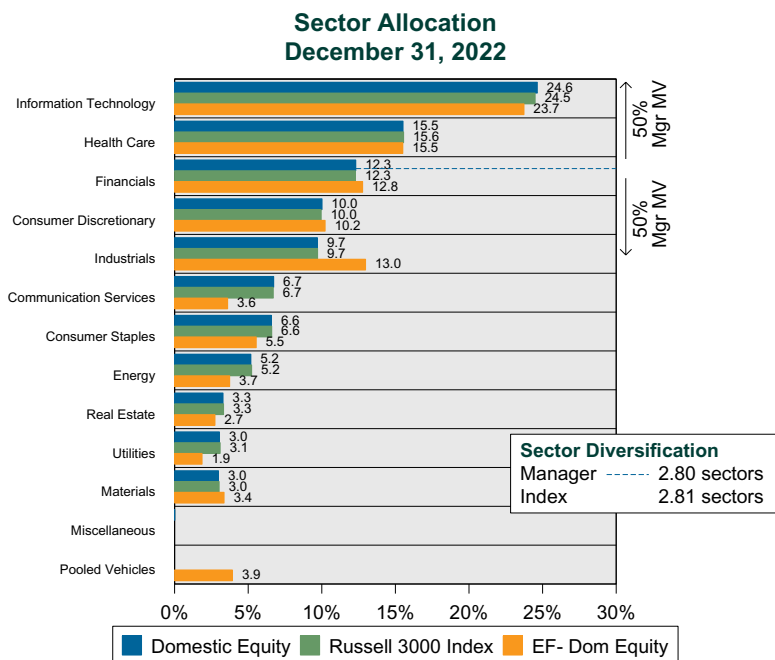
This graph compares the manager's portfolio characteristics with the range of characteristics for the portfolios which make up the manager's style group. This analysis illustrates whether the manager's current holdings are consistent with other managers employing the same style.

Portfolio Characteristics Percentile Rankings Rankings Against EF- Domestic Equity as of December 31, 2022



Sector Weights

The graph below contrasts the manager's sector weights with those of the benchmark and median sector weights across the members of the peer group. The magnitude of sector weight differences from the index and the manager's sector diversification are also shown. Diversification by number and concentration of holdings are also compared to the benchmark and peer group. Issue Diversification represents by count, and Diversification Ratio by percent, the number of holdings that account for half of the portfolio's market value.



International Equity

Period Ended December 31, 2022

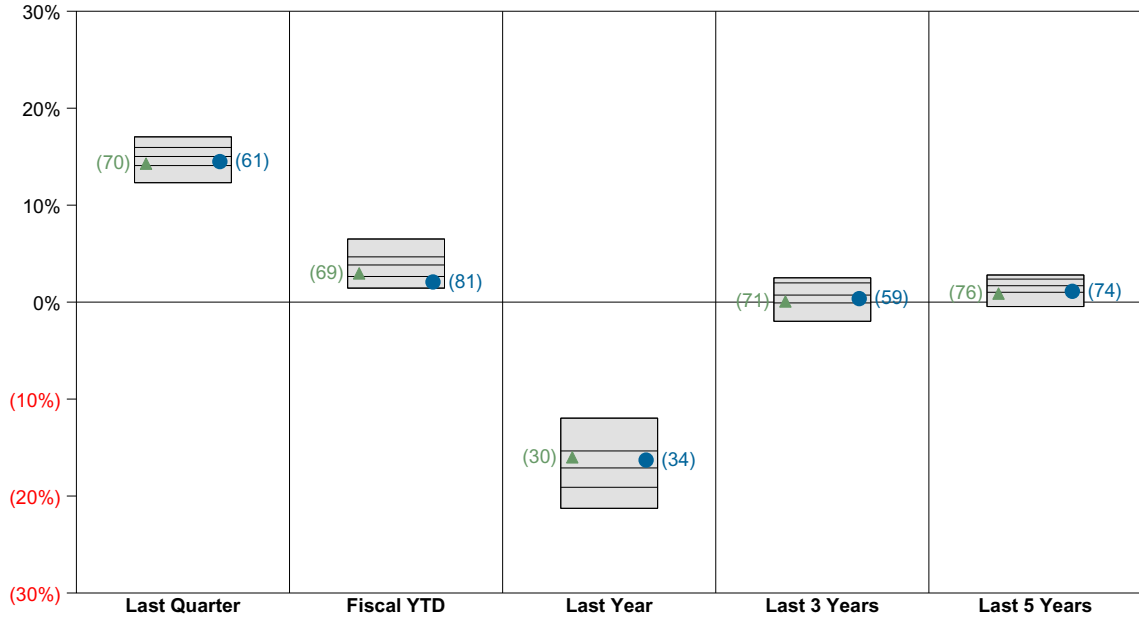
Inception Date

Parametric was funded December 12th, 2017.

Quarterly Summary and Highlights

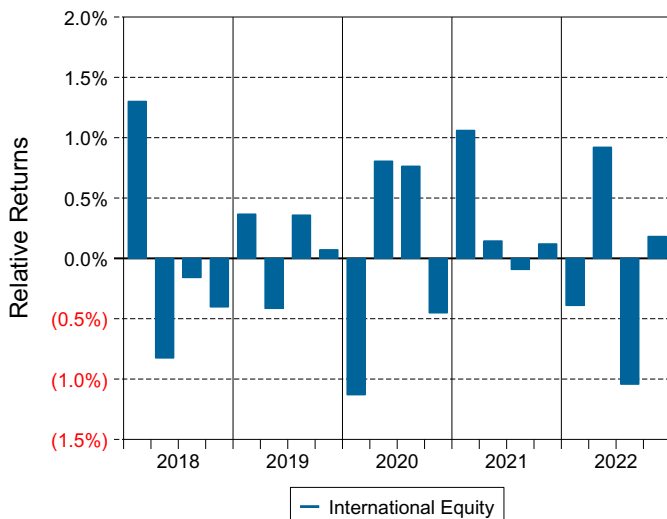
- International Equity's portfolio posted a 14.49% return for the quarter placing it in the 61 percentile of the EF-International Equity group for the quarter and in the 34 percentile for the last year.
- International Equity's portfolio outperformed the MSCI ACWI ex US by 0.21% for the quarter and underperformed the MSCI ACWI ex US for the year by 0.29%.

Performance vs EF- International Equity (Gross)

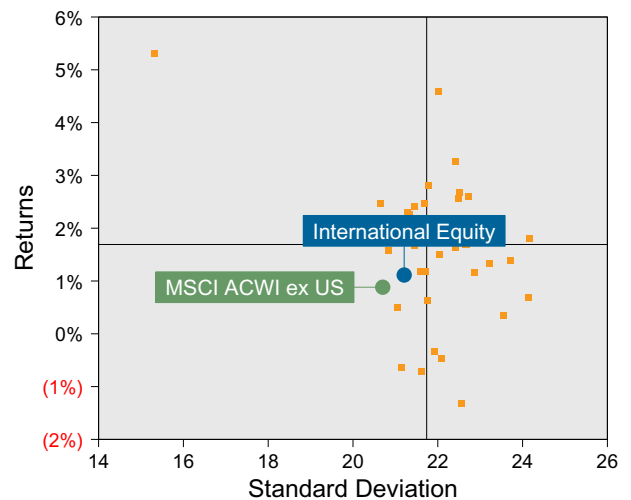


10th Percentile	17.05	6.51	(11.97)	2.51	2.80
25th Percentile	15.95	4.67	(15.35)	1.98	2.37
Median	15.02	3.83	(17.10)	0.73	1.69
75th Percentile	14.09	2.64	(19.10)	(0.08)	1.01
90th Percentile	12.32	1.44	(21.27)	(1.98)	(0.46)
International Equity	14.49	2.08	(16.29)	0.36	1.11
MSCI ACWI ex US	14.28	2.96	(16.00)	0.07	0.88

Relative Return vs MSCI ACWI ex US



EF- International Equity (Gross) Annualized Five Year Risk vs Return

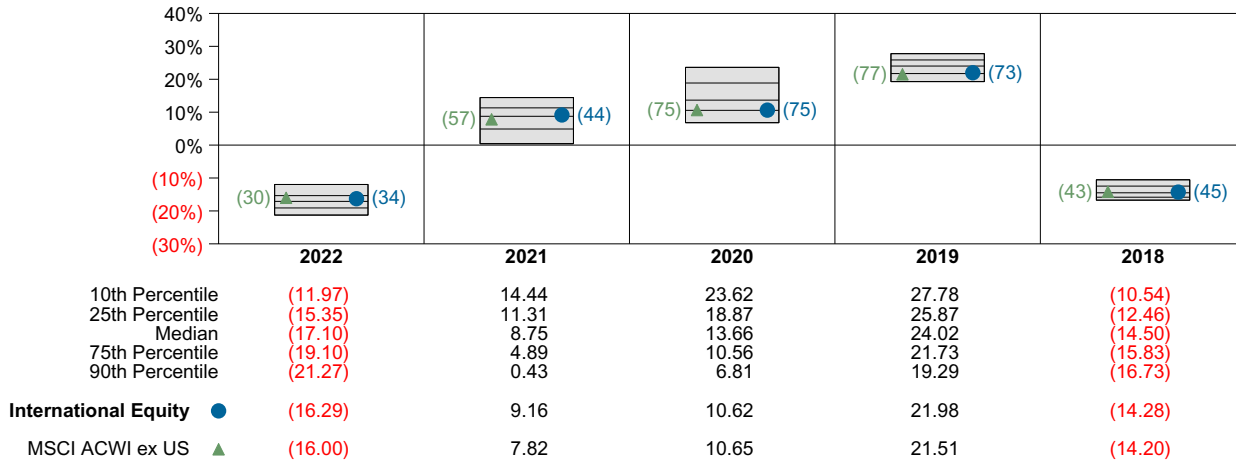


International Equity Return Analysis Summary

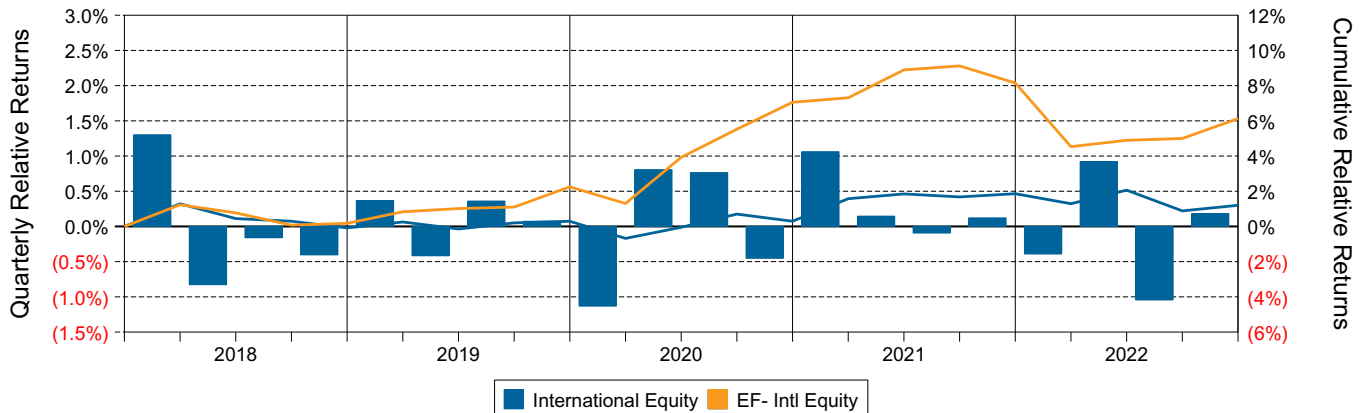
Return Analysis

The graphs below analyze the manager's return on both a risk-adjusted and unadjusted basis. The first chart illustrates the manager's ranking over different periods versus the appropriate style group. The second chart shows the historical quarterly and cumulative manager returns versus the appropriate market benchmark. The last chart illustrates the manager's ranking relative to their style using various risk-adjusted return measures.

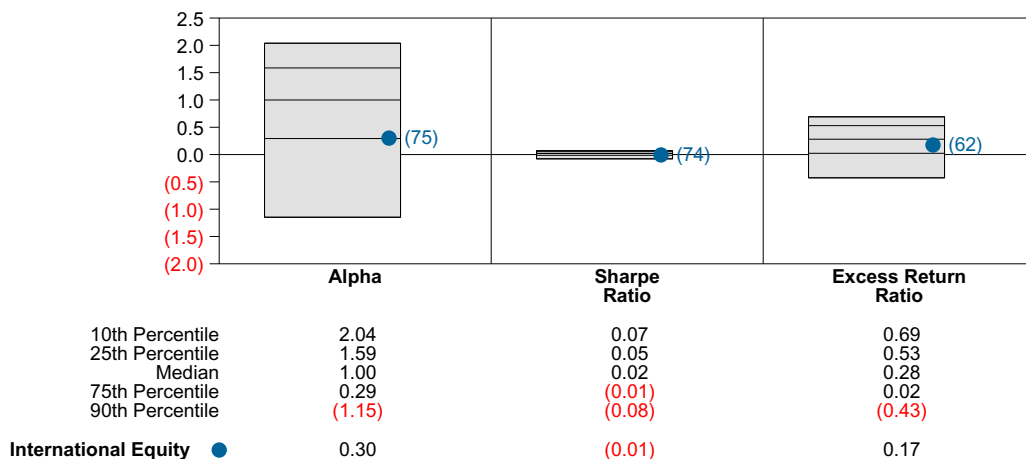
Performance vs EF- International Equity (Gross)



Cumulative and Quarterly Relative Returns vs MSCI ACWI ex US



Risk Adjusted Return Measures vs MSCI ACWI ex US Rankings Against EF- International Equity (Gross) Five Years Ended December 31, 2022

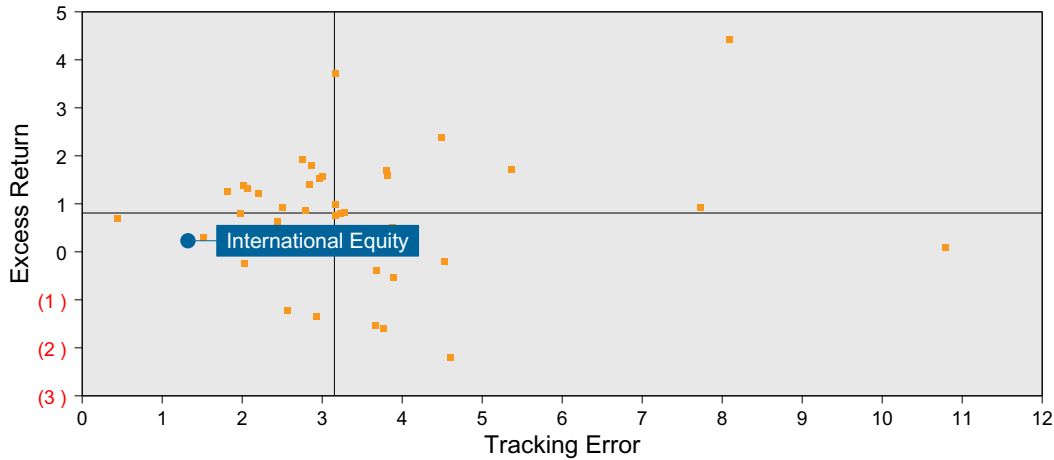


International Equity Risk Analysis Summary

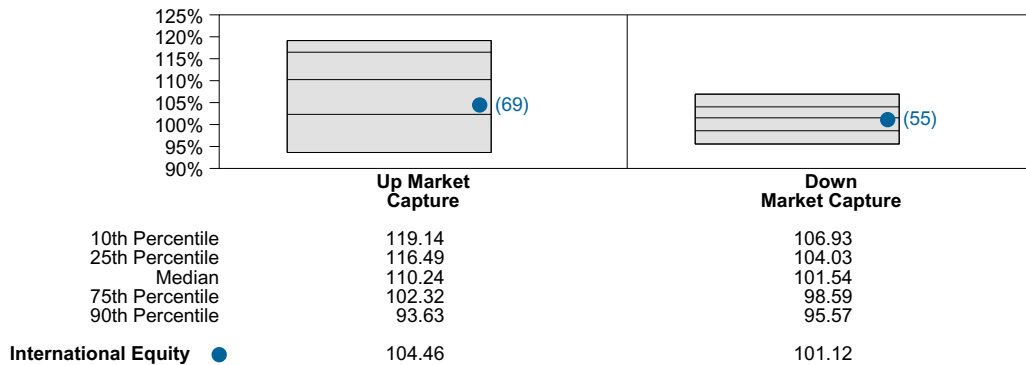
Risk Analysis

The graphs below analyze the risk or variation of a manager's return pattern. The first scatter chart illustrates the relationship, called Excess Return Ratio, between excess return and tracking error relative to the benchmark. The second chart shows Up and Down Market Capture. The last two charts show the ranking of the manager's risk statistics versus the peer group.

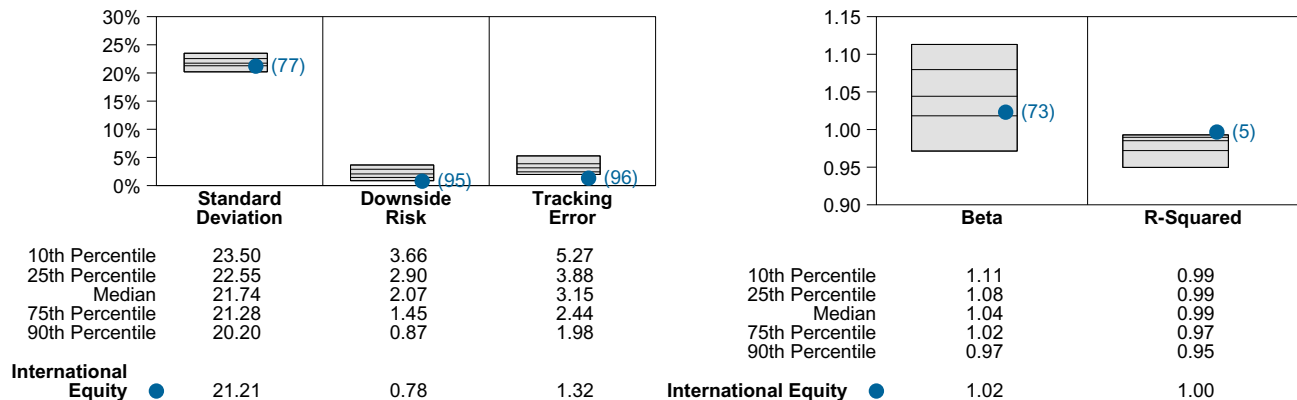
Risk Analysis vs EF- International Equity (Gross) Five Years Ended December 31, 2022



Market Capture vs MSCI ACWI ex US Rankings Against EF- International Equity (Gross) Five Years Ended December 31, 2022



Risk Statistics Rankings vs MSCI ACWI ex US Rankings Against EF- International Equity (Gross) Five Years Ended December 31, 2022

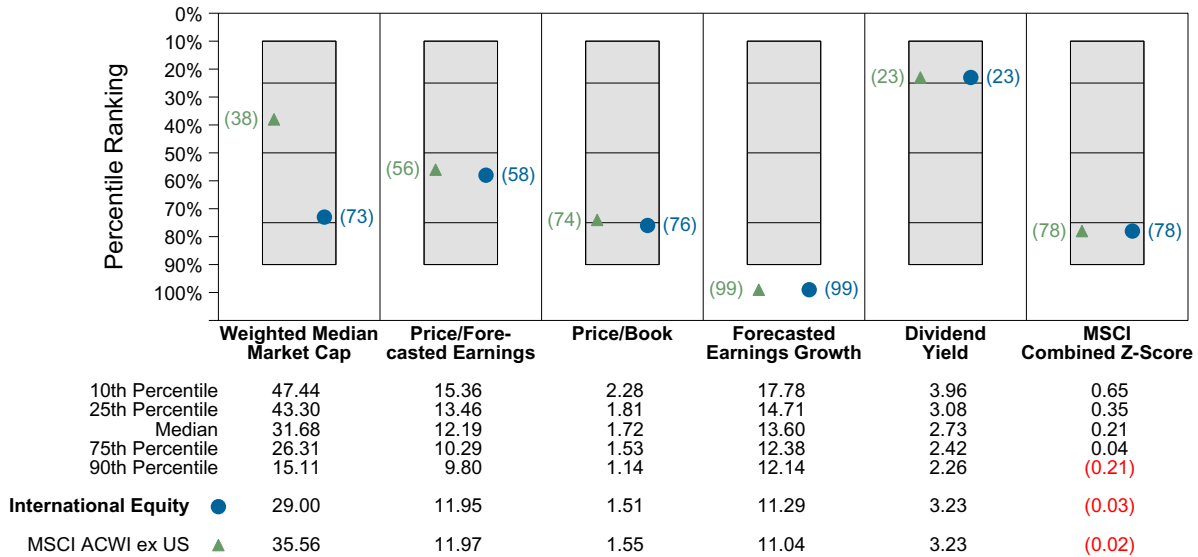


International Equity Equity Characteristics Analysis Summary

Portfolio Characteristics

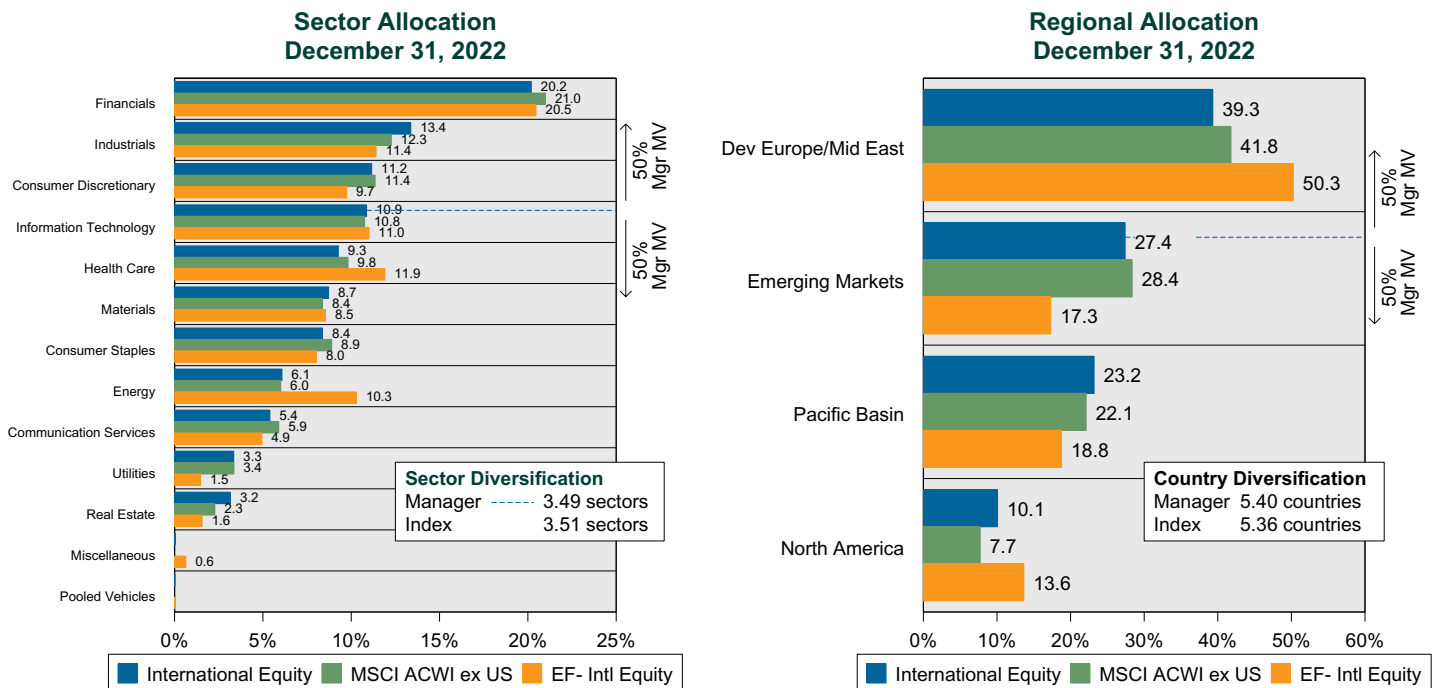
This graph compares the manager's portfolio characteristics with the range of characteristics for the portfolios which make up the manager's style group. This analysis illustrates whether the manager's current holdings are consistent with other managers employing the same style.

Portfolio Characteristics Percentile Rankings Rankings Against EF- International Equity as of December 31, 2022



Sector Weights

The graph below contrasts the manager's sector weights with those of the benchmark and median sector weights across the members of the peer group. The magnitude of sector weight differences from the index and the manager's sector diversification are also shown. The regional allocation chart compares the manager's geographical region weights with those of the benchmark as well as the median region weights of the peer group.



Total Fixed Income

Period Ended December 31, 2022

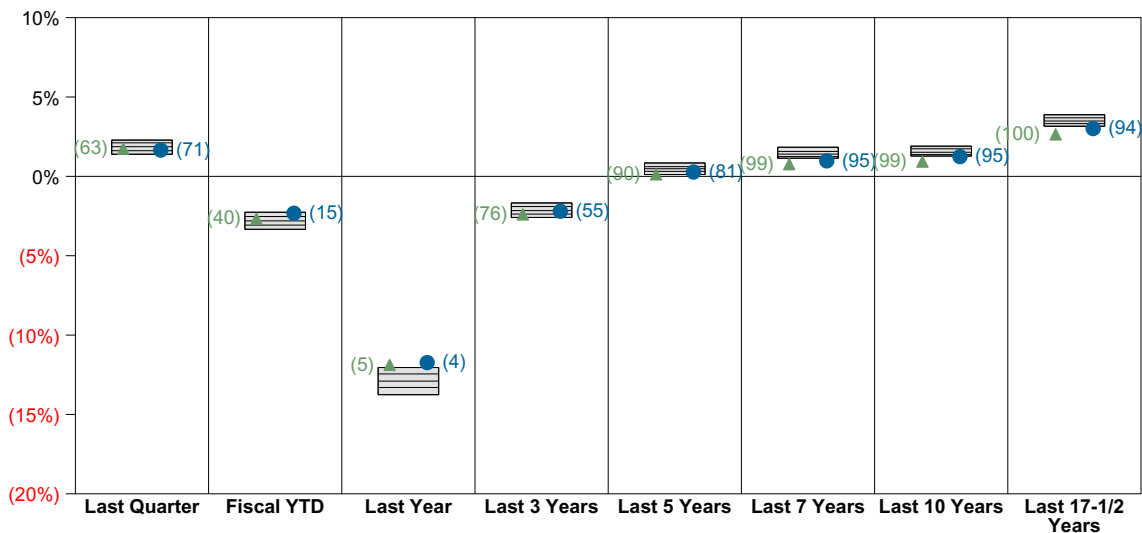
Benchmark Definition

Total Fixed Income Benchmark consists of 100% PFSF Fixed Income Benchmark through December 31, 2018, 90% Bloomberg U.S. Aggregate and 10% Bloomberg Gov/Credit 1-3 Yrs through March 31, 2021, 89% Bloomberg U.S. Aggregate and 11% Bloomberg Gov/Credit 1-3 Yrs through June 30, 2021 and 88% Bloomberg U.S. Aggregate and 12% Bloomberg Gov/Credit 1-3 Yrs, thereafter.

Quarterly Summary and Highlights

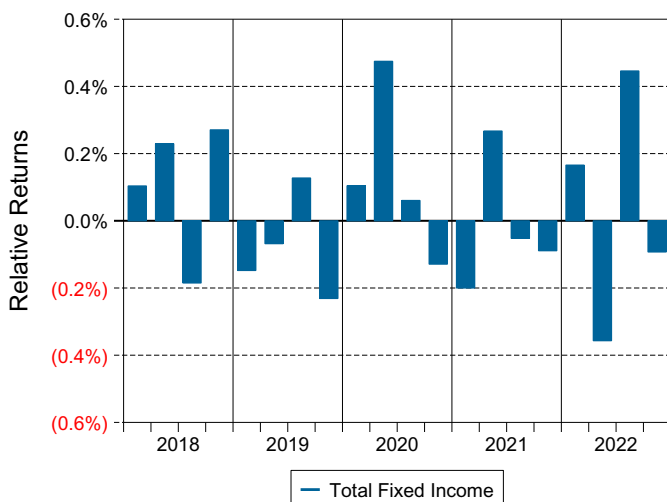
- Total Fixed Income's portfolio posted a 1.66% return for the quarter placing it in the 71 percentile of the Callan Core Bond Fixed Income group for the quarter and in the 4 percentile for the last year.
- Total Fixed Income's portfolio underperformed the Total Fixed Income Benchmark by 0.09% for the quarter and outperformed the Total Fixed Income Benchmark for the year by 0.14%.

Performance vs Callan Core Bond Fixed Income (Gross)

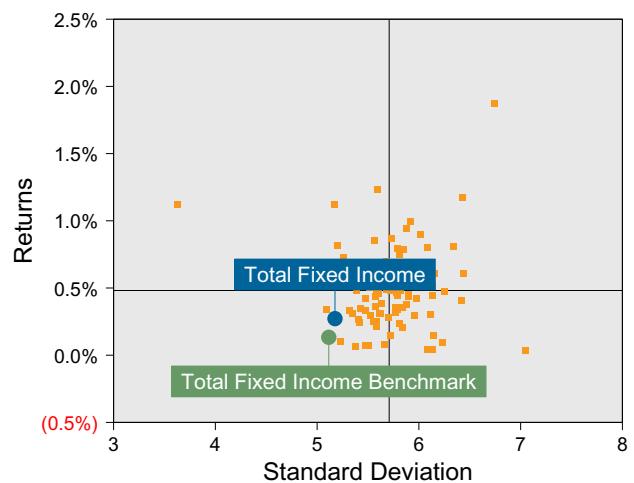


	Last Quarter	Fiscal YTD	Last Year	Last 3 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 17-1/2 Years
10th Percentile	2.28	(2.26)	(12.04)	(1.68)	0.84	1.84	1.90	3.88
25th Percentile	2.11	(2.53)	(12.45)	(1.90)	0.61	1.57	1.74	3.69
Median	1.87	(2.81)	(12.90)	(2.16)	0.48	1.40	1.52	3.49
75th Percentile	1.62	(3.07)	(13.30)	(2.38)	0.31	1.25	1.37	3.32
90th Percentile	1.39	(3.34)	(13.75)	(2.59)	0.12	1.14	1.28	3.16
Total Fixed Income	1.66	(2.33)	(11.73)	(2.20)	0.27	0.98	1.24	3.01
Total Fixed Income Benchmark	1.75	(2.67)	(11.88)	(2.39)	0.13	0.77	0.94	2.65

Relative Returns vs Total Fixed Income Benchmark



Callan Core Bond Fixed Income (Gross) Annualized Five Year Risk vs Return

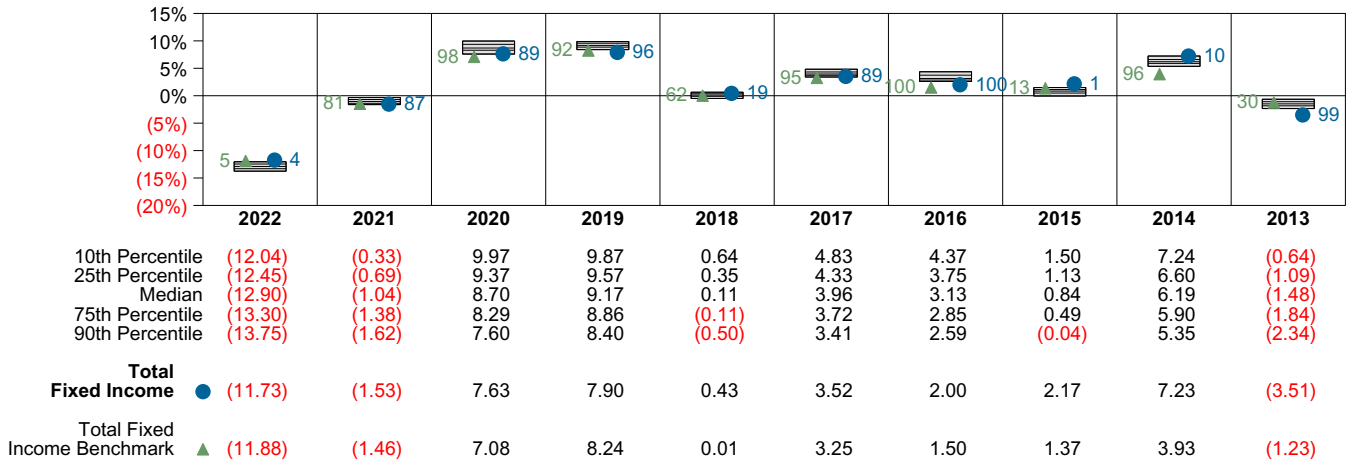


Total Fixed Income Return Analysis Summary

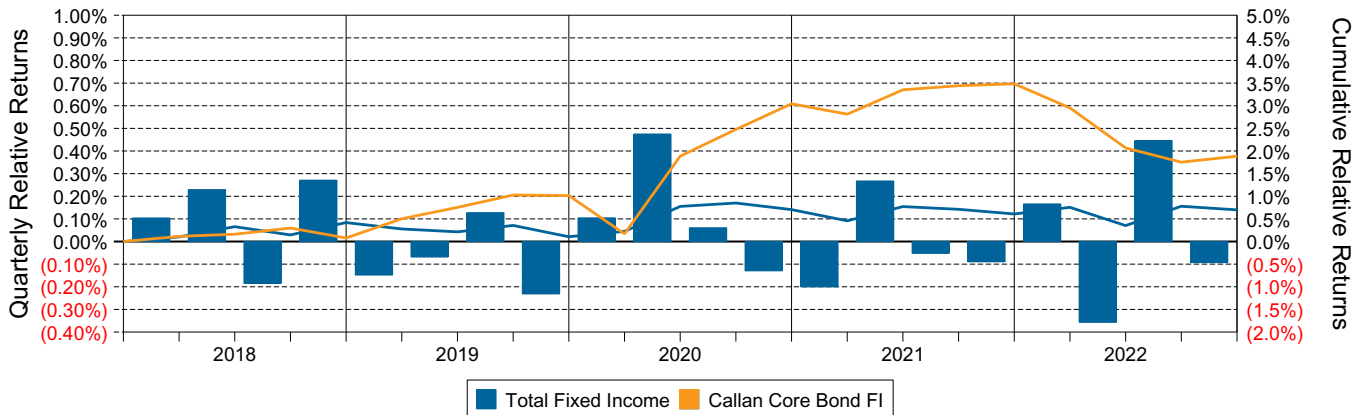
Return Analysis

The graphs below analyze the manager's return on both a risk-adjusted and unadjusted basis. The first chart illustrates the manager's ranking over different periods versus the appropriate style group. The second chart shows the historical quarterly and cumulative manager returns versus the appropriate market benchmark. The last chart illustrates the manager's ranking relative to their style using various risk-adjusted return measures.

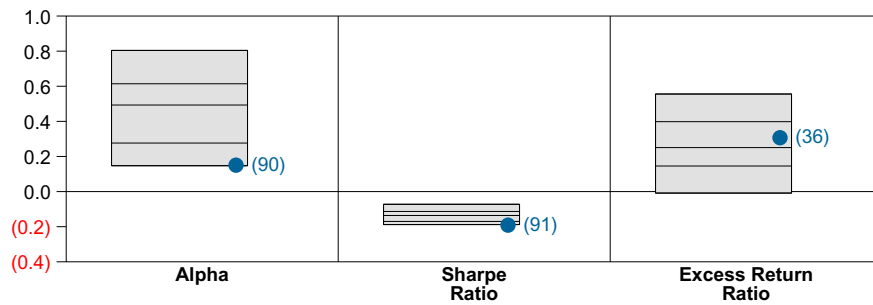
Performance vs Callan Core Bond Fixed Income (Gross)



Cumulative and Quarterly Relative Returns vs Total Fixed Income Benchmark



Risk Adjusted Return Measures vs Total Fixed Income Benchmark Rankings Against Callan Core Bond Fixed Income (Gross) Five Years Ended December 31, 2022



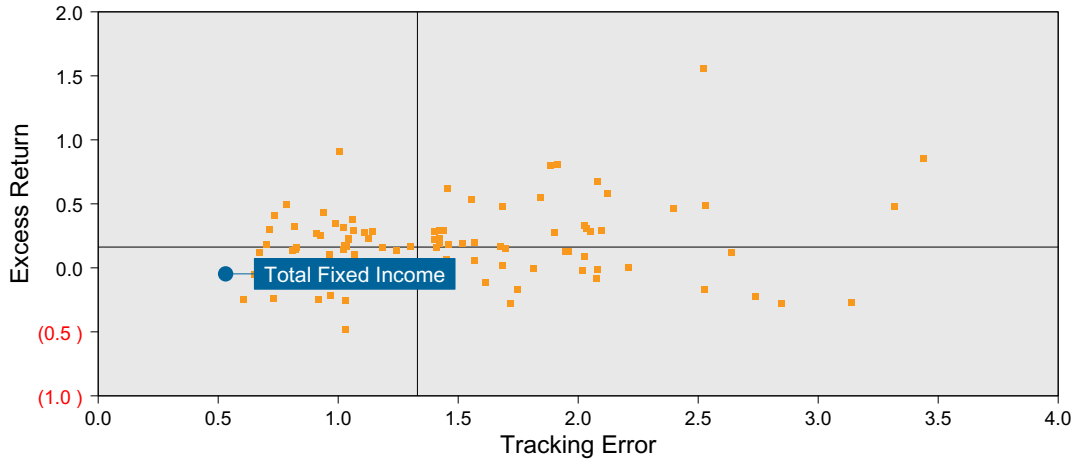
10th Percentile	0.80	(0.07)	0.56
25th Percentile	0.61	(0.11)	0.40
Median	0.49	(0.14)	0.25
75th Percentile	0.28	(0.17)	0.15
90th Percentile	0.15	(0.19)	(0.01)
Total Fixed Income	0.15	(0.19)	0.31

Total Fixed Income Risk Analysis Summary

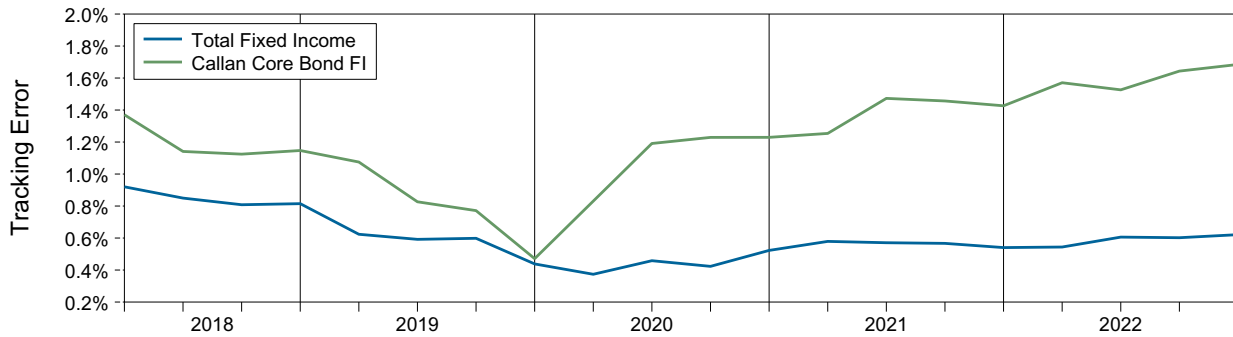
Risk Analysis

The graphs below analyze the risk or variation of a manager's return pattern. The first scatter chart illustrates the relationship, called Excess Return Ratio, between excess return and tracking error relative to the benchmark. The second chart shows tracking error patterns versus the benchmark over time. The last two charts show the ranking of the manager's risk statistics versus the peer group.

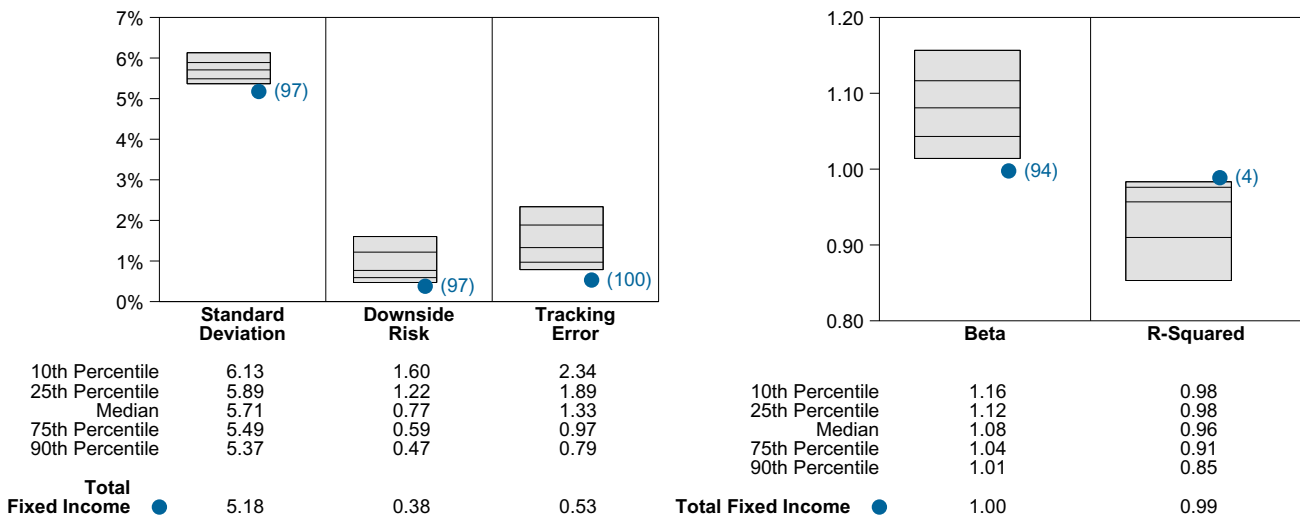
Risk Analysis vs Callan Core Bond Fixed Income (Gross) Five Years Ended December 31, 2022



Rolling 12 Quarter Tracking Error vs Total Fixed Income Benchmark



Risk Statistics Rankings vs Total Fixed Income Benchmark Rankings Against Callan Core Bond Fixed Income (Gross) Five Years Ended December 31, 2022

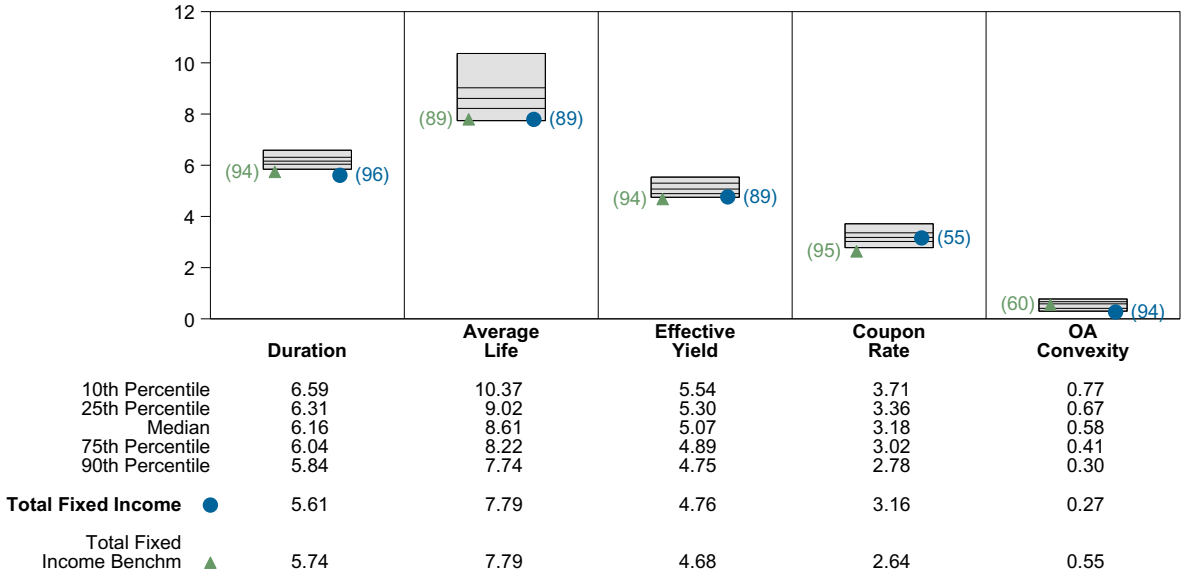


Total Fixed Income Bond Characteristics Analysis Summary

Portfolio Characteristics

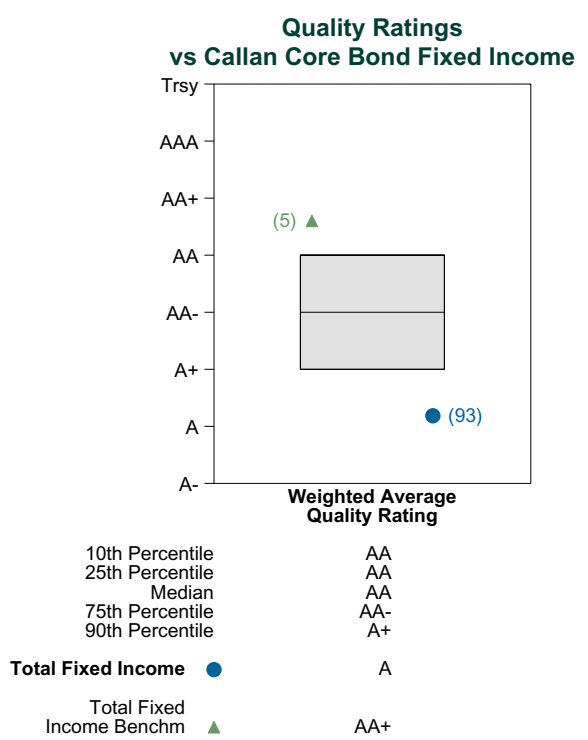
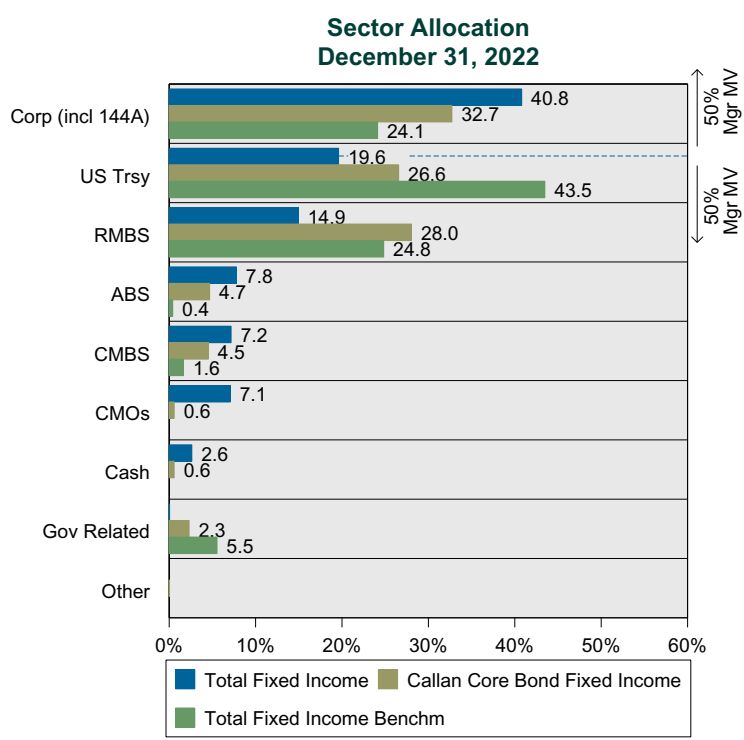
This graph compares the manager's portfolio characteristics with the range of characteristics for the portfolios which make up the manager's style group. This analysis illustrates whether the manager's current holdings are consistent with other managers employing the same style.

Fixed Income Portfolio Characteristics Rankings Against Callan Core Bond Fixed Income as of December 31, 2022



Sector Allocation and Quality Ratings

The first graph compares the manager's sector allocation with the average allocation across all the members of the manager's style. The second graph compares the manager's weighted average quality rating with the range of quality ratings for the style.

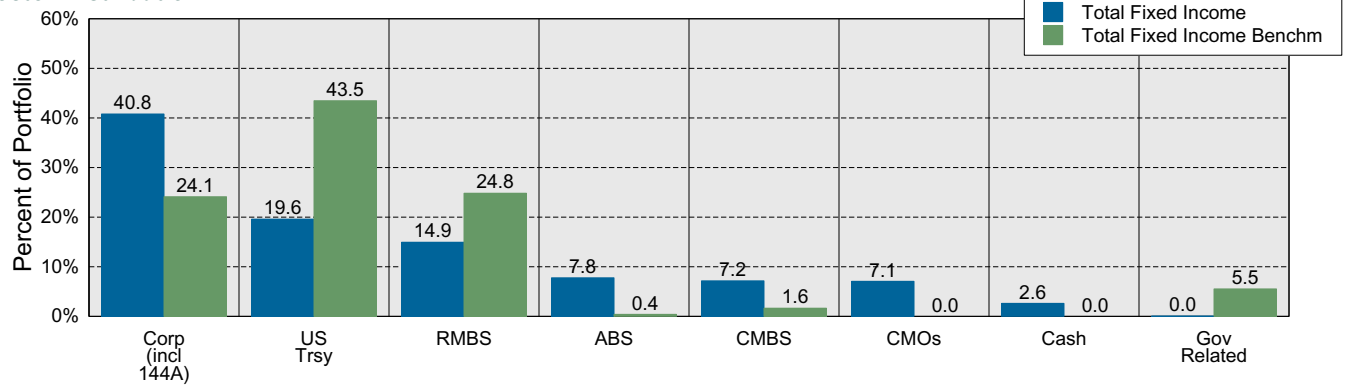


Total Fixed Income Portfolio Characteristics Summary As of December 31, 2022

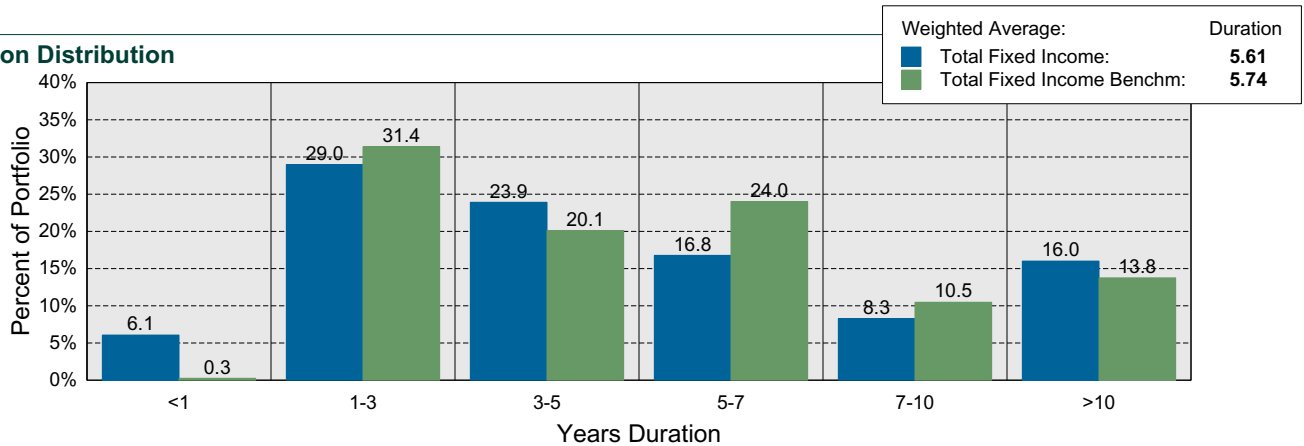
Portfolio Structure Comparison

The charts below compare the structure of the portfolio to that of the index from the three perspectives that have the greatest influence on return. The first chart compares the two portfolios across sectors. The second chart compares the duration distribution. The last chart compares the distribution across quality ratings.

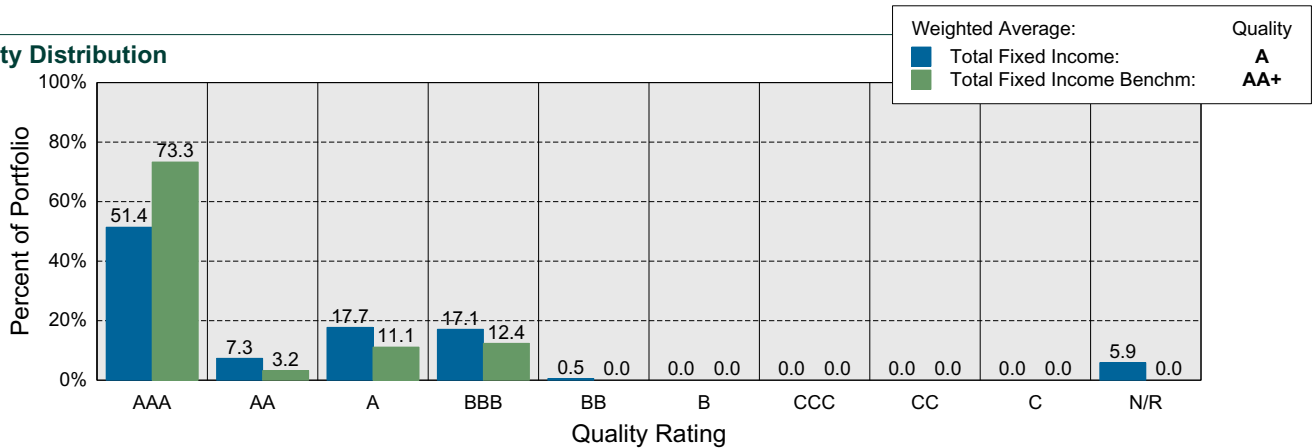
Sector Distribution



Duration Distribution



Quality Distribution



Colorado Treasurer's Portfolio

Period Ended December 31, 2022

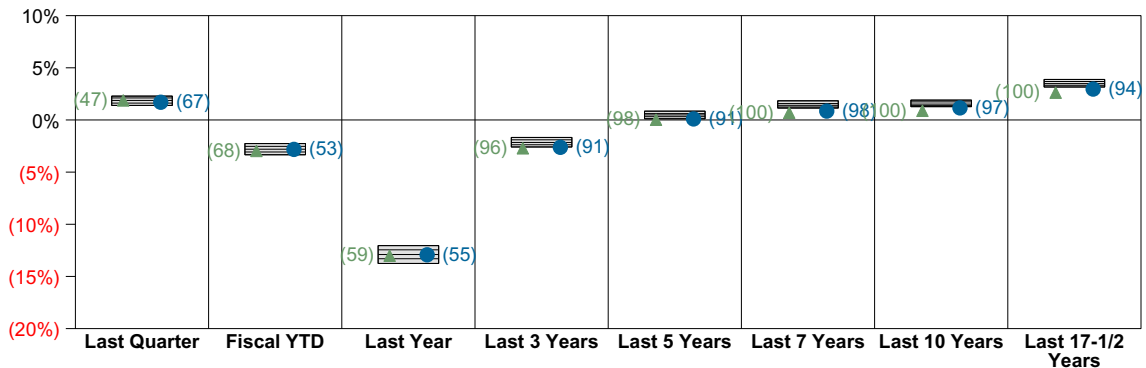
Investment Philosophy

The Fixed Income Portfolio is managed by the Colorado State Treasury and was initially funded in 3Q 2005. The PSPF Custom Benchmark consisted of 37% U.S. Treasury 1-10 Year Index, 34% Mortgages 0-10 Year WAL Index, 19% AAA U.S. Agencies 1-10 Year Index and 10% U.S. Corporates AAA Rated 1-10 Years Index through March 31, 2017 and the Bloomberg U.S. Aggregate thereafter. It is important to note that the Fixed Income Portfolio has historically been managed under a buy and hold mandate for investment yield. The Callan Core Bond Fixed Income Manager Universe used to construct the floating bar chart exhibit below, representing 77 core fixed income managers and products, is largely composed of products following a total return mandate. The School Fund bond portfolio is subject to statutorily imposed net loss restrictions. As such, relative performance comparison of the Fixed Income Portfolio to this universe may not be entirely representative of relative performance.

Quarterly Summary and Highlights

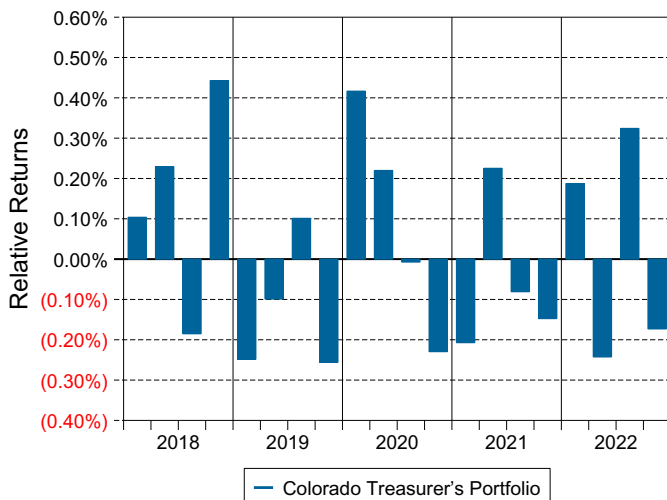
- Colorado Treasurer's Portfolio's portfolio posted a 1.70% return for the quarter placing it in the 67 percentile of the Callan Core Bond Fixed Income group for the quarter and in the 55 percentile for the last year.
- Colorado Treasurer's Portfolio's portfolio underperformed the PSPF Bond Custom Benchmark by 0.18% for the quarter and outperformed the PSPF Bond Custom Benchmark for the year by 0.08%.

Performance vs Callan Core Bond Fixed Income (Gross)

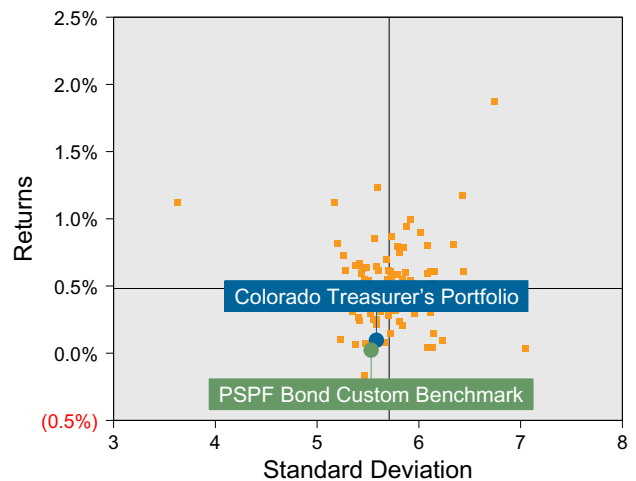


	Last Quarter	Fiscal YTD	Last Year	Last 3 Years	Last 5 Years	Last 7 Years	Last 10 Years	Last 17-1/2 Years
10th Percentile	2.28	(2.26)	(12.04)	(1.68)	0.84	1.84	1.90	3.88
25th Percentile	2.11	(2.53)	(12.45)	(1.90)	0.61	1.57	1.74	3.69
Median	1.87	(2.81)	(12.90)	(2.16)	0.48	1.40	1.52	3.49
75th Percentile	1.62	(3.07)	(13.30)	(2.38)	0.31	1.25	1.37	3.32
90th Percentile	1.39	(3.34)	(13.75)	(2.59)	0.12	1.14	1.28	3.16
Colorado Treasurer's Portfolio	1.70	(2.82)	(12.93)	(2.62)	0.10	0.85	1.15	2.96
PSPF Bond Custom Benchmark	1.87	(2.97)	(13.01)	(2.71)	0.02	0.69	0.88	2.62

Relative Returns vs PSPF Bond Custom Benchmark



Callan Core Bond Fixed Income (Gross) Annualized Five Year Risk vs Return

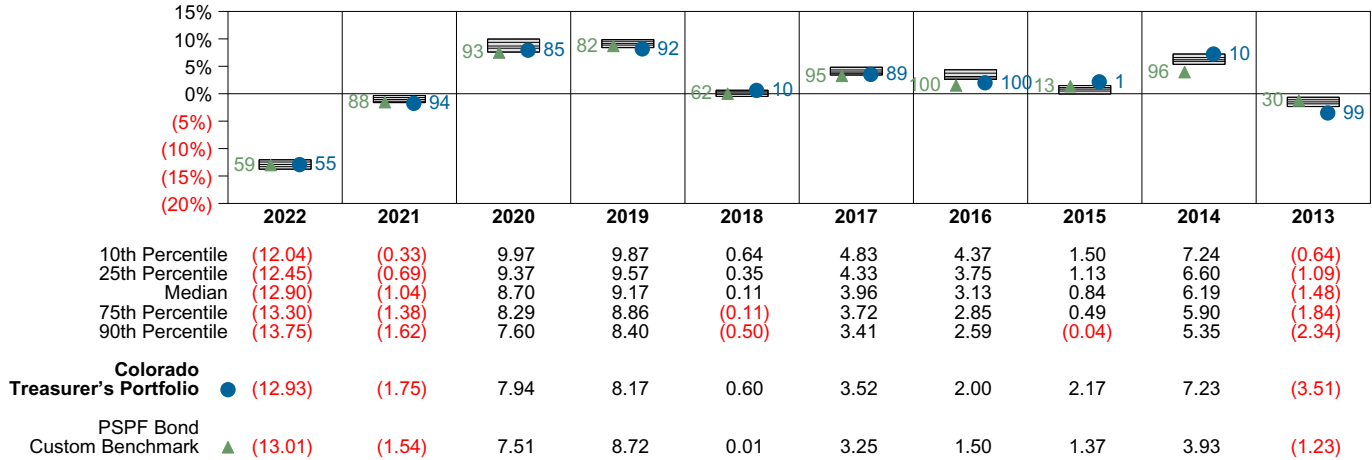


Colorado Treasurer's Portfolio Return Analysis Summary

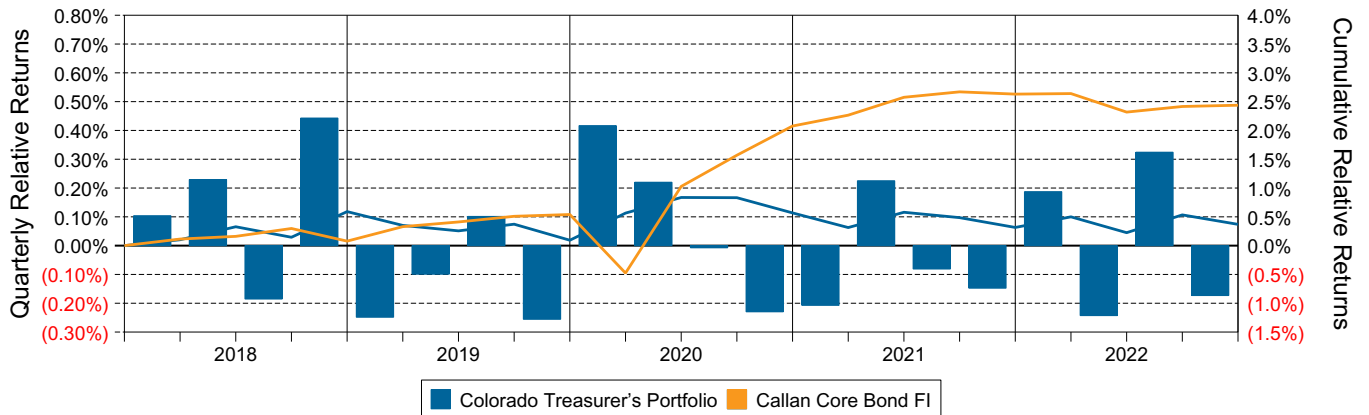
Return Analysis

The graphs below analyze the manager's return on both a risk-adjusted and unadjusted basis. The first chart illustrates the manager's ranking over different periods versus the appropriate style group. The second chart shows the historical quarterly and cumulative manager returns versus the appropriate market benchmark. The last chart illustrates the manager's ranking relative to their style using various risk-adjusted return measures.

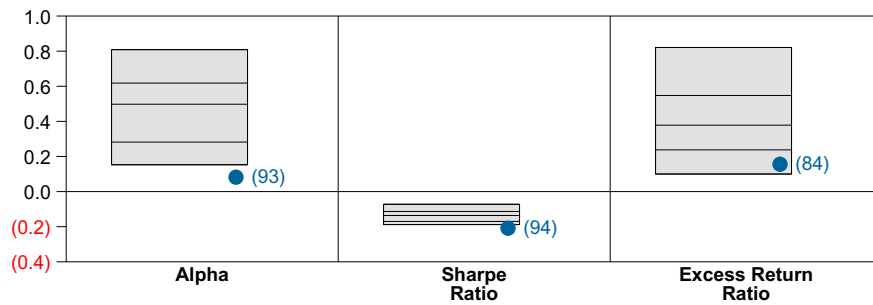
Performance vs Callan Core Bond Fixed Income (Gross)



Cumulative and Quarterly Relative Returns vs PSPF Bond Custom Benchmark



Risk Adjusted Return Measures vs PSPF Bond Custom Benchmark Rankings Against Callan Core Bond Fixed Income (Gross) Five Years Ended December 31, 2022

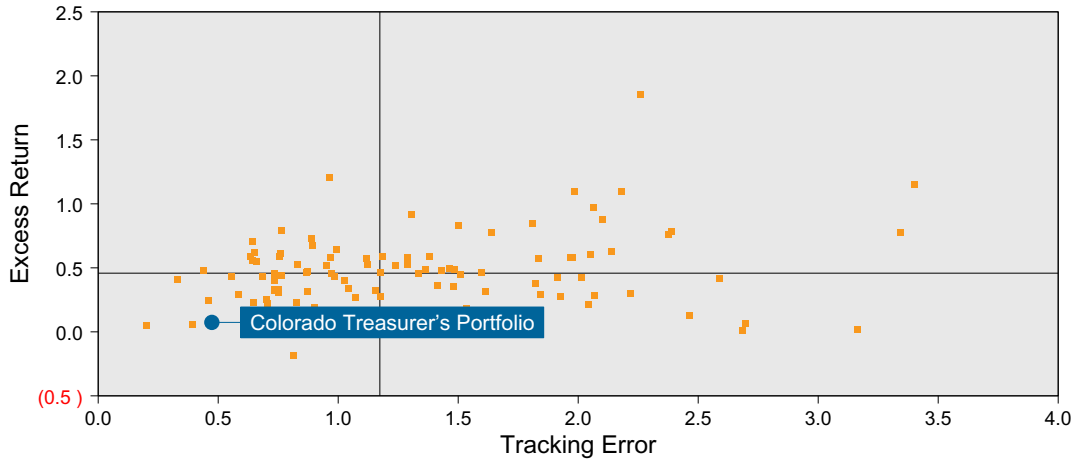


Colorado Treasurer's Portfolio Risk Analysis Summary

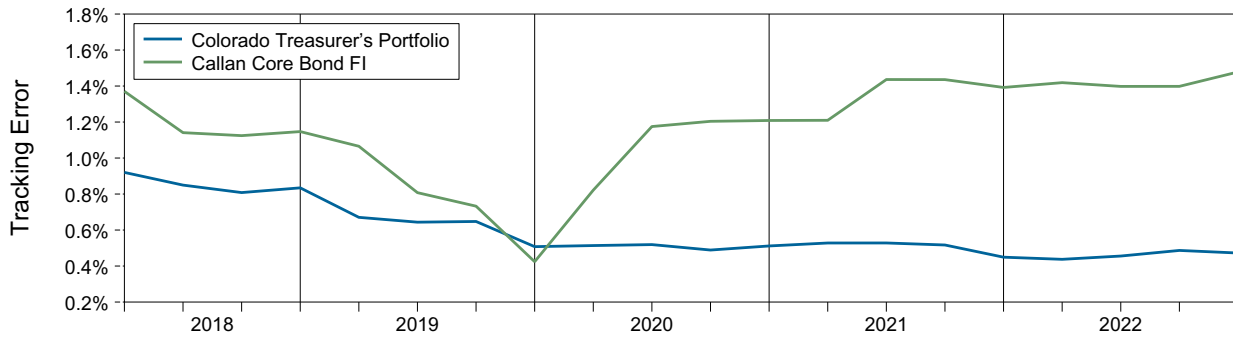
Risk Analysis

The graphs below analyze the risk or variation of a manager's return pattern. The first scatter chart illustrates the relationship, called Excess Return Ratio, between excess return and tracking error relative to the benchmark. The second chart shows tracking error patterns versus the benchmark over time. The last two charts show the ranking of the manager's risk statistics versus the peer group.

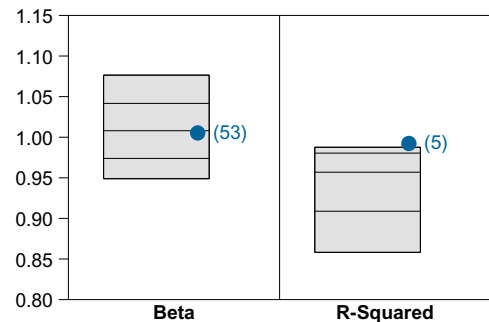
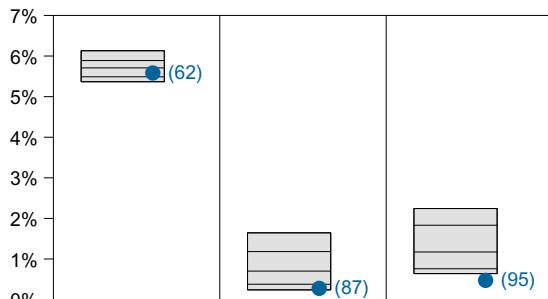
Risk Analysis vs Callan Core Bond Fixed Income (Gross) Five Years Ended December 31, 2022



Rolling 12 Quarter Tracking Error vs PSPF Bond Custom Benchmark



Risk Statistics Rankings vs PSPF Bond Custom Benchmark Rankings Against Callan Core Bond Fixed Income (Gross) Five Years Ended December 31, 2022



10th Percentile
25th Percentile
Median
75th Percentile
90th Percentile

6.13
5.89
5.71
5.49
5.37

1.64
1.18
0.70
0.38
0.24

2.24
1.83
1.17
0.76
0.64

10th Percentile
25th Percentile
Median
75th Percentile
90th Percentile

1.08
1.04
1.01
0.97
0.95

0.99
0.98
0.96
0.91
0.86

Colorado Treasurer's Portfolio ● 5.58 0.28 0.47

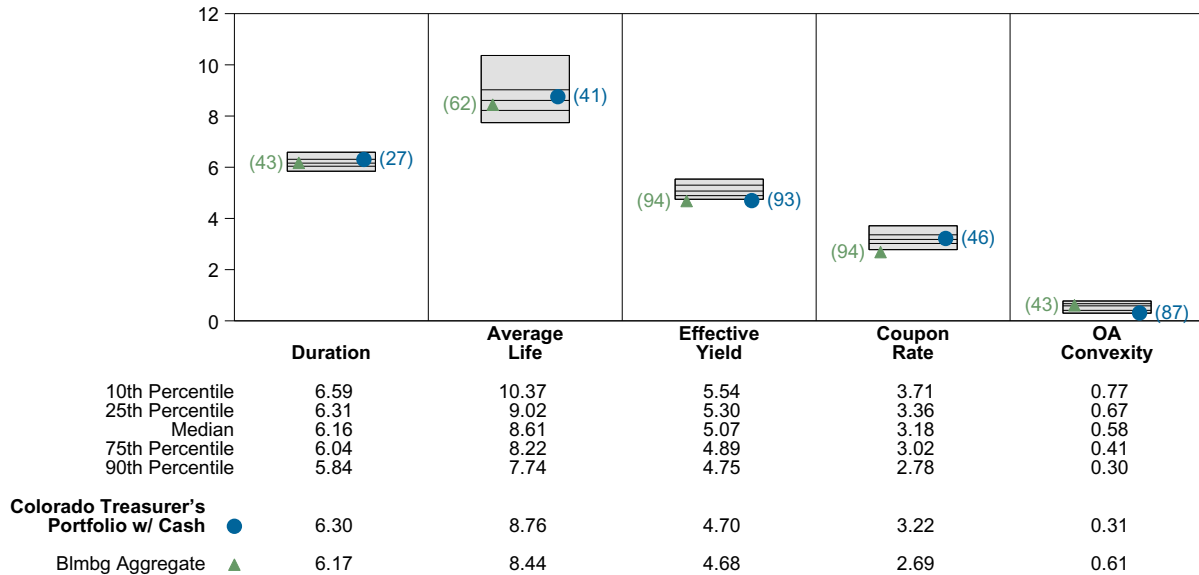
Colorado Treasurer's Portfolio ● 1.01 0.99

Colorado Treasurer's Portfolio w/ Cash Bond Characteristics Analysis Summary

Portfolio Characteristics

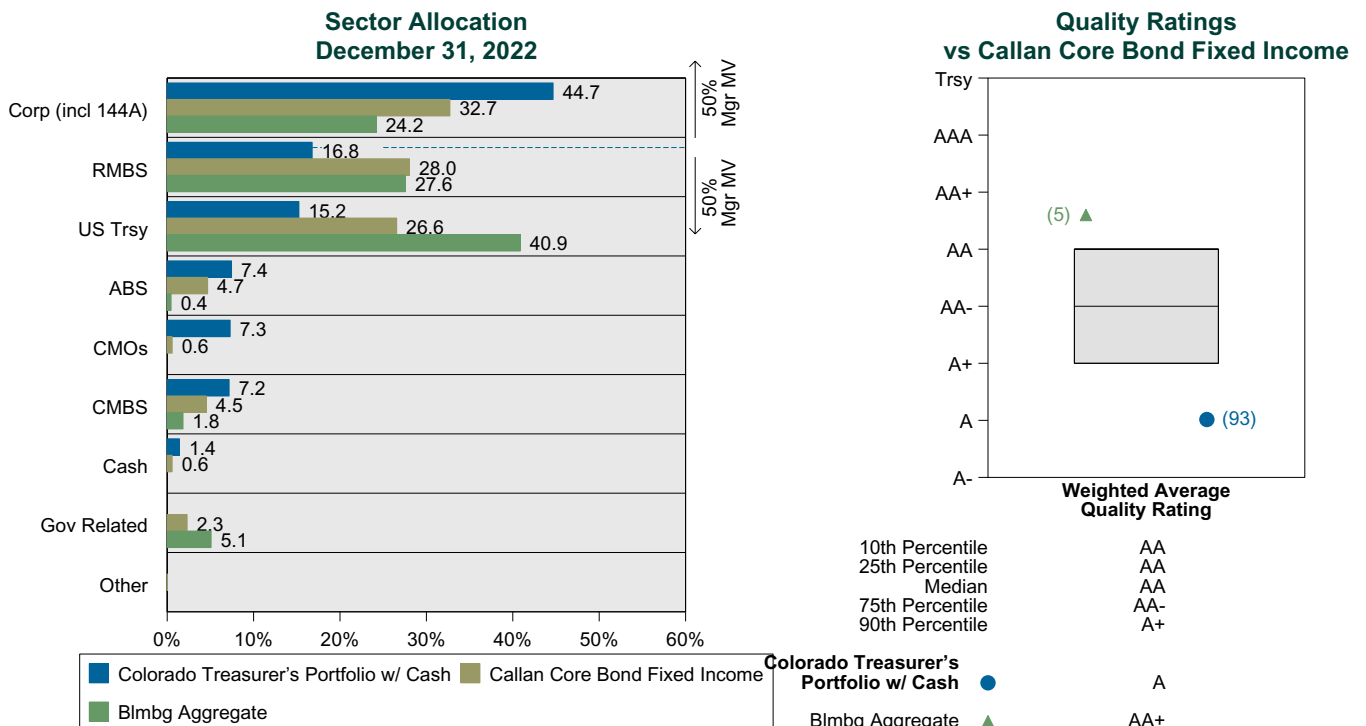
This graph compares the manager's portfolio characteristics with the range of characteristics for the portfolios which make up the manager's style group. This analysis illustrates whether the manager's current holdings are consistent with other managers employing the same style. Fixed Income Portfolio characteristics includes Cash Pool allocation.

Fixed Income Portfolio Characteristics Rankings Against Callan Core Bond Fixed Income as of December 31, 2022



Sector Allocation and Quality Ratings

The first graph compares the manager's sector allocation with the average allocation across all the members of the manager's style. The second graph compares the manager's weighted average quality rating with the range of quality ratings for the style.

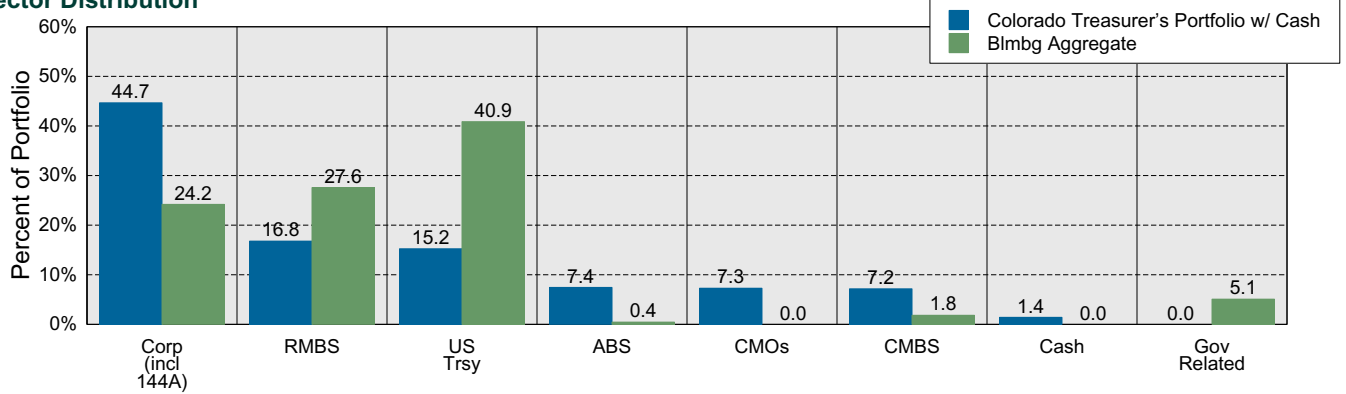


Colorado Treasurer's Portfolio w/ Cash Portfolio Characteristics Summary As of December 31, 2022

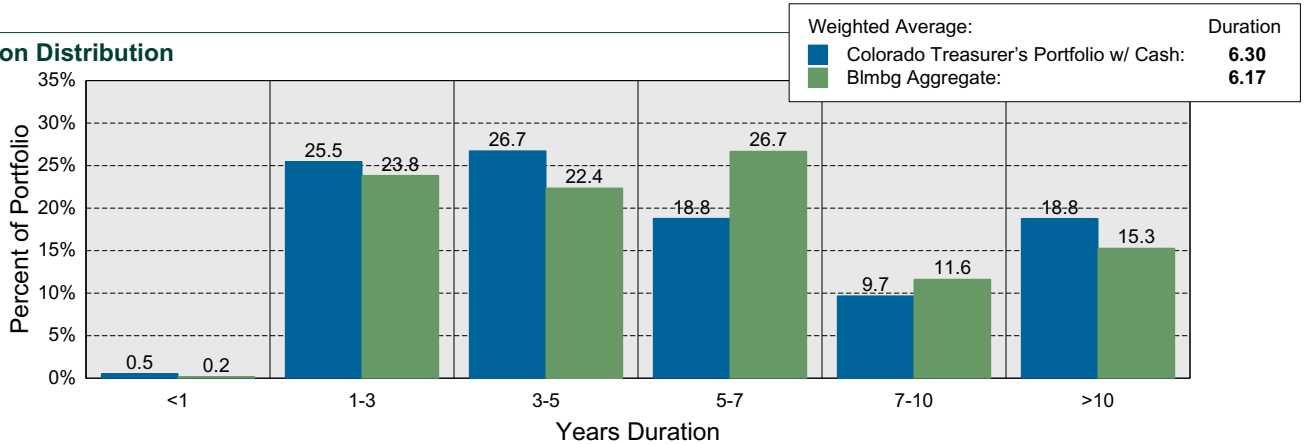
Portfolio Structure Comparison

The charts below compare the structure of the portfolio to that of the index from the three perspectives that have the greatest influence on return. The first chart compares the two portfolios across sectors. The second chart compares the duration distribution. The last chart compares the distribution across quality ratings.

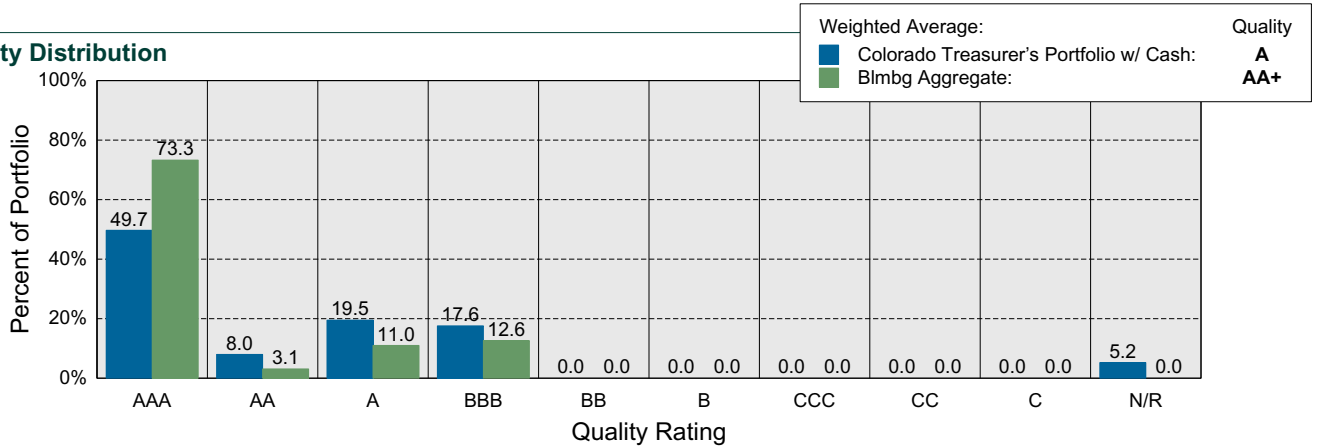
Sector Distribution



Duration Distribution



Quality Distribution



Janus Henderson Short Duration Period Ended December 31, 2022

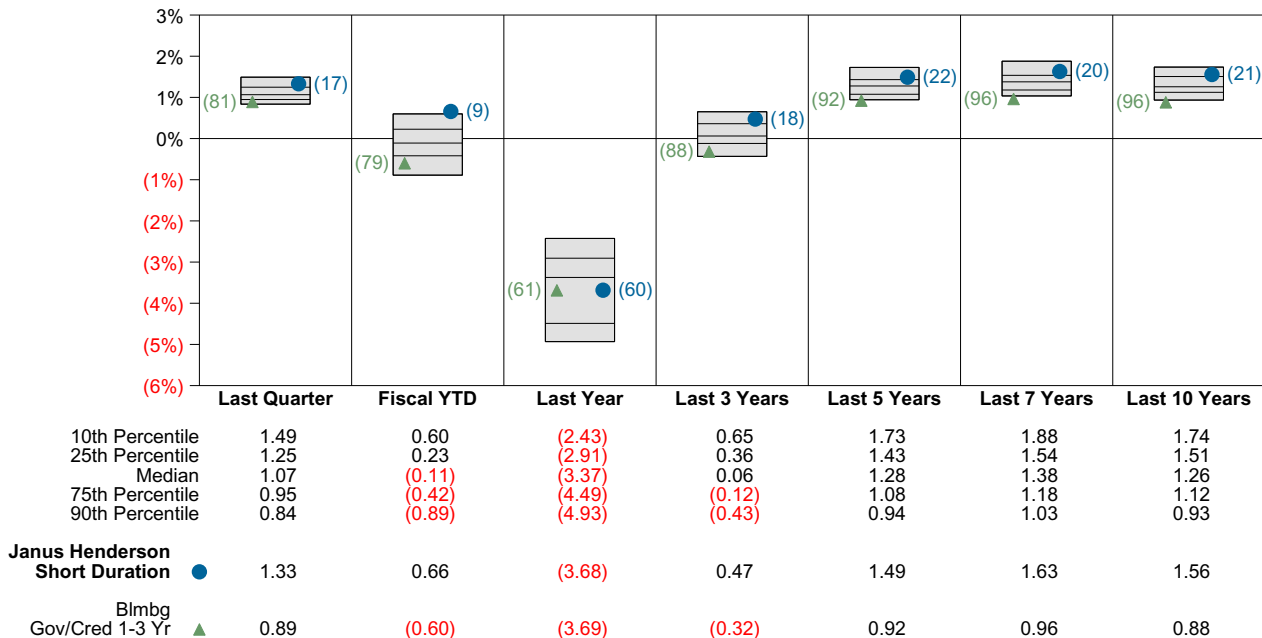
Investment Philosophy

Janus Henderson believes a bottom-up, fundamentally driven investment process that focuses on credit-oriented investments can generate risk-adjusted outperformance over time. A comprehensive bottom-up view drives decision-making at a macro level, enabling them to make informed decisions about allocations to all sectors of the fixed income universe. The Short Duration Fixed Income strategy emphasizes risk-adjusted performance and capital preservation with value generated principally from prudent credit selection and credit sector positioning. The Janus Henderson short duration portfolio was funded November 9th, 2018. Prior returns represent the manager's composite returns.

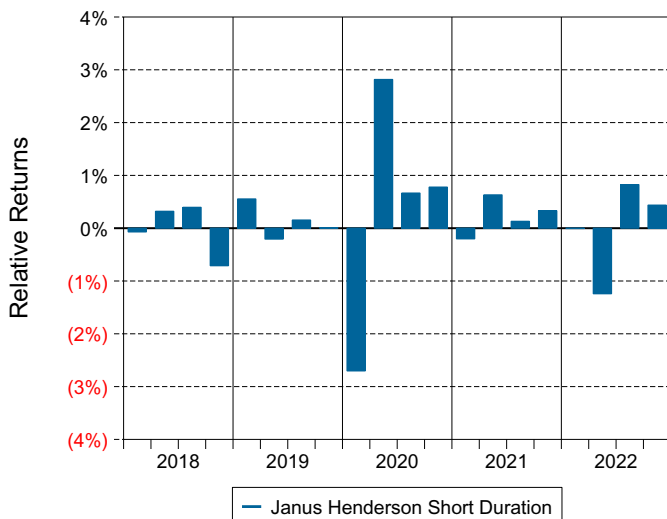
Quarterly Summary and Highlights

- Janus Henderson Short Duration's portfolio posted a 1.33% return for the quarter placing it in the 17 percentile of the Callan Short Term Fixed Income group for the quarter and in the 60 percentile for the last year.
- Janus Henderson Short Duration's portfolio outperformed the Blmbg Gov/Cred 1-3 Yr by 0.44% for the quarter and outperformed the Blmbg Gov/Cred 1-3 Yr for the year by 0.00%.

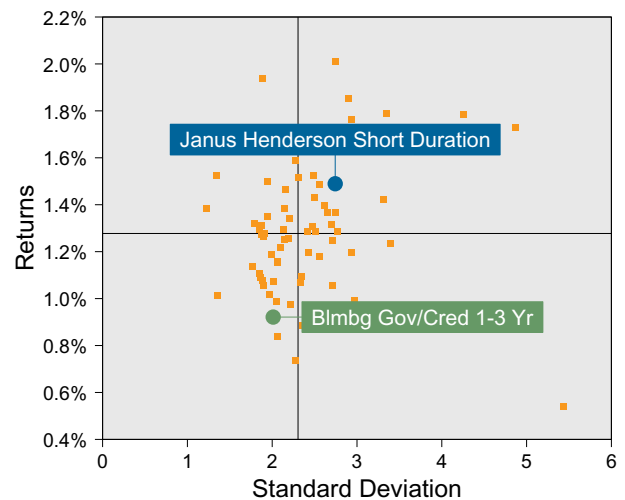
Performance vs Callan Short Term Fixed Income (Gross)



Relative Return vs Blmbg Gov/Cred 1-3 Yr



Callan Short Term Fixed Income (Gross) Annualized Five Year Risk vs Return

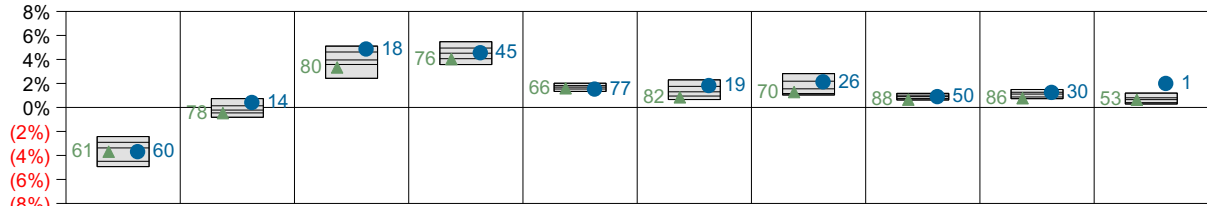


Janus Henderson Short Duration Return Analysis Summary

Return Analysis

The graphs below analyze the manager's return on both a risk-adjusted and unadjusted basis. The first chart illustrates the manager's ranking over different periods versus the appropriate style group. The second chart shows the historical quarterly and cumulative manager returns versus the appropriate market benchmark. The last chart illustrates the manager's ranking relative to their style using various risk-adjusted return measures.

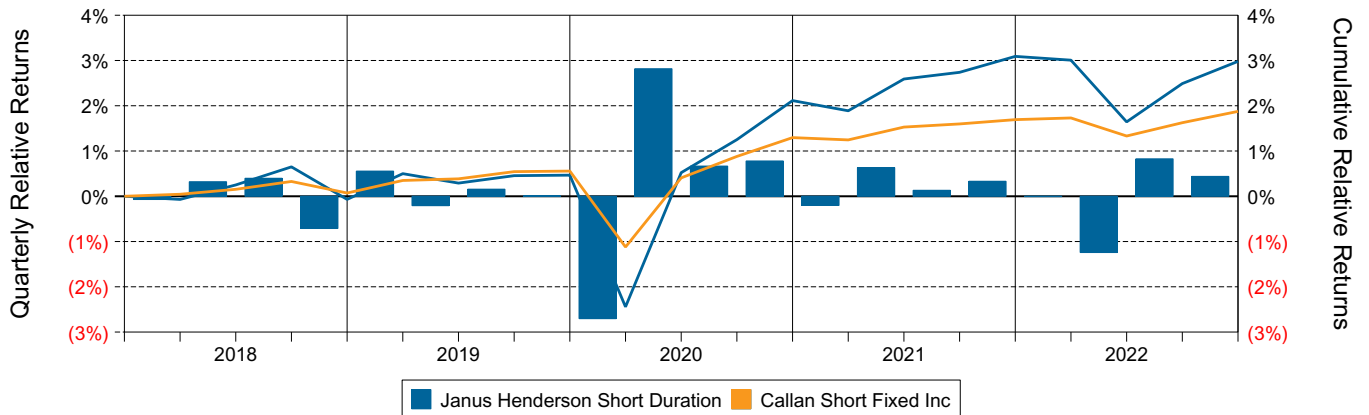
Performance vs Callan Short Term Fixed Income (Gross)



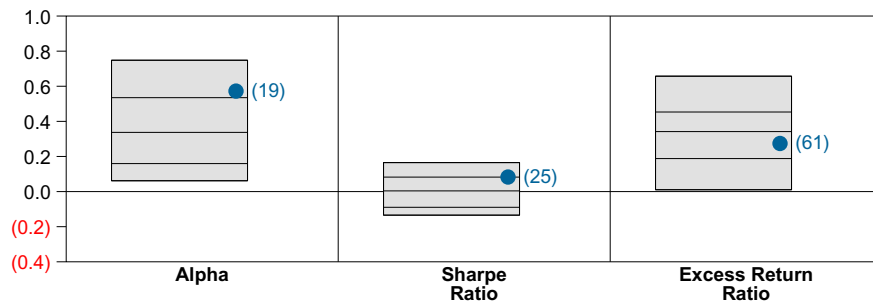
	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
10th Percentile	(2.43)	0.74	5.11	5.48	2.02	2.30	2.82	1.17	1.50	1.19
25th Percentile	(2.91)	0.14	4.62	4.95	1.82	1.76	2.19	1.02	1.27	0.80
Median	(3.37)	(0.22)	3.96	4.52	1.69	1.30	1.55	0.90	1.11	0.65
75th Percentile	(4.49)	(0.46)	3.58	4.06	1.54	0.95	1.16	0.75	0.87	0.40
90th Percentile	(4.93)	(0.82)	2.43	3.57	1.33	0.66	1.04	0.62	0.73	0.29

	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Janus Henderson Short Duration	(3.68)	0.41	4.87	4.56	1.53	1.82	2.13	0.90	1.25	2.00
Blmbg Gov/Cred 1-3 Yr	(3.69)	(0.47)	3.33	4.03	1.60	0.84	1.28	0.65	0.77	0.64

Cumulative and Quarterly Relative Returns vs Blmbg Gov/Cred 1-3 Yr



Risk Adjusted Return Measures vs Blmbg Gov/Cred 1-3 Yr Rankings Against Callan Short Term Fixed Income (Gross) Five Years Ended December 31, 2022



	Alpha	Sharpe Ratio	Excess Return Ratio
10th Percentile	0.75	0.17	0.66
25th Percentile	0.53	0.08	0.45
Median	0.34	0.00	0.34
75th Percentile	0.16	(0.09)	0.19
90th Percentile	0.06	(0.13)	0.01

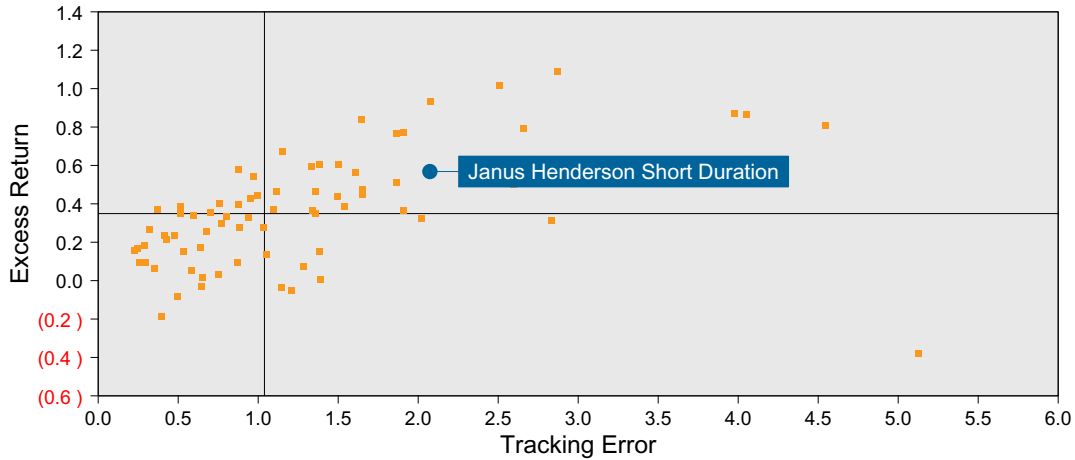
Janus Henderson Short Duration	0.57	0.08	0.27
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Janus Henderson Short Duration Risk Analysis Summary

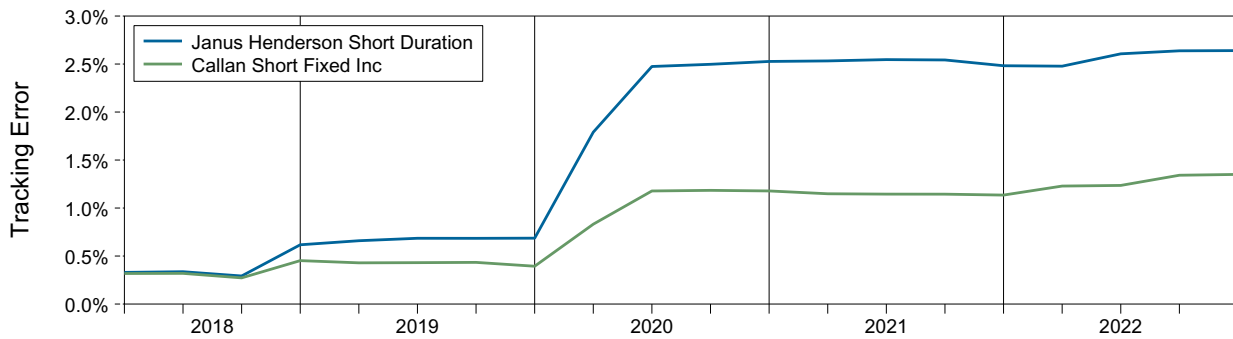
Risk Analysis

The graphs below analyze the risk or variation of a manager's return pattern. The first scatter chart illustrates the relationship, called Excess Return Ratio, between excess return and tracking error relative to the benchmark. The second chart shows tracking error patterns versus the benchmark over time. The last two charts show the ranking of the manager's risk statistics versus the peer group.

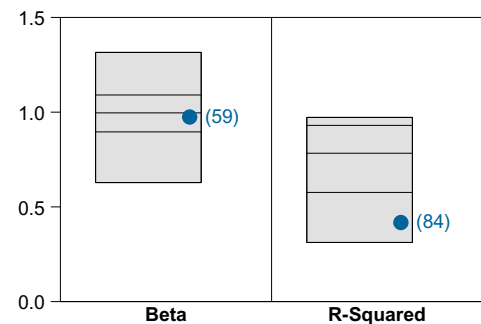
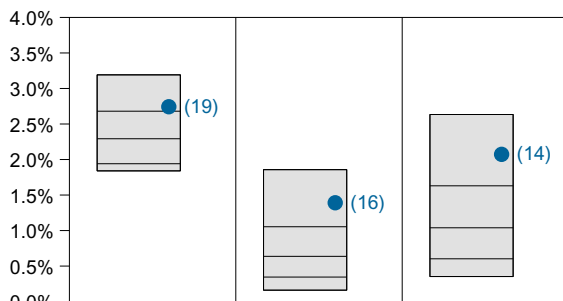
Risk Analysis vs Callan Short Term Fixed Income (Gross) Five Years Ended December 31, 2022



Rolling 12 Quarter Tracking Error vs Blmbg Gov/Cred 1-3 Yr



Risk Statistics Rankings vs Blmbg Gov/Cred 1-3 Yr Rankings Against Callan Short Term Fixed Income (Gross) Five Years Ended December 31, 2022



10th Percentile
25th Percentile
Median
75th Percentile
90th Percentile

3.19
2.68
2.29
1.94
1.84

1.86
1.05
0.64
0.35
0.16

2.63
1.63
1.04
0.60
0.35

10th Percentile
25th Percentile
Median
75th Percentile
90th Percentile

1.32
1.09
1.00
0.90
0.63

0.97
0.93
0.78
0.58
0.31

Janus Henderson Short Duration ●

2.74

1.39

2.07

Janus Henderson Short Duration ●

0.97

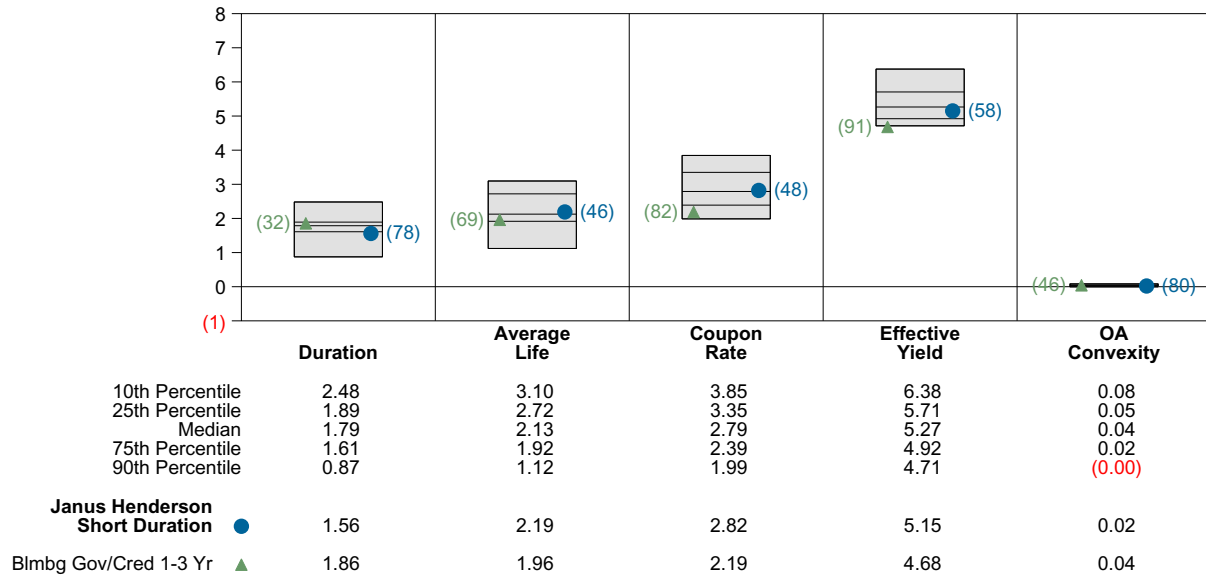
0.42

Janus Henderson Short Duration Bond Characteristics Analysis Summary

Portfolio Characteristics

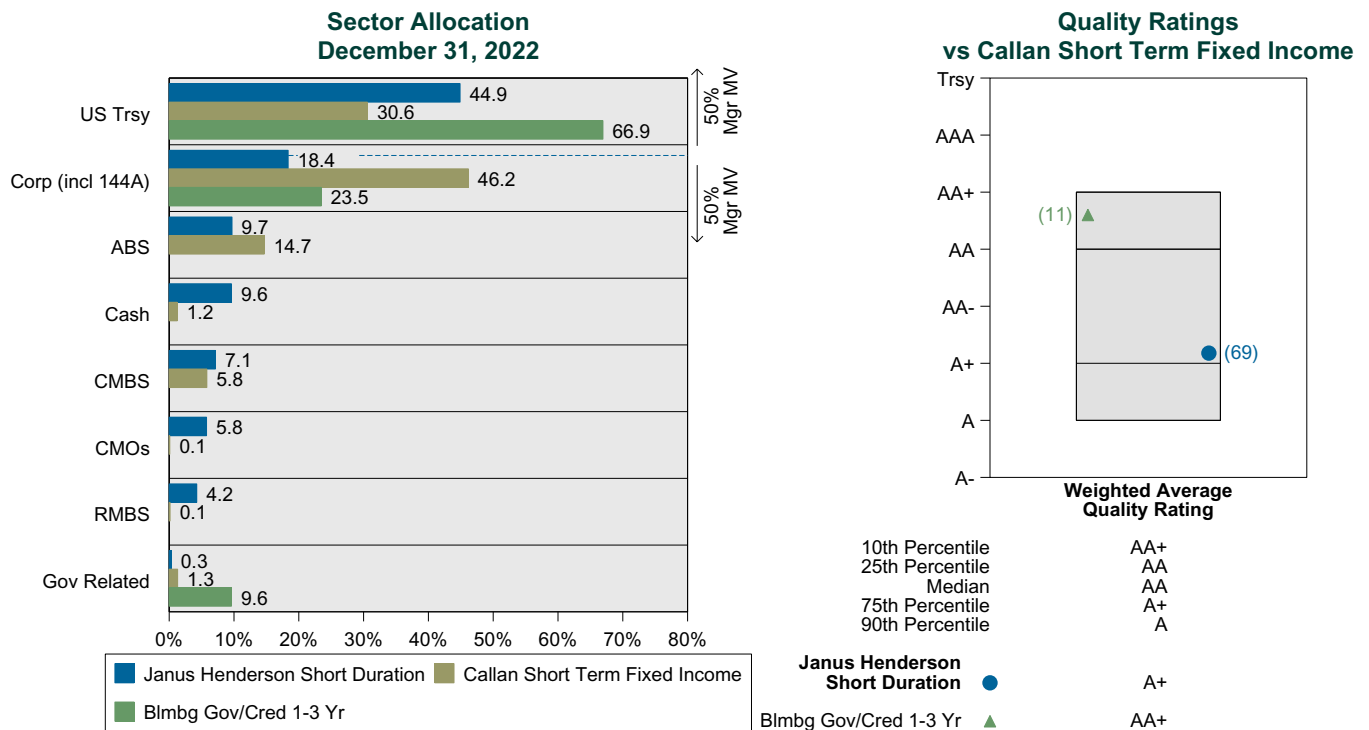
This graph compares the manager's portfolio characteristics with the range of characteristics for the portfolios which make up the manager's style group. This analysis illustrates whether the manager's current holdings are consistent with other managers employing the same style. Fixed Income Portfolio characteristics includes Cash Pool allocation.

Fixed Income Portfolio Characteristics Rankings Against Callan Short Term Fixed Income as of December 31, 2022



Sector Allocation and Quality Ratings

The first graph compares the manager's sector allocation with the average allocation across all the members of the manager's style. The second graph compares the manager's weighted average quality rating with the range of quality ratings for the style.

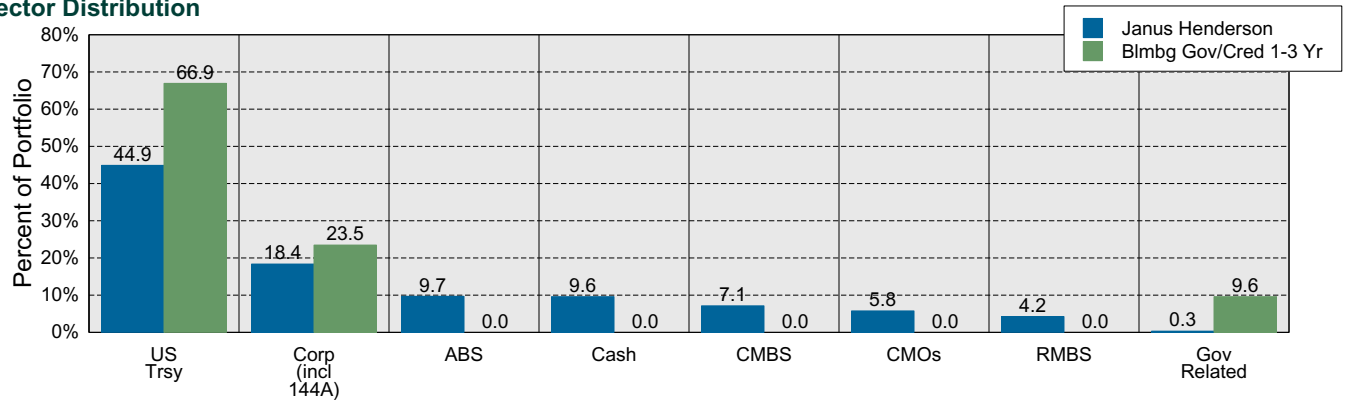


Janus Henderson Portfolio Characteristics Summary As of December 31, 2022

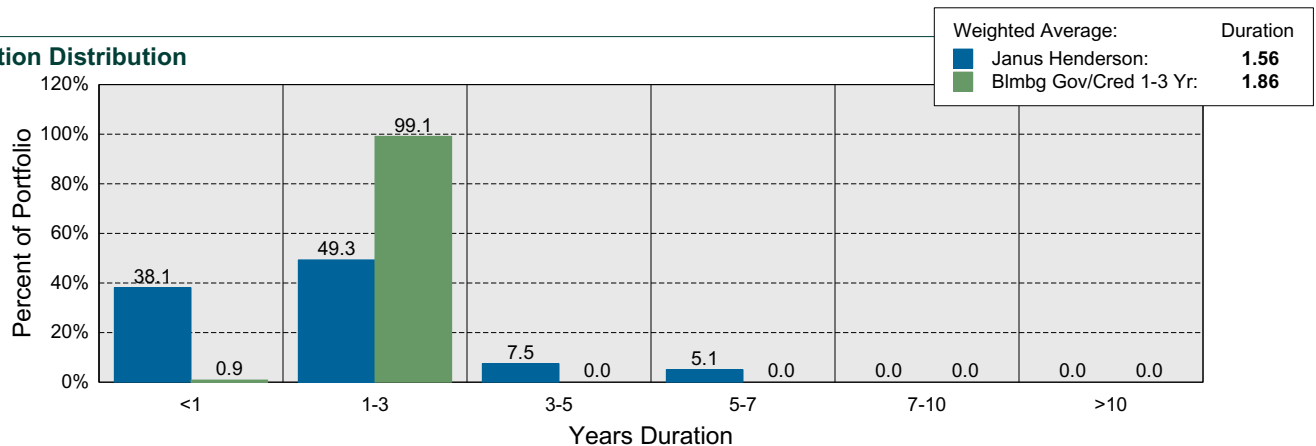
Portfolio Structure Comparison

The charts below compare the structure of the portfolio to that of the index from the three perspectives that have the greatest influence on return. The first chart compares the two portfolios across sectors. The second chart compares the duration distribution. The last chart compares the distribution across quality ratings.

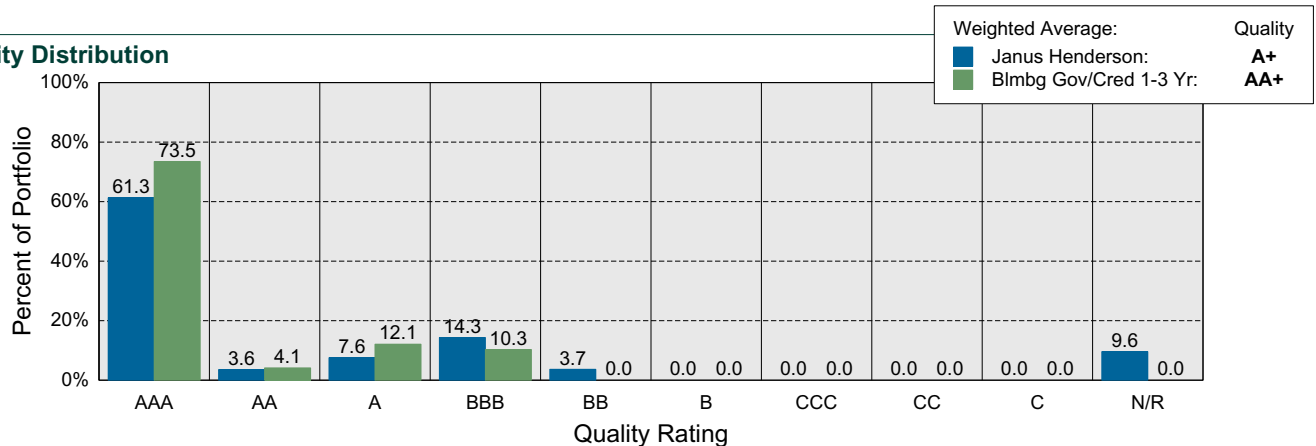
Sector Distribution



Duration Distribution



Quality Distribution



High Income Strategies

Period Ended December 31, 2022

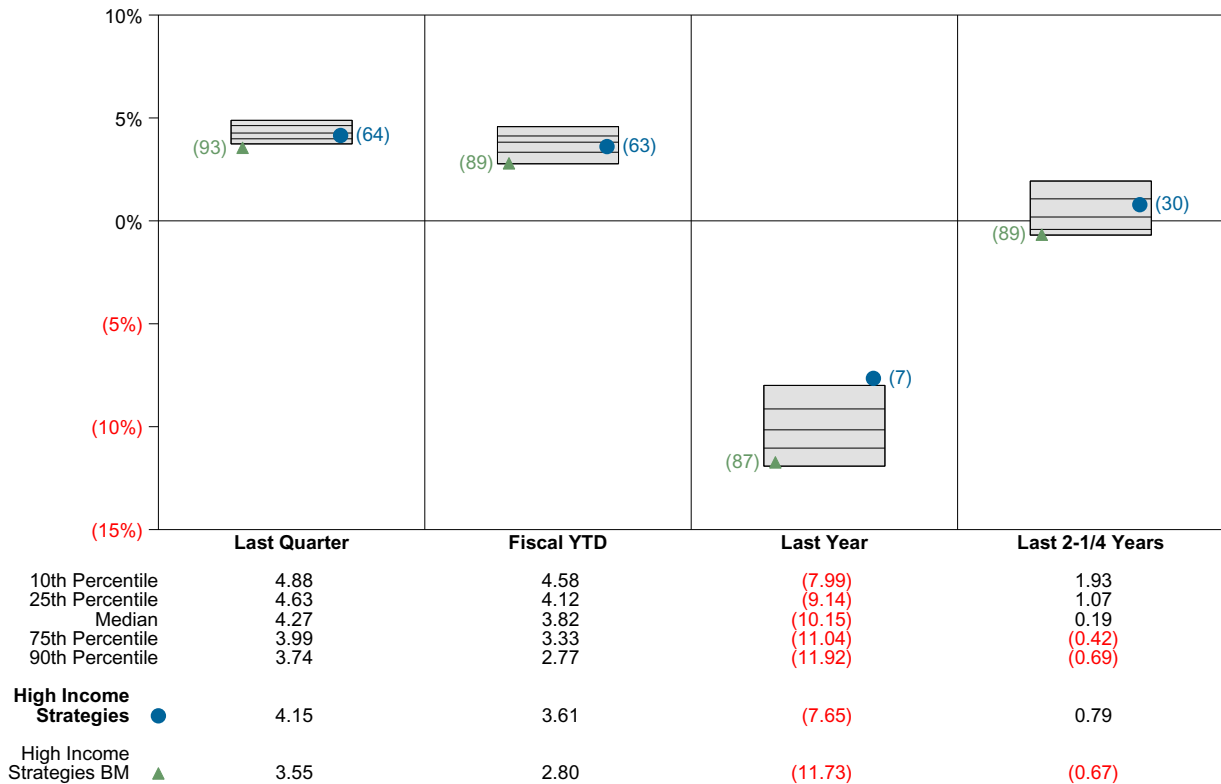
Benchmark Definition

The High Income Strategies Benchmark consists of 85% Blmbg High Yield Index and 15% ICE BofA US All Cap Secs Index.

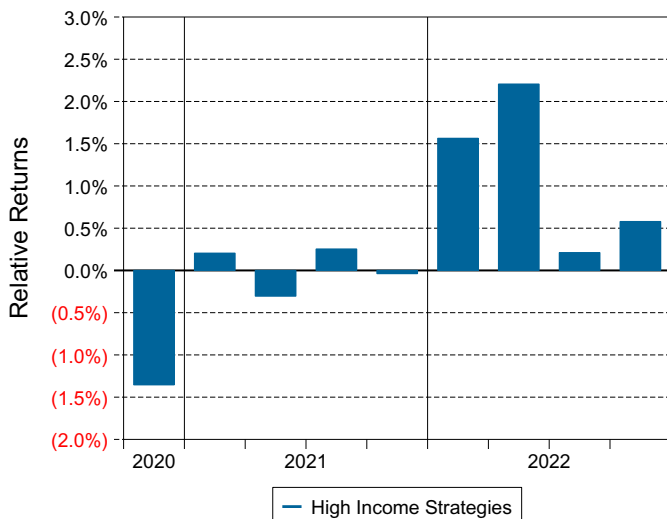
Quarterly Summary and Highlights

- High Income Strategies's portfolio posted a 4.15% return for the quarter placing it in the 64 percentile of the Callan High Yield Fixed Income group for the quarter and in the 7 percentile for the last year.
- High Income Strategies's portfolio outperformed the High Income Strategies BM by 0.60% for the quarter and outperformed the High Income Strategies BM for the year by 4.08%.

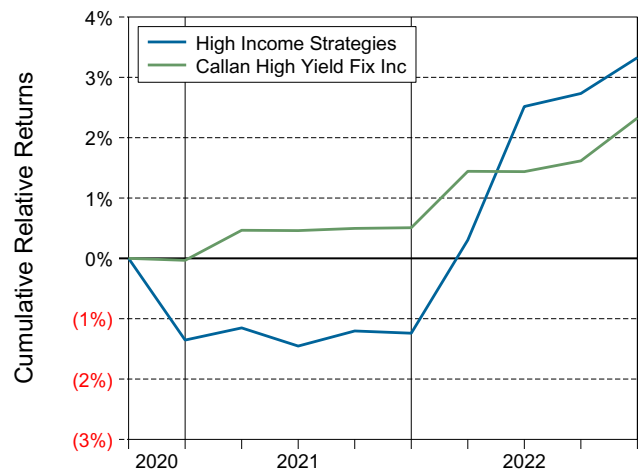
Performance vs Callan High Yield Fixed Income (Gross)



Relative Return vs High Income Strategies BM



Cumulative Returns vs High Income Strategies BM

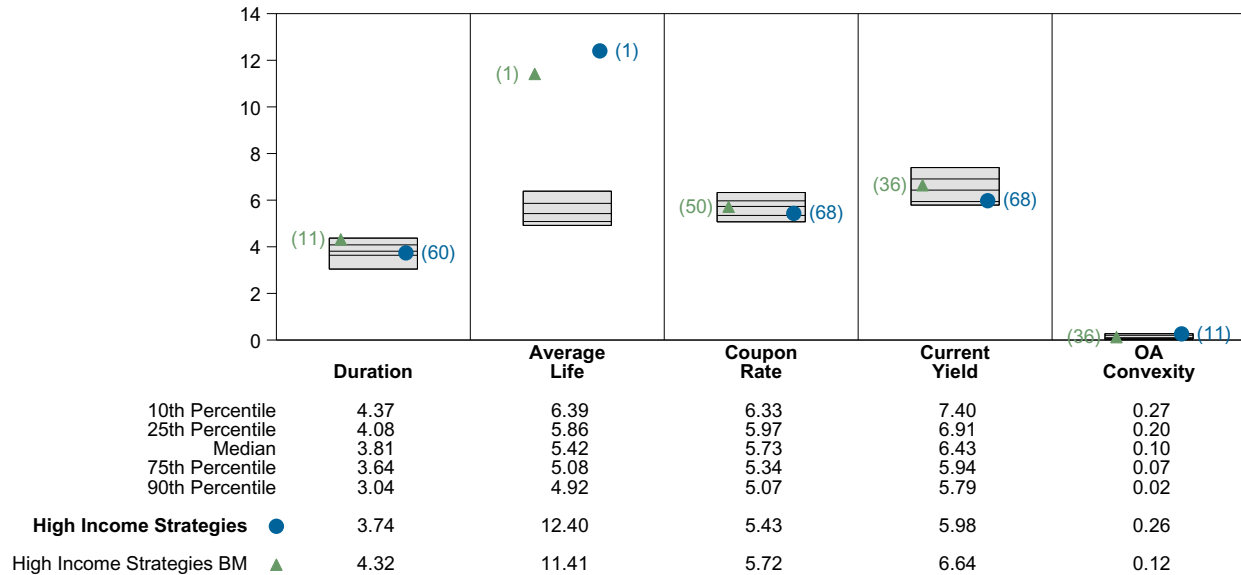


High Income Strategies Bond Characteristics Analysis Summary

Portfolio Characteristics

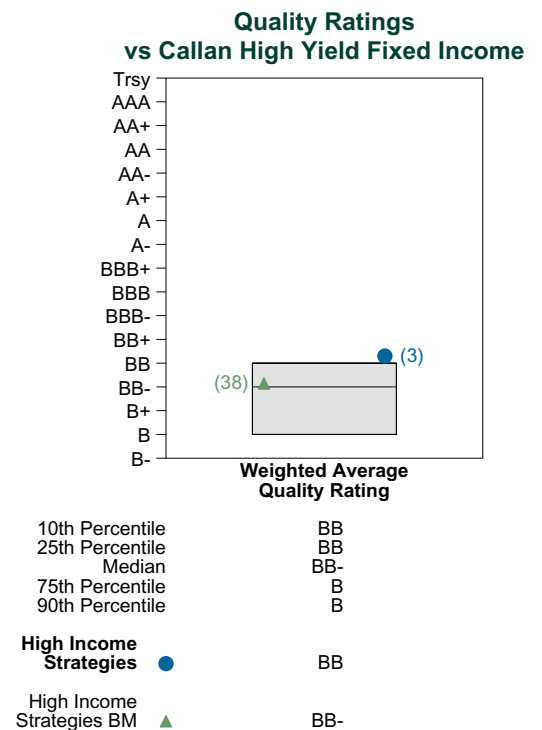
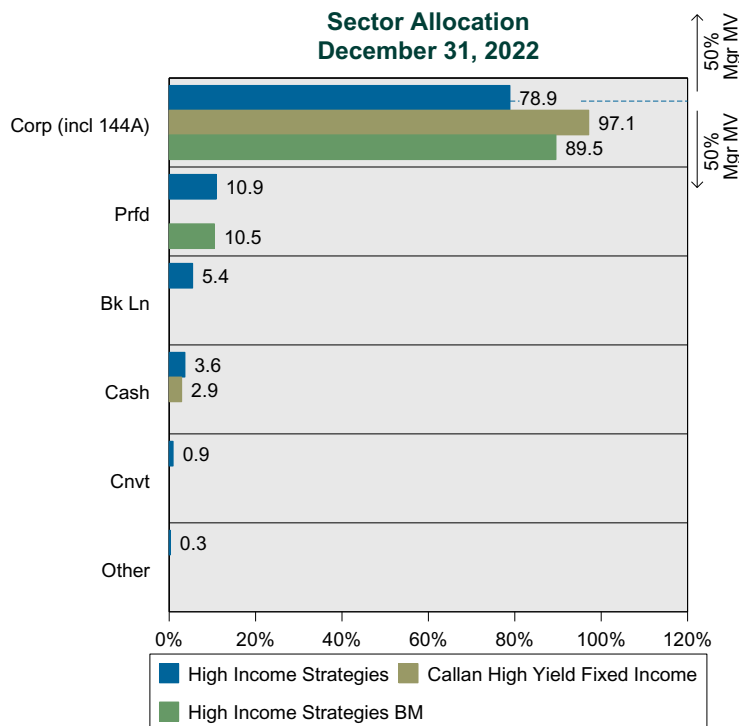
This graph compares the manager's portfolio characteristics with the range of characteristics for the portfolios which make up the manager's style group. This analysis illustrates whether the manager's current holdings are consistent with other managers employing the same style. Fixed Income Portfolio characteristics includes Cash Pool allocation.

Fixed Income Portfolio Characteristics Rankings Against Callan High Yield Fixed Income as of December 31, 2022



Sector Allocation and Quality Ratings

The first graph compares the manager's sector allocation with the average allocation across all the members of the manager's style. The second graph compares the manager's weighted average quality rating with the range of quality ratings for the style.

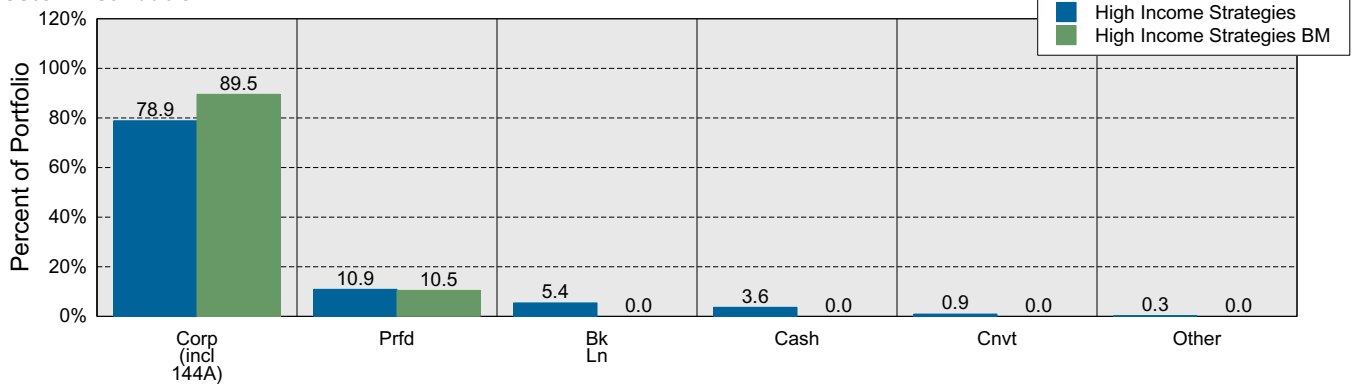


High Income Strategies Portfolio Characteristics Summary As of December 31, 2022

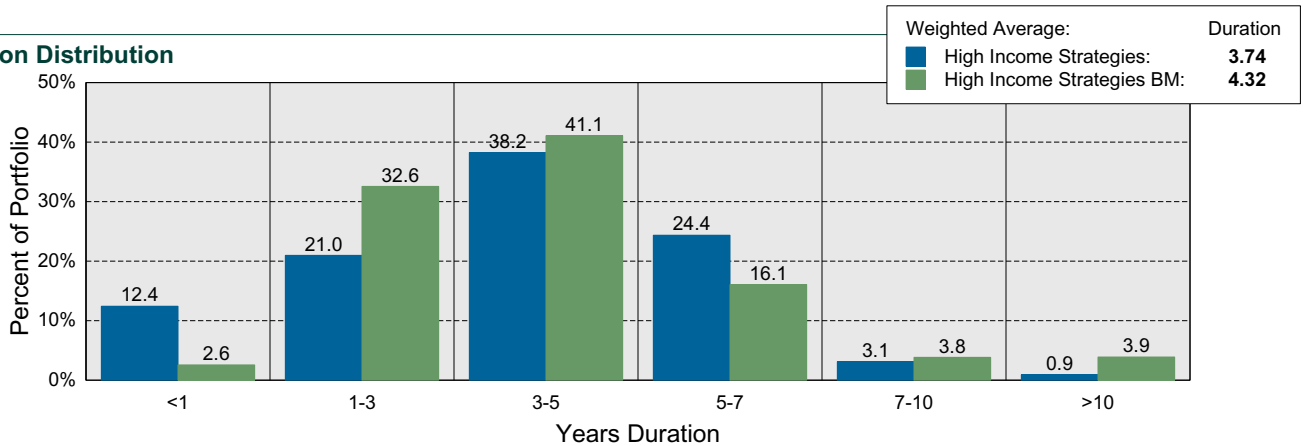
Portfolio Structure Comparison

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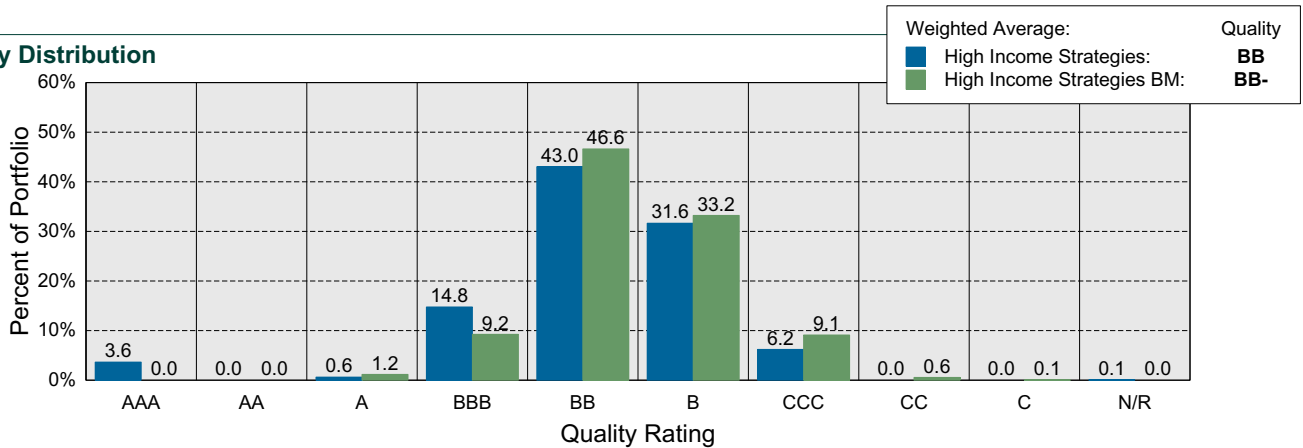
Sector Distribution



Duration Distribution



Quality Distribution



Mackay Shield US High Yield Period Ended December 31, 2022

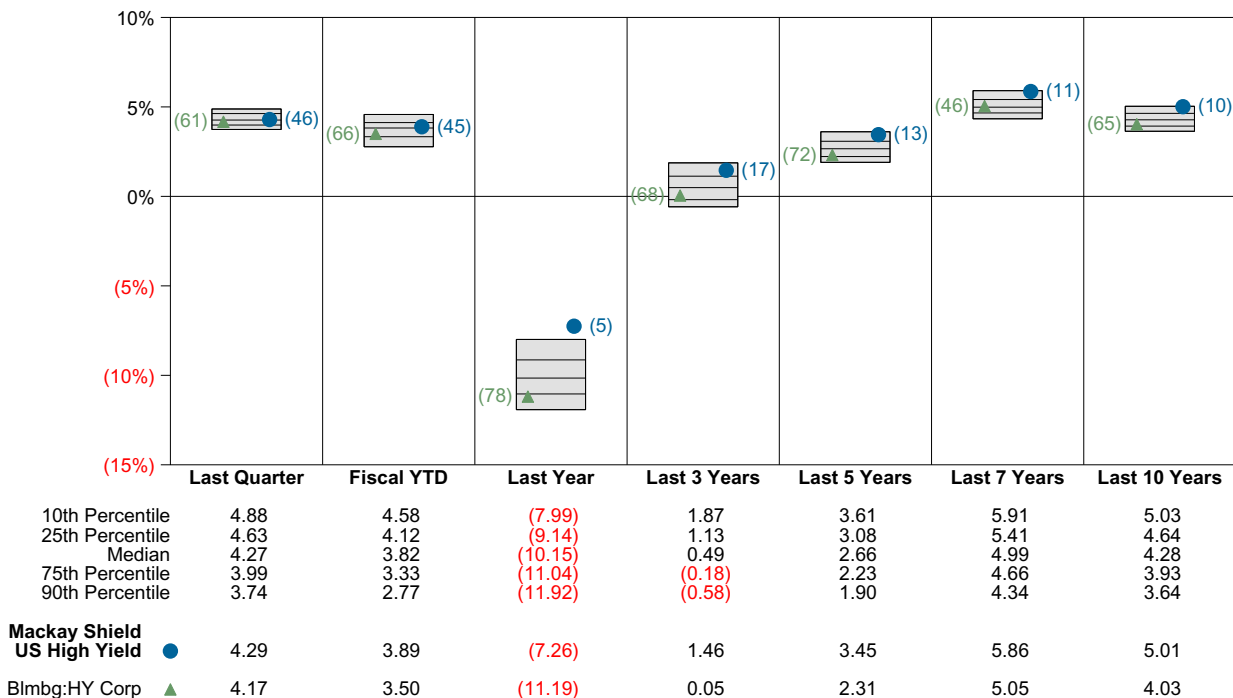
Investment Philosophy

Mackay relies on rigorous fundamental analysis to select companies with strong free cash flow and asset coverage in its quest to maximize yield, adjusted for default risk. The strategy is well diversified with sector and quality weights a residual of the security selection process. Mackay believes that long-term value is best created by avoiding downside risk (i.e. defaults) while selecting companies with attractive valuations and a catalyst for spread compression. Mackay Shield US High Yield was funded July 24, 2020. Returns prior to inception reflect the manager's high yield composite returns.

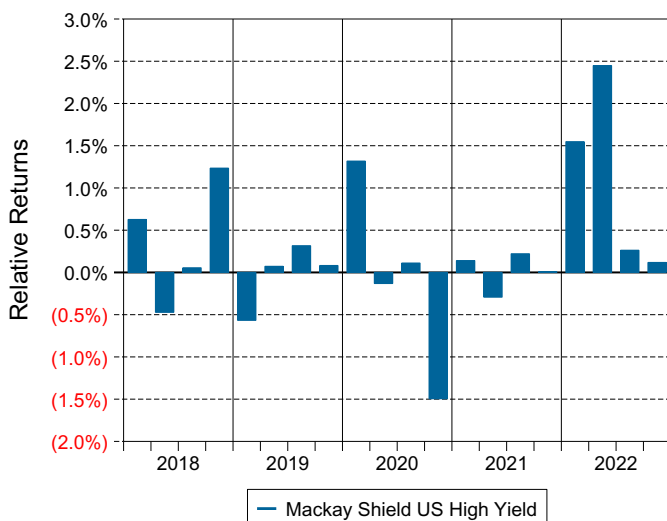
Quarterly Summary and Highlights

- Mackay Shield US High Yield's portfolio posted a 4.29% return for the quarter placing it in the 46 percentile of the Callan High Yield Fixed Income group for the quarter and in the 5 percentile for the last year.
- Mackay Shield US High Yield's portfolio outperformed the Blmbg:HY Corp by 0.12% for the quarter and outperformed the Blmbg:HY Corp for the year by 3.93%.

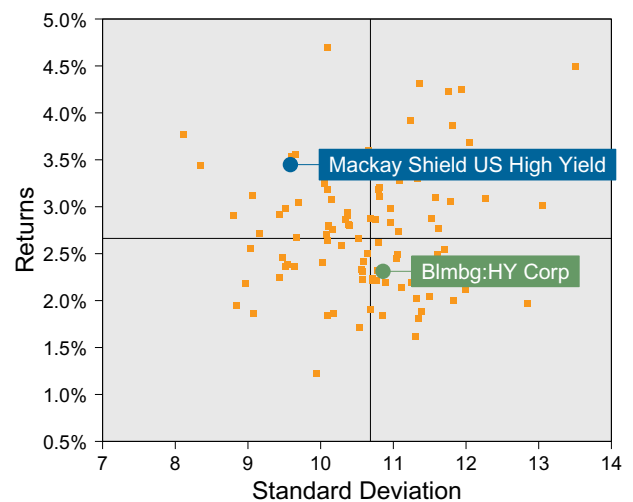
Performance vs Callan High Yield Fixed Income (Gross)



Relative Return vs Blmbg:HY Corp



Callan High Yield Fixed Income (Gross) Annualized Five Year Risk vs Return

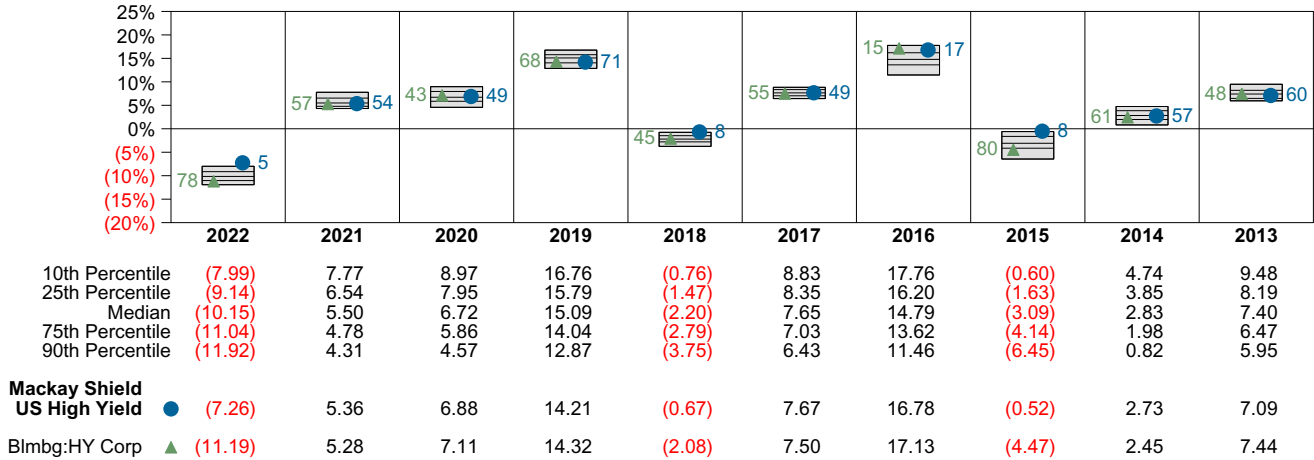


Mackay Shield US High Yield Return Analysis Summary

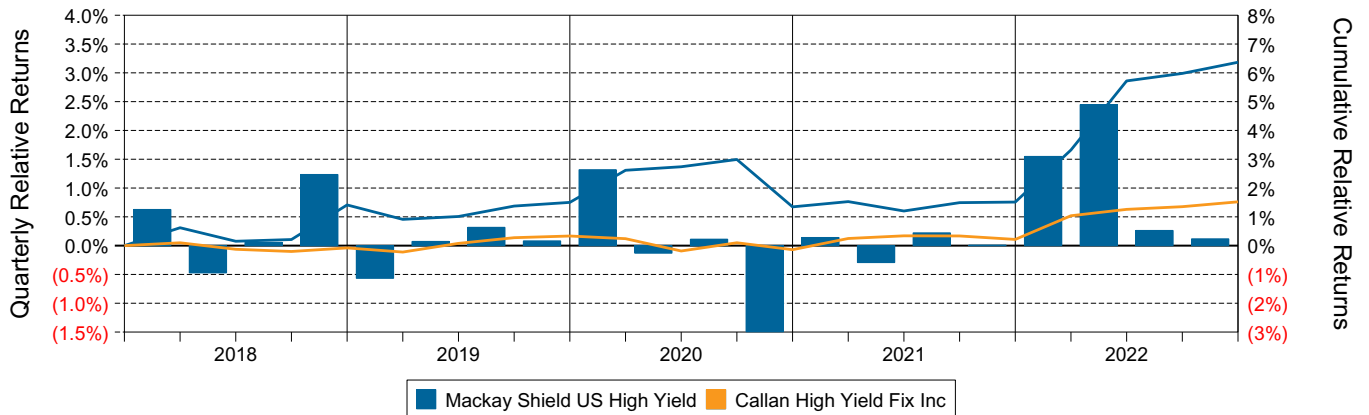
Return Analysis

The graphs below analyze the manager's return on both a risk-adjusted and unadjusted basis. The first chart illustrates the manager's ranking over different periods versus the appropriate style group. The second chart shows the historical quarterly and cumulative manager returns versus the appropriate market benchmark. The last chart illustrates the manager's ranking relative to their style using various risk-adjusted return measures.

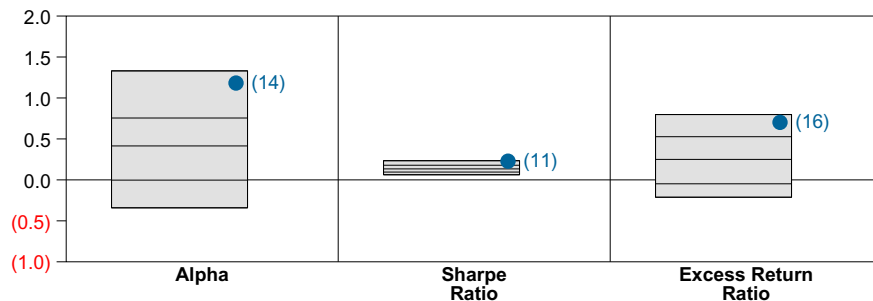
Performance vs Callan High Yield Fixed Income (Gross)



Cumulative and Quarterly Relative Returns vs Blmbg:HY Corp



Risk Adjusted Return Measures vs Blmbg:HY Corp Rankings Against Callan High Yield Fixed Income (Gross) Five Years Ended December 31, 2022

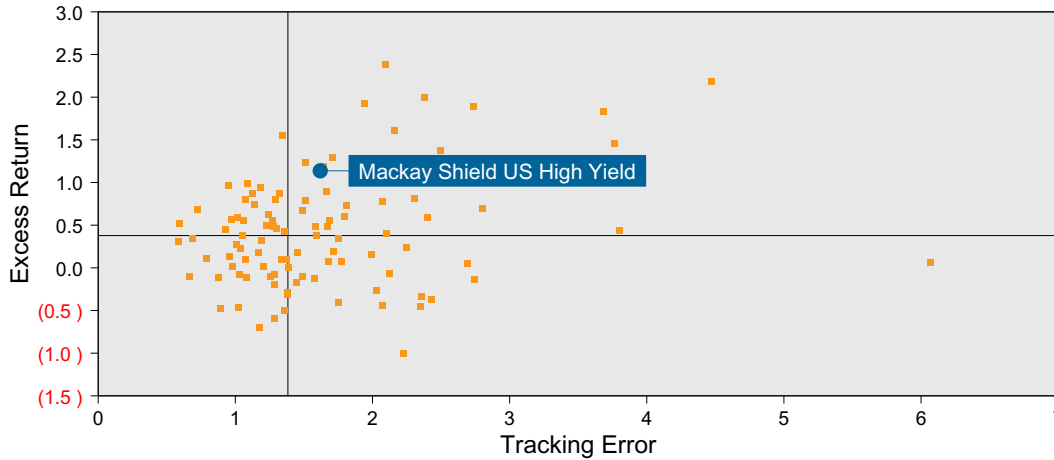


Mackay Shield US High Yield Risk Analysis Summary

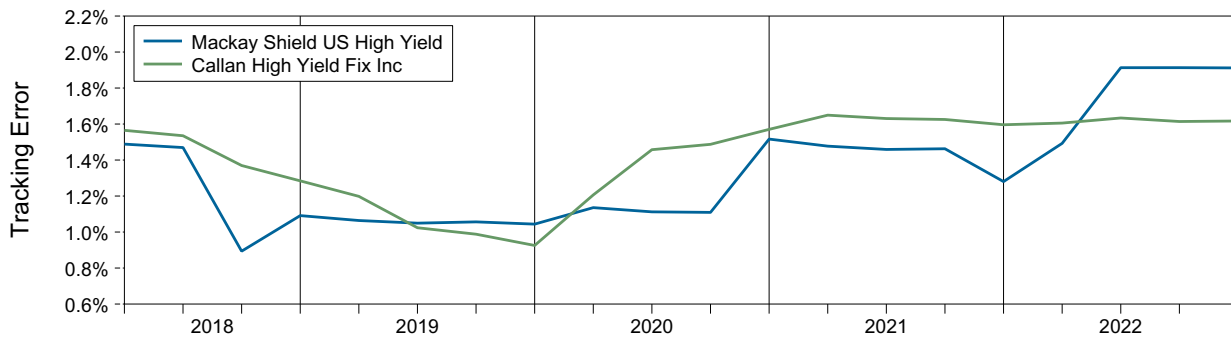
Risk Analysis

The graphs below analyze the risk or variation of a manager's return pattern. The first scatter chart illustrates the relationship, called Excess Return Ratio, between excess return and tracking error relative to the benchmark. The second chart shows tracking error patterns versus the benchmark over time. The last two charts show the ranking of the manager's risk statistics versus the peer group.

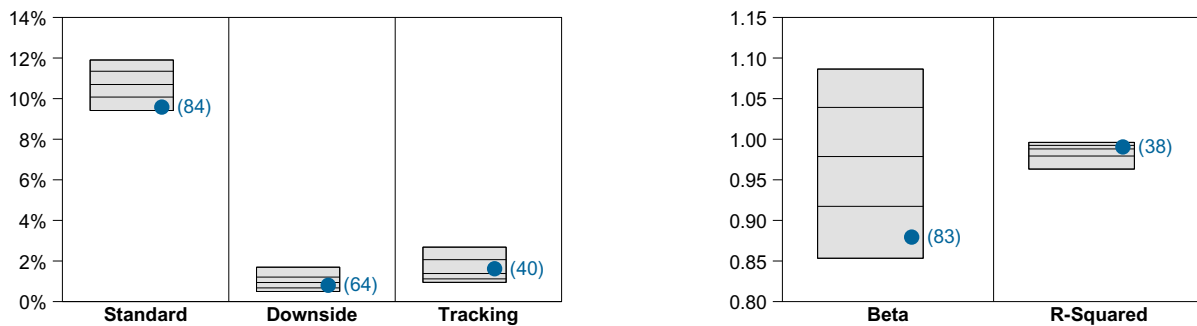
Risk Analysis vs Callan High Yield Fixed Income (Gross) Five Years Ended December 31, 2022



Rolling 12 Quarter Tracking Error vs Blmbg:HY Corp



Risk Statistics Rankings vs Blmbg:HY Corp Rankings Against Callan High Yield Fixed Income (Gross) Five Years Ended December 31, 2022



10th Percentile 11.90
25th Percentile 11.35
Median 10.70
75th Percentile 10.08
90th Percentile 9.41

Standard Deviation

Downside Risk

Tracking Error

10th Percentile 1.09
25th Percentile 1.04
Median 0.98
75th Percentile 0.92
90th Percentile 0.85

Beta

R-Squared

Mackay Shield US High Yield ●

9.58

0.80

1.62

Mackay Shield US High Yield ●

0.88

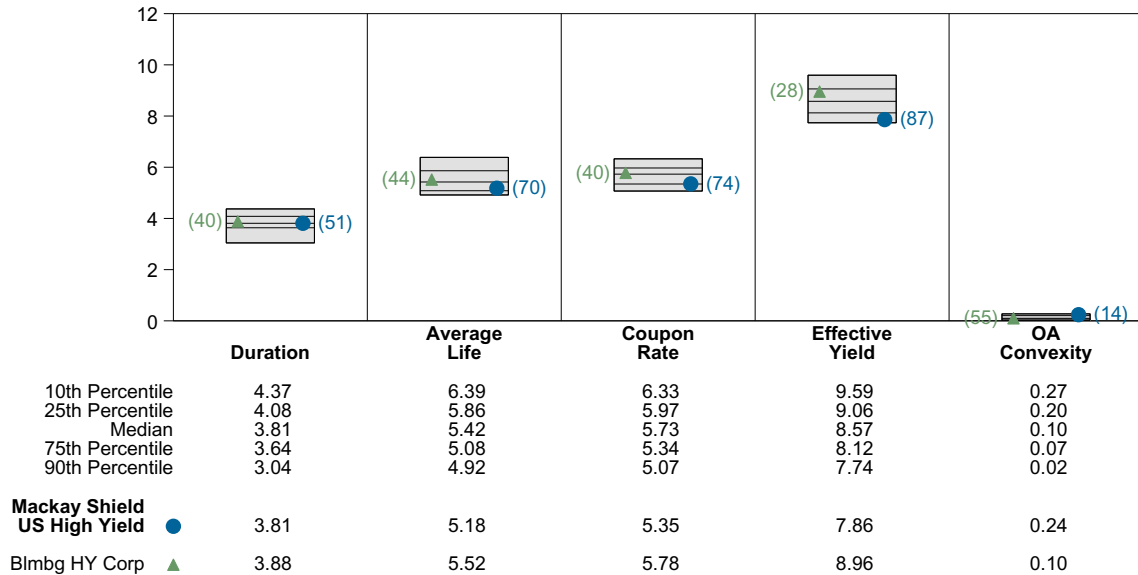
0.99

Mackay Shield US High Yield Bond Characteristics Analysis Summary

Portfolio Characteristics

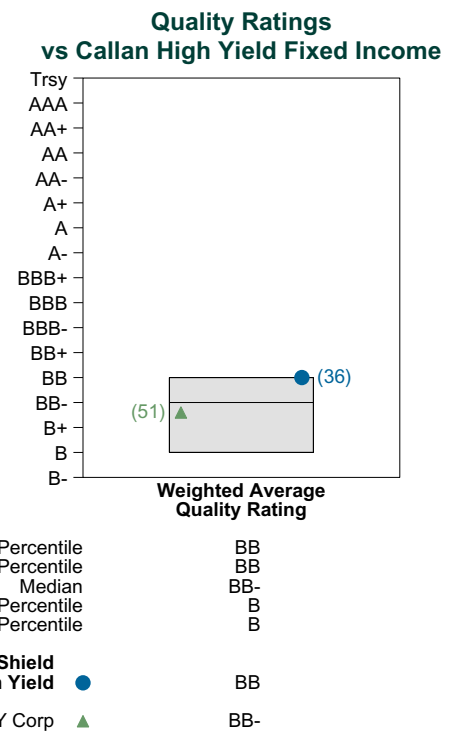
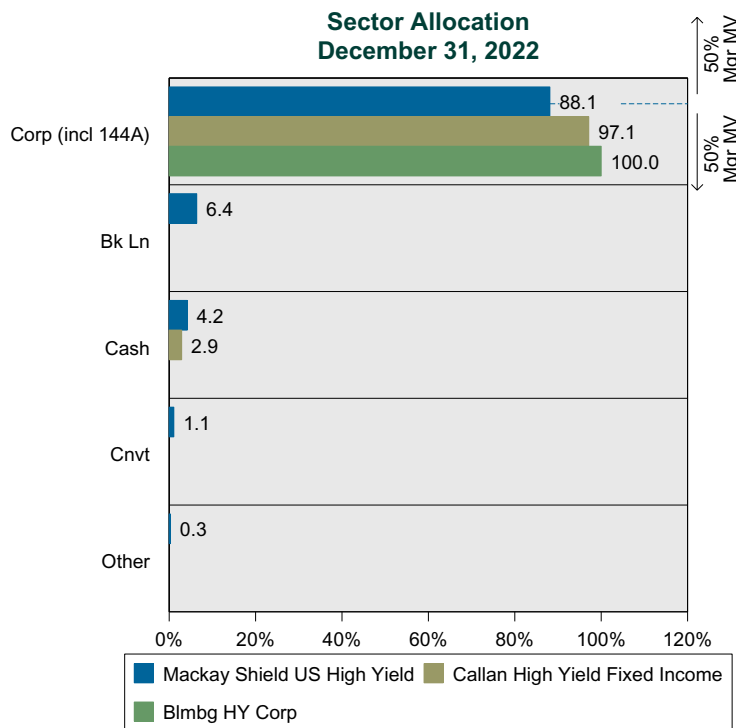
This graph compares the manager's portfolio characteristics with the range of characteristics for the portfolios which make up the manager's style group. This analysis illustrates whether the manager's current holdings are consistent with other managers employing the same style. Fixed Income Portfolio characteristics includes Cash Pool allocation.

Fixed Income Portfolio Characteristics Rankings Against Callan High Yield Fixed Income as of December 31, 2022



Sector Allocation and Quality Ratings

The first graph compares the manager's sector allocation with the average allocation across all the members of the manager's style. The second graph compares the manager's weighted average quality rating with the range of quality ratings for the style.

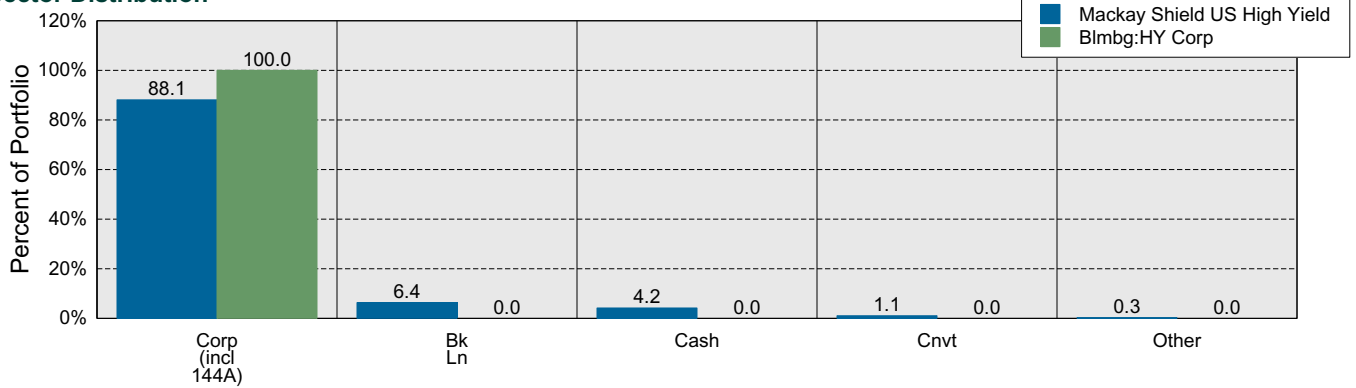


Mackay Shield US High Yield Portfolio Characteristics Summary As of December 31, 2022

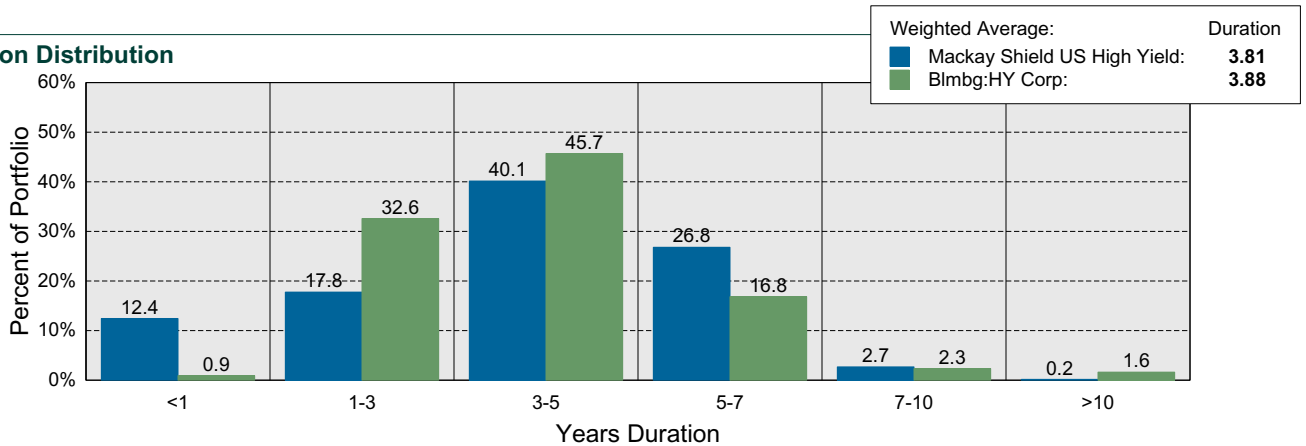
Portfolio Structure Comparison

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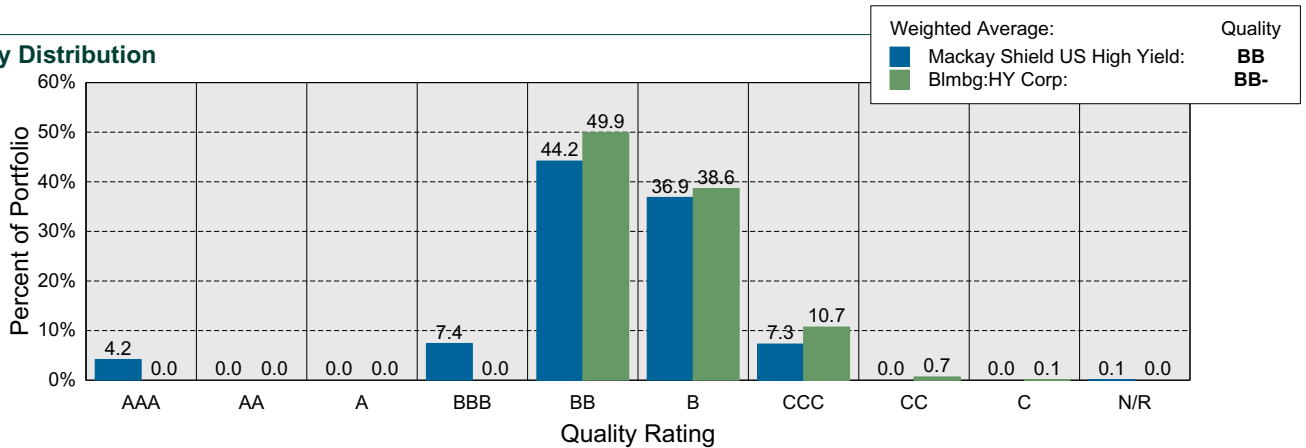
Sector Distribution



Duration Distribution



Quality Distribution



Principal Preferred Securities Period Ended December 31, 2022

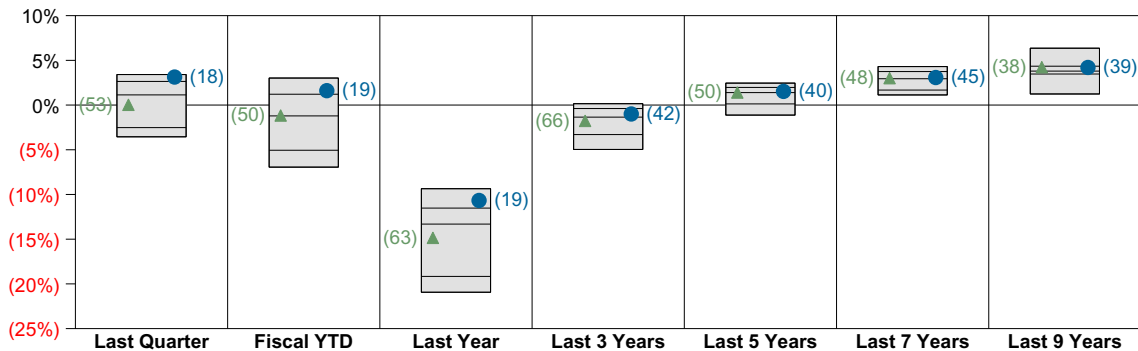
Investment Philosophy

Spectrum is a wholly owned subsidiary of Principal Global Investors. The firm has an exclusive focus on preferred securities globally. The firm employs an active approach to managing this sector with an emphasis on income as well as total return. Preferred securities are structurally subordinated fixed income investments that come in many flavors, each with unique structures and with many different labels. Common characteristics, however, are that they are subordinate to senior investment grade debt, pay a specified coupon, and are callable by the issuer. Credit quality typically ranges from BBB+ to BB. Coupon payments can be deferrable, non-deferrable and cumulative or non-cumulative. These attributes make the instruments complex and active management requires skill and experience in this sector. Principal Preferred Securities was funded July 30, 2020. Returns prior to inception reflect the Principal Preferred Securities mutual fund historical returns.

Quarterly Summary and Highlights

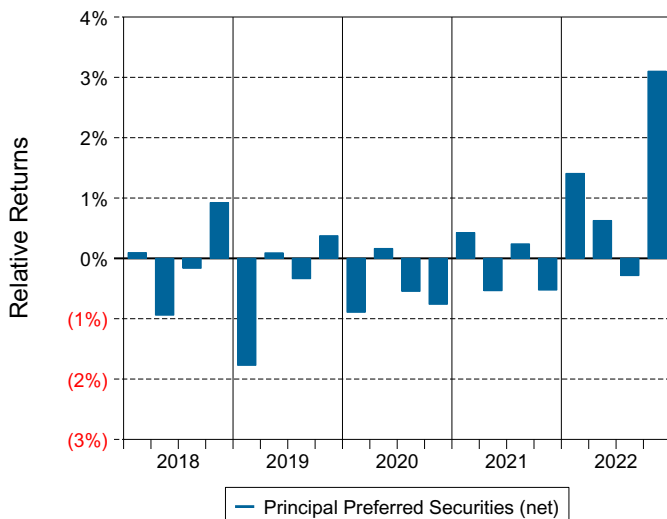
- Principal Preferred Securities (net)'s portfolio posted a 3.13% return for the quarter placing it in the 18 percentile of the Morningstar Preferred Stock Funds group for the quarter and in the 19 percentile for the last year.
- Principal Preferred Securities (net)'s portfolio outperformed the ICE BofA US All Cap Secs by 3.10% for the quarter and outperformed the ICE BofA US All Cap Secs for the year by 4.18%.

Performance vs Morningstar Preferred Stock Funds (Net)

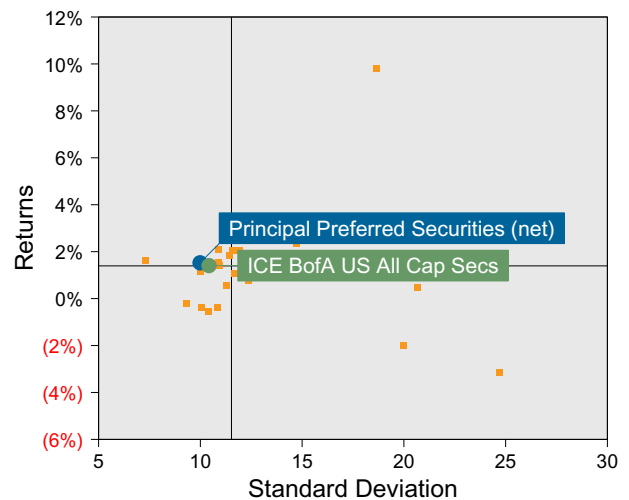


	Last Quarter	Fiscal YTD	Last Year	Last 3 Years	Last 5 Years	Last 7 Years	Last 9 Years
10th Percentile	3.41	3.02	(9.35)	0.15	2.45	4.30	6.36
25th Percentile	2.64	1.21	(11.52)	(0.39)	1.97	3.75	4.34
Median	1.14	(1.21)	(13.31)	(1.35)	1.39	2.94	3.80
75th Percentile	(2.52)	(5.05)	(19.16)	(3.30)	0.13	1.68	3.47
90th Percentile	(3.55)	(6.94)	(20.94)	(4.96)	(1.12)	1.13	1.24
Principal Preferred Securities (net)	3.13	1.61	(10.67)	(1.00)	1.53	3.08	4.20
ICE BofA US All Cap Secs	0.03	(1.17)	(14.85)	(1.77)	1.41	3.01	4.24

Relative Return vs ICE BofA US All Cap Secs



Morningstar Preferred Stock Funds (Net) Annualized Five Year Risk vs Return

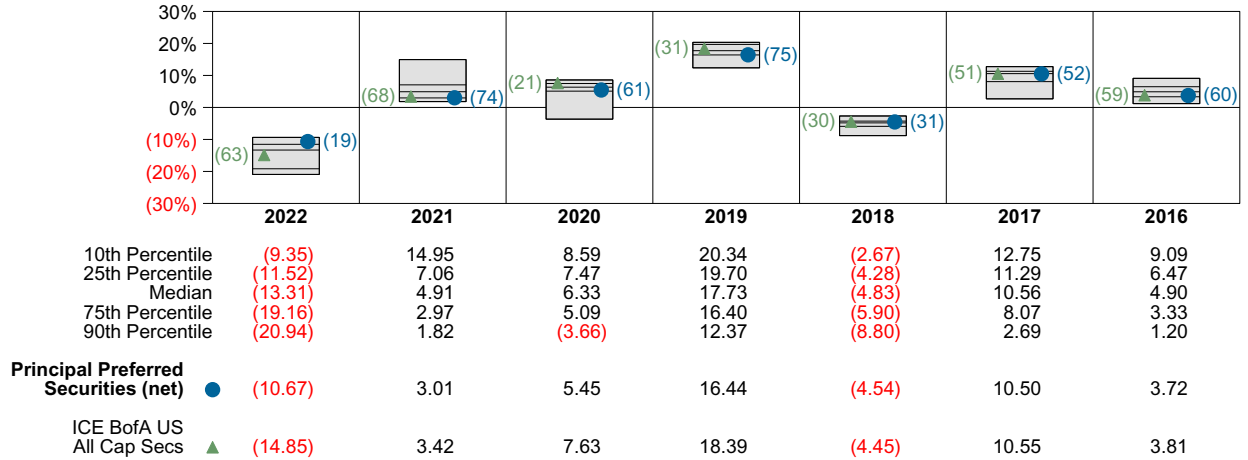


Principal Preferred Securities Return Analysis Summary

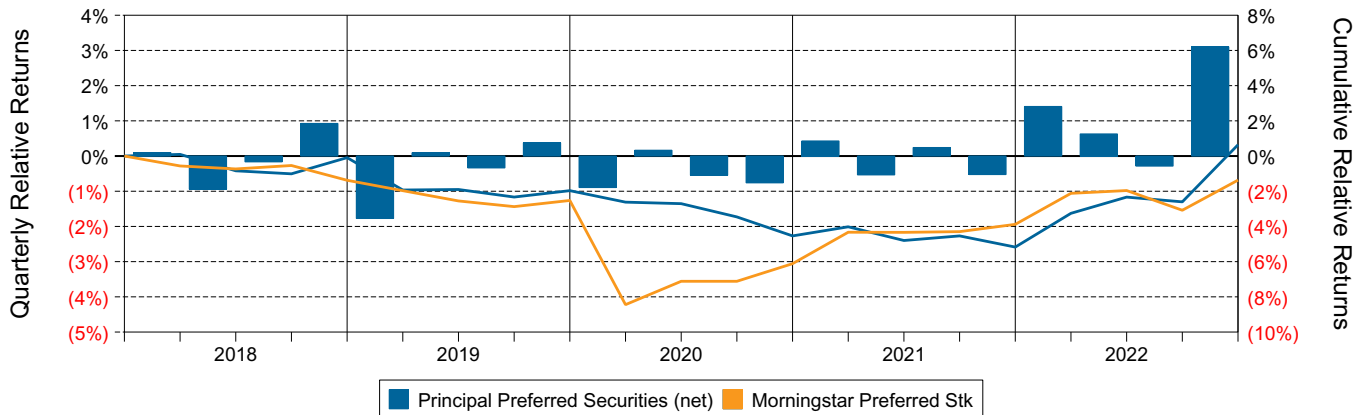
Return Analysis

The graphs below analyze the manager's return on both a risk-adjusted and unadjusted basis. The first chart illustrates the manager's ranking over different periods versus the appropriate style group. The second chart shows the historical quarterly and cumulative manager returns versus the appropriate market benchmark. The last chart illustrates the manager's ranking relative to their style using various risk-adjusted return measures.

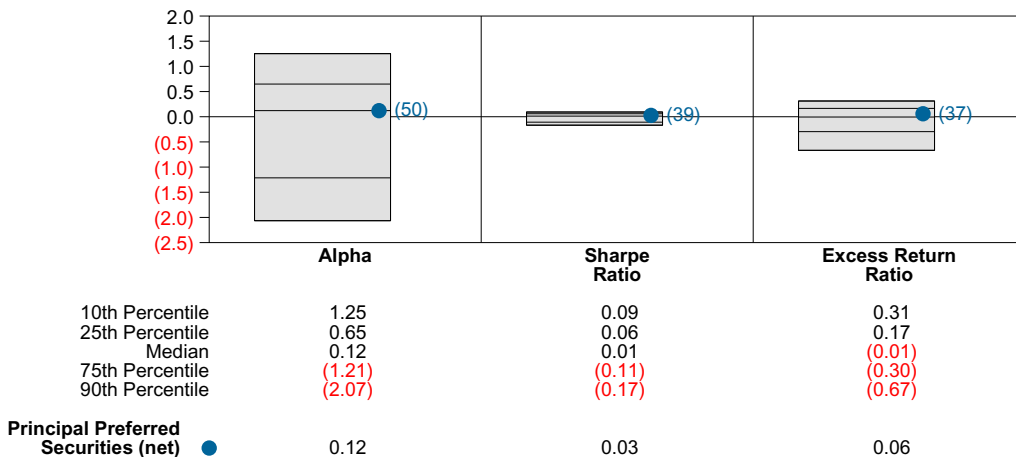
Performance vs Morningstar Preferred Stock Funds (Net)



Cumulative and Quarterly Relative Returns vs ICE BofA US All Cap Secs



Risk Adjusted Return Measures vs ICE BofA US All Cap Secs Rankings Against Morningstar Preferred Stock Funds (Net) Five Years Ended December 31, 2022

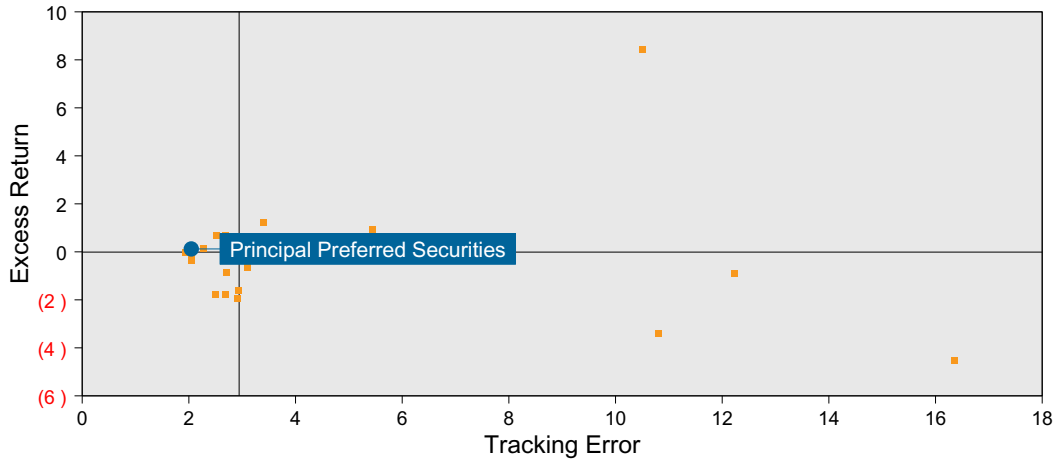


Principal Preferred Securities Risk Analysis Summary

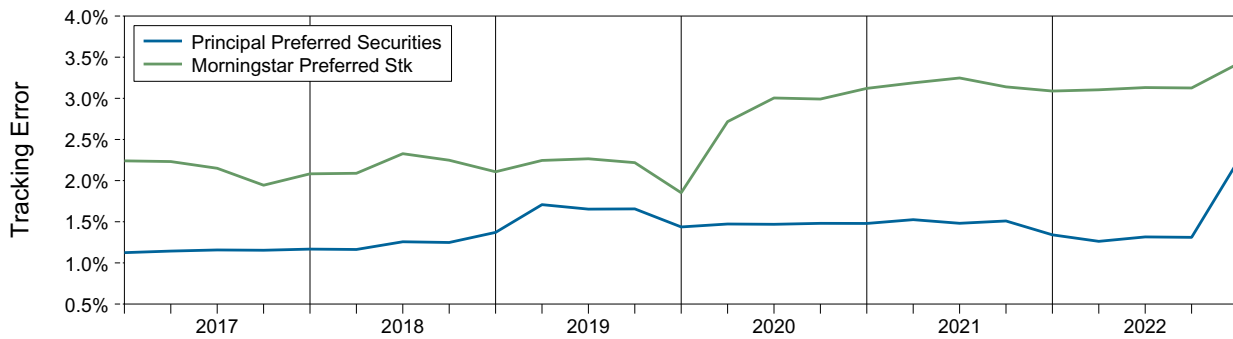
Risk Analysis

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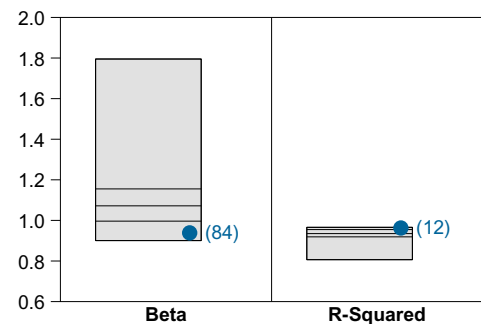
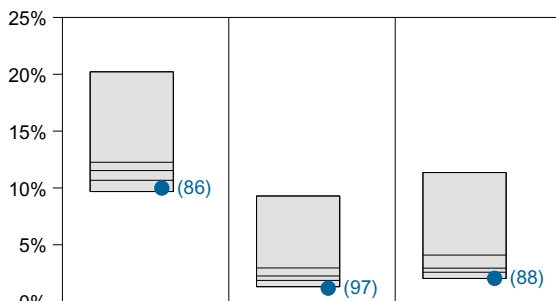
Risk Analysis vs Morningstar Preferred Stock Funds (Net) Five Years Ended December 31, 2022



Rolling 12 Quarter Tracking Error vs ICE BofA US All Cap Secs



Risk Statistics Rankings vs ICE BofA US All Cap Secs Rankings Against Morningstar Preferred Stock Funds (Net) Five Years Ended December 31, 2022



Principal Preferred Securities ●

Standard Deviation: 9.98

Downside Risk: 1.18

Tracking Error: 2.05

Principal Preferred Securities ●

Beta: 0.94

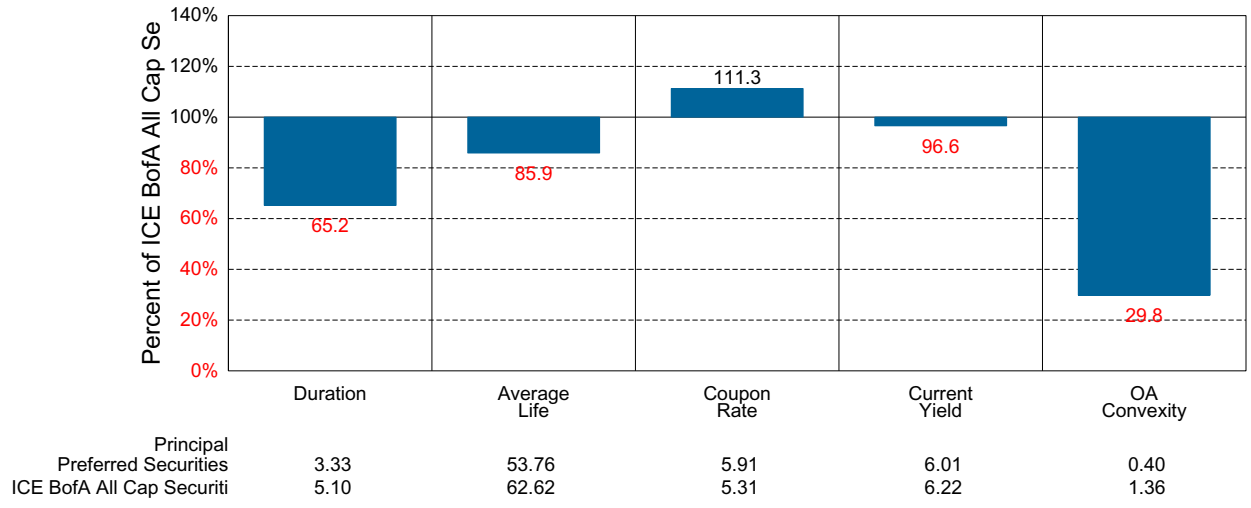
R-Squared: 0.96

Principal Preferred Securities Bond Characteristics Analysis Summary

Portfolio Characteristics

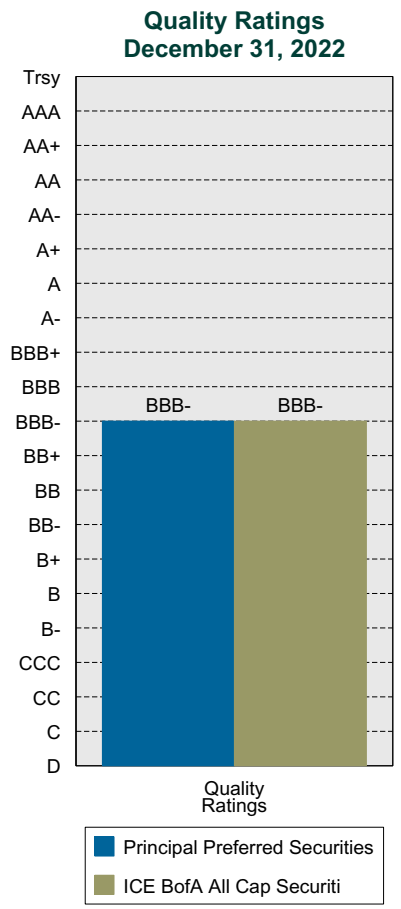
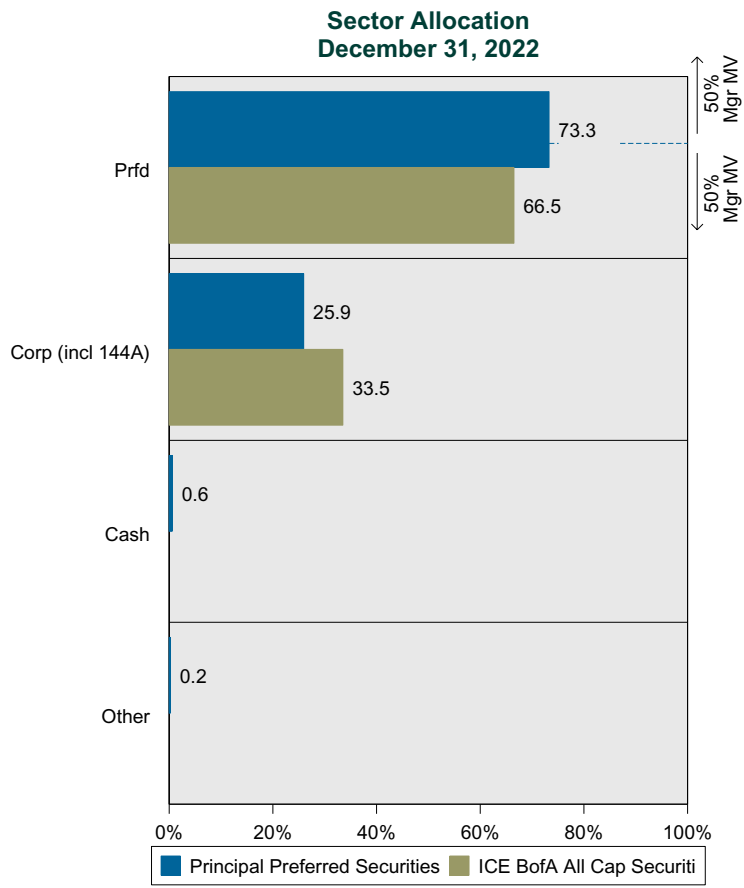
This graph compares the manager's portfolio characteristics with the range of characteristics for the portfolios which make up the manager's style group. This analysis illustrates whether the manager's current holdings are consistent with other managers employing the same style. Fixed Income Portfolio characteristics includes Cash Pool allocation.

Portfolio Characteristics Relative to ICE BofA All Cap Securities as of December 31, 2022



Sector Allocation and Quality Ratings

The first graph compares the manager's sector weights for the most recent quarter with those of the benchmark. The second graph compares the manager's weighted average quality rating with those of the benchmark.

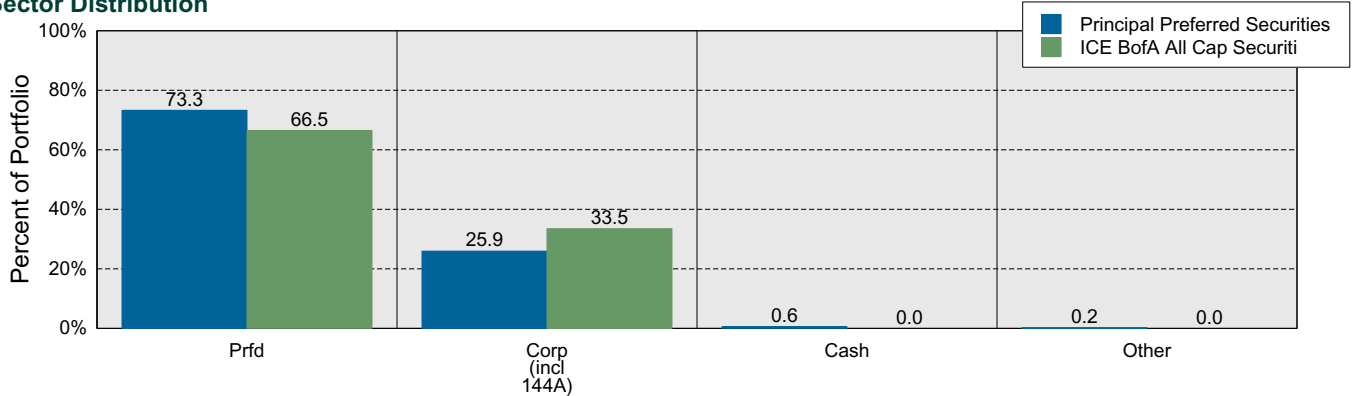


Principal Preferred Securities Portfolio Characteristics Summary As of December 31, 2022

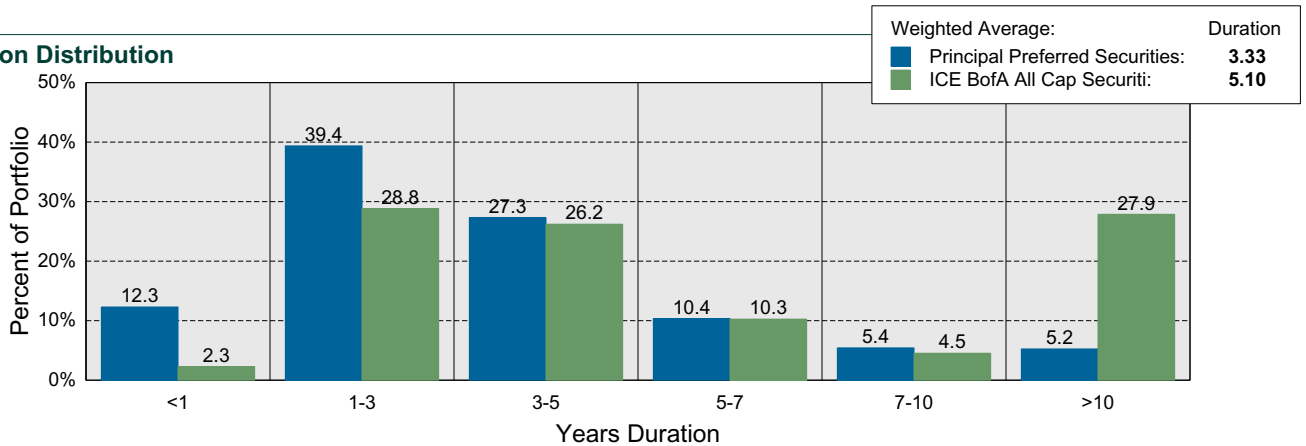
Portfolio Structure Comparison

The charts below compare the structure of the portfolio to that of the index from the three perspectives that have the greatest influence on return. The first chart compares the two portfolios across sectors. The second chart compares the duration distribution. The last chart compares the distribution across quality ratings.

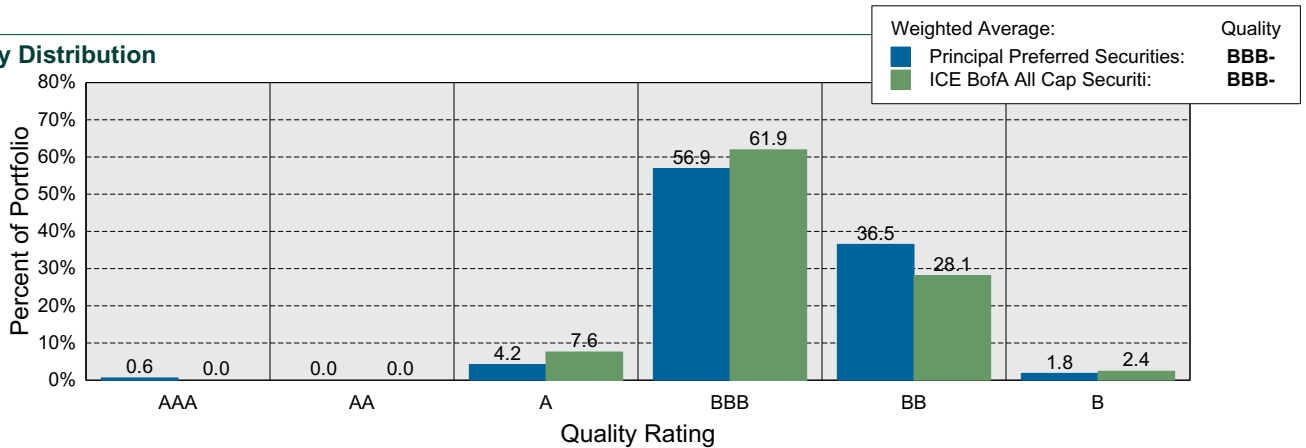
Sector Distribution



Duration Distribution



Quality Distribution



Quarterly Highlights

The Callan Institute provides research to update clients on the latest industry trends and carefully structured educational programs to enhance the knowledge of industry professionals. Visit www.callan.com/research-library to see all of our publications, and www.callan.com/blog to view our blog. For more information contact Barb Gerraty at 415-274-3093 / institute@callan.com.

New Research from Callan's Experts

2022 ESG Survey | Callan's 10th annual survey assesses the status of environmental, social, and governance (ESG) investing in the U.S. institutional investment market.

Considering Currency: A Guide for Institutional Investors | This guide to currency trends over time provides institutional investors with multiple ways to benchmark and analyze their portfolios.

2022 Nuclear Decommissioning Funding Study | Julia Moriarty offers key insights into the status of nuclear decommissioning funding to make peer comparisons more accurate and relevant.

Blog Highlights

What DC Plan Sponsors Should Know About Recent Litigation Trends | Callan reviewed lawsuits filed against DC plans between January 2019 and August 2022, to provide an analysis of trends in litigation centered on the fiduciary duties outlined in ERISA.

How Does Your Public DB Plan Measure Up? | Most public DB plans saw sharp losses for the fiscal year ended 6/30/22. However, plan returns for fiscal year 2021 were the strongest in three decades.

Index Selection Within TDF Benchmarks Can Make a Big Difference | Most TDF providers build a custom benchmark for performance comparisons. While this approach is useful, it does not capture differences in glidepath design and asset allocation that are the major drivers of relative performance.

Webinar Replays

Callan's 2023-2032 Capital Markets Assumptions | During this webinar, Jay Kloepfer, Kevin Machiz, and Adam Lozinski described our 2023-2032 Capital Markets Assumptions, discussed the process

and rationale behind these long-term assumptions, and explained the potential implications for strategic recommendations.

Corporate Pension Hibernation | Callan specialists explore why closed and frozen plans might wish to hibernate in the current market, thereby deferring the decision to fully terminate until the future.

Research Cafe: ESG Interview Series | During this interview, Tom Shingler of Callan discusses with Sara Rosner, director of environment research and engagement for AllianceBernstein's responsible investing team, carbon emissions and why they matter to investors.

Quarterly Periodicals

Private Equity Update, 3Q22 | A high-level summary of private equity activity in the quarter through all the investment stages

Active vs. Passive Charts, 3Q22 | A comparison of active managers alongside relevant benchmarks over the long term

Market Pulse, 3Q22 | A quarterly market reference guide covering trends in the U.S. economy, developments for institutional investors, and the latest data on the capital markets

Capital Markets Review, 3Q22 | Analysis and a broad overview of the economy and public and private markets activity each quarter across a wide range of asset classes

Hedge Fund Update, 3Q22 | Commentary on developments for hedge funds and multi-asset class (MAC) strategies

Real Assets Update, 3Q22 | A summary of market activity for real assets and private real estate during the quarter

Private Credit Update, 3Q22 | A review of performance and fundraising activity for private credit during the quarter

Events

A complete list of all upcoming events can be found on our website: callan.com/events-education.

Please mark your calendar and look forward to upcoming invitations:

2023 National Conference

April 2-4, 2023 – Scottsdale, AZ

2023 June Workshops

June 27, 2023 – New York

June 29, 2023 – Chicago

For more information about events, please contact Barb Gerraty: 415-274-3093 / gerraty@callan.com

Education: By the Numbers

50+

Unique pieces of research the Institute generates each year

525

Attendees (on average) of the Institute's annual National Conference

3,700

Total attendees of the "Callan College" since 1994

Education

Founded in 1994, the "Callan College" offers educational sessions for industry professionals involved in the investment decision-making process.

Introduction to Investments

March 1-2 – Chicago

May 23-25 – Virtual

This program familiarizes institutional investor trustees and staff and asset management advisers with basic investment theory, terminology, and practices. Our virtual session is held over three days with virtual modules of 2.5-3 hours, while the in-person session lasts one-and-a-half days. This course is designed for individuals with less than two years of experience with asset-management oversight and/or support responsibilities. Virtual tuition is \$950 per person and includes instruction and digital materials. In-person tuition is \$2,350 per person and includes instruction, all materials, breakfast and lunch on each day, and dinner on the first evening with the instructors.

Additional information including registration can be found at: callan.com/events-education



“Research is the foundation of all we do at Callan, and sharing our best thinking with the investment community is our way of helping to foster dialogue to raise the bar across the industry.”

Greg Allen, CEO and Chief Research Officer

List of Callan's Investment Manager Clients

Confidential – For Callan Client Use Only

Callan takes its fiduciary and disclosure responsibilities to clients very seriously. We recognize that there are numerous potential conflicts of interest encountered in the investment consulting industry, and that it is our responsibility to manage those conflicts effectively and in the best interest of our clients. At Callan, we employ a robust process to identify, manage, monitor, and disclose potential conflicts on an ongoing basis.

The list below is an important component of our conflicts management and disclosure process. It identifies those investment managers that pay Callan fees for educational, consulting, software, database, or reporting products and services. We update the list quarterly because we believe that our fund sponsor clients should know the investment managers that do business with Callan, particularly those investment manager clients that the fund sponsor clients may be using or considering using. Please note that if an investment manager receives a product or service on a complimentary basis (e.g., attending an educational event), they are not included in the list below. Callan is committed to ensuring that we do not consider an investment manager's business relationship with Callan, or lack thereof, in performing evaluations for or making suggestions or recommendations to its other clients. Please refer to Callan's ADV Part 2A for a more detailed description of the services and products that Callan makes available to investment manager clients through our Institutional Consulting Group, Independent Adviser Group, and Fund Sponsor Consulting Group. Due to the complex corporate and organizational ownership structures of many investment management firms, parent and affiliate firm relationships are not indicated on our list.

Fund sponsor clients may request a copy of the most currently available list at any time. Fund sponsor clients may also request specific information regarding the fees paid to Callan by particular fund manager clients. Per company policy, information requests regarding fees are handled exclusively by Callan's Compliance department.

Manager Name	Manager Name
abrdrn (Aberdeen Standard Investments)	Baillie Gifford International, LLC
Acadian Asset Management LLC	Baird Advisors
Adams Street Partners, LLC	Barings LLC
AEGON USA Investment Management Inc.	Baron Capital Management, Inc.
AllianceBernstein	Barrow, Hanley, Mewhinney & Strauss, LLC
Allianz	Belle Haven Investments
Allspring Global Investments	BentallGreenOak
American Century Investments	BlackRock
Amundi US, Inc.	Blackstone Group (The)
Antares Capital LP	BNY Mellon Asset Management
AQR Capital Management	Boston Partners
Ares Management LLC	Brandes Investment Partners, L.P.
Ariel Investments, LLC	Brandywine Global Investment Management, LLC
Aristotle Capital Management, LLC	Brookfield Asset Management Inc.
Arrowmark Partners	Brown Brothers Harriman & Company
ARS Investment Partners LLC	Capital Group
Atlanta Capital Management Co., LLC	Carillon Tower Advisers
AXA Investment Managers	Carlyle Group

Manager Name

CastleArk Management, LLC
Chartwell Investment Partners
ClearBridge Investments, LLC
Clearlake Capital
Cohen & Steers Capital Management, Inc.
Columbia Threadneedle Investments North America
Conestoga Capital Advisors
Credit Suisse Asset Management, LLC
Crescent Capital Group LP
D.E. Shaw Investment Management, LLC
DePrince, Race & Zollo, Inc.
Diamond Hill Capital Management, Inc.
Dimensional Fund Advisors L.P.
Doubleline
Duff & Phelps Investment Management Co.
DWS
EARNEST Partners, LLC
Epoch Investment Partners, Inc.
Fayez Sarofim & Company
Federated Hermes, Inc.
Fidelity Institutional Asset Management
Fiera Capital Corporation
First Hawaiian Bank Wealth Management Division
First Sentier Investors
Fisher Investments
Franklin Templeton
Fred Alger Management, LLC
GAM (USA) Inc.
GlobeFlex Capital, L.P.
GoldenTree Asset Management, LP
Goldman Sachs
Golub Capital
Guggenheim Investments
GW&K Investment Management
Harbor Capital Advisors
HarbourVest Partners, LLC
Hardman Johnston Global Advisors LLC
Heitman LLC
HPS Investment Partners, LLC
Hotchkis & Wiley Capital Management, LLC

Manager Name

Impax Asset Management LLC
Income Research + Management
Insight Investment
Intech Investment Management LLC
Intercontinental Real Estate Corporation
Invesco
J.P. Morgan
Janus
Jennison Associates LLC
J O Hambro Capital Management Limited
Jobs Peak Advisors
Johnson Asset Management
KeyCorp
Kohlberg Kravis Roberts & Co. (KKR)
Lazard Asset Management
LGIM America
Lighthouse Investment Partners, LLC
Lincoln National Corporation
Longview Partners
Loomis, Sayles & Company, L.P.
Lord Abbett & Company
LSV Asset Management
MackKay Shields LLC
Macquarie Asset Management
Man Group
Manning & Napier Advisors, LLC
Manulife Investment Management
Marathon Asset Management, L.P.
McKinley Capital Management, LLC
Mellon
MetLife Investment Management
MFS Investment Management
MidFirst Bank
MLC Asset Management
Mondrian Investment Partners Limited
Monroe Capital LLC
Montag & Caldwell, LLC
Morgan Stanley Investment Management
MUFG Union Bank, N.A.
Napier Park Global Capital

Manager Name

Natixis Investment Managers

Neuberger Berman

Newton Investment Management

Ninety One North America, Inc.

Northern Trust Asset Management

Nuveen

Oaktree Capital Management, L.P.

P/E Investments

Pacific Investment Management Company

Pantheon Ventures

Parametric Portfolio Associates LLC

Partners Group (USA) Inc.

Pathway Capital Management, LP

Peregrine Capital Management, LLC

PFM Asset Management LLC

PGIM Fixed Income

PGIM Quantitative Solutions LLC

Pictet Asset Management

PineBridge Investments

Polen Capital Management, LLC

Principal Asset (formerly Principal Global)

Pugh Capital Management Inc.

Putnam Investments, LLC

Pzena Investment Management, LLC

Raymond James Investment Management

RBC Global Asset Management

Regions Financial Corporation

Richard Bernstein Advisors LLC

Robeco Institutional Asset Management, US Inc.

Manager Name

Rothschild & Co. Asset Management US

S&P Dow Jones Indices

Schroder Investment Management North America Inc.

Segall Bryant & Hamill

SLC Management

Smith Graham & Co. Investment Advisors, L.P.

State Street Global Advisors

Strategic Global Advisors, LLC

Strategic Value Partners, LLC

T. Rowe Price Associates, Inc.

The TCW Group, Inc.

Thompson, Siegel & Walmsley LLC

Thornburg Investment Management, Inc.

Tri-Star Trust Bank

UBS Asset Management

ULLICO Investment Advisors, Inc.

VanEck

Versus Capital Group

Victory Capital Management Inc.

Virtus Investment Partners, Inc.

Vontobel Asset Management

Voya

Walter Scott & Partners Limited

WCM Investment Management

Wellington Management Company, LLP

Western Asset Management Company LLC

Westfield Capital Management Company, LP

Westwood Global Investments

William Blair & Company LLC

Important Disclosures

Information contained in this document may include confidential, trade secret and/or proprietary information of Callan and the client. It is incumbent upon the user to maintain such information in strict confidence. Neither this document nor any specific information contained herein is to be used other than by the intended recipient for its intended purpose.

The content of this document is particular to the client and should not be relied upon by any other individual or entity. There can be no assurance that the performance of any account or investment will be comparable to the performance information presented in this document.

Certain information herein has been compiled by Callan from a variety of sources believed to be reliable but for which Callan has not necessarily verified for accuracy or completeness. Information contained herein may not be current. Callan has no obligation to bring current the information contained herein. This content of this document may consist of statements of opinion, which are made as of the date they are expressed and are not statements of fact. The opinions expressed herein may change based upon changes in economic, market, financial and political conditions and other factors. Callan has no obligation to bring current the opinions expressed herein.

The statements made herein may include forward-looking statement regarding future results. The forward-looking statement herein: (i) are best estimations consistent with the information available as of the date hereof and (ii) involve known and unknown risks and uncertainties. Actual results may vary, perhaps materially, from the future result projected in this document. Undue reliance should not be placed on forward-looking statements.

Callan disclaims any responsibility for reviewing the risks of individual securities or the compliance/non-compliance of individual security holdings with a client's investment policy guidelines.

This document should not be construed as legal or tax advice on any matter. You should consult with legal and tax advisers before applying any of this information to your particular situation.

Reference to, or inclusion in this document of, any product, service or entity should not necessarily be construed as recommendation, approval, or endorsement or such product, service or entity by Callan. This document is provided in connection with Callan's consulting services and should not be viewed as an advertisement of Callan, or of the strategies or products discussed or referenced herein.

The issues considered and risks highlighted herein are not comprehensive and other risks may exist that the user of this document may deem material regarding the enclosed information. Any decision you make on the basis of this document is sole responsibility of the client, as the intended recipient, and it is incumbent upon you to make an independent determination of the suitability and consequences of such a decision.

Callan undertakes no obligation to update the information contained herein except as specifically requested by the client.

Past performance is no guarantee of future results.

February 2023



Colorado Public School Permanent Fund

2023 Asset Allocation Update &
Rebalancing Recommendation

Janet Becker-Wold, CFA
Senior Vice President & Manager

Alex Browning
Senior Vice President

Summary of Important Changes for 2023 Capital Markets Assumptions

10 Year Geometric Return Differences

- Cash return increased 1.55%
- Inflation assumption increased 0.25% (from 2.25% to 2.50%)
- Large Cap U.S. Equity increased 0.75% (from 6.50% to 7.25%)
- Small-Mid Cap U.S. Equity increased 0.75% (from 6.70% to 7.45%)
- Global ex-U.S. equity increased 0.65% (from 6.80% to 7.45%)
- Core U.S. fixed income increased 2.50% (from 1.75% to 4.23%)
- High Yield return projections increased by 2.35% (from 3.90% to 6.25%)

2023 Projected Risk and Returns

PSPF Asset Classes

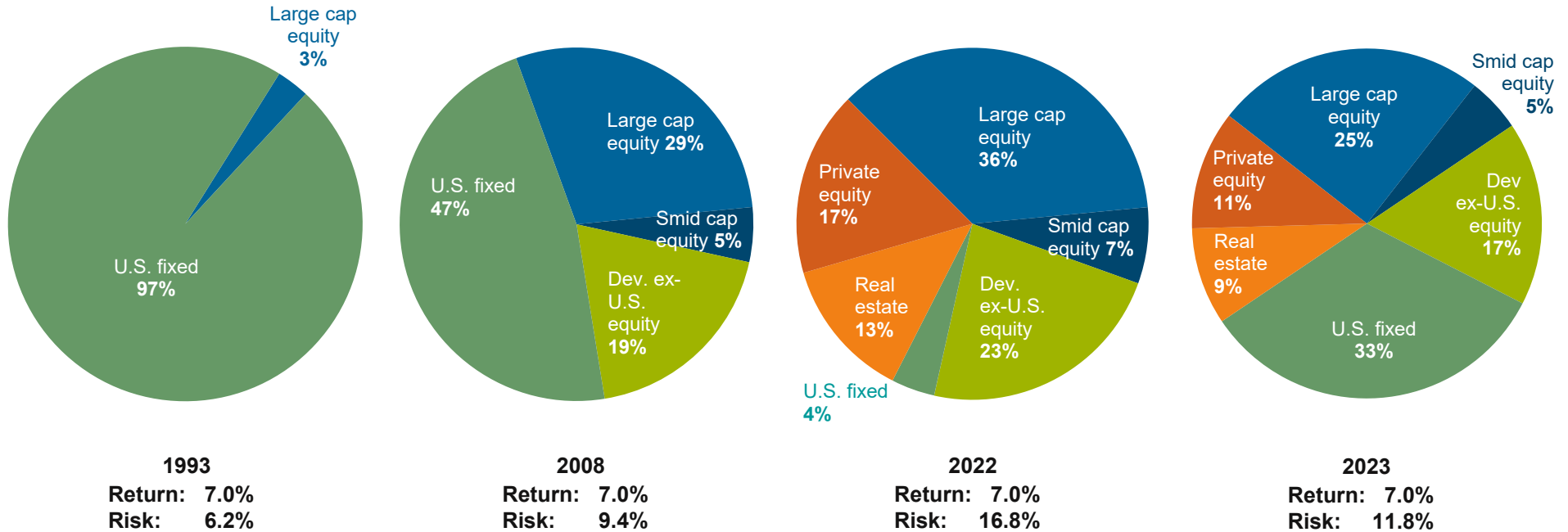
Summary of Callan's Long-Term Capital Market Assumptions (2023 – 2032)

Asset Class	Index	Projected Return		Real	Projected Risk
		1-Year Arithmetic	10-Year Geometric*		Standard Deviation
Equities					
Large Cap U.S. Equity	S&P 500	8.60%	7.25%	4.75%	17.75%
Smid Cap U.S. Equity	Russell 2500	9.60%	7.45%	4.95%	22.15%
Global ex-U.S. Equity	MSCI ACWI ex USA	9.45%	7.45%	4.95%	21.25%
Developed ex-U.S. Equity	MSCI World ex USA	9.00%	7.25%	4.75%	20.15%
Emerging Market Equity	MSCI Emerging Markets	10.45%	7.45%	4.95%	25.70%
Fixed Income					
Short Duration Gov/Credit	Bloomberg 1-3 Year Gov/Credit	3.75%	3.80%	1.30%	2.30%
Core U.S. Fixed	Bloomberg Aggregate	4.25%	4.23%	1.75%	4.10%
High Yield	Bloomberg High Yield	6.75%	6.25%	3.75%	11.75%

* Geometric returns are derived from arithmetic returns and the associated risk (standard deviation).

7% Expected Returns Over Past 30 Years

Increasing Complexity



Increasing Risk

In 1993, our return expectation for broad U.S. fixed income was 6.85%.
Just 3% in return-seeking assets was required to earn a 7% projected return.

15 years later, an investor would have needed over half of the portfolio in public equities to achieve a 7% projected return.

In 2022 an investor was required to include 96% in return-seeking assets (including 30% in private market investments) to earn a 7% projected return at almost 3x the volatility compared to 1993.

Today's 7% expected return portfolio is much more reasonable than it was just a year ago, with a third in fixed income and a correspondingly lower level of risk.

Projected Return and Risk for Colorado Public School Permanent Fund (PSPF)

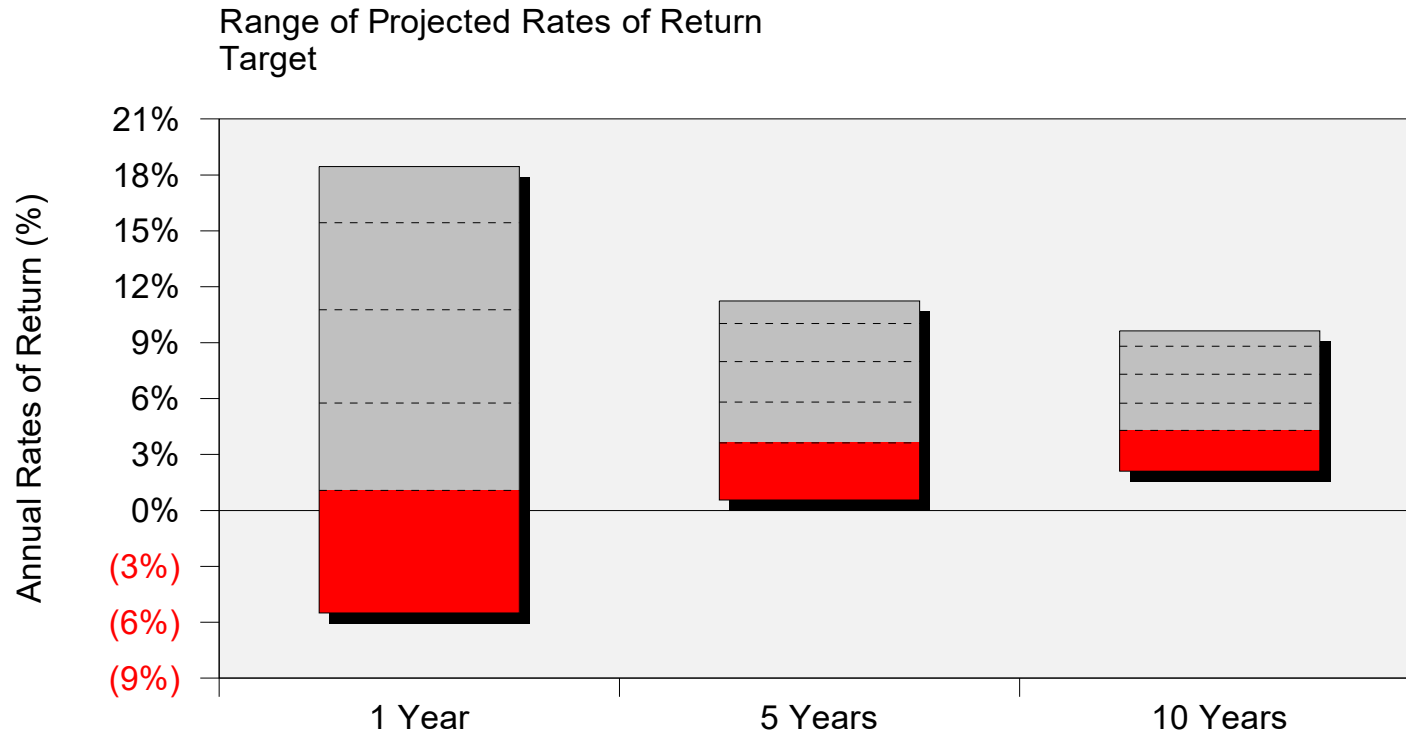
Utilizing Callan's 2023 10-Year Capital Market Assumptions

Portfolio Component	Target
Broad US Equity	18
Global ex-US Equity	12
Core US Fixed	52
High Yield	10
Short Duration Gov't/Credit	8
Totals	100
10 Yr. Geometric Mean Return	5.78%
Projected Standard Deviation	6.92%
10 Yr. Simulated Sharpe Ratio	0.42%
Projected Yield	4.11%

- As a point of reference, the expected return on the portfolio using Callan's 2022 projections was 3.83% with a standard deviation of 6.43%.
- The increase in equity, and especially fixed income expectations, from 2022 to 2023 improved the expected return by nearly 2% with a small increase in risk.
- The current yield on the market duration portfolio today is 4.02% (expected interest income of \$21.8 million) compared to 2.75% in the beginning of 2022.

Range of Returns – One, Five and 10-Year Periods

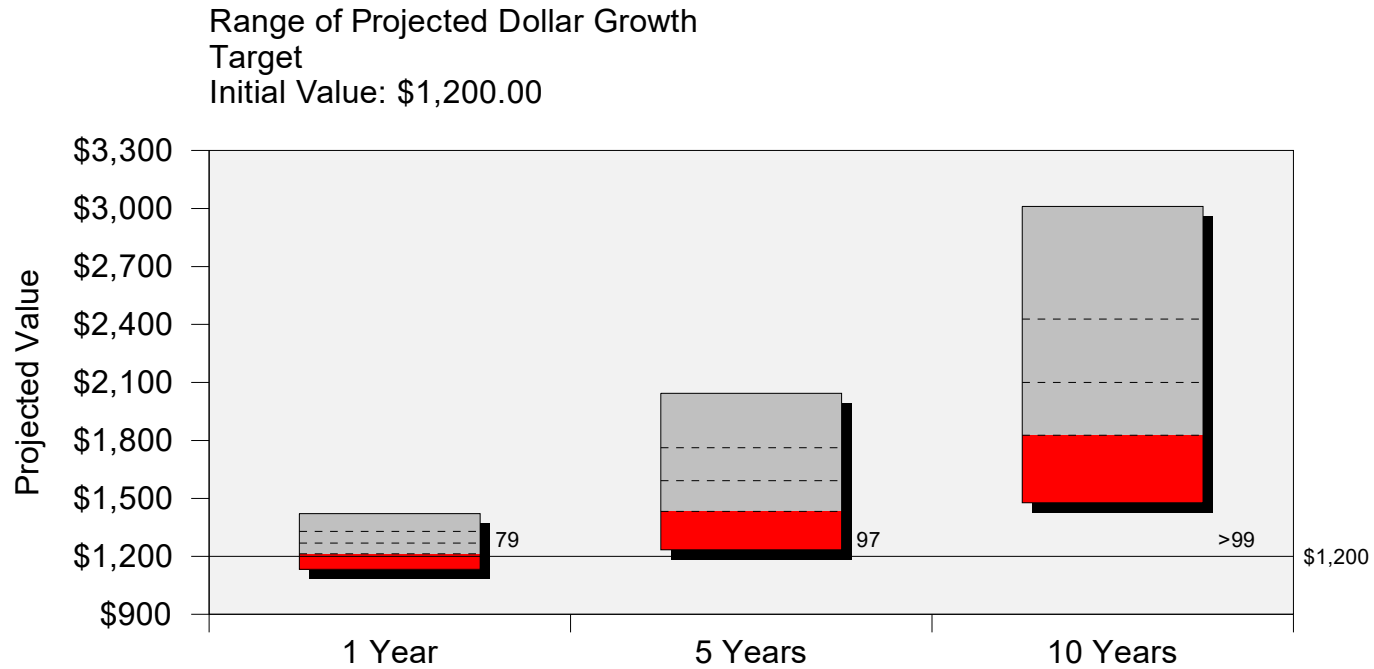
5th to 95th Percentile



	1 Year	5 Years	10 Years
5th Percentile	18.4%	11.2%	9.6%
10th Percentile	15.4%	10.0%	8.8%
25th Percentile	10.8%	8.0%	7.3%
Median	5.8%	5.8%	5.8%
75th Percentile	1.1%	3.6%	4.3%
95th Percentile	(5.5%)	0.6%	2.1%

Projected Market Values – One, Five and 10-Year Periods

5th to 95th Percentile



5th Percentile	\$1,421	\$2,044	\$3,010
25th Percentile	\$1,329	\$1,763	\$2,429
Median	\$1,269	\$1,591	\$2,100
75th Percentile	\$1,213	\$1,433	\$1,826
95th Percentile	\$1,134	\$1,234	\$1,478
Prob > \$1,200	79.3%	96.7%	>99.0%

Note that projected dollar values do not include incoming cash flows or disbursements.

Dollars in hundreds of thousands.

Asset Allocation and Rebalancing Guidelines

Colorado Public School Fund Investment Board – Investment Policy Statement (IPS)

ASSET CLASSES	STRUCTURE	Lower Limit	Strategic Allocation	Upper Limit
<u>Equities:</u>	Domestic Equity	14%	18.0%	22%
	International Equity	8%	12.0%	16%
	Total Equities	24%	30.0%	36%
<u>Fixed Income:</u>	Market Duration Bonds	45%	52.5%	60%
	Short Duration Bonds	5%	7.5%	10%
	Total Fixed Income	60%	60.0%	70%
<u>High Income Strategies:</u>	High Yield Fixed Income	4.5%	8.5%	12.5%
	Preferred Securities	0%	1.5%	3.0%
	Total High Income Strategies	5%	10.0%	15%
Total Portfolio			100%	

The IPS states:

The asset allocation of the PSPF will be reviewed monthly by the Portfolio Administrator and at least quarterly by the PSFIB. The goal of the review is to evaluate whether action should be taken to rebalance the PSPF toward the IPS strategic asset allocation ranges.

When available, cash inflows will be deployed in a manner consistent with the strategic asset allocation and individual asset class structures. **The PSFIB may deviate from the aforementioned allocation of cash inflows if deemed to be in the best interest of the PSPF.**

All actions authorized by the PSFIB will be executed by the Portfolio Administrator as soon as practicable with guidance provided by the PSFIB as needed or requested.

Rebalancing Recommendation: \$32.4 million in Cash Available For Investing

Asset values as of January 31, 2023

	1/31/23 Balance	%	Target	Difference	New Allocation	New Total	New %	IPS Ranges
Treasury Bond Port	\$ 663,441,051	51.05%	52.50%	-1.45%	\$ 16,800,000	\$ 680,241,051	51.1%	45%-60%
Equity - Parametric	\$ 405,178,652	31.18%	30.00%	1.18%	\$ 10,000,000	\$ 415,178,652	31.2%	24%-36%
Short Duration - Janus	\$ 102,835,221	7.91%	7.50%	0.41%	\$ 2,300,000	\$ 105,135,221	7.9%	5%-10%
Preferred Sec - Spectrum	\$ 19,653,848	1.51%	1.50%	0.01%	\$ 500,000	\$ 20,153,848	1.5%	0%-3%
High Yield - Mackay	\$ 108,393,534	8.34%	8.50%	-0.16%	\$ 2,700,000	\$ 111,093,534	8.3%	4.5%-12.5%
Grand Total	\$ 1,299,502,306	100.00%	100.00%	0.00%	\$ 32,300,000	\$ 1,331,802,306	100.0%	

Cash available	\$ 32,868,453
Cash available -\$500,000	\$ 32,368,453

All asset classes are within rebalancing ranges as of January 31, 2023.

Callan and the Portfolio Administrator have reviewed the asset allocation and recommend that the Cash Available for Investing be deployed into all asset classes consistent with the target allocation.

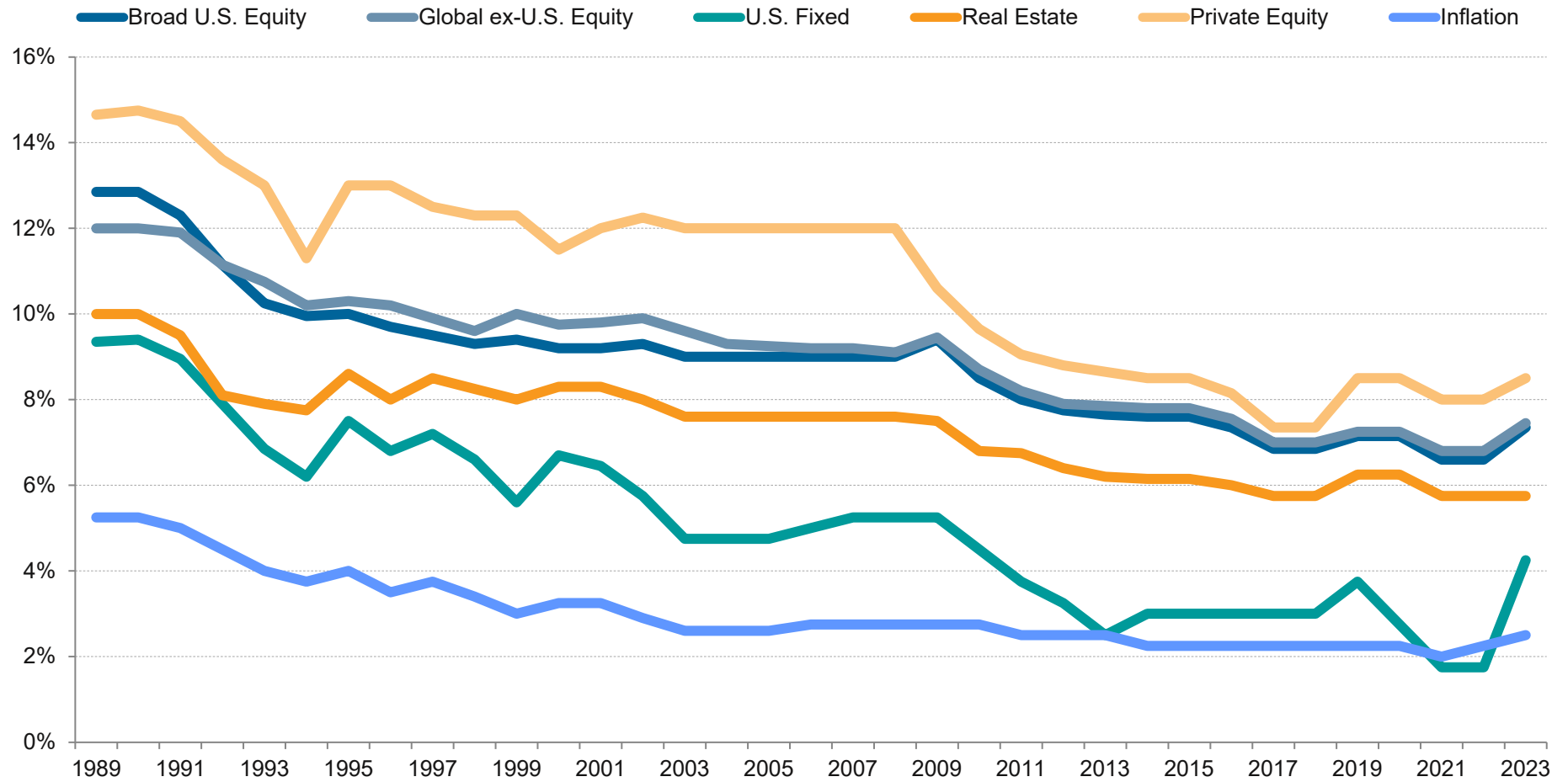
Per Treasury's request, \$500,000 will remain in cash.

Callan

APPENDIX

Return Projections: Major Asset Classes

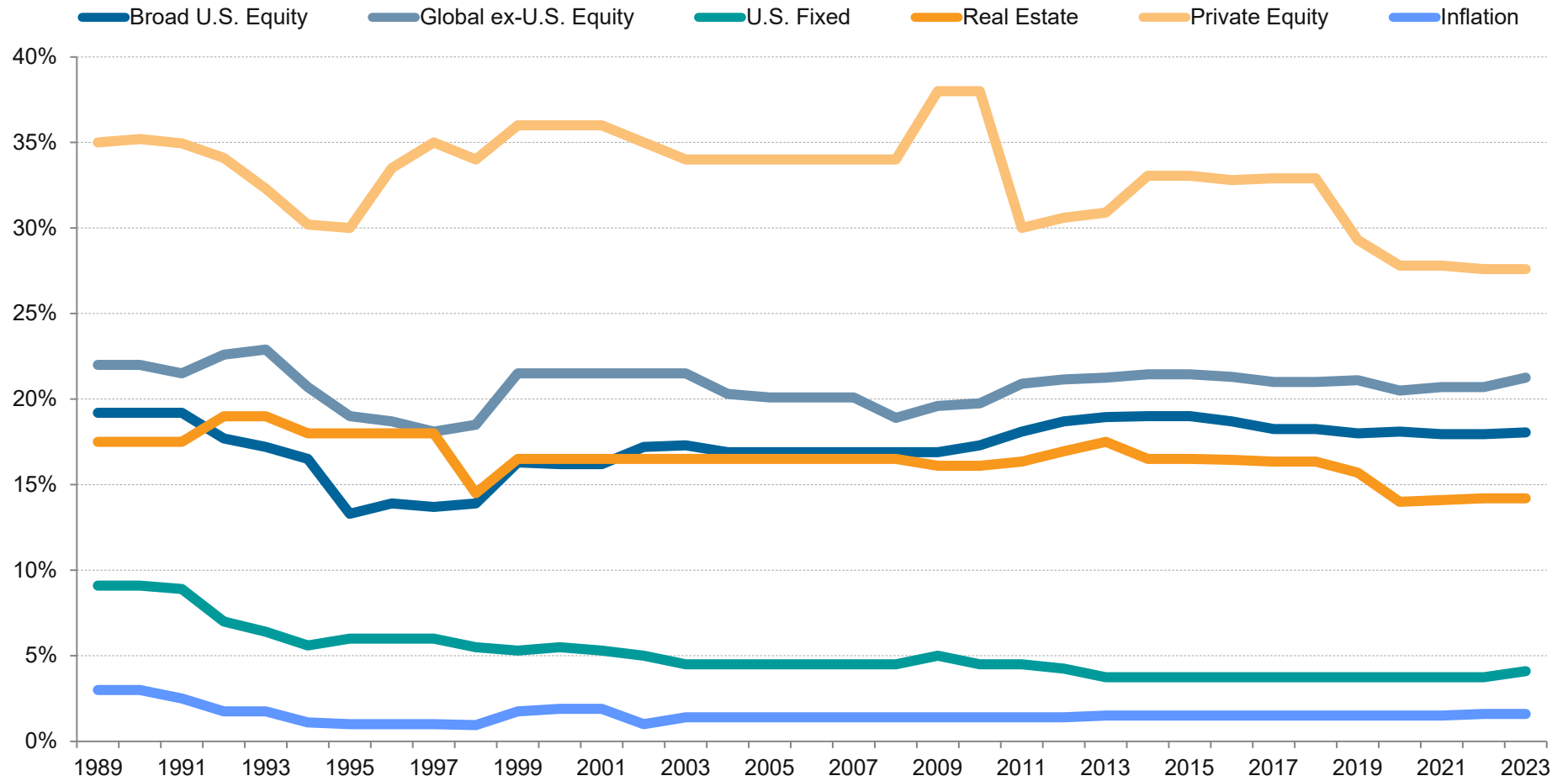
1989–2023



Source: Callan

Risk Projections: Major Asset Classes

1989–2023



Source: Callan

CO PUBLIC SCHOOL PERMANENT FUND
FINANCIAL REPORT FOR THE 6 MONTHS ENDED DECEMBER 31, 2022

Fund Activity	6 Months Ended December 31, 2022	FY End June 30, 2022	FY End June 30, 2021	FY End June 30, 2020
Beginning Fund Value (Cash + Investments)	1,242,693,044	1,333,667,415	1,260,932,051	1,148,213,997
Transfers to PSPF:				
State Land Board Rents, Royalties, & NSE Funds	63,868,967	96,430,154	515,169	61,534,527
Escheats Fund	36,264	84,983	109,211	158,354
Realized Gains / (Losses)	(765,463)	1,116,400	7,300,693	8,891,469
Change in Unrealized Market Gain / (Loss)	(21,681,443)	(188,605,908)	64,810,291	42,133,704
Ending Fund Value	1,284,151,370	1,242,693,044	1,333,667,415	1,260,932,051

*Net Unrealized Loss as of 12/31/2022 - (81,868,114.48)

**Net Unrealised Loss as of 1/31/2022 - (28,584,092.71)

Income / Expense Summary	6 Months Ended December 31, 2022	FY End June 30, 2022	FY End June 30, 2021	FY End June 30, 2020
Total Portfolio Earned Income	18,252,387	33,891,255	31,757,543	31,463,648
Total Expenses	(319,046)	(1,121,294)	(861,651)	(561,082)
Change in Income Receivable	-	(49,701)	(585,940)	(507,951)
CRS 22-41-105 Recoveries	-	(1,418,227)	-	-
Net Income Available for Distribution	17,933,342	31,302,033	30,309,952	30,394,615

*Distributions to BEST as of 12/31/2022 - \$17,933,342

Asset Allocation at December 31, 2022	Market Value	Cost	Unrealized Gain / (Loss)
Total Fixed Income	839,799,475	944,711,873	(104,912,399)
Short Duration - Janus	92,357,836	95,703,686	(3,345,850)
High Yield - MacKay Shields	99,347,358	111,242,139	(11,894,781)
Preferred Securities - Spectrum	18,718,969	21,775,000	(3,056,031)
Treasury Portfolio	629,375,311	715,991,048	(86,615,737)
Total Equity	375,579,228	352,534,943	23,044,284
Cash & Cash Equivalents	30,533,303	30,533,303	-
Total Fund Value	2,085,711,480	2,272,491,993	(81,868,114)



Colorado Public School Fund Investment Board Portfolio Review

February 27, 2023

Dan Ryan

Senior Director – Relationship Management

Parametric Portfolio Associates® LLC

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Dryan@paraport.com

Jim Reber

Managing Director - Portfolio Management

Parametric Portfolio Associates® LLC

(206) 694-4145

Jreber@paraport.com

Firm Overview

Parametric Overview

We help institutional investors build, manage, and protect their portfolios.



Extensive, established investment capabilities

An industry pioneer in overlay solutions and custom indexing, Parametric is a trusted fiduciary for institutional asset owners.



Focus on transparency and repeatability

We provide research and rules-based solutions with a quantitative approach. Our solutions span global markets, asset classes, and instrument types.



Extension of staff partnership

We help investors solve specific portfolio challenges, implementing tailored solutions via a high-touch service model.

\$389B+

Firm wide AUM¹, including \$175 B+ in institutional assets

500+

Institutional client relationships

192

Investment professionals, including 108 CFA charterholders and 10 PhDs

30+

Years of investment experience across equities, fixed income, and derivatives

Asset figures are approximate as of 12/31/2022.

¹AUM includes overlay exposure, and both discretionary and non-discretionary assets of Parametric Portfolio Associates® LLC (the Firm).

Certain statements contained herein reflect the subjective view of Parametric and its personnel and as such cannot be independently verified. Please refer to the disclosures for additional information.

Institutional Capabilities

We offer a comprehensive platform for investors seeking to:

- ✓ Eliminate inefficiencies
- ✓ Create custom exposures
- ✓ Capitalize on market opportunities
- ✓ Address strategic and episodic risks

Efficient implementation

Flexible exposure management programs tailored to fit specific needs

Solution ideas

- Cash overlay
- Rebalancing
- Transition exposure
- Custom equity exposures
- Custom fixed income exposures
- Responsible investing (ESG)

Return enhancement

Systematic strategies that seek alpha across asset classes

Solution ideas

- Alternative risk premia
- Systematic alpha
- Portable alpha
- Commodity management
- Tax management

Risk mitigation

Customizable tools that address and manage specific portfolio risks

Solution ideas

- Tail-risk strategies
- Market and security hedging programs
- Asset and liability hedging
- Currency management

Investing involves market- and program-specific risks. All investments are subject to loss.

The Parametric Difference



Collaborative, client-centric approach

Clients are supported by a high-touch, consultative team with decades of experience structuring and executing custom strategies.



The next level of implementation refinement

Our investments in technology and thoughtful trade execution deliver highly competitive solutions across markets.



Comprehensive, transparent investment approach

Clients gain comprehensive exposure management tools with daily reporting delivered in a customizable format.

Certain statements contained herein reflect the subjective view of Parametric and its personnel and as such cannot be independently verified. Please refer to the disclosures for additional information.

Diversity, Equity, and Inclusion

Our mission

We aspire to be an industry leader in our representation of a truly diverse and inclusive workforce to reflect the communities in which we live and work.

Our principles



Accountability

Senior leadership teams take actions to improve diversity, equity, and inclusion.



Advancement

Through training and education, we support all employees along their career journeys.



Representation

We boost representation through targeted recruitment, development, and retention.



Culture

We aim to foster an atmosphere of inclusion and belonging.

Helping our clients stay true to their DEI missions

We offer you customizable ways to pursue your missions through our wide array of responsible investing strategies, including portfolio construction and active ownership.

"Making sustained, meaningful progress in our firm's DEI agenda is a top priority for Parametric. Our employees deserve it, our clients expect it, and we perform better as a business because of it." —Brian Langstraat, CEO

Representative Client List as of December 31, 2022

> **Public**

East Bay Municipal Utility District
Fairfax County Retirement Systems
Houston Police Officers' Pension System
Manhattan & Bronx Surface Transit Operating Authority Pension Plan
Marin County Employees' Retirement Association
Massachusetts Pension Reserves Investment Management Board
New Mexico Public Employees' Retirement Association
Oakland Police and Fire Retirement System
Orange County Employees Retirement System
San Mateo County Employees' Retirement Association
Teachers Retirement System of Louisiana
Utah School & Institutional Trust Funds Office
Wisconsin Investment Board

> **Endowments**

Carnegie Institution of Washington
Florida State University
Indiana University Foundation
Pepperdine University
Texas Christian University
University of Michigan
University of Minnesota

> **Faith-Based**

Catholic Diocese of Fort Worth
Covenant Ministries of Benevolence
Ministers & Missionaries' Benefit Board of American Baptist Churches
Pension Fund of the Christian Church
YMCA Retirement Fund

> **Health care**

Advocate Aurora Health, Inc.
North Memorial Health Care
Trinity Health

> **Taft-Hartley**

Board of Trustees ABC-NABET Retirement Trust Fund
Boilermaker-Blacksmith National Pension Trust
Greater Pennsylvania Carpenters' Pension Fund
Chicago Laborers' Pension & Welfare Funds
International Union of Painters and Allied Trades
SEIU Benefit Funds
Teamsters, Western Pennsylvania

> **Foundations**

The John D. & Catherine T. MacArthur Foundation
The McKnight Foundation
Strada Education Network, Inc.
Wisconsin Alumni Research Foundation

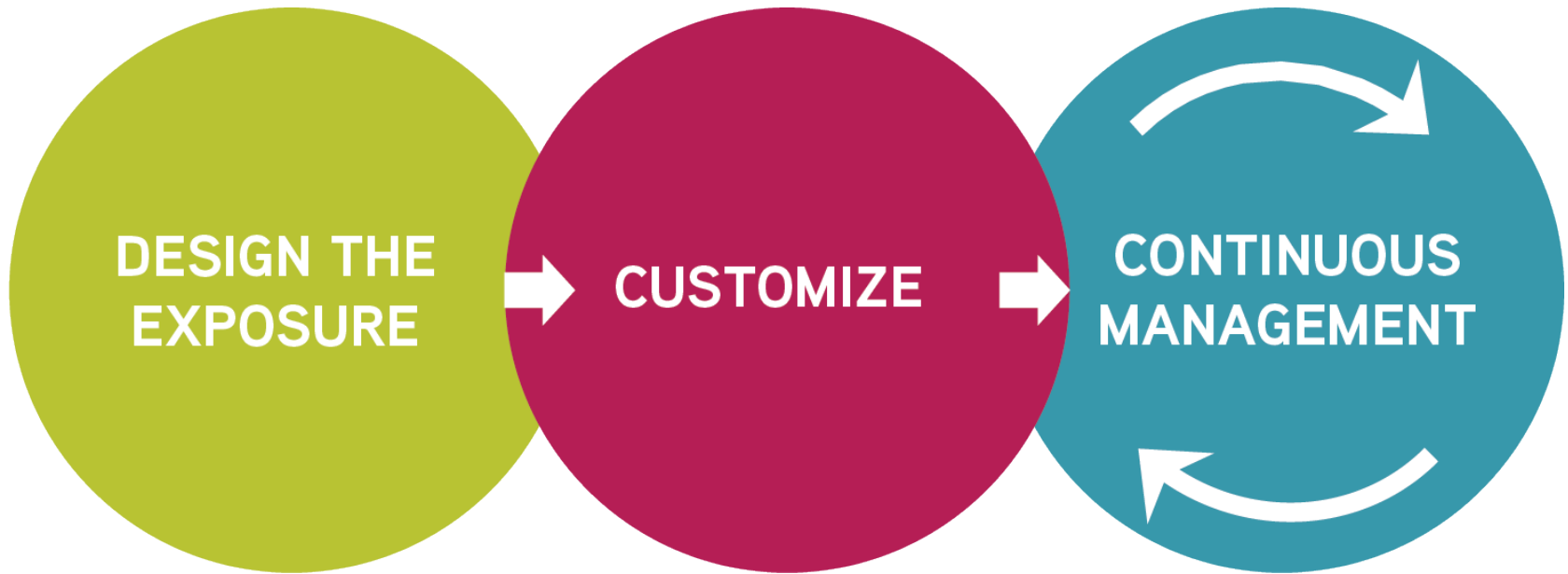
> **Corporate**

The Boeing Company
Eversource Energy
Target Corporation
Raytheon Technologies Corporation

It is not known whether listed clients approve or disapprove of the adviser and inclusion on the list should not be interpreted as an endorsement of or a testimonial of client experience with Parametric. The clients on the partial list included herein were selected as being representative of the different types of institutional clients and businesses serviced by Parametric. Performance-based data was not a determining factor in their selection.

Portfolio Review

Custom Core[®] Equity Investment Process



Design the Exposure

Parametric offers over 100 benchmark and strategy options that can be blended to create a portfolio that represents a custom geographic exposure, investment style, or responsible investment goal. Examples include:

Licensed benchmarks

Cap-weighted benchmarks

- US, International, Global

Responsible investing benchmarks

- MSCI ESG
- KLD 400

Factor benchmarks

- MSCI Factor Indexes
- S&P® Factor Indexes

Parametric strategies

Responsible investing strategies

- FFV Catholic Values
- Fossil Fuel Free
- ESG
- Jewish Values
- Clean Technology

Factor strategies

- Value
- Dividend Yield
- Momentum
- Quality
- Low Volatility
- Value, Size, Profitability
- Value, Momentum, Profitability

Customization options vary by firm and platform.

Colorado Public School Fund Investment Board's Portfolio

Portfolio structure:

Objective: Provide global equity exposure while adhering to CPSFIB's gain/loss requirement

Custom benchmark: 60% Russell 3000 Index/40% MSCI ACWI ex-US Index

Instruments: Exchange Traded Funds (ETFs)

Target tracking error: +/- 1% per annum

Rebalancing: Coordinated with tracking error and gain/loss realization goals

CPSFIB Customizations:

Loss Avoidance: Managed to avoid realization of losses; Parametric rebalances back to policy weights if only a realized gain is assured

Individual equity securities prohibited: Utilize basket of ETFs

Dividends: Swept quarterly

Consultative management: Regular discussions with CPSFIB staff and Callan to review positioning, performance, gain/loss needs

Customizable: Will strive to realize gains to offset losses elsewhere in CPSFIB portfolio, when directed to do so

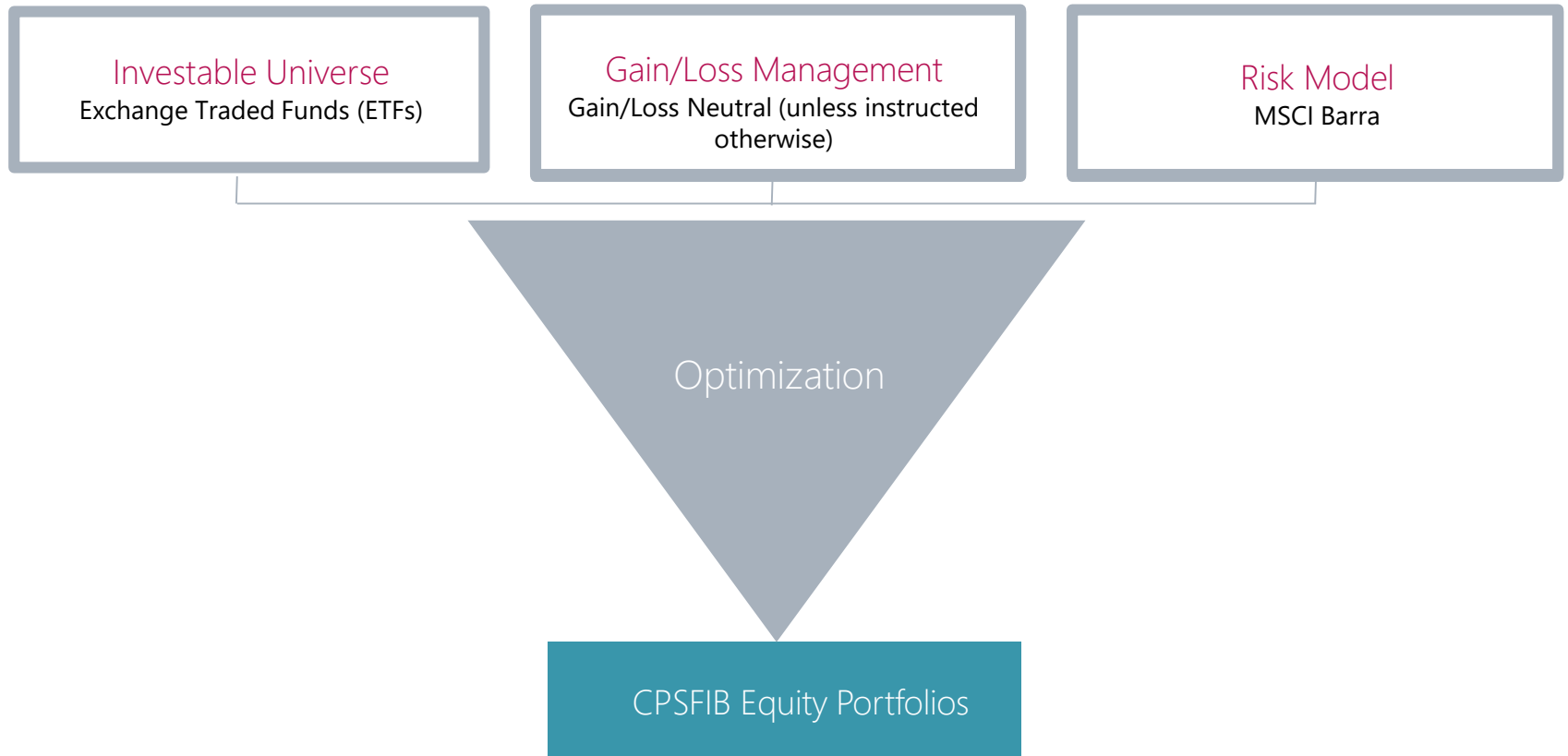
Customize

Parametric offers many customization options to help investors manage risk in their portfolios. Here are a few examples.

Exposure options	Tax management	Responsible investing
<ul style="list-style-type: none">> Index blending> Factor tilts> Management of in-kind assets> ETF management> Call-writing overlays> Sector and industry exclusions	<ul style="list-style-type: none">> Systematic tax management> Transition analysis> Staged diversification> Charitable gifting> Tax-efficient cash withdrawals> Client-directed gain/risk budgets	<ul style="list-style-type: none">> Screens> Integrations> Socially responsible indexes> Proxy voting> Shareholder resolutions

Customization options vary by firm and platform.

Equity Investment Process



Colorado Public School Fund Investment Board Relationship Review

December 12, 2017:	Initial investment of \$50,000,000
2018:	Additional investment of \$165,000,000
2019:	Additional investment of \$11,000,000
2020:	Net Additional investment of \$3,075,000
2021:	Net Additional investment of \$65,400,000
2022:	Net Additional investment of \$53,425,000
December 31, 2022:	\$375,978,346

Performance as of December 31, 2022 <i>Periods over one year are annualized</i>	QTD	1 Year	3 Year	5 Year	2018	2019	2020	2021	Since Inception*
Colorado Public School Fund Investment Board (Gross-of-Fees)	10.03	-18.05	4.32	5.62	-8.82	26.99	16.60	18.81	5.85
Colorado Public School Fund Investment Board (Net-of-Fees)	10.01	-18.11	4.24	5.53	-8.90	26.87	16.51	18.72	5.76
60% Russell 3000 / 40% ACWI ex US	10.03	-17.84	4.30	5.63	-8.83	27.15	17.13	18.30	5.85

*Inception date: 12/12/2017

Performance reflects the deduction of brokerage commissions and the reinvestment of dividends and other earnings. Performance for periods of less than one year has not been annualized. Performance, cost basis, unrealized gain/losses, and realized gains/losses calculated and reported by Parametric may vary from official custodial statements based on different accounting procedures, reporting dates or valuation methodologies for certain securities. This information has not been audited and is subject to change without notice. Past performance is not indicative of future results. It is not possible to invest directly in an index; they are unmanaged and do not reflect the deduction of fees, taxes and expenses. See Disclosures for additional information.

Portfolio Characteristics

Colorado Public School Fund Investment Board As of December 31, 2022

Characteristics	Portfolio	Benchmark
Number Of Holdings	9100	5217
Dividend Yield	2.33	2.31
Weighted Avg. Cap. (millions)	\$238,016	\$245,986

Sector Weights (%)	Portfolio	Benchmark
Communication Services	6.29	6.41
Consumer Discretionary	10.53	10.55
Consumer Staples	7.35	7.50
Energy	5.51	5.57
Financials	15.62	15.76
Health Care	12.89	13.26
Industrials	11.19	10.76
Information Technology	18.89	18.95
Materials	5.35	5.16
Real Estate	3.24	2.90
Utilities	3.15	3.19

Source: Parametric and FactSet as of 12/31/2022. Sectors, as of the date indicated, are based on weightings, not performance. Information is as of the date indicated and is subject to change at any time. It is not possible to invest directly in an index.

Portfolio Characteristics

Colorado Public School Fund Investment Board As of December 31, 2022

		Weight	Cost Basis	Market Value	Unrealized Gain/Loss	Dividend Yield
ITOT	ISHARES CORE S&P TOTAL US STOCK MKT ETF	58.9%	\$186,236,226	\$221,553,483	\$35,317,257	1.58
IEFA	ISHARES TR CORE MSCI EAFE	25.6%	\$103,904,576	\$96,198,404	-\$7,706,172	3.24
EWC	ISHARES MSCI CANADA	4.1%	\$14,737,841	\$15,357,800	\$619,959	3.29
IEMG	ISHARES CORE MSCI EMERGING	11.3%	\$50,145,457	\$42,469,540	-\$7,675,917	3.16
	US Dollars	0.1%	\$399,119	\$399,119	-	
TOTAL		100%	\$355,423,220	\$375,978,346	\$20,555,127	

Source: Parametric and FactSet as of 12/31/2022. Sectors, as of the date indicated, are based on weightings, not performance. Information is as of the date indicated and is subject to change at any time. It is not possible to invest directly in an index.

Country Weights

Colorado Public School Fund Investment Board
As of December 31, 2022

Weights (%)	Portfolio	Benchmark
Argentina	0.00	0.01
Australia	2.11	2.05
Austria	0.08	0.05
Belgium	0.28	0.26
Brazil	0.60	0.58
Canada	3.99	3.09
Chile	0.07	0.06
China	3.25	3.60
Colombia	0.02	0.01
Cyprus	0.00	0.00
Czech Republic	0.01	0.02
Denmark	0.73	0.76
Egypt	0.01	0.01
Finland	0.28	0.26
France	2.72	3.07
Germany	1.95	2.12
Greece	0.04	0.04
Hong Kong	0.86	0.83
Hungary	0.02	0.02
India	1.74	1.64
Indonesia	0.23	0.21
Ireland	0.11	0.18
Israel	0.25	0.20
Italy	0.61	0.61
Japan	5.95	5.59
Kuwait	0.11	0.10
Luxembourg	0.00	0.00

	Portfolio	Benchmark
Malaysia	0.20	0.18
Mexico	0.26	0.26
Netherlands	1.00	1.11
New Zealand	0.08	0.05
Norway	0.25	0.21
Peru	0.03	0.04
Philippines	0.09	0.08
Poland	0.08	0.08
Portugal	0.06	0.06
Qatar	0.11	0.11
Russia	0.00	0.00
Saudi Arabia	0.44	0.47
Singapore	0.41	0.39
South Africa	0.42	0.41
South Korea	1.32	1.28
Spain	0.61	0.63
Sweden	0.93	0.88
Switzerland	2.41	2.58
Taiwan	1.64	1.56
Thailand	0.28	0.25
Turkey	0.09	0.08
United Arab Emirates	0.13	0.15
United Kingdom	3.99	3.93
United States	59.13	59.82

Source: Parametric and FactSet as of 12/31/2022. Countries, as of the date indicated, are based on weightings, not performance. Information is as of the date indicated and is subject to change at any time. It is not possible to invest directly in an index.

Implementation Scenarios

Current

ETF	Ticker	Fee	Yield	Weight	PTE	Market Value	Yield (\$)	Fee (\$)
iShares Core S&P Total US Market ETF	ITOT	0.03%	1.51%	60%	0.41%	\$ 225,000,000	\$ 3,408,547	\$ 67,500
iShares Core MSCI EAFE ETF	IEFA	0.07%	2.79%	25%	1.68%	\$ 93,750,000	\$ 2,612,770	\$ 65,625
iShares MSCI Canada ETF	EWC	0.50%	2.96%	4%	3.77%	\$ 15,000,000	\$ 443,337	\$ 75,000
iShares Core MSCI Emerging Markets ETF	IEMG	0.09%	2.59%	11%	3.39%	\$ 41,250,000	\$ 1,066,889	\$ 37,125
	<i>All In ETF Fee</i>	0.07%				\$ 375,000,000	\$ 7,531,542	\$ 245,250
	<i>Average Yield</i>	2.01%		<i>Predicted Tracking Error</i>	0.66%			

Option 1

ETF	Ticker	Fee	Yield	Weight	PTE	Market Value	Yield (\$)	Fee (\$)
iShares Core S&P Total US Market ETF	ITOT	0.03%	1.51%	60%	0.41%	\$ 225,000,000	\$ 3,408,547	\$ 67,500
Vanguard FTSE All World ex-US ETF	VEU	0.07%	2.86%	40%	1.46%	\$ 150,000,000	\$ 4,297,483	\$ 105,000
	<i>All In ETF Fee</i>	0.05%				\$ 375,000,000	\$ 7,706,030	\$ 172,500
	<i>Average Yield</i>	2.05%		<i>Predicted Tracking Error</i>	0.63%			

Option 2

ETF	Ticker	Fee	Yield	Weight	PTE	Market Value	Yield (\$)	Fee (\$)
iShares Core S&P Total US Market ETF	ITOT	0.03%	1.51%	60%	0.41%	\$ 225,000,000	\$ 3,408,547	\$ 67,500
Vanguard Developed Markets Index Fund ETF	VEA	0.05%	2.88%	30%	1.81%	\$ 112,500,000	\$ 3,236,357	\$ 56,250
iShares Core MSCI Emerging Markets ETF	IEMG	0.09%	2.59%	10%	3.39%	\$ 37,500,000	\$ 969,899	\$ 33,750
	<i>All In ETF Fee</i>	0.04%				\$ 375,000,000	\$ 7,614,803	\$ 157,500
	<i>Average Yield</i>	2.03%		<i>Predicted Tracking Error</i>	0.70%			

Source: FactSet as of 1/31/2023

Appendix

Parametric Investment Committee: Custom Core[®]

Thomas Lee, CFA
Co-President & Chief Investment Officer

Investment Strategy

Paul Bouchey, CFA
Global Head of Research

Jennifer Sireklove, CFA
Managing Director, Investment Strategy

Jeremy Milleson
Director, Investment Strategy

Portfolio Management

Thomas Seto
Head of Investment Management

Biographies

Thomas Lee, CFA

Co-President & Chief Investment Officer

Tom is a member of Parametric's Executive Committee and leads Parametric's Research, Strategy, Portfolio Management, and Trading teams, coordinating resources, aligning priorities, and establishing processes for achieving clients' investment objectives. Tom has coauthored articles on topics ranging from liability-driven investing to the volatility risk premium. He is a voting member of all the firm's investment committees. Prior to joining Parametric in 1994 (originally as an employee of the Clifton Group, which was acquired by Parametric in 2012), Tom spent two years working for the Board of Governors of the Federal Reserve in Washington, DC. He earned a BS in economics and an MBA in finance from the University of Minnesota. A CFA charterholder, Tom is a member of the CFA Society of Minnesota.

Jennifer Sireklove, CFA

Managing Director, Investment Strategy

Jennifer leads the Investment Strategy Team at Parametric, which is responsible for all aspects of Parametric's equity-based investment strategies. In addition, she has direct investment responsibility for Parametric's Emerging Markets and International Equity Strategies and chairs Parametric's Stewardship Committee. Previously she helped build Parametric's active ownership and custom ESG portfolio construction practices. Prior to joining Parametric in 2013, she worked in equity research, primarily covering the energy, utility, and industrial sectors at firms including D.A. Davidson and McAdams Wright Ragen. Jennifer earned an MBA in finance and accounting from the University of Chicago and a BA in economics from Reed College. A CFA charterholder since 2006, Jennifer is a member of the CFA Society of Seattle.

Dan Ryan

Executive Director, Client Relationship Management

Dan is responsible for managing client relationships throughout the western US. Prior to joining Parametric in 2013, Dan was vice president and senior relationship manager at State Street Global Advisors. He earned a BA in history from the University of Michigan.

Thomas Seto

Head of Investment Management

Thomas is responsible for all portfolio management and trading related to our equity strategies. Prior to joining Parametric in 1998, Thomas served as the head of US Equity Index investments at Barclays Global Investors. He earned an MBA in finance from the University of Chicago Booth School of Business and a BS in electrical engineering from the University of Washington.

Paul Bouchey, CFA

Global Head of Research

Paul leads Parametric's research and development activities across equity and derivative strategies. He is the Co-Editor of the Journal of Wealth Management and has authored numerous journal articles on tax management, risk management, and factor investing. Paul earned a BA in mathematics and physics from Whitman College and an MS in computational finance and risk management from the University of Washington. A CFA charterholder, he is a member of the CFA Society of Seattle.

Jeremy Milleson

Director, Investment Strategy

Jeremy is responsible for assisting in the continued evolution of Parametric's Custom Core® Strategies. He works closely with clients and advisors to design, develop, and implement custom portfolio solutions. Prior to joining Parametric in 2012, Jeremy worked as an instructor in economics at the University of Washington and also worked for Bernstein Investment Research and Management and Banc of America Investment Services. He earned MA and BS degrees in economics from the University of Washington.

Jim Reber

Managing Director, Portfolio Management

James is responsible for portfolio management of Parametric's Private Client Direct Group, primarily serving Parametric's wealth management and family office client base. The Private Client Direct Group manages US, non-US, and global Custom Core® portfolios. Prior to joining Parametric in 2004, James was a senior associate with Standard and Poor's Corporate Value Consulting Group, providing financial valuation services to IT and technology industries. He earned an MBA from the University of Washington and a BS in chemical engineering from Michigan State University.

Disclosure

Parametric Portfolio Associates® LLC ("Parametric"), headquartered in Seattle, is registered as an investment advisor with the Securities and Exchange Commission under the Investment Advisors Act of 1940. Parametric is a leading global asset management firm, providing investment strategies and customized exposure management directly to institutional investors and indirectly to individual investors through financial intermediaries. Parametric offers a variety of rules-based investment strategies, including alpha-seeking equity, fixed-income, alternative and options strategies. Parametric also offers implementation services, including customized equity, traditional overlay and centralized portfolio management. Parametric is part of Morgan Stanley Investment Management, the asset management division of Morgan Stanley, and offers these capabilities through offices located in Seattle, Boston, Minneapolis, New York, and Westport. This material may not be forwarded or reproduced, in whole or in part, without the written consent of Parametric. Parametric and its affiliates are not responsible for its use by other parties.

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Client portfolio performance is presented gross of advisory fees. Advisory fees are deducted quarterly from a client's portfolio and would impact performance adversely. As an example, assuming (a) \$1,000,000 investment, (b) portfolio return of 5% per year, and (c) 1.00% annual investment advisory fee, the cumulative fees paid would be \$10,209.57 in the first year, \$55,254.43 over five years, and \$122,351.51 over ten years. Actual fees charged vary by portfolio due to various conditions, including account size. Parametric's investment advisory fees are described further in Part 2A of Form ADV, which is available upon request.

When calculating after-tax returns, Parametric applies the client's individual tax rate (which may include federal and state income taxes), if provided by the client. If the individual tax rate is not provided by the client, Parametric applies the highest U.S. federal tax rates. For short-term gains, the highest U.S. federal marginal income tax rate is 37% plus the 3.8% net investment income tax, for a combined rate of 40.8%. For long-term gains, the highest U.S. capital gains tax rate is 20% plus the 3.8% net investment income tax, for a combined rate of 23.8%. These assumed tax rates are applied to both net realized gains and losses in the portfolio. State and local taxes are not reflected unless provided by the client. Applying the highest rate may cause the after-tax performance shown to be different than an investor's actual experience. Investors' actual tax rates, the presence of current or future capital loss carry forwards, and other investor tax circumstances will cause an investor's actual after-tax performance to be over or under Parametric's estimates presented here. In periods when net realized losses exceed net realized gains, applying the highest tax rates to our calculations illustrates the highest after-tax return that could be expected of the portfolio, and assumes the maximum potential tax benefit was derived. Actual client after-tax returns will vary. As with all after-tax performance, the after-tax performance reported here is an estimate. In particular, it has been assumed that the investor has, or will have sufficient capital gains from sources outside of this portfolio to fully offset any net capital losses realized, and any resulting tax benefit has been included in Parametric's computation of after-tax performance.

Disclosures continue on next page.

Disclosures (Continued)

Performance, cost basis, unrealized gain/losses, and realized gains/losses calculated and reported by Parametric may vary from official custodial statements based on different accounting procedures, reporting dates or valuation methodologies for certain securities. Client performance summaries and any related data produced by Parametric are not audited. Clients are encouraged to carefully review and compare the official custodial records with the various data and performance statistics reported by Parametric.

Benchmark after-tax returns are simulated for each client portfolio using client-specific, after-tax benchmark portfolios. Performance of the after-tax benchmark is simulated using the same inception date, cash flows, cost basis, and tax rates as the client portfolio. The after-tax benchmark's capital gain realization rate is based on the average turnover rate of the pre-tax benchmark and ending gain or loss of the after-tax benchmark for each period. The dividend income is estimated using the pre-tax benchmark index's dividend return during the period. After-tax benchmark returns reflect the deduction of taxes, but do not include any other fees or expenses. After-tax benchmark returns are hypothetical, do not reflect actual trading, and may not be relied upon for investment decisions.

Benchmark/index information provided is for illustrative purposes only. Indexes are unmanaged and cannot be invested in directly. Deviations from the benchmarks provided herein may include, but are not limited to, factors such as: the purchase of higher risk securities, over/under-weighting specific sectors and countries, limitations in market capitalization, company revenue sources, and/or client restrictions. Parametric's proprietary investment process considers factors such as additional guidelines, restrictions, weightings, allocations, market conditions and other investment characteristics. Thus, returns may at times materially differ from the stated benchmark and/or other disciplines provided for comparison.

There is no assurance that a separately managed account ("SMA") will achieve its investment objective. SMAs are subject to market risk, which is the possibility that the market values of the securities in an account will decline and that the value of the securities may therefore be less than what you paid for them. Market values can change daily due to economic and other events (e.g., natural disasters, health crises, terrorism, conflicts and social unrest) that affect markets, countries, companies or governments. It is difficult to predict the timing, duration, and potential adverse effects (e.g., portfolio liquidity) of events. Accordingly, you can lose money investing in an SMA.

Investment strategies that seek to enhance after-tax performance may be unable to fully realize strategic gains or harvest losses due to various factors. Market conditions may limit the ability to generate tax losses. Tax-loss harvesting involves the risks that the new investment could perform worse than the original investment and that transaction costs could offset the tax benefit. Also, a tax-managed strategy may cause a client portfolio to hold a security in order to achieve more favorable tax treatment or to sell a security in order to create tax losses. Prospective investors should consult with a tax or legal advisor before making any investment decision.

An environmental, social and governance ("ESG") investment strategy limits the types and number of investment opportunities available to the investor and, as a result, the investor's portfolio may underperform other investment strategies that do not have an ESG focus. The ESG investment strategy may result in investments in securities or industry sectors that underperform the market as a whole or underperform other strategies which apply ESG standards. An issuer's ESG performance or the investment adviser's assessment of such performance may change over time, which could cause the investor to temporarily hold securities that do not comply with the investor's responsible investment criteria. In evaluating an investment, the investment adviser is dependent upon information and data that may be incomplete, inaccurate or unavailable, which could adversely affect the analysis of the ESG factors relevant to a particular investment. Successful application of the investor's responsible investment strategy will depend on the investment adviser's skill in properly identifying and analyzing material ESG issues.

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Parametric is located at 800 Fifth Avenue, Suite 2800, Seattle, WA 98104. For more information regarding Parametric and its investment strategies, or to request a copy of the firm's Form ADV or a list of composites, contact us at 206 694 5500 or visit www.parametricportfolio.com.

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