CITY OF OAKLAND

AGENDA REPORT

TO:	Jestin D. Johnson City Administrator	**FROM:**	Erin Roseman Finance Director
SUBJECT:	Oakland PFRS's Investment Portfolio and Actuarial Valuation for the Quarter Ending December 31, 2022	**DATE:**	May 26, 2023

City Administrator Approval Jestin Johnson (Jun 14, 2023 08:19 PDT) Date: Jun 14, 2023

RECOMMENDATION

Staff Recommends That the City Council Receive an Informational Report on the Oakland Police and Fire Retirement System's ("PFRS", or "System") Investment Portfolio as of December 31, 2022 and the PFRS Actuarial Valuation as of July 1, 2022.

EXECUTIVE SUMMARY

The attached Quarterly Investment Performance report (***Attachment A***) provided by the PFRS Investment Consultant, Meketa Investment Group (MIG) summarizes the performance of the PFRS investment portfolio for the quarter ended December 31, 2022. In addition, the Council is being provided the recently updated PFRS' Actuarial Valuation (***Attachment B***) as of July 1, 2022.

During the most recent quarter, the PFRS Total Portfolio generated an absolute return of 5.6 percent, gross of fees, underperforming its policy benchmark by -0.4 percent. The portfolio matched its benchmark over the latest one- and three periods and outperformed over the five-year period. This is discussed in more detail in the "Investment Performance" section of this report.

	Quarter	1 Year	3 Year	5 Year
Total Portfolio	5.6	-14.5	2.3	4.3
Policy Benchmark	6.0	-14.5	2.3	4.0
Excess Return	**-0.4**	**0.0**	**0.0**	**0.3**

As of July 1, 2022, the System's Unfunded Actuarial Liability is approximately $130.2 million, and the System had a Funded Ratio of 72.6 percent on a Market Value of Assets (MVA) basis. This is discussed in more detail in the "PFRS Actuarial Valuation" section of this report.

BACKGROUND / LEGISLATIVE HISTORY

The Oakland Police and Fire Retirement System is a closed defined benefit plan established by the City of Oakland's (the "City") Charter. PFRS is governed by a board of seven trustees (the "PFRS Board"). PFRS covers the City's sworn police and fire employees hired prior to July 1, 1976. PFRS was closed to new members on June 30,1976. As of December 31, 2022, PFRS had 674 retired members and no active members.

The System's investment portfolio is governed by the investment policy set by the PFRS Board. The PFRS Board sets an investment policy that authorizes investments in a variety of domestic and international equity and fixed income securities. Eleven external investment managers currently manage the System's portfolio. Most of the portfolio is held in custody at Northern Trust. In accordance with the City Charter, the PFRS Board makes investment decisions in accordance with the prudent person standard as defined by applicable court decisions and as required by the California Constitution.

In March 1997, the City issued Taxable Pension Obligation Bonds, Series 1997 ("1997 POBs") and as a result deposited $417 million into the System to pay the City's contributions through June 2011. As a result of the funding agreement entered at the time the 1997 POBs were issued, City payments to PFRS were suspended from February 25, 1997 to June 30, 2011. The City of Oakland resumed contributing to PFRS effective July 1, 2011 and contributed $45.5 million for the fiscal year (FY) ended June 30, 2012.

In July 2012, the City issued $212.5 million of Taxable Pension Obligation Bonds, Series 2012 ("2012 POBs"). The City subsequently deposited $210 million into the System and entered a funding agreement with the PFRS Board. Thus, no additional contributions were required until July 1, 2017. As of the most recent actuary study dated July 1, 2022, the System's Unfunded Actuarial Liability is approximately $130.2 million, and the System had a Funded Ratio of 72.6 percent on a Market Value of Assets (MVA) basis. The City of Oakland is currently making monthly payments to the Plan for the FY 2022/2023 required contribution of $32.7 million.

ANALYSIS AND POLICY ALTERNATIVES

The attached report provided by the Oakland Police and Fire Retirement System's (PFRS) Investment Consultant and Actuary summarizes the performance of the PFRS' investment portfolio and actuarial funding status. These reports are being provided in accordance with the City of Oakland Charter, to provide an update to City Council on the status of the Oakland Police and Fire Retirement System.

The presentation of this report supports the Citywide priority ***of responsive, trustworthy government***. This report communicates the PFRS's financial positions and obligations to the public, policy makers, retirees and stakeholders, while the annual audits of the PFRS finances provides assurance of the accuracy of information contained therein.

PFRS' Membership

The City Charter establishes plan membership, contribution, and benefit provisions. The System serves the City's sworn employees hired prior to July 1, 1976 who have not transferred to the California Public Employees' Retirement System ("CalPERS"). As of December 31, 2022, the System's membership was 674 as shown on ***Table 1*** *below*.

Table 1
PFRS Membership
as of December 31, 2022

Membership	POLICE	FIRE	TOTAL
Retiree	289	167	456
Beneficiary	127	91	218
Total Membership	416	268	674

PFRS Investment Portfolio

As of December 31, 2022, the PFRS' portfolio had an aggregate value of $398.44 million as shown in ***Table 2***.

Table 2
PFRS Investment Portfolio
as of December 31, 2022

Investment	Fair Value
Domestic Equities	$159,779,185
Fixed Income	101,552,915
Covered Calls	27,503,720
International Equities	49,851,663
Crisis Risk Offset	39,452,288
Credit	8,603,832
Cash	11,692,108
Total Portfolio	$398,435,711

As of December 31, 2022, the PFRS portfolio had an aggregate value of $398.4 million. This represents a $21.2 million increase in investment value and withdrew ($5.2) million in outflows for benefit payments over the quarter. During the previous one-year period, the PFRS Total Portfolio decreased in value by $69.1 million and withdrew ($15.7) million in outflows for benefit payments as shown in ***Table 3*** below. The investment drawdowns for benefit payments are less City of Oakland Contributions to the PFRS Plan of $8.2 million for the Quarter and $32.7 million for the Year.

Table 3
Change in PFRS Portfolio Valuation
as of December 31, 2022

Total Plan Value	1 Quarter	1 Year
Beginning Market Value	$382,458,040	$483,220,978
Investment Drawdowns for Benefit Payments	(5,217,746)	(15,709,585)
Gain/(Loss) on Investment	21,195,418	(69,075,682)
Ending Market Value	$398,435,711	$398,435,711

PFRS Investment Performance

During the most recent quarter ending December 31, 2022, the PFRS Total Portfolio generated an absolute return of 5.6 percent, gross of fees, underperforming its policy benchmark by -0.4 percent. The portfolio kept pace with the benchmark over the one-year period and three-year period, and 0.3 percent over the five-year period.

Over the most recent quarter ending December 31, 2022, the Plan's Domestic Equity allocation outperformed its benchmark by 1.0 percent. The Plan's International Equity allocation outperformed its benchmark by 0.8 percent. The Plan's Fixed Income allocation underperformed its benchmark of 0.1 percent. The Plan's Credit allocation underperformed its benchmark of -2.3 percent. The Plan's Crisis Risk Offset allocation underperformed its benchmark by -6.4 percent, while the Covered Calls allocation outperformed its benchmark by 0.9 percent. ***Table 4*** shows PFRS recent investment performance in comparison to its corresponding benchmarks.

Table 4
PFRS Asset Class Performance
as of December 31, 2022

Investment Type	Quarter	1 Year	3 Year	5 Year
PFRS Total Fund	5.6	-14.5	2.3	4.3
PFRS Policy Benchmark	6.0	-14.5	2.3	4.0
Excess Returns	-0.4	0.0	0.0	0.3
PFRS Domestic Equity	8.2	-16.7	7.2	8.5
Benchmark: Russell 3000	7.2	-19.2	7.1	8.8
Excess Returns	1.0	2.5	0.1	-0.3
PFRS International Equity	15.1	-15.7	0.3	1.7
Benchmark: MSCI ACWI Ex US	14.3	-16.0	0.1	0.9
Excess Returns	0.8	0.3	0.2	0.8

Table 4
PFRS Asset Class Performance
as of December 31, 2022 *cont'd*

Investment Type	**Quarter**	**1 Year**	**3 Year**	**5 Year**
PFRS Fixed Income	2.1	-12.9	-2.1	0.5
Benchmark: Bloomberg Barclays	2.2	-13.0	-2.5	0.2
Excess Returns	-0.1	0.1	0.4	0.3
PFRS Credit	1.9	-7.6	3.0	3.0
Benchmark: Bloomberg US High Yield	4.2	-11.2	0.0	2.3
Excess Returns	-2.3	3.6	3.0	0.7
PFRS Crisis Risk Offset	-4.9	-14.5	-14.6	-
Benchmark: SG Multi Alt Risk Premia	1.5	4.8	-1.3	-
Excess Returns	-6.4	-19.3	-13.3	-
PFRS Covered Calls	7.7	-12.5	6.7	7.2
Benchmark: CBOE BXM	6.8	-11.4	1.3	2.9
Excess Returns	0.9	-1.1	5.4	4.3
Cash	0.0	0.0	0.4	1.1
Citigroup 3 Month T-Bill Index	0.9	1.5	0.7	1.2
Excess Returns	-0.9	-1.5	-0.3	-0.1

Table 5 compares PFRS Total Portfolio performance to other pension funds and benchmarks.

Table 5
PFRS Total Fund Performance
as of December 31, 2022

	Quarter	1 Year	3 Year	5 Year
PFRS Fund (Gross of Fees)	5.6%	-14.5%	2.3%	4.3%
Comparisons:				
PFRS Actuarial Expected Rate of Return (blend) (a) (b)	1.5%	6.0%	6.0%	6.0%
Policy Benchmark (blend) (c)	6.0%	-14.5%	2.3%	4.0%
Median Fund (d)	5.8%	-13.4%	4.0%	5.2%
CalSTRS Investment Returns (Gross of Fees)	4.0%	-6.7%	7.3%	7.3%
East Bay Mud Investment Returns (Gross of Fees)	7.5%	-13.4%	3.3%	4.9%
San Joaquin County Returns (Gross of Fees)	3.7%	-6.8%	5.1%	5.4%

a) The actuarial expected rate of return was 8% through 6/30/2009, 7.5% through 6/30/2010, 7% through 6/30/2011, 6.75% through 6/30/2014, 6.5% through 12/31/2017, and 6.0% currently.
b) The quarterly actuarial expected rate of return is calculated based on the 6.0% annual return assumption.
c) The Policy Benchmark currently consists of 40% Russell 3000, 12% MSCI ACWI ex U.S., 31% Bloomberg US Universal, 5% CBOE BXM, 10% SG Multi Alternative Risk Premia, 2% Bloomberg US High Yield.
d) Median Fund is of Public Defined Benefits Plans with $250 million to $1 billion in assets.

PFRS Actuarial Valuation

As of the latest actuarial valuation dated July 1, 2022, the PFRS Funded Ratio (actuarial value of assets divided by present value of future benefits) is 72.6 percent. As a result of the funding agreement and the City's deposit of $210 million in 2012 POBs to the System, no contributions were required until fiscal year 2017/2018. The City resumed contributions to the System on July 1, 2017. The required contribution for fiscal year 2022/2023 is $32.71 million. ***Table 6*** below shows a summary of the July 1, 2022 PFRS Actuarial valuation results.

Table 6
Summary of Plan Results
($ in thousands)

	July 01, 2022
Actuarial Liability	$ 552,966
Less: Actuarial Value of Assets	(422,762)
Unfunded Actuarial Liability	$ 130,204
Funded Ratio (AVA) liability	76.5%

Projected City of Oakland Contributions

Article XXVI Section 2619 (6) required that the City fully fund the PFRS Plan by 2026. ***Table 7*** summarizes the projected employer contributions.

Table 7
Projected Employer Contributions
Police and Fire Retirement System
(in millions)

Fiscal Year Ending	Employer Contribution
2023	$32.7
2024	40.8
2025	44.0
2026	48.8

FISCAL IMPACT

This is an informational report. There are no budget implications associated with this report

PUBLIC OUTREACH / INTEREST

This item did not require public outreach other than the required posting on the City's website.

COORDINATION

This report was prepared in coordination with the PFRS' Investment Consultant (MIG) and PFRS' Actuary (Cheiron).

SUSTAINABLE OPPORTUNITIES

Economic: Whenever possible, the PFRS Board seeks to benefit the local Oakland based economy. In 2006, the PFRS Board, along with staff, created the PFRS Local Broker provision. This provision mandates that the PFRS Investment Managers consider using Oakland based brokers for all trades conducted on behalf of the fund based on best execution. This program aims to regenerate some of the commissions generated by the System into the Oakland economy.

Environmental*:* The PFRS Board supports a sustainable environment. On June 29, 2016, the PFRS Board passed Resolution No. 6927 prohibiting PFRS investment managers from investing PFRS funds in any publicly traded company which derives at least 50 percent of its revenue from the mining and extracting of thermal coal.

Race & Equity*:* There are no race and equity opportunities associated with this report.

ACTION REQUESTED OF THE CITY COUNCIL

Staff recommends that the Council receive this informational report on the Oakland Police and Fire Retirement System ("PFRS") Investment Portfolio as of December 31, 2022 and the PFRS Actuarial Valuation as of July 1, 2022.

For questions regarding this report, please contact Erin Roseman, Director of Finance, at (510) 238-2026.

Respectfully submitted,

Erin Roseman (Jun 13, 2023 16:54 PDT)

ERIN ROSEMAN
Director of Finance, Finance Department

Reviewed by:
David Jones, Treasury Administrator

Prepared by:
Téir Jenkins, Investment & Operations Manager
Retirement Unit

Attachments (2):

Attachment A: Oakland Police and Fire System Quarterly Investment Performance Report as of December 31, 2022

Attachment B: Oakland Police and Fire System Actuarial Valuation Report as of July 1, 2022

MEKETA | 45 YEARS
CELEBRATING A MILESTONE

Oakland Police and Fire Retirement System

February 22, 2023

Quarterly Performance Report as of December 31, 2022

Agenda

Executive Summary

Total Portfolio Review

The Oakland Police and Fire Retirement System (OPFRS) portfolio finished the 2022 calendar year with a market value of $398.4 million. This represents a $21.2 million capital appreciation in investment value after $5.2 million in net outflows over the quarter. In the calendar year 2022, the OPFRS Total Portfolio faced a $69.1 million depreciation, after withdrawals totaling $15.7 million for net outflows including benefit payments.

→ As of 12/31/2022, all the asset classes were within acceptable allocation ranges relative to policy targets.[1]

Investment Performance

→ During the most recent quarter, the OPFRS portfolio generated an absolute return of 5.6%, gross of fees, underperforming its policy benchmark[2] by (-0.4%). It kept pace with the benchmark over the trailing 1- and 3-year periods, though it has maintained a slight outperformance over the 5-year period.

	Quarter	FYTD	1 Year	3 Year	5 Year
Total Portfolio (Gross)	5.6	0.7	(-14.5)	2.3	4.3
Policy Benchmark	6.0	1.1	(-14.5)	2.3	4.0
Excess Return	(-0.4)	(-0.4)	0	0	0.1
Reference: Total Portfolio (Net) [3]	*5.5*	*0.6*	*(-14.7)*	*2.0*	*4.0*

[1] Asset allocation as of 12/31/2022. Target weightings reflect the interim phase (where Crisis Risk Offset component is set to 10%) of the Plan's previously approved asset allocation (effective 5/31/2017).
[2] Evolving Policy Benchmark consists of 40% Russell 3000, 12% MSCI ACWI ex U.S., 33% Bloomberg Universal, 5% CBOE BXM, 6.7% SG Multi Asset Risk Premia, 3.3% Bloomberg Long Treasury from 1/1/2019 through 5/31/2022; and 40% Russell 3000 / 12% MSCI ACWI ex USA / 31% Bloomberg US Universal TR / 5% CBOE BXM / 10% SG Multi Alternative Risk Premia Index / 2% Bloomberg US High Yield thereafter.
[3] Longer-term (>1 year) Net of fee returns include estimates based on OPFRS manager fee schedule (approximately 34 bps).

Total Portfolio Review (Continued)

The primary factors of the Total Plan's underperformance against the Policy Benchmark during the quarter were the underperformance within the Crisis Risk Offset segment, which surpassed the positive contributions made by the Domestic and International Equity segments.

Peer Comparison

→ In comparison to its peer group[1], the portfolio has lagged the median fund's return over the quarter as well as the 1-, 3-, and 5-year periods.

	Quarter	FYTD	1 Year	3 Year	5 Year
Total Portfolio (Gross)	5.6	0.7	(-14.5)	2.3	4.3
Peer Group Median Fund	5.8	1.2	(-13.4)	4.0	5.2
vs. Peer Median Fund	(-0.2)	(-0.5)	(-1.1)	(-1.7)	(-0.9)
Reference: Total Portfolio (Net) [2]	*5.5*	*0.6*	*(-14.7)*	*2.0*	*4.0*

[1] Source: Investment Metrics peer universe, Public Defined Benefit plans with $250 million to $1 billion in assets as of 12/31/2022.
[2] Longer-term (>1 year) Net of fee returns include estimates based on OPFRS manager fee schedule (approximately 34 bps).

Asset Class & Manager Highlights

→ **Domestic equity** outperformed the Russell 3000 Index for all periods measured except for the longer 5-year trailing period.

- Among the active managers, **Earnest Partners** and **Rice Hall James** trailed their respective benchmarks for the quarter while maintaining outperformance over the 1-year and longer periods. **Wellington Select Quality** and **Brown Advisory** both outperformed their benchmarks for all the available time periods.[1]

→ **International equity** outperformed the MSCI ACWI ex US Index for all time periods measured. Reflecting the positive market conditions during the fourth quarter, both managers—one active and one passive—generated double-digit positive absolute returns for the quarter.

- The Plan's active international equity manager, **SGA MSCI ACWI ex US**, outperformed its benchmark for all time periods available.[1]
- The passive **Vanguard** posted underperformance over the 1- and 3-year periods, due to a large deviation from its tracked index in December. This is due to Vanguard's fair-value pricing methodology, that may cause deviations from its tracked index that are expected to equalize over the longer term.

[1] Due to their recent inception, Wellington Select Quality has less than 1-year of performance history and Brown Fundamental Small Cap Value has less than 3-year of performance history. SGA MSCI ACWI ex US and Vanguard Developed Markets ETF have less than 5-year of performance history.

Asset Class & Manager Highlights (Continued)

→ **Fixed income** trailed the Bloomberg Universal Index over the quarter, while it outperformed the benchmark across all other time periods. The managers' quarterly relative performance is mixed.

- **Ramirez** underperformed, **Reams** outperformed, and **Wellington Core Bond** tracked their respective benchmarks for the quarter. **Ramirez** and **Reams**, which have longer 3- and 5-year performance history, both maintained their outperformance over their respective benchmarks for these periods.

→ The **Credit** segment, with **Polen Capital** as its only manager, underperformed the asset class's benchmark, Bloomberg US High Yield Index, during the quarter though it has maintained their excess return above their respective benchmarks over the 1-, 3-, and 5-year periods.

→ **Covered Calls** and both of its underlying strategies outperformed its CBOE S&P 500 Buy-Write Index over the quarter and the longer 3- and 5-year periods, while trailing in the 1-year period.

→ The **Crisis Risk Offset** segment trailed its benchmark SG Multi Alternative Risk Premia Index over the quarter as well as other time periods measured.

- Even though the portfolio has trailed across all time periods, as a long-term-oriented segment of the Plan and given the recency of funding for two[1] of the three underlying managers, the underperformance ought not to be overly scrutinized.
- Due to the addition of Kepos and Versor as Alternative Risk Premia and Systematic Trend Following managers within this segment in 2022, the current benchmark does not accurately reflect its components. We will be recommending an update to this benchmark for the Committee to consider in the following meetings.

[1] Kepos Alternative Risk Premia and Versor Trend Following were incepted within the first half of 2022 and therefore have less than 1-year of performance history.

Economic and Market Update

Data as of December 31, 2022

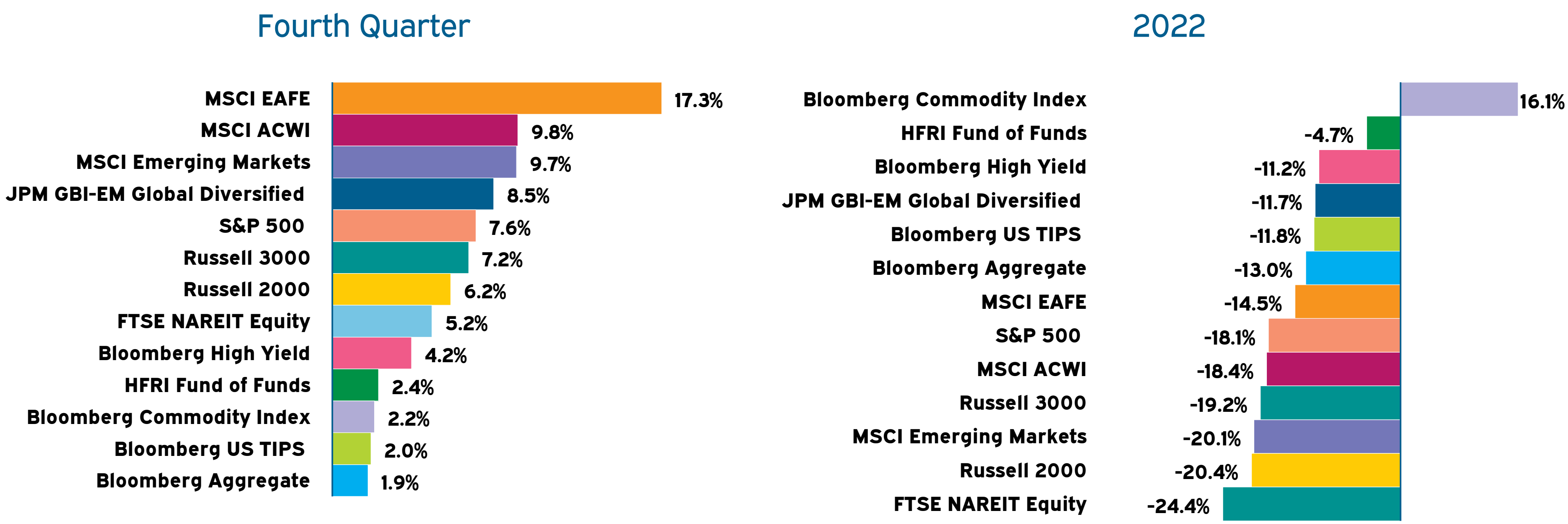
Commentary

→ Ending a very tough year, most asset classes posted gains in the fourth quarter on signs that policy tightening would slow given cooling inflation.

- Chairman Powell's testimony in November reiterated previous messaging on persistent and high inflation and the need for an extended period of monetary tightening weighing on assets in December. Markets remained focused though on signs that inflation is falling and that the size of future Fed rate hikes could be lower.
- US equity markets sold off (-5.9%) in December but returned 7.2% in the fourth quarter as investors balanced the Fed's caution with improving inflation data.
- In developed equity markets outside the US, sentiment deteriorated somewhat in December, but they posted a strong fourth quarter return of 17.3% driven by a falling US dollar and results in Europe where inflation started to slow.
- Emerging market equities declined in December too (-1.4%) but less than the US and also had a strong fourth quarter (+9.7%). A weaker US dollar, declining inflation globally, and signs of China reopening its economy all contributed to the results.
- Bonds experienced one of the worst years on record given inflation levels and the rapid rise in interest rates. Optimism over declining inflation and a slower pace of policy tightening benefited bonds overall in the fourth quarter though.

→ Looking to 2023, the path of inflation and monetary policy, slowing growth globally, China reopening its economy, and the war in Ukraine will all be key.

Index Returns[1]



→ After broad declines in Q3 driven by expectations for further policy tightening, most major asset classes were up in the fourth quarter on hopes of inflation and policy tightening peaking.

→ Outside of commodities, all other public market asset classes declined in 2022. It was the first time since the 1960s that both stocks and bonds declined together in a calendar year.

[1] Source: Bloomberg and FactSet. Data is as of December 31, 2022.

Domestic Equity Returns[1]

Domestic Equity	December (%)	Q4 (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)
S&P 500	-5.8	7.6	-18.1	7.7	9.4	12.6
Russell 3000	-5.9	7.2	-19.2	7.1	8.8	12.1
Russell 1000	-5.8	7.2	-19.1	7.3	9.1	12.4
Russell 1000 Growth	-7.7	2.2	-29.1	7.8	11.0	14.1
Russell 1000 Value	-4.0	12.4	-7.5	6.0	6.7	10.3
Russell MidCap	-5.4	9.2	-17.3	5.9	7.1	11.0
Russell MidCap Growth	-6.0	6.9	-26.7	3.9	7.6	11.4
Russell MidCap Value	-5.1	10.5	-12.0	5.8	5.7	10.1
Russell 2000	-6.5	6.2	-20.4	3.1	4.1	9.0
Russell 2000 Growth	-6.4	4.1	-26.4	0.6	3.5	9.2
Russell 2000 Value	-6.6	8.4	-14.5	4.7	4.1	8.5

US Equities: Russell 3000 Index declined 5.9% for December but gained 7.2% for the quarter. Historic inflation and rapidly rising interest rates led to significant declines (-19.2%) for the full year.

- → US stocks fell broadly in December on the Federal Reserve signaling its continued resolve to raise rates but gained overall for the quarter on hopes that interest rates could be peaking soon given slowing inflation.
- → All sectors declined during December, led by consumer discretionary and technology with defensive sectors declining less. For the quarter though, most sectors were up led by energy and industrials.
- → In a continuation on the overall trend in 2022 value stocks outperformed growth stocks in the fourth quarter given higher interest rates and slowing growth.

[1] Source: Bloomberg. Data is as of December 31, 2022.

Foreign Equity Returns[1]

Foreign Equity	December (%)	Q4 (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)
MSCI ACWI ex. US	-0.7	14.3	-16.0	0.1	0.9	3.8
MSCI EAFE	0.1	17.3	-14.5	0.9	1.5	4.7
MSCI EAFE (Local Currency)	-3.0	8.7	-7.0	3.6	3.8	7.6
MSCI EAFE Small Cap	1.1	15.8	-21.4	-0.9	0.0	6.2
MSCI Emerging Markets	-1.4	9.7	-20.1	-2.7	-1.4	1.4
MSCI Emerging Markets (Local Currency)	-2.0	6.6	-15.5	0.1	1.3	4.6
MSCI China	5.2	13.5	-21.9	-7.5	-4.5	2.4

Developed international equities (MSCI EAFE) rose 0.1% in December and an impressive 17.3% in the fourth quarter. Emerging markets (MSCI EM) fell -1.4% in December but gained 9.7% for the quarter. Inflation and rising rates also weighed on international equities last year, as well as a strong US dollar for most of the year.

→ International developed market equities, specifically Europe, held up better relative to the rest of the world in December with the MSCI EAFE up 0.1%. In the fourth quarter, they returned a significant 17.3% due in part to the recent weakness in the US dollar (they returned only 8.7% in local terms) leading to lower declines for the year.

→ In December emerging markets outperformed the US but trailed developed market equities as China's rally was not enough to offset weakness elsewhere (e.g., India -5.5%). For the quarter, a weakening US dollar and China reopening led to strong results (+9.7%), but emerging markets remained the weakest for 2022 due to China.

→ Like the US, value outpaced growth globally in 2022.

[1] Source: Bloomberg. Data is as of December 31, 2022.

Fixed Income Returns[1]

Fixed Income	December (%)	Q4 (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)	Current Yield (%)	Duration (Years)
Bloomberg Universal	-0.3	2.2	-13.0	-2.5	0.2	1.3	5.1	6.2
Bloomberg Aggregate	-0.5	1.9	-13.0	-2.7	0.0	1.1	4.7	6.4
Bloomberg US TIPS	-1.0	2.0	-11.8	1.2	2.1	1.1	4.4	6.7
Bloomberg High Yield	-0.6	4.2	-11.2	0.0	2.3	4.0	9.0	4.4
JPM GBI-EM Global Diversified (USD)	2.2	8.5	-11.7	-6.1	-2.5	-2.0	5.8	4.9

Fixed Income: The Bloomberg Universal fell -0.3% in December but rose 2.2% for the fourth quarter. Last year was one of the worst on record, with the broad bond market declining 13%.

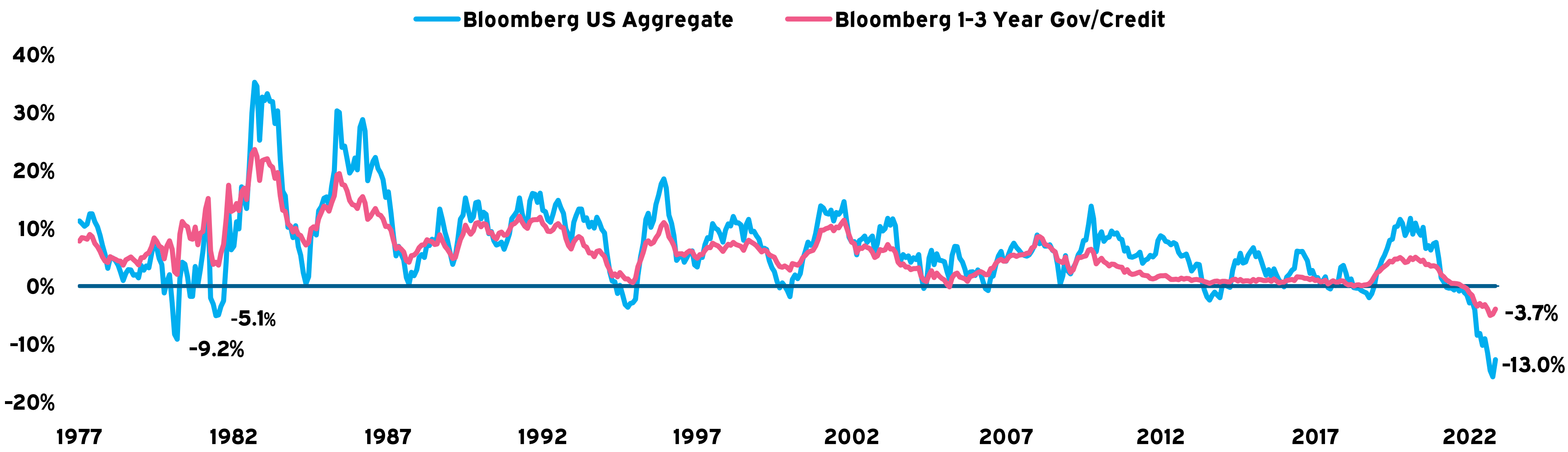
→ The Federal Reserve reconfirming its commitment to tighten policy in the face of high inflation weighed on US fixed income in December. For the quarter though the broad US bond market (Bloomberg Aggregate) was up 1.9% on hopes that inflation would continue to decline and corresponding expectations for the slowing of policy rate hikes.

→ TIPS produced similar results to the broad US bond market for the quarter but outperformed for the year given their inflation adjustment.

→ Riskier bonds outperformed for the quarter due to improving risk sentiment with emerging market bonds performing particularly well.

[1] Source: Bloomberg. JPM GBI-EM data is from InvestorForce. Data is as of December 31, 2022. The yield and duration data from Bloomberg is defined as the index's yield to worst and modified duration respectively.

Fixed Income
Rolling One-year Returns[1]



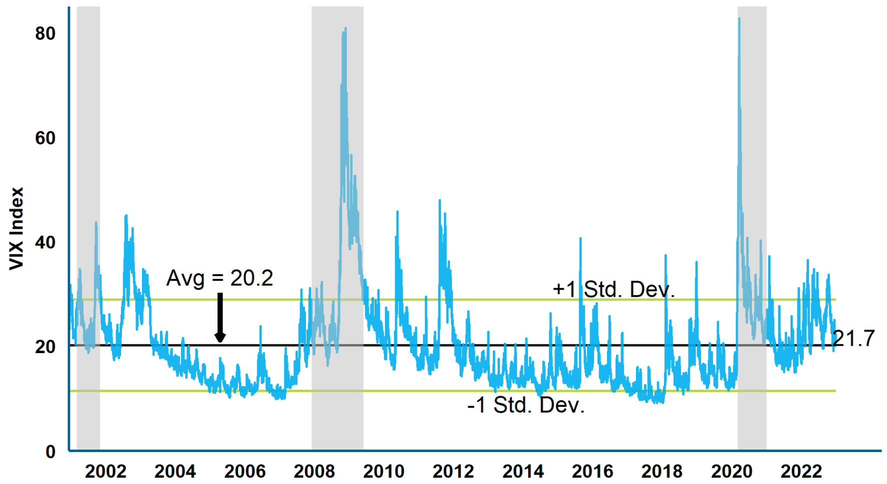
→ Last year was one of the worst return periods for the US bond market given the historic inflation levels and the corresponding rapid rise in interest rates.

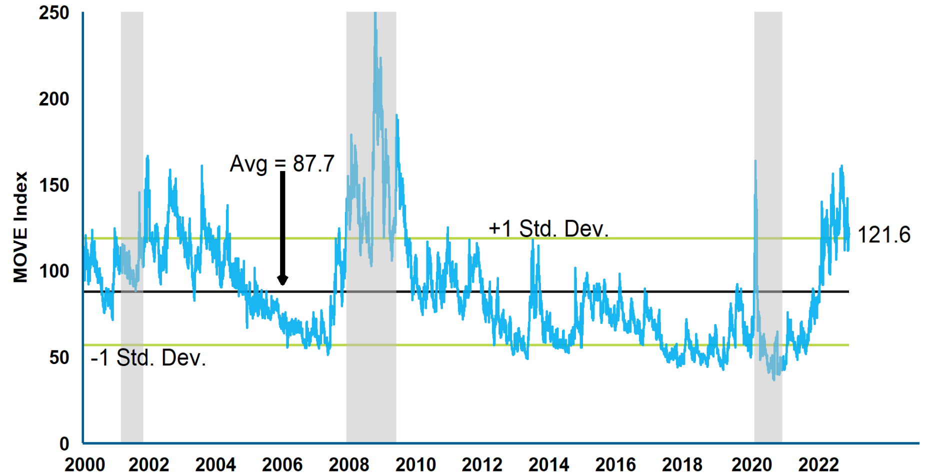
→ The broad bond market (Bloomberg US Aggregate) declined 13% in 2022 making it one of the worst periods on record.

→ Short-term bond declines were far smaller (-3.7%) last year, but also were one of the worst on record.

1 Source: Bloomberg. Data is as of December 31, 2022.

Equity and Fixed Income Volatility[1]



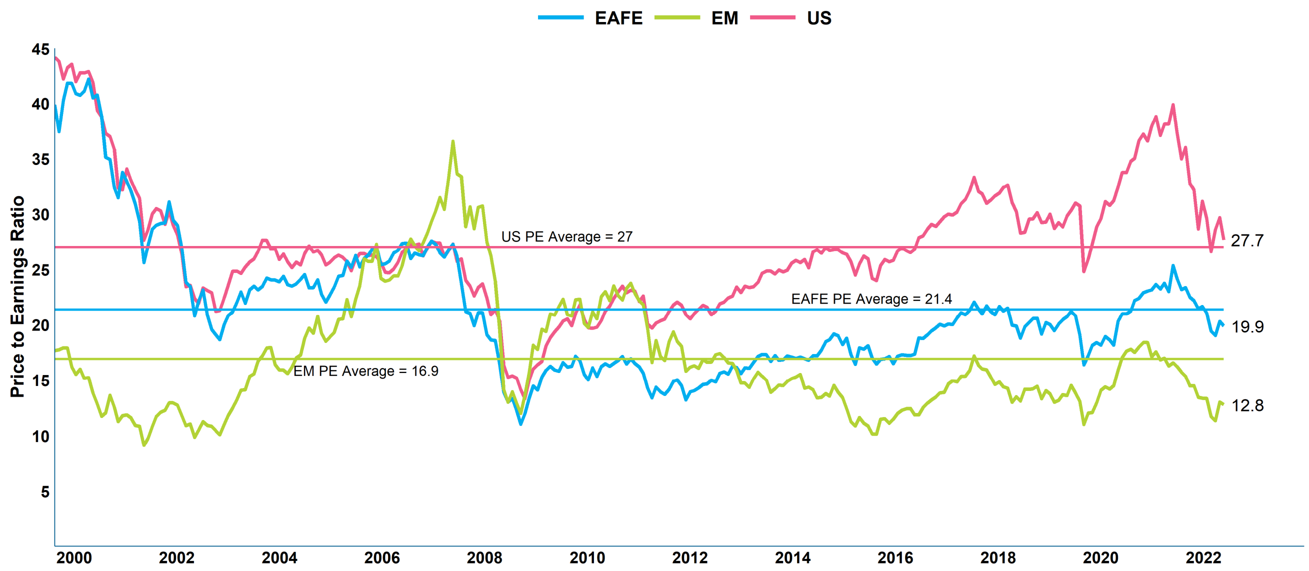


→ Volatility in equities (VIX) finished the year down from its highs and near its long run average as investors anticipated the potential end of Fed rate hikes this year.

→ Fixed income (MOVE) remained elevated and well above its long-run average at year-end due to the uncertain path of US interest rates as the Federal Reserve continues its hawkish stance on inflation.

[1] Equity and Fixed Income Volatility – Source: Bloomberg. Implied volatility as measured using VIX Index for equity markets and the MOVE Index to measure interest rate volatility for fixed income markets. Data is as of December 2022. The average line indicated is the average of the VIX and MOVE values between January 2000 and the recent month-end respectively.

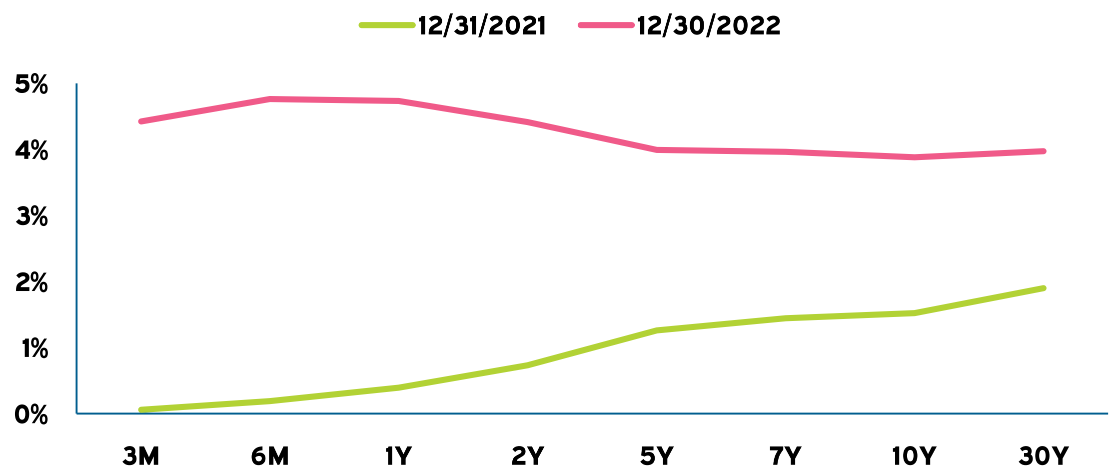
Equity Cyclically Adjusted P/E Ratios[1]



- → After December's sell-off, US equity price-to-earnings ratio finished the year near its long-term (21st century) average.
- → International developed market valuations rose but remain below their own long-term average, with those for emerging markets the lowest and well under the long-term average.
- → Price declines have been the main driver of recent multiple compression as earnings have remained resilient. Concerns remain over whether earnings strength will continue in the face of slowing growth.

[1] US Equity Cyclically Adjusted P/E on S&P 500 Index. Source: Robert Shiller, Yale University, and Meketa Investment Group. Developed and Emerging Market Equity (MSCI EAFE and EM Index) Cyclically Adjusted P/E – Source: MSCI and Bloomberg. Earnings figures represent the average of monthly "as reported" earnings over the previous ten years. Data is as of December 2022. The average line is the long-term average of the US, EM, and EAFE PE values from December 1999 to the recent month-end respectively.

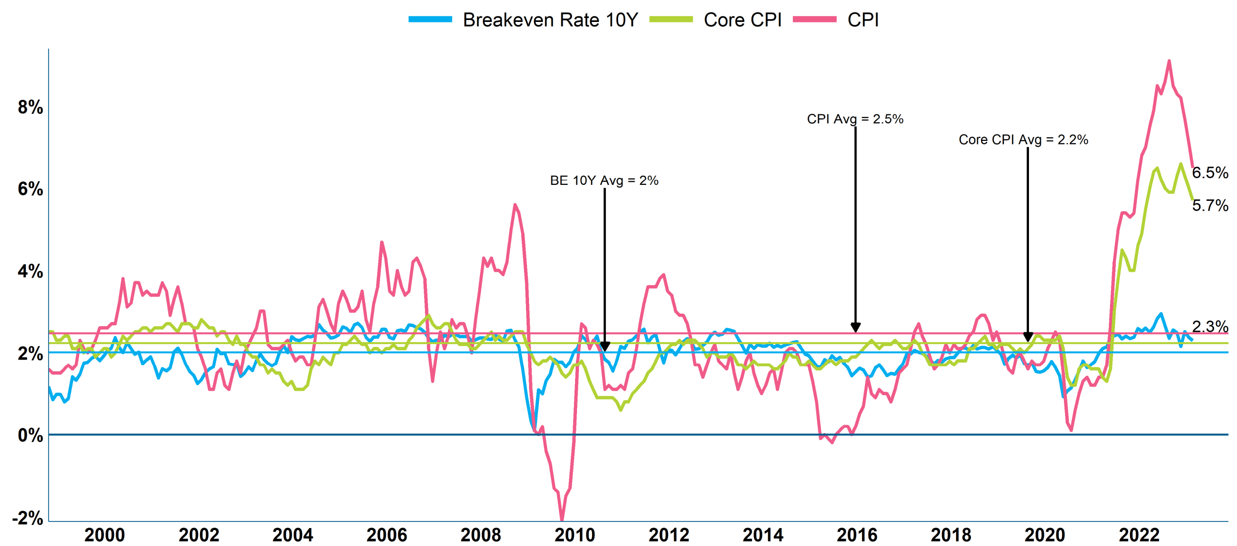
US Yield Curve[1]



- → In December, policy-sensitive interest rates at the front-end of the curve continued to rise with the two-year Treasury yield increasing from 4.3% to 4.4%. Longer dated ten-year Treasury yields also increased (3.6% to 3.9%). For the year, the yield curve rose dramatically across maturities and moved from steep to inverted.
- → The Fed remains strongly committed to fighting inflation, as it increased rates another 50 basis points to a range of 4.0% to 4.5% at its December meeting. This brought the total number of increases for 2022 to seven.
- → The yield spread between two-year and ten-year Treasuries narrowed somewhat to -0.54% after finishing November at -0.70%. The more closely watched measure by the Fed of three-month and ten-year Treasuries also remained inverted. Historically, inversions in the yield curve have often preceded recessions.

[1] Source: Bloomberg. Data is as of December 31, 2022.

Ten-Year Breakeven Inflation and CPI[1]



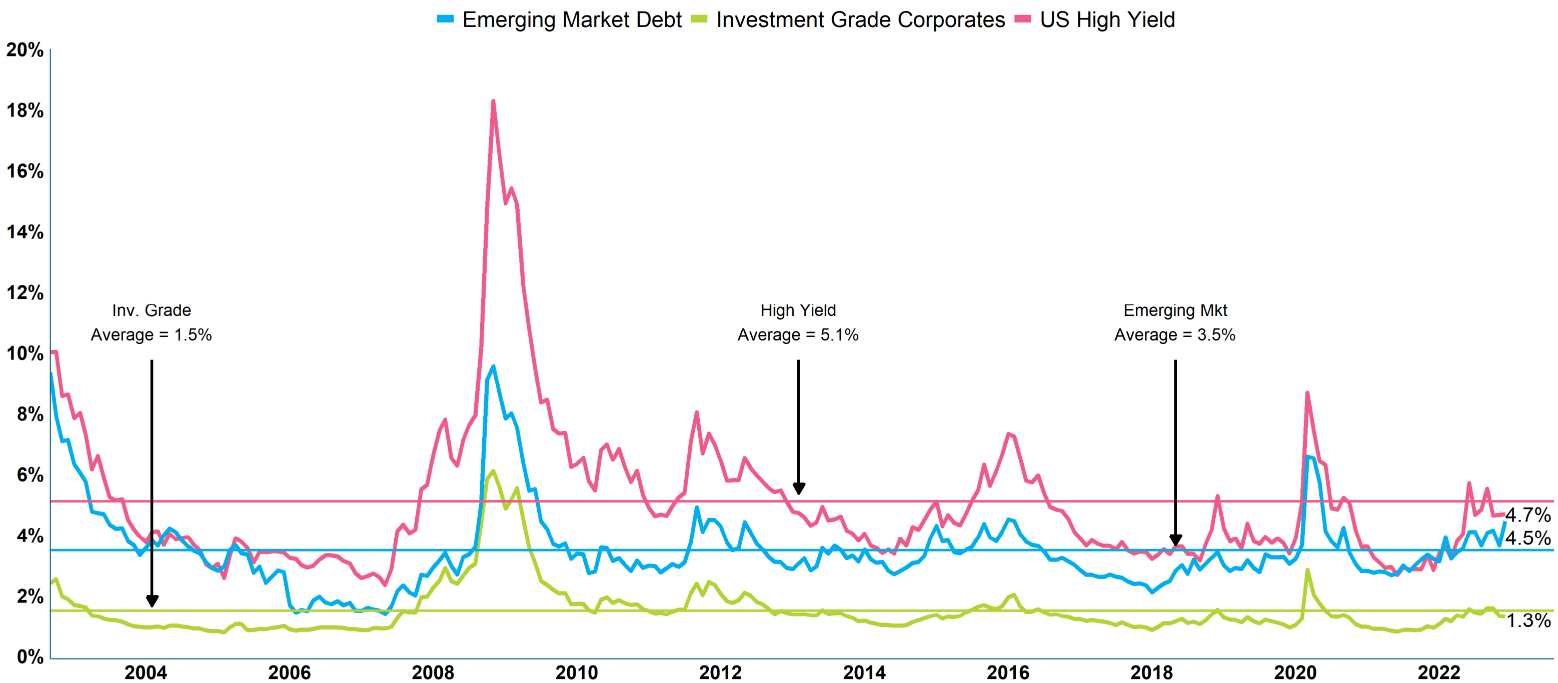
→ In December inflation continued to decline (6.5% versus 7.1%) matching expectations and providing support for the Fed to slow the pace of policy tightening. Energy prices fell again for the month but remain up 7.3% from a year prior, while food prices fell slightly, and stickier service prices continued to increase.

→ Core inflation – excluding food and energy – also continued to decline in December (5.7% versus 6.0%) and matched estimates.

→ Inflation expectations (breakevens) declined slightly for the month (2.3% versus 2.4%) and remain well below current inflation levels as investors anticipate a significant moderation in inflation.

[1] Source: Bloomberg. Data is as of December 2022. The CPI and 10 Year Breakeven average lines denote the average values from August 1998 to the present month-end respectively. Breakeven values represent month-end values for comparative purposes.

Credit Spreads vs. US Treasury Bonds[1]

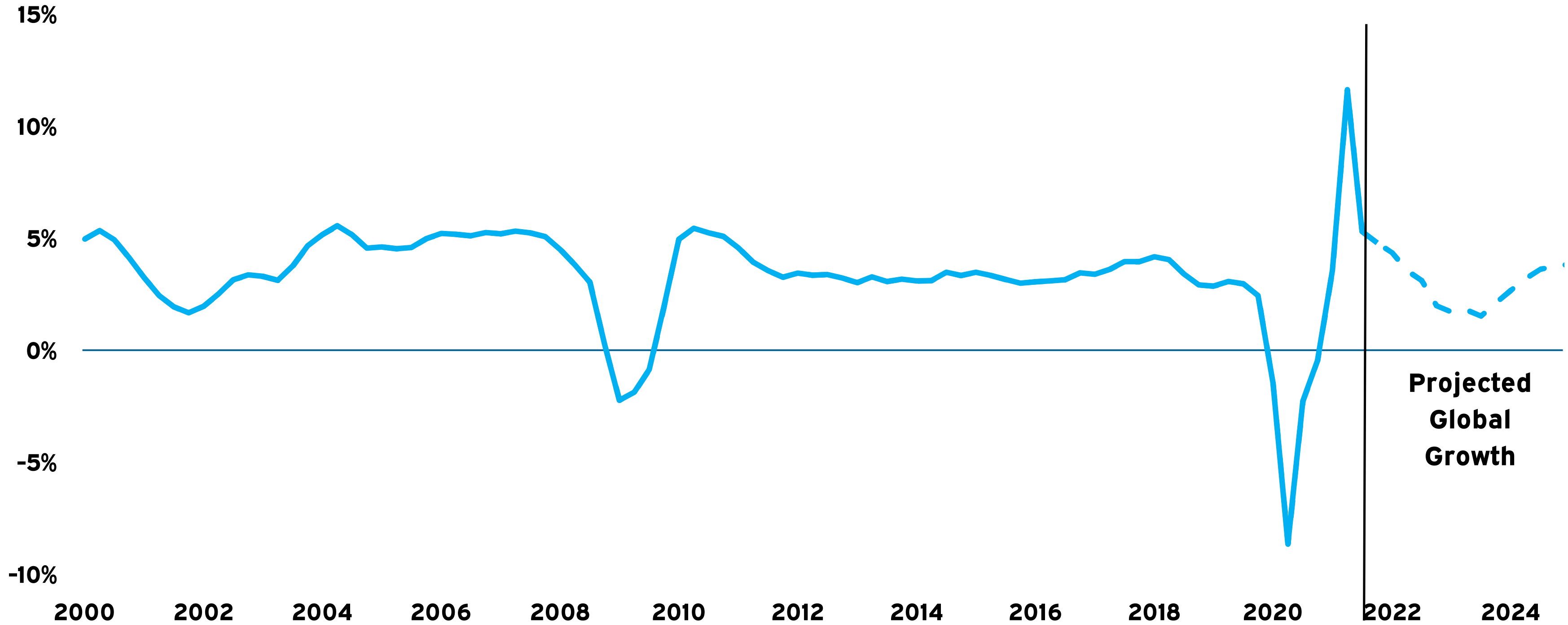


→ High yield spreads (the added yield above a comparable maturity Treasury) finished December at 4.7% (the same as the end of November) remaining below their long-run average.

→ Investment grade spreads also held steady at 1.3% as attractive yields and strong balance sheets continued to attract investors, while emerging market spreads rose (4.5% versus 3.6%) due to concerns regarding slower growth and lower commodity prices.

[1] Sources: Bloomberg. Data is as of December 31, 2022. Average lines denote the average of the investment grade, high yield, and emerging market spread values from August 2000 to the recent month-end respectively.

Global Real Gross Domestic Product (GDP) Growth[1]



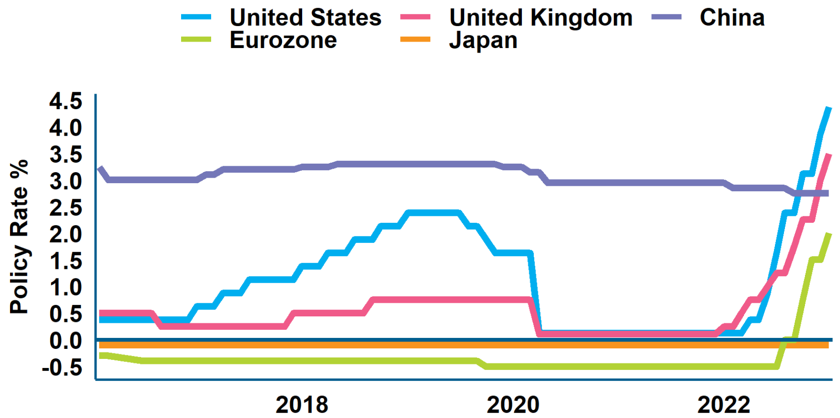
→ Global economies are expected to slow in 2023 compared to 2022, with risks of recession increasing given persistently high inflation and related tighter monetary policy.

→ The delicate balancing act of central banks trying to reduce inflation without dramatically impacting growth will remain key.

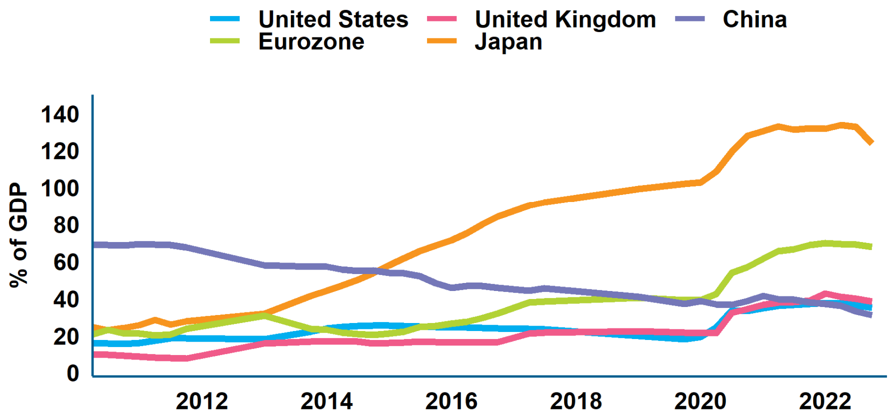
[1] Source: Oxford Economics (World GDP, US$ prices & PPP exchange rate, real, % change YoY). Updated December 2022.

Central Bank Response[1]

Policy Rates



Balance Sheet as % of GDP



→ In 2022 many central banks aggressively reduced pandemic-era policy support in the face of high inflation with the US taking a more aggressive approach.

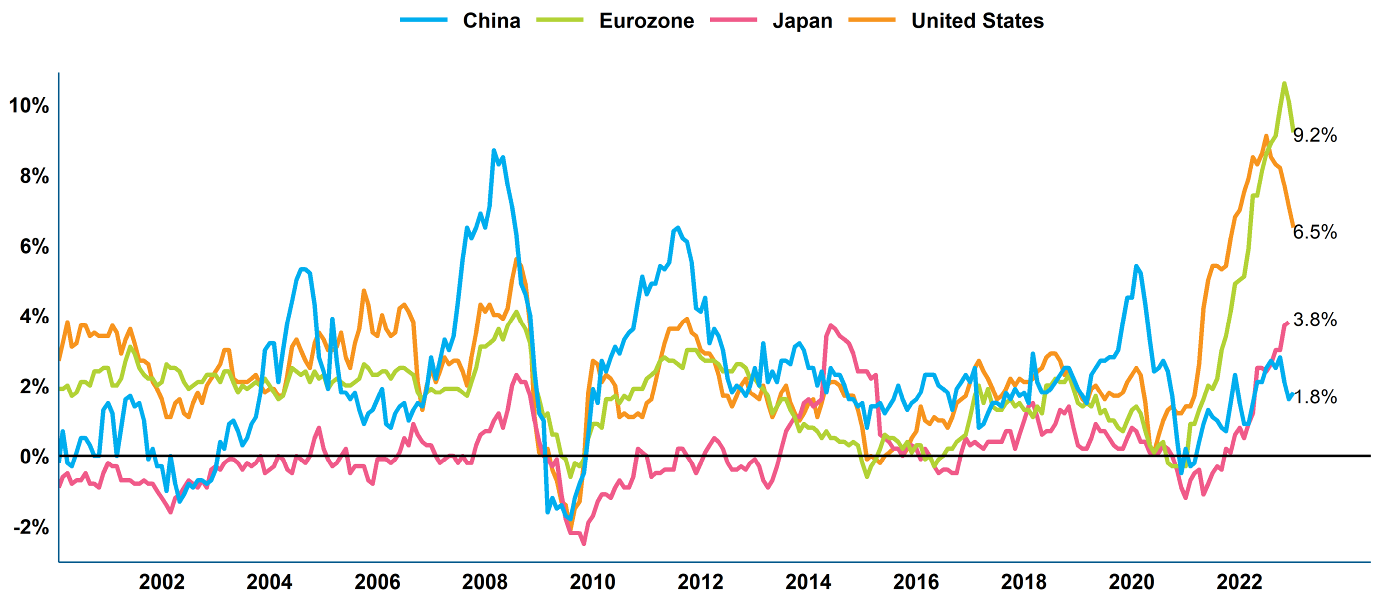
→ In December, the Bank of Japan relaxed its target yield for the 10-year bond which may mark an incremental step toward policy normalization after eight years of quantitative easing.

→ The one notable central bank outlier is China, where the central bank has lowered rates and reserve requirements in response to slowing growth.

→ The risk remains for a policy error, particularly overtightening, as record inflation and aggressive tightening to date could heavily weigh on global growth. The Federal Reserve's policy rate path could diverge from others this year given their strong early start to tightening.

[1] Source: Bloomberg. Policy rate data is as of December 31, 2022. China policy rate is defined as the medium-term lending facility 1 year interest rate. Balance sheet as % of GDP is based on quarterly data and is as of December 31, 2022.

Inflation (CPI Trailing Twelve Months)[1]



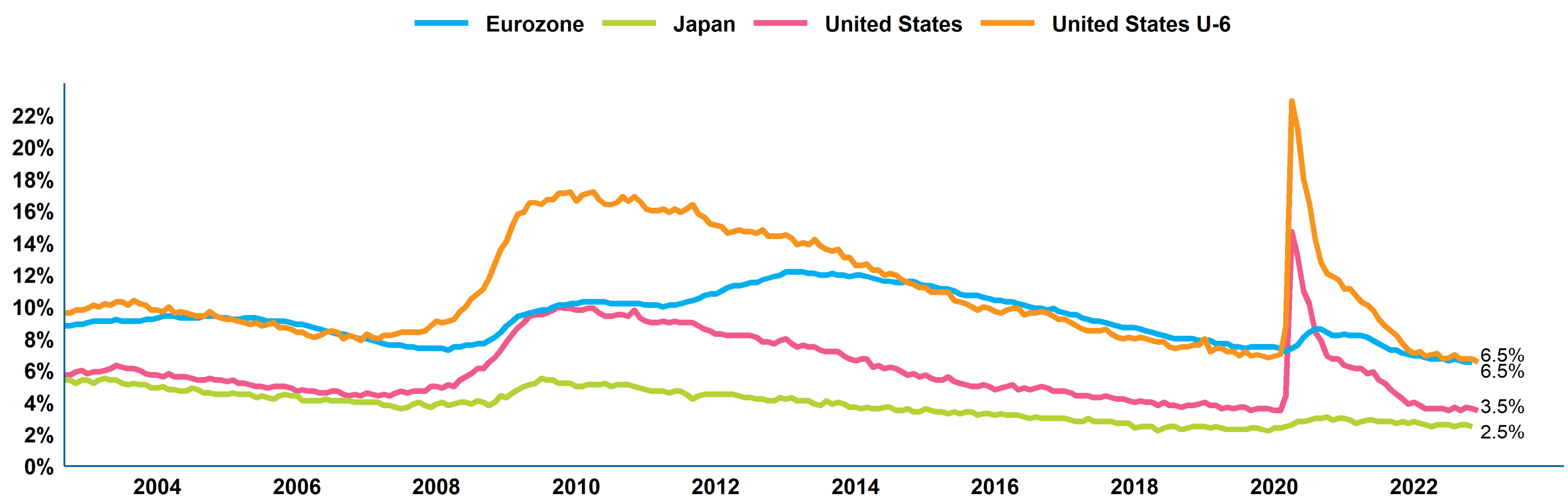
→ Inflation increased dramatically from the lows of the pandemic, particularly in the US and Eurozone where it has reached levels not seen in many decades.

→ Inflation pressures are slowly declining in the US, but they remain elevated, while in Europe they have reached historic levels due to skyrocketing energy prices and a weak euro.

→ Supply issues related to the pandemic, record monetary and fiscal stimulus, strict COVID-19 restrictions in China, and higher commodity prices driven by the war in Ukraine have been key global drivers of inflation.

[1] Source: Bloomberg. Data is as of December 2022. The most recent Japanese inflation data is as of November 2022.

Unemployment[1]



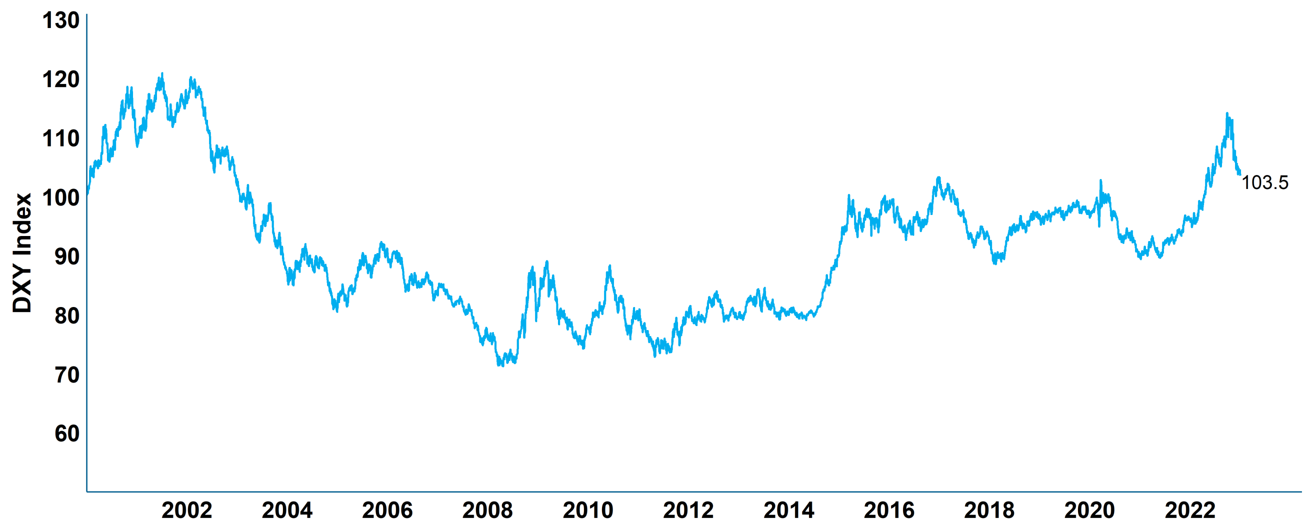
→ As economies have largely reopened, helped by vaccines for the virus, improvements have been seen in the labor market.

→ Despite slowing growth and high inflation, the US labor market remains a bright spot. Unemployment in the US, which experienced the steepest rise from the pandemic, has remained in a tight 3.5%-3.7% range for most of the year.

→ The strong labor market and higher wages, although beneficial for workers, motivates the Fed's efforts to fight inflation, likely leading to higher unemployment.

[1] Source: Bloomberg. Data is as December 31, 2022, for the US. The most recent data for Eurozone and Japanese unemployment is as of November 30, 2022.

US Dollar versus Broad Currencies[1]



→ Overall, the US dollar continued to weaken from its recent peak in December as declining inflation supported the case for the Federal Reserve to slow its tightening.

→ The dollar finished the year much higher than it started though due to the increased pace of policy tightening, stronger relative growth, and safe-haven flows.

→ As we look to 2023, the track of inflation across economies and the corresponding monetary policy will likely be key drivers of currency moves.

[1] Source: Bloomberg. Data as of December 31, 2022.

Summary

Key Trends:

→ The impacts of record high inflation will remain key, with market volatility likely to stay high.

→ Monetary policy could diverge in 2023 with the Fed pausing and others continuing to tighten. The risk of policy errors in both directions remains.

→ Growth will continue to slow globally next year, with many economies likely falling into recessions. Inflation, monetary policy, and the war will all be key.

→ In the US the end of many fiscal programs is expected to put the burden of continued growth on consumers. Higher energy and food prices could weigh on consumer spending.

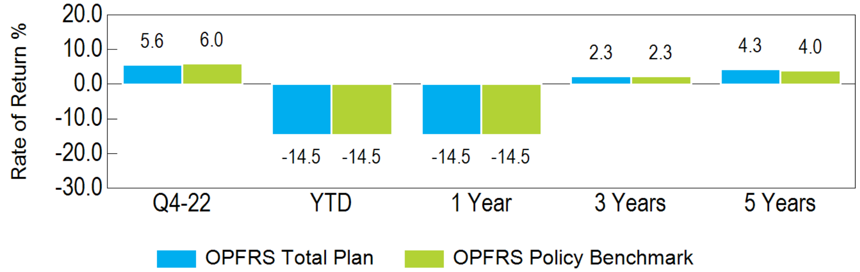
→ Valuations have significantly declined in the US to around long-term averages, largely driven by price declines. The key going forward will be whether earnings can remain resilient if growth continues to slow.

→ Outside the US, equity valuations remain lower in both emerging and developed markets, but risks remain, including potential continued strength in the US dollar, higher inflation particularly weighing on Europe, and China's rushed exit from COVID-19 restrictions and on-going weakness in the real estate sector.

4Q 2022 Performance

as of December 31, 2022

Return Summary
Ending December 31, 2022



Summary of Cash Flows

	Quarter-To-Date	One Year
Beginning Market Value	$382,458,040	$483,220,978
Net Cash Flow	-$5,217,746	-$15,709,585
Capital Appreciation	$21,195,418	-$69,075,682
Ending Market Value	$398,435,711	$398,435,711

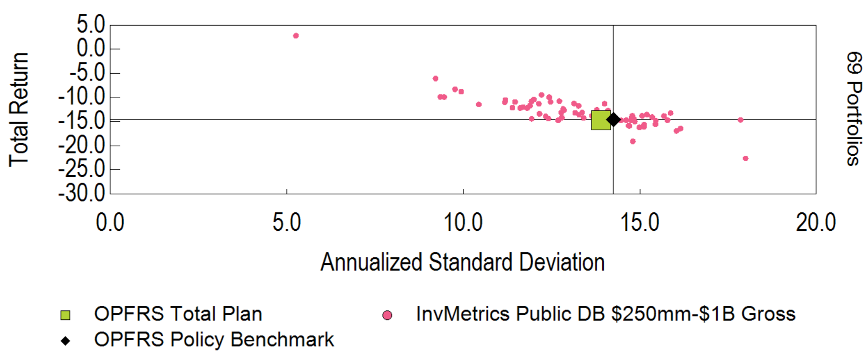
YTD Ending December 31, 2022

	Total Return	Anlzd Standard Deviation
OPFRS Total Plan	-14.5%	13.9%
OPFRS Policy Benchmark	-14.5%	14.3%

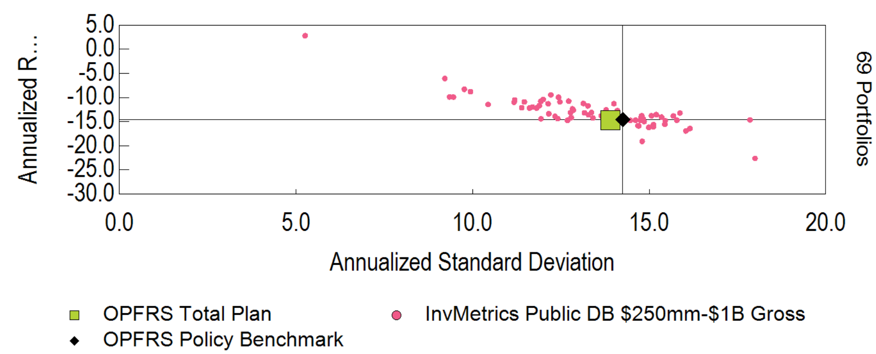
1 Year Ending December 31, 2022

	Anlzd Return	Anlzd Standard Deviation
OPFRS Total Plan	-14.5%	13.9%
OPFRS Policy Benchmark	-14.5%	14.3%

Total Return vs. Annualized Standard Deviation
1 Year Ending December 31, 2022



Annualized Return vs. Annualized Standard Deviation
1 Year Ending December 31, 2022



Performance shown is Gross-of-Fees.

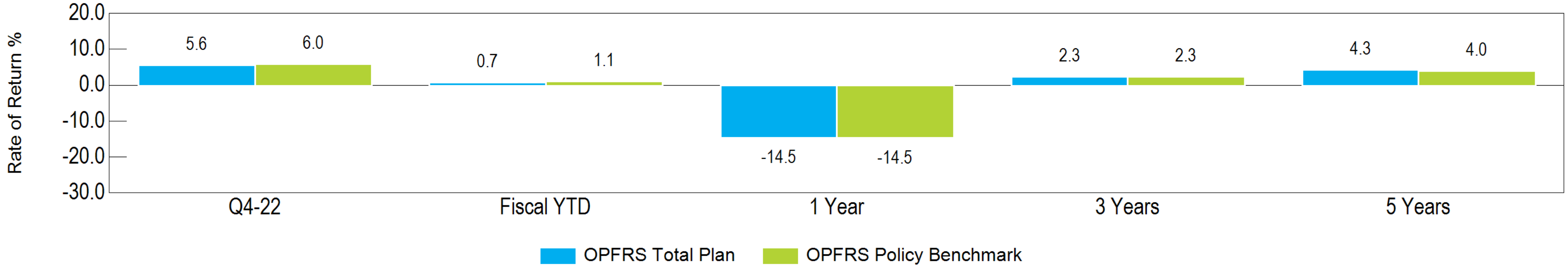
Oakland Police and Fire Retirement System Total Plan

Asset Class Performance (gross of fees) | As of December 31, 2022

	Market Value ($)	QTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	7 Yrs (%)	10 Yrs (%)
OPFRS Total Plan	**398,435,711**	**5.6**	**0.7**	**-14.5**	**2.3**	**4.3**	**6.8**	**7.0**
OPFRS Policy Benchmark		*6.0*	*1.1*	*-14.5*	*2.3*	*4.0*	*6.5*	*6.5*
Excess Return		-0.4	-0.4	0.0	0.0	0.3	0.3	0.5
InvMetrics Public DB $250mm-$1B Gross Median		*5.8*	*1.2*	*-13.4*	*4.0*	*5.2*	*7.1*	*7.3*
Domestic Equity	**159,779,185**	**8.2**	**3.0**	**-16.7**	**7.2**	**8.5**	**11.0**	**12.0**
Russell 3000 (Blend)		*7.2*	*2.4*	*-19.2*	*7.1*	*8.8*	*11.0*	*12.1*
Excess Return		1.0	0.6	2.5	0.1	-0.3	0.0	-0.1
International Equity	**49,851,663**	**15.1**	**4.1**	**-15.7**	**0.3**	**1.7**	**5.6**	**5.2**
MSCI ACWI ex US (Blend)		*14.3*	*3.0*	*-16.0*	*0.1*	*0.9*	*4.8*	*3.8*
Excess Return		0.8	1.1	0.3	0.2	0.8	0.8	1.4
Fixed Income	**101,552,915**	**2.1**	**-2.6**	**-12.9**	**-2.1**	**0.5**	**1.8**	**1.6**
Bloomberg Universal (Blend)		*2.2*	*-2.3*	*-13.0*	*-2.5*	*0.2*	*1.3*	*1.3*
Excess Return		-0.1	-0.3	0.1	0.4	0.3	0.5	0.3
Credit	**8,603,832**	**1.9**	**1.5**	**-7.6**	**3.0**	**3.0**	**6.0**	**--**
Bloomberg US High Yield TR		*4.2*	*3.5*	*-11.2*	*0.0*	*2.3*	*5.0*	--
Excess Return		-2.3	-2.0	3.6	3.0	0.7	1.0	
Covered Calls	**27,503,720**	**7.7**	**2.2**	**-12.5**	**6.7**	**7.2**	**8.8**	**--**
CBOE S&P 500 BuyWrite USD		*6.8*	*-1.3*	*-11.4*	*1.3*	*2.9*	*4.9*	--
Excess Return		0.9	3.5	-1.1	5.4	4.3	3.9	
Crisis Risk Offset	**39,452,288**	**-4.9**	**-4.9**	**-14.5**	**-14.6**	**-8.2**	**--**	**--**
SG Multi Alternative Risk Premia Index		*1.5*	*2.4*	*4.8*	*-1.3*	--	--	--
Excess Return		-6.4	-7.3	-19.3	-13.3			
Cash	**11,692,108**	**0.0**	**0.0**	**0.0**	**0.4**	**1.1**	**1.0**	**0.7**
FTSE T-Bill 3 Months TR		*0.9*	*1.3*	*1.5*	*0.7*	*1.2*	*1.0*	*0.7*
Excess Return		-0.9	-1.3	-1.5	-0.3	-0.1	0.0	0.0

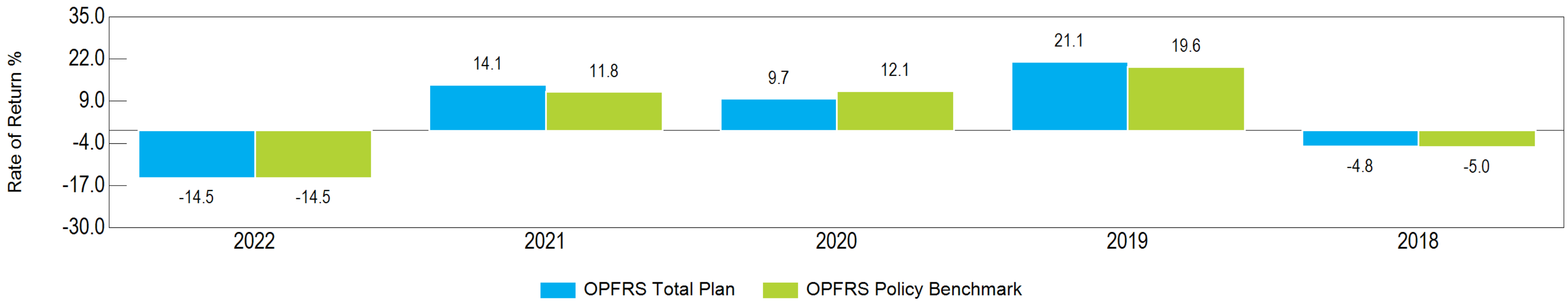
Performance shown is gross-of-fees. Fiscal year begins on July 1.

Trailing Period Performance (annualized)
Ending December 31, 2022



	QTD (%)	Fiscal YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	2018 (%)	2019 (%)	2020 (%)	2021 (%)	2022 (%)
OPFRS Total Plan	**5.6**	**0.7**	**-14.5**	**2.3**	**4.3**	**-4.8**	**21.1**	**9.7**	**14.1**	**-14.5**
OPFRS Policy Benchmark	*6.0*	*1.1*	*-14.5*	*2.3*	*4.0*	*-5.0*	*19.6*	*12.1*	*11.8*	*-14.5*
InvMetrics Public DB $250mm-$1B Gross Median	*5.8*	*1.2*	*-13.4*	*4.0*	*5.2*	*-4.1*	*18.6*	*13.1*	*13.6*	*-13.4*

Calendar Year Performance
Ending December 31, 2022



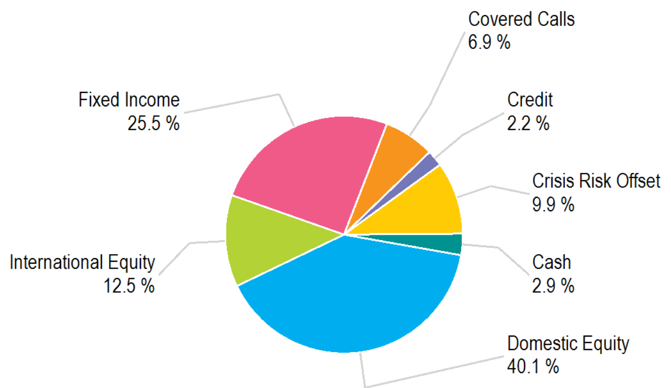
Fiscal year begins on July 1.

Asset Allocation vs. Target

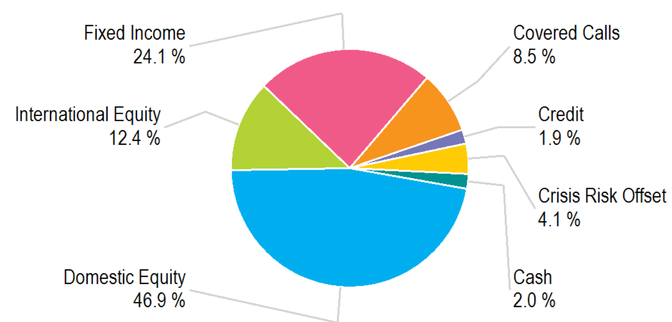
As Of December 31, 2022

	Current	%	Policy	Difference*
Domestic Equity	$159,779,185	40.1%	40.0%	0.1%
International Equity	$49,851,663	12.5%	12.0%	0.5%
Fixed Income	$101,552,915	25.5%	31.0%	-5.5%
Covered Calls	$27,503,720	6.9%	5.0%	1.9%
Credit	$8,603,832	2.2%	2.0%	0.2%
Crisis Risk Offset	$39,452,288	9.9%	10.0%	-0.1%
Cash	$11,692,108	2.9%	0.0%	2.9%
Total	**$398,435,711**	**100.0%**	**100.0%**	

December 31, 2022: $382,458,040



December 31, 2021: $449,834,415



Cash account market value includes cash balances held in ETF accounts at the custodian and risiduals from terminated managers.

Target weightings reflect the Plan's evolving asset allocation (effective 5/31/2017.)

	Market Value	% of Portfolio	QTD	1 Yr	3 Yrs	5 Yrs	S.I.	S.I. Date
Domestic Equity	**159,779,185**	**100.0**	**8.2**	**-16.7**	**7.2**	**8.5**	**8.6**	**Jun-97**
Russell 3000 (Blend)			*7.2*	*-19.2*	*7.1*	*8.8*	*8.7*	*Jun-97*
Excess Return			1.0	2.5	0.1	-0.3	-0.1	
Northern Trust Russell 1000	69,741,287	43.6	7.2	-19.4	7.2	9.1	12.6	Jun-10
Russell 1000			*7.2*	*-19.1*	*7.3*	*9.1*	*12.6*	*Jun-10*
Excess Return			0.0	-0.3	-0.1	0.0	0.0	
EARNEST Partners	43,615,104	27.3	7.8	-15.3	8.9	10.0	10.0	Apr-06
Russell MidCap			*9.2*	*-17.3*	*5.9*	*7.1*	*8.3*	*Apr-06*
Excess Return			-1.4	2.0	3.0	2.9	1.7	
eV US Mid Cap Core Equity Gross Rank			*80*	*60*	*17*	*21*	*32*	*Apr-06*
Wellington Select Quality Equity	22,198,719	13.9	13.7	--	--	--	0.9	May-22
Russell 1000			*7.2*	--	--	--	*-6.4*	*May-22*
Excess Return			6.5				7.3	
eV US Large Cap Core Equity Gross Rank			*3*	--	--	--	*8*	*May-22*
Brown Fundamental Small Cap Value	10,924,340	6.8	12.5	-6.9	--	--	1.8	Apr-21
Russell 2000 Value			*8.4*	*-14.5*	--	--	*-5.5*	*Apr-21*
Excess Return			4.1	7.6			7.3	
eV US Small Cap Value Equity Gross Rank			*29*	*22*	--	--	*22*	*Apr-21*
Rice Hall James	13,299,736	8.3	3.3	-23.7	3.4	4.2	6.1	Jul-17
Russell 2000 Growth			*4.1*	*-26.4*	*0.6*	*3.5*	*5.2*	*Jul-17*
Excess Return			-0.8	2.7	2.8	0.7	0.9	
eV US Small Cap Growth Equity Gross Rank			*62*	*25*	*70*	*91*	*89*	*Jul-17*

Performance shown is gross-of-fees.

	Market Value	% of Portfolio	QTD	1 Yr	3 Yrs	5 Yrs	S.I.	S.I. Date
International Equity	**49,851,663**	**100.0**	**15.1**	**-15.7**	**0.3**	**1.7**	**5.0**	**Jan-98**
MSCI ACWI ex US (Blend)			*14.3*	*-16.0*	*0.1*	*0.9*	*4.7*	*Jan-98*
Excess Return			0.8	0.3	0.2	0.8	0.3	
Vanguard Developed Markets ETF	14,054,284	28.2	16.8	-15.4	1.3	--	4.6	Sep-19
FTSE Developed All Cap Ex US TR USD			*16.3*	*-15.3*	*1.5*	--	*4.8*	*Sep-19*
Excess Return			0.5	-0.1	-0.2		-0.2	
SGA ACWI ex-U.S. Equity	35,797,379	71.8	14.4	-15.6	0.2	--	0.4	Dec-19
MSCI ACWI ex USA			*14.3*	*-16.0*	*0.1*	--	*1.5*	*Dec-19*
Excess Return			0.1	0.4	0.1		-1.1	
eV ACWI ex-US All Cap Core Eq Gross Rank			*52*	*36*	*83*	--	*95*	*Dec-19*

Performance shown is gross-of-fees.

	Market Value	% of Portfolio	QTD	1 Yr	3 Yrs	5 Yrs	S.I.	S.I. Date
Fixed Income	**101,552,915**	**100.0**	**2.1**	**-12.9**	**-2.1**	**0.5**	**4.7**	**Dec-93**
Bloomberg Universal (Blend)			*2.2*	*-13.0*	*-2.5*	*0.2*	*4.5*	*Dec-93*
Excess Return			-0.1	0.1	0.4	0.3	0.2	
Ramirez	69,021,211	68.0	1.7	-13.0	-2.4	0.4	1.2	Jan-17
Bloomberg US Aggregate TR			*1.9*	*-13.0*	*-2.7*	*0.0*	*0.6*	*Jan-17*
Excess Return			-0.2	0.0	0.3	0.4	0.6	
eV US Core Fixed Inc Gross Rank			*66*	*67*	*78*	*64*	*37*	*Jan-17*
Wellington Core Bond	6,531,106	6.4	1.9	-14.4	--	--	-7.5	Apr-21
Bloomberg US Aggregate TR			*1.9*	*-13.0*	--	--	*-6.7*	*Apr-21*
Excess Return			0.0	-1.4			-0.8	
eV US Core Fixed Inc Gross Rank			*50*	*96*	--	--	*98*	*Apr-21*
Reams	26,000,599	25.6	3.2	-12.0	1.4	2.8	5.1	Feb-98
Bloomberg Universal (Blend)			*2.2*	*-13.0*	*-2.5*	*0.2*	*4.1*	*Feb-98*
Excess Return			1.0	1.0	3.9	2.6	1.0	
eV US Core Plus Fixed Inc Gross Rank			*10*	*21*	*1*	*2*	*40*	*Feb-98*

Performance shown is gross-of-fees.

	Market Value	% of Portfolio	QTD	1 Yr	3 Yrs	5 Yrs	S.I.	S.I. Date
Credit	**8,603,832**	**100.0**	**1.9**	**-7.6**	**3.0**	**3.0**	**4.7**	**Feb-15**
Bloomberg US High Yield TR			*4.2*	*-11.2*	*0.0*	*2.3*	*3.8*	*Feb-15*
Excess Return			-2.3	3.6	3.0	0.7	0.9	
Polen Capital	8,603,832	100.0	1.9	-7.6	3.0	3.0	4.7	Feb-15
ICE BofA High Yield Master TR			*4.0*	*-11.2*	*-0.2*	*2.1*	*3.7*	*Feb-15*
Excess Return			-2.1	3.6	3.2	0.9	1.0	
eV US High Yield Fixed Inc Gross Rank			*93*	*26*	*6*	*36*	*14*	*Feb-15*

Performance shown is gross-of-fees.

Manager Performance - Gross of Fees | As of December 31, 2022

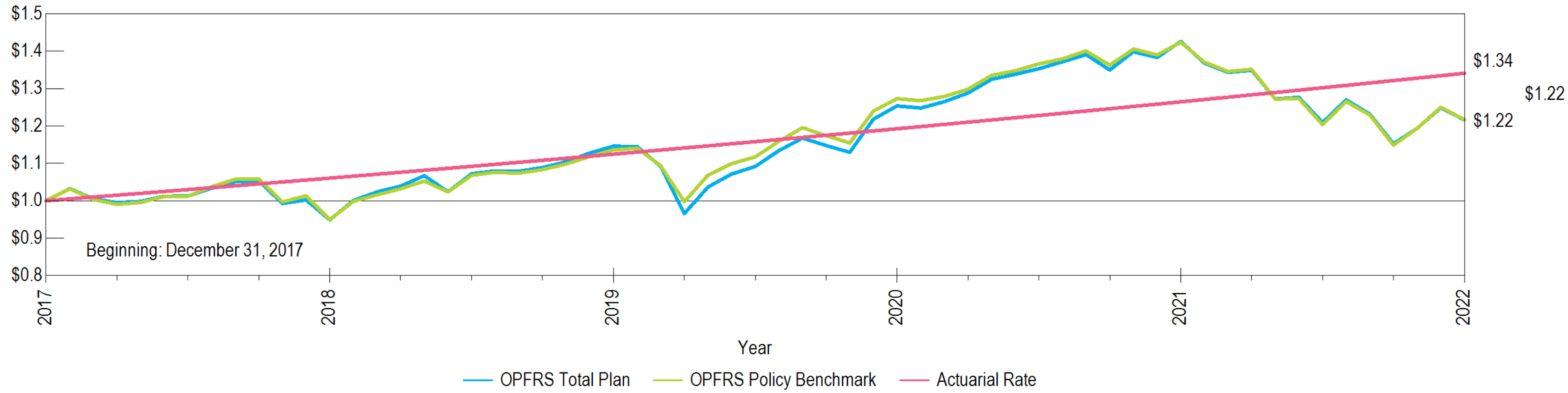
	Market Value	% of Portfolio	QTD	1 Yr	3 Yrs	5 Yrs	S.I.	S.I. Date
Covered Calls	**27,503,720**	**100.0**	**7.7**	**-12.5**	**6.7**	**7.2**	**8.1**	**Apr-14**
CBOE S&P 500 BuyWrite USD			*6.8*	*-11.4*	*1.3*	*2.9*	*4.9*	*Apr-14*
Excess Return			0.9	-1.1	5.4	4.3	3.2	
Parametric BXM	13,942,810	50.7	7.1	-9.7	4.5	5.1	6.4	Apr-14
CBOE S&P 500 BuyWrite USD			*6.8*	*-11.4*	*1.3*	*2.9*	*4.9*	*Apr-14*
Excess Return			0.3	1.7	3.2	2.2	1.5	
Parametric DeltaShift	13,560,909	49.3	8.3	-15.1	8.4	9.1	10.0	Apr-14
CBOE S&P 500 BuyWrite USD			*6.8*	*-11.4*	*1.3*	*2.9*	*4.9*	*Apr-14*
Excess Return			1.5	-3.7	7.1	6.2	5.1	
eV US Large Cap Core Equity Gross Rank			*56*	*42*	*38*	*58*	*65*	*Apr-14*

Performance shown is gross-of-fees.

	Market Value	% of Portfolio	QTD	1 Yr	3 Yrs	5 Yrs	S.I.	S.I. Date
Crisis Risk Offset	**39,452,288**	**100.0**	**-4.9**	**-14.5**	**-14.6**	**-8.2**	**-9.3**	**Aug-18**
SG Multi Alternative Risk Premia Index			1.5	4.8	-1.3	--	-0.5	Aug-18
Excess Return			-6.4	-19.3	-13.3		-8.8	
Versor Trend Following	15,908,714	40.3	-11.2	--	--	--	6.1	Apr-22
SG Trend Index			-6.1	--	--	--	15.6	Apr-22
Excess Return			-5.1				-9.5	
Vanguard Long-Term Treasury ETF	13,706,568	34.7	-1.1	-29.4	-7.6	--	-5.7	Jul-19
Bloomberg US Govt Long TR			-0.6	-29.2	-7.4	--	-5.5	Jul-19
Excess Return			-0.5	-0.2	-0.2		-0.2	
Kepos Alternative Risk Premia	9,837,006	24.9	1.1	--	--	--	-1.0	Feb-22
SG Multi Alternative Risk Premia Index			1.5	--	--	--	3.9	Feb-22
Excess Return			-0.4				-4.9	

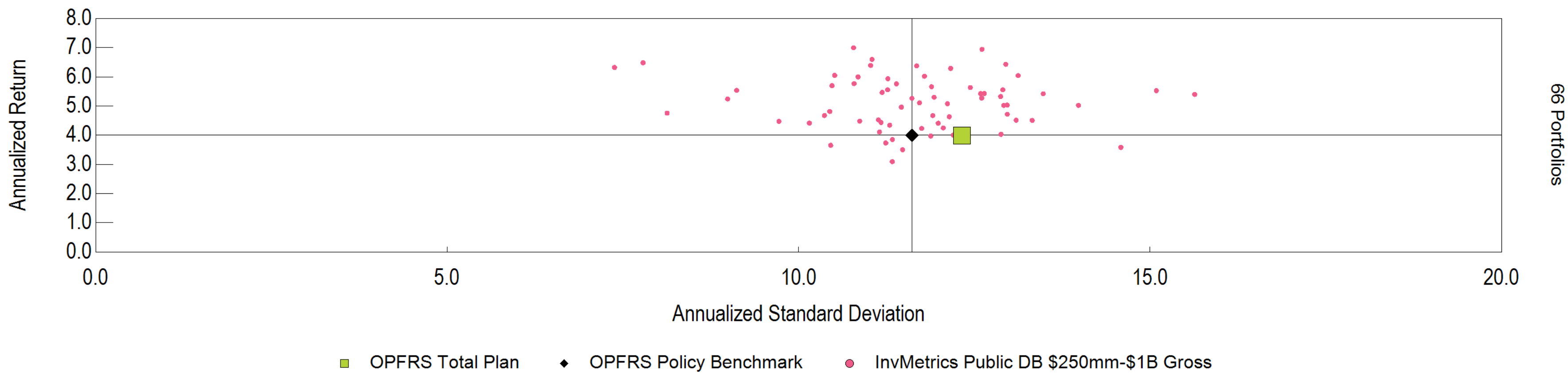
Performance shown is gross-of-fees.

Growth of a Dollar



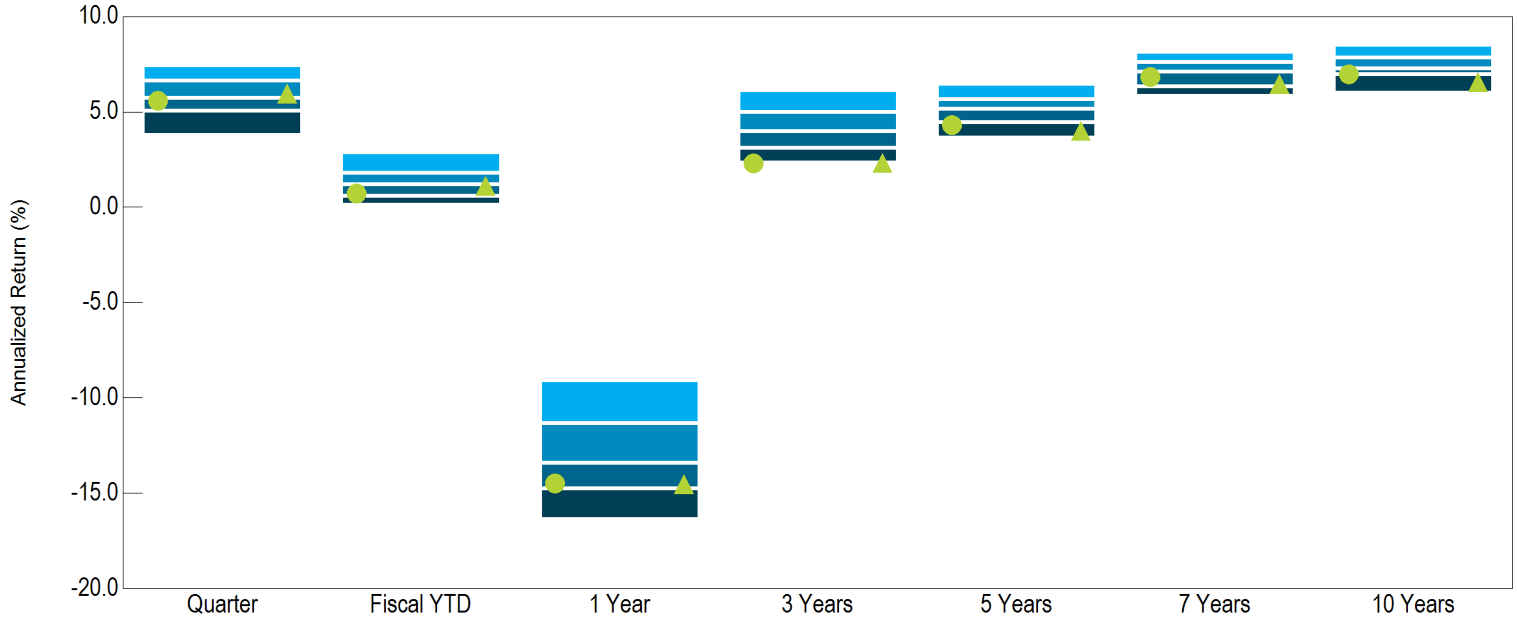
The actuarial expected rate of return was 8% through 6/30/2009, 7.5% through 6/30/2010, 7% through 6/30/2011, 6.75% through 6/30/2014, 6.5% through 2/31/2017 and 6.0% currently

Annualized Return vs. Annualized Standard Deviation
5 Years Ending December 31, 2022



Performance shown is gross-of-fees.

InvMetrics Public DB $250mm-$1B Gross Return Comparison



	Return (Rank)													
5th Percentile	7.4		2.9		-9.1		6.1		6.5		8.1		8.5	
25th Percentile	6.6		1.8		-11.3		5.0		5.7		7.6		7.9	
Median	5.8		1.2		-13.4		4.0		5.2		7.1		7.3	
75th Percentile	5.1		0.6		-14.7		3.1		4.5		6.4		7.0	
95th Percentile	3.8		0.1		-16.3		2.4		3.7		5.9		6.0	
# of Portfolios	69		69		69		68		66		64		61	
● OPFRS Total Plan	5.6	(56)	0.7	(71)	-14.5	(73)	2.3	(98)	4.3	(83)	6.8	(63)	7.0	(77)
▲ OPFRS Policy Benchmark	6.0	(43)	1.1	(54)	-14.5	(73)	2.3	(97)	4.0	(90)	6.5	(72)	6.5	(79)

Fiscal year begins on July 1.

Manager Monitoring / Probation Status

Manager Monitoring/Probation Status

Return vs. Benchmark since Corrective Action

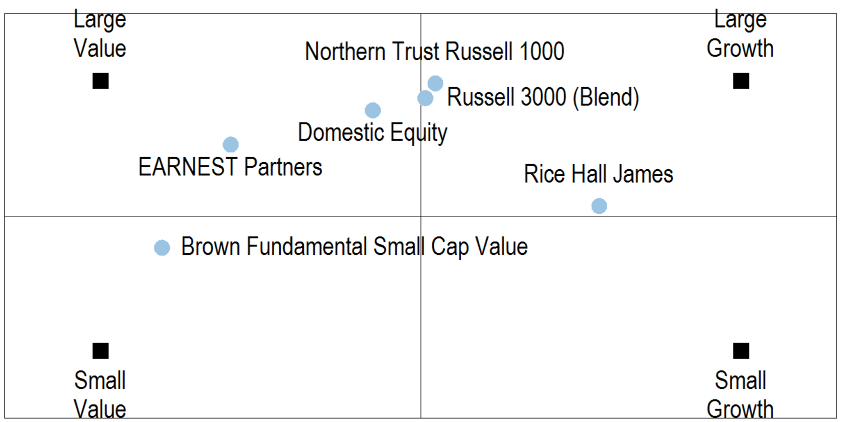
Portfolio	Status	Concern Triggering the Watch Status	Months Since Corrective Action	Performance[1] Since Corrective Action	Peer Group Percentile Ranking[2]	Date of Corrective Action[3]
Polen Capital[4]	On Watch	Performance/Organization	42	2.8	32	5/29/2019
ICE BofAML US High Yield				1.6		
Rice Hall James	On Watch	Performance/Organization	42	6.1	72	5/29/2019
Russell 2000 Growth				4.5		

Investment Performance Criteria for Manager Monitoring/Probation Status

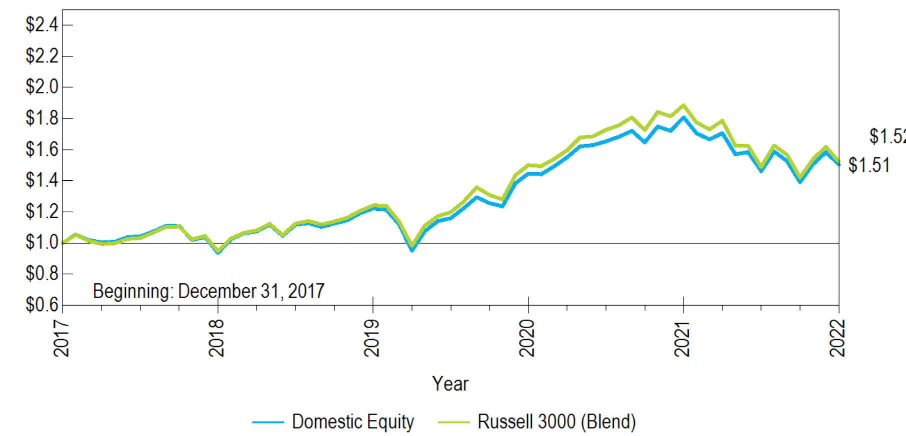
Asset Class	Short-term (Rolling 12 months)	Medium-term (Rolling 36 months)	Long-term (60 + months)
Active Domestic Equity	Fund return < benchmark return by 3.5%	Annualized Fund return < benchmark return by 1.75% for 6 consecutive months	VRR[5] < 0.97 for 6 consecutive months
Active International Equity	Fund return < benchmark return by 4.5%	Annualized Fund return < benchmark return by 2.0% for 6 consecutive months	VRR < 0.97 for 6 consecutive months
Passive International Equity	Tracking Error > 0.50%	Tracking Error > 0.45% for 6 consecutive months	Annualized Fund return < benchmark return by 0.4% for 6 consecutive months
Fixed Income	Fund return < benchmark return by 1.5%	Annualized Fund return < benchmark return by 1.0% for 6 consecutive months	VRR < 0.98 for 6 consecutive months

[1] Annualized performance if over one year. Performance shown is gross-of-fees.
[2] Ranking over most recent quarter if on watch for less than 1 year, or over 1 year if on watch for more than a year. Peer group comparison is gross-of-fees.
[3] Approximate date based on when the Board voted to either monitor a manager at a heightened level or place it on probation.
[4] Polen Capital High Yield strategy was formerly known as DDJ High Yield prior to 2022.
[5] VRR (Value Relative Ratio) is calculated as manager cumulative return/ benchmark return.

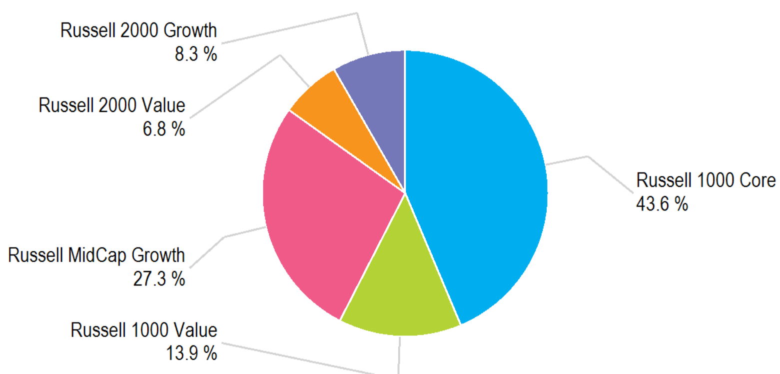
U.S. Effective Style Map



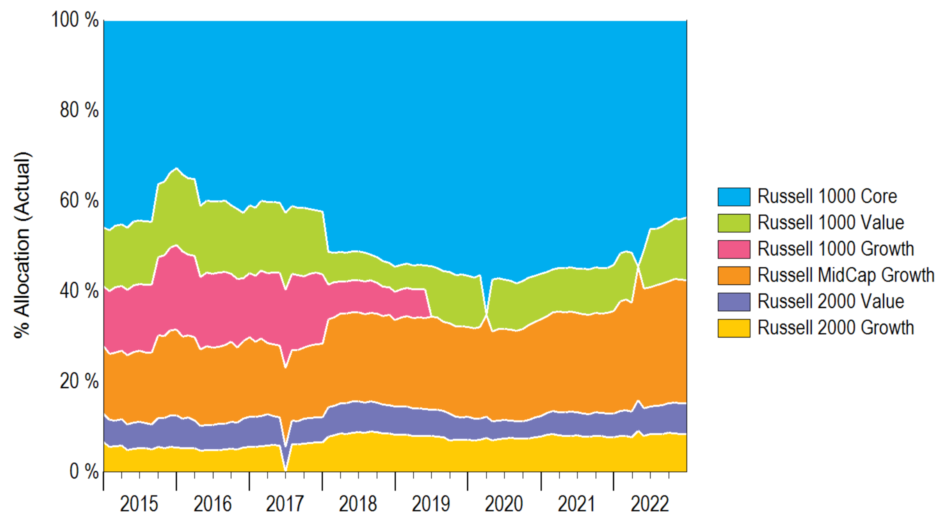
Growth of a Dollar



Style Exposure

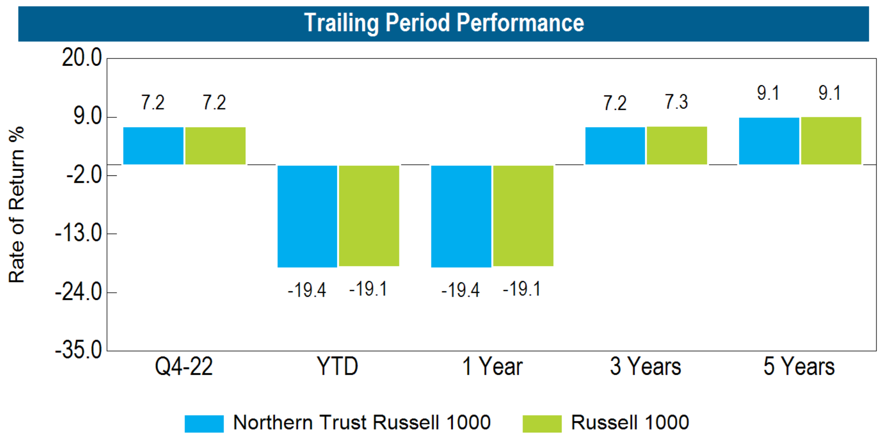


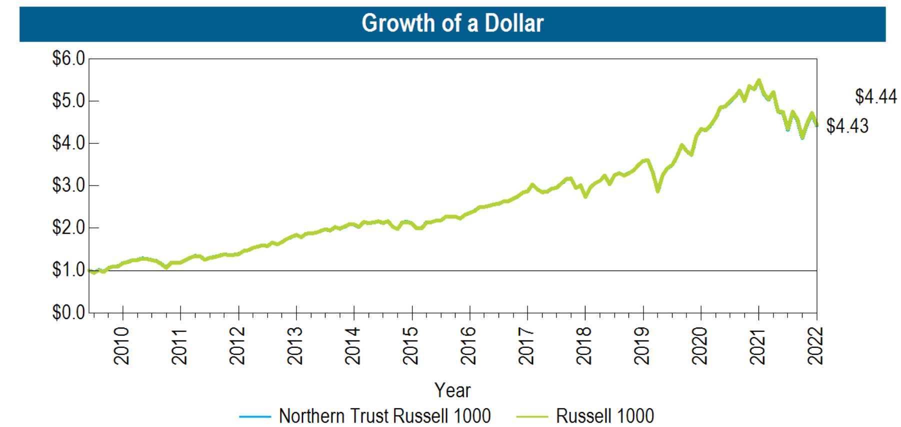
Style History (5-Year)

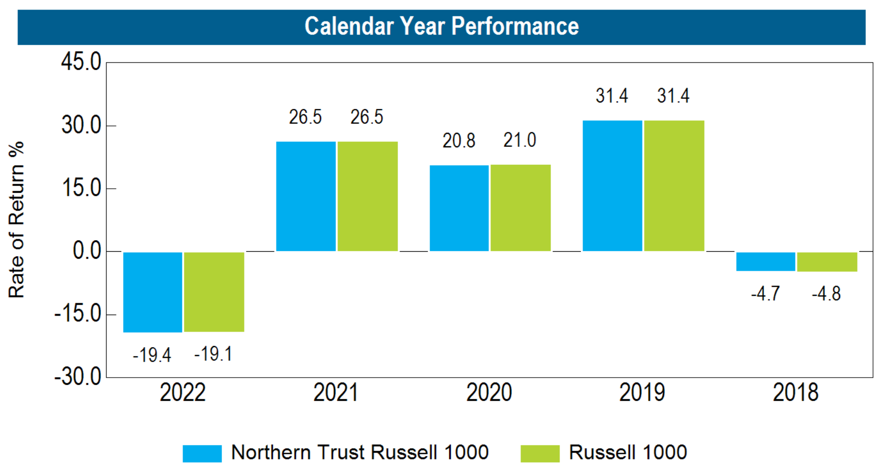


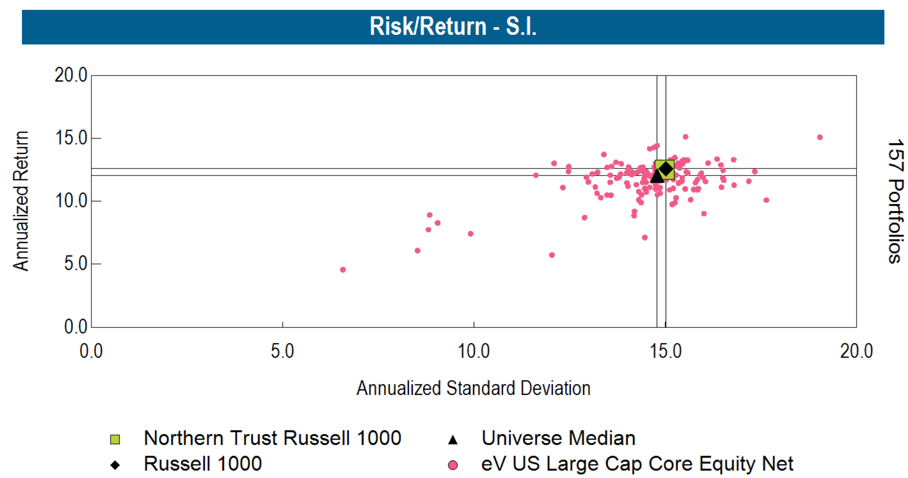
Northern Trust Russell 1000 | As of December 31, 2022

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Northern Trust Russell 1000	12.5%	15.0%	0.0%	1.0	-0.6	0.2%	98.5%	100.0%
Russell 1000	12.6%	15.0%	0.0%	1.0	--	0.0%	100.0%	100.0%





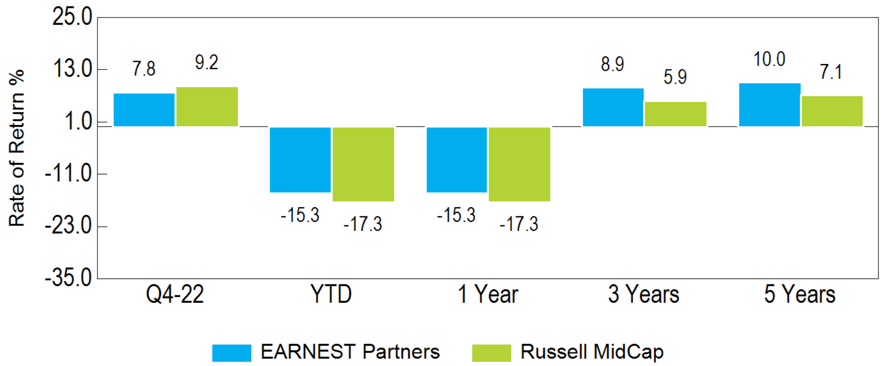




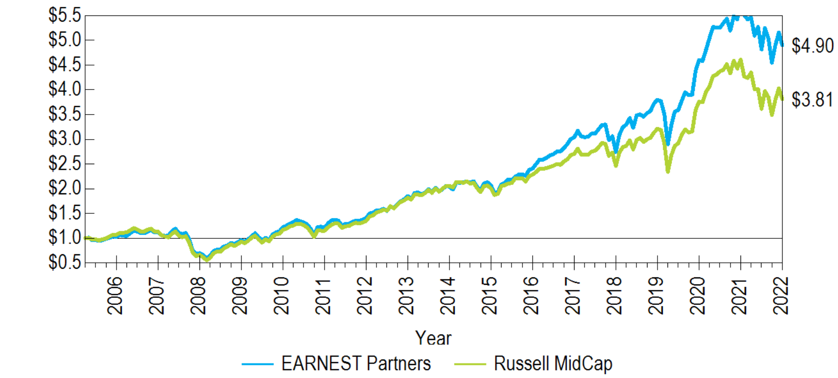
Performance shown is net-of-fees and since inception.

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
EARNEST Partners	9.0%	17.9%	0.1%	1.0	0.2	3.6%	93.5%	99.2%
Russell MidCap	8.3%	18.0%	0.0%	1.0	--	0.0%	100.0%	100.0%

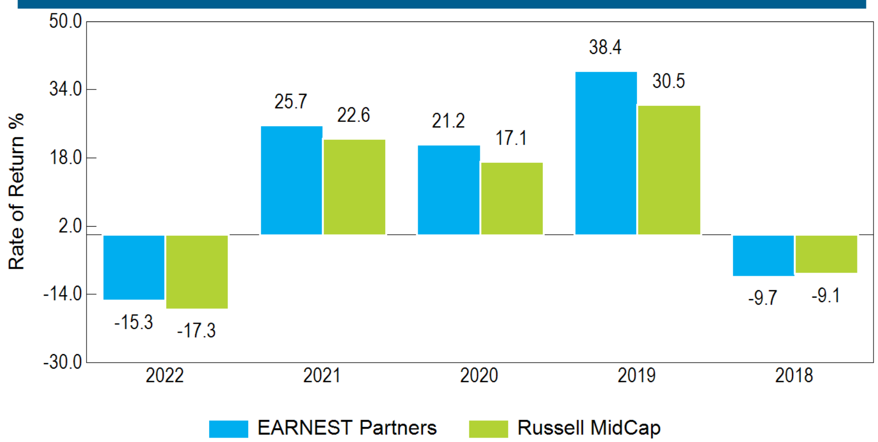
Trailing Period Performance



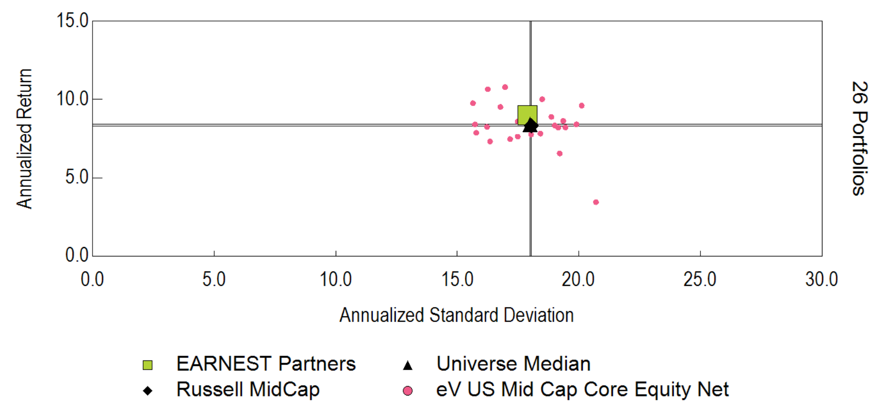
Growth of a Dollar



Calendar Year Performance



Risk/Return - S.I.

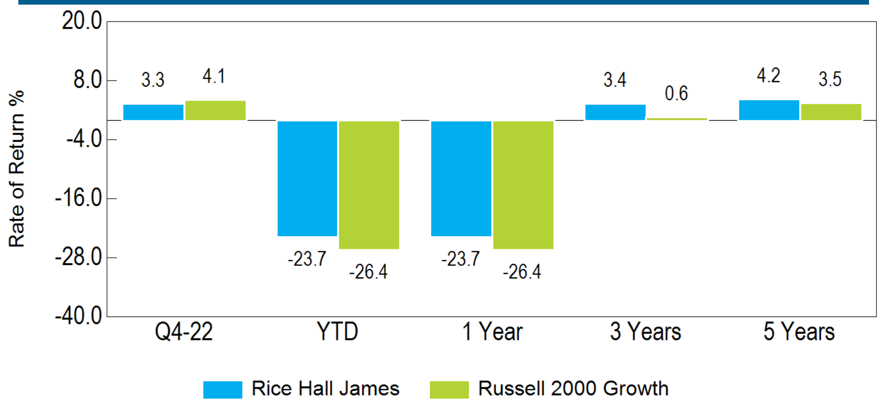


Performance shown is net-of-fees and since inception.

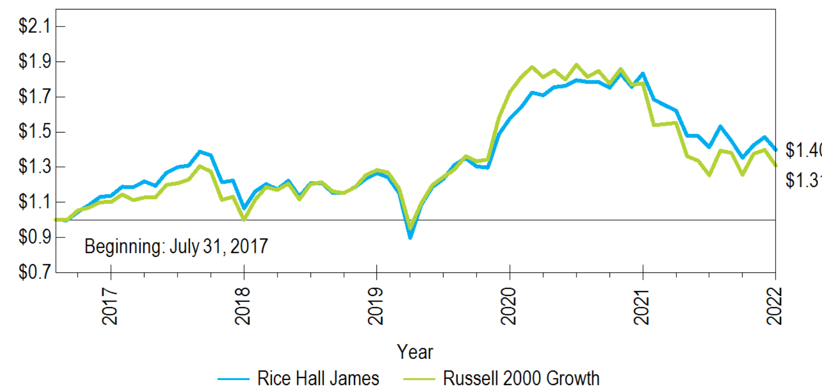
Rice Hall James | As of December 31, 2022

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Rice Hall James	5.3%	22.0%	0.1%	0.9	0.0	7.7%	79.5%	93.6%
Russell 2000 Growth	5.1%	23.1%	0.0%	1.0	--	0.0%	100.0%	100.0%

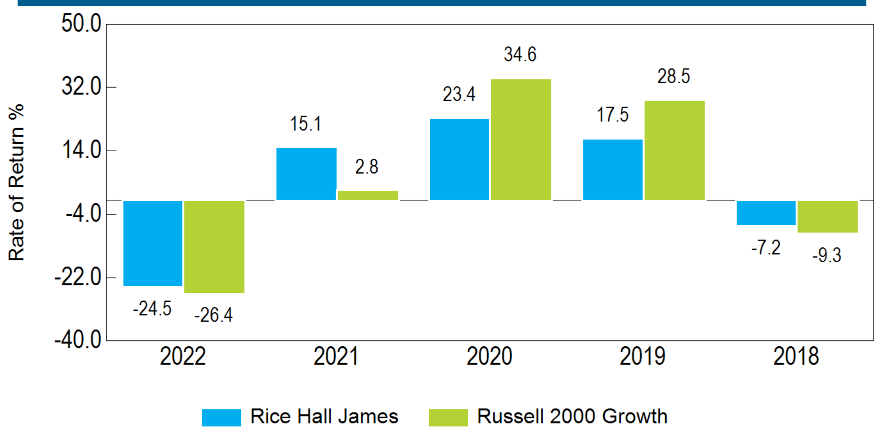
Trailing Period Performance



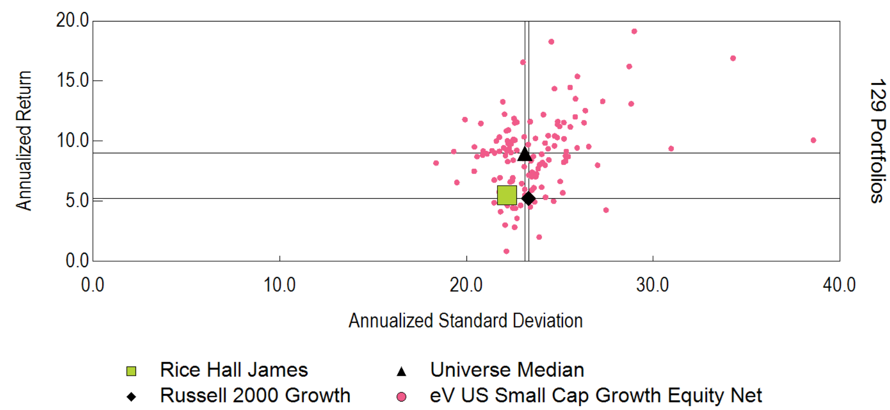
Growth of a Dollar



Calendar Year Performance



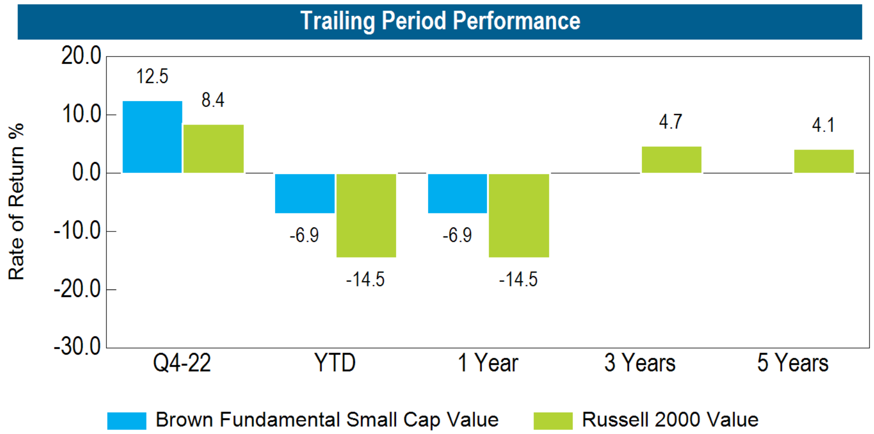
Risk/Return - S.I.

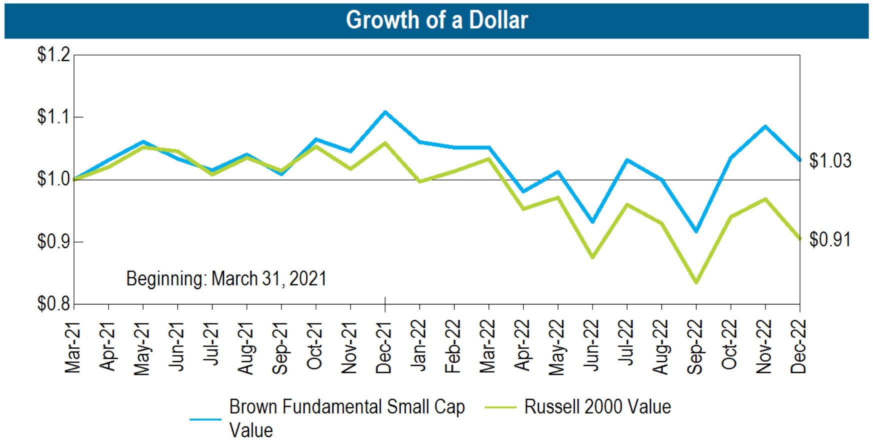


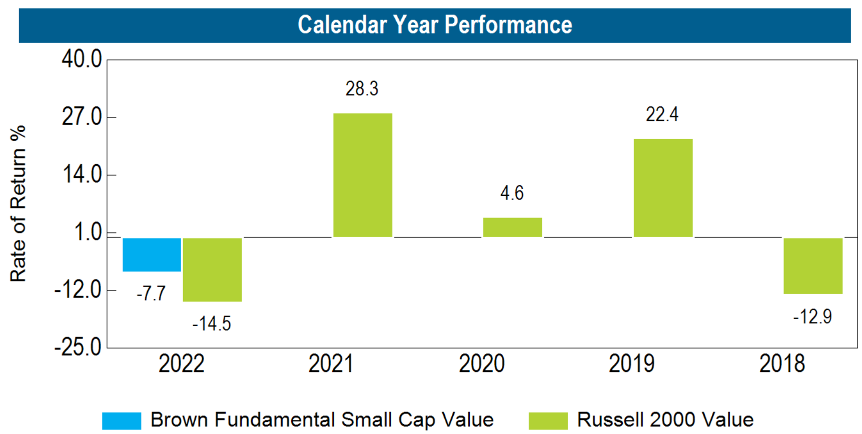
Performance shown is net-of-fees and since inception.

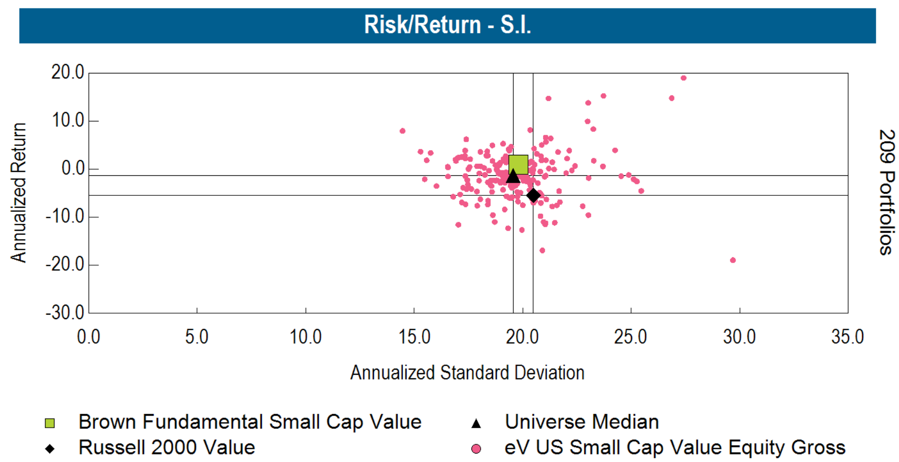
Brown Fundamental Small Cap Value | As of December 31, 2022

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Brown Fundamental Small Cap Value	0.9%	19.8%	0.5%	0.9	1.3	4.9%	108.9%	88.0%
Russell 2000 Value	-5.5%	20.5%	0.0%	1.0	--	0.0%	100.0%	100.0%







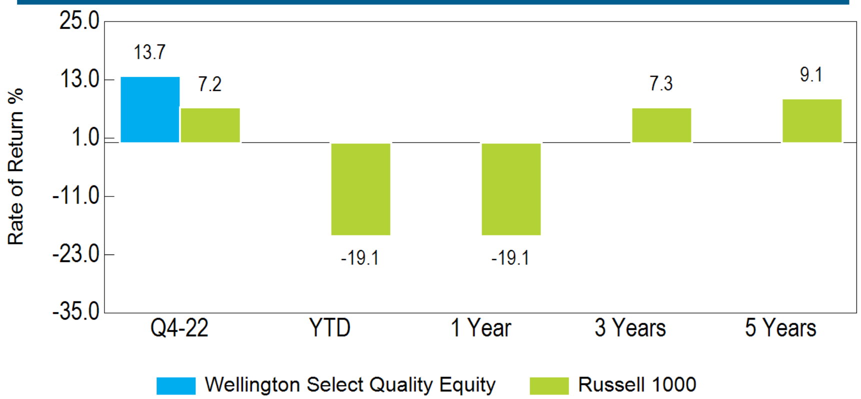


Performance shown is net-of-fees and since inception.

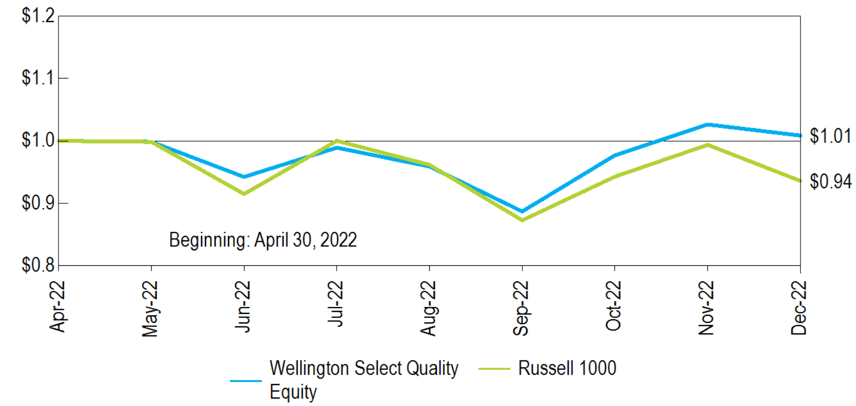
Wellington Select Quality Equity | As of December 31, 2022

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Wellington Select Quality Equity	0.9%	20.8%	0.7%	0.8	0.8	8.8%	87.8%	68.4%
Russell 1000	-6.4%	25.6%	0.0%	1.0	--	0.0%	100.0%	100.0%

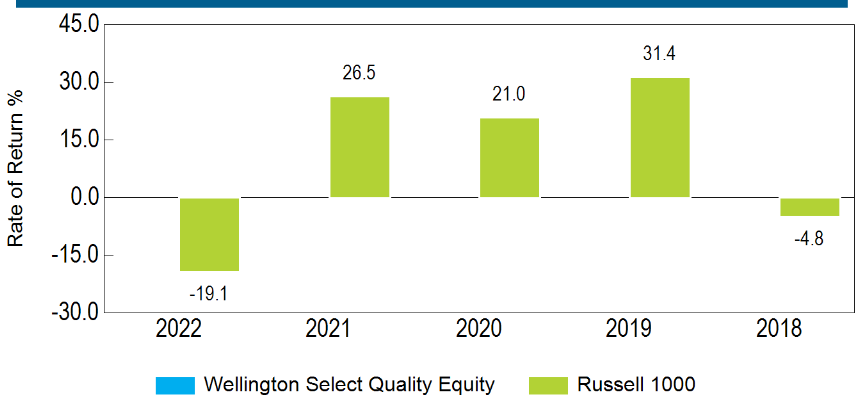
Trailing Period Performance



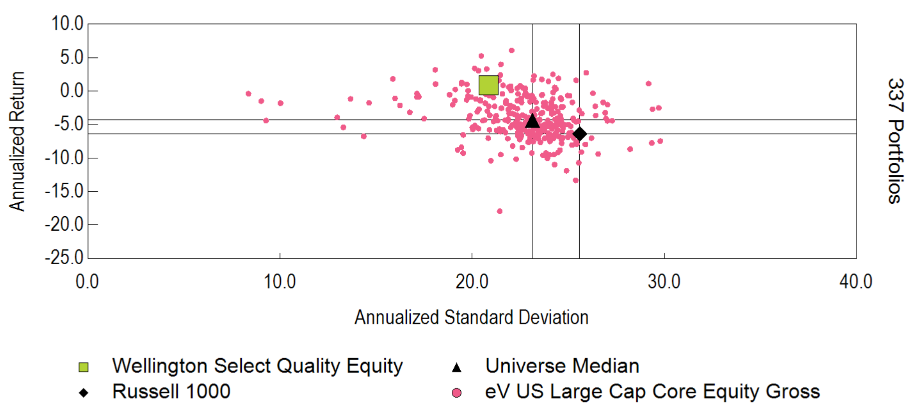
Growth of a Dollar



Calendar Year Performance

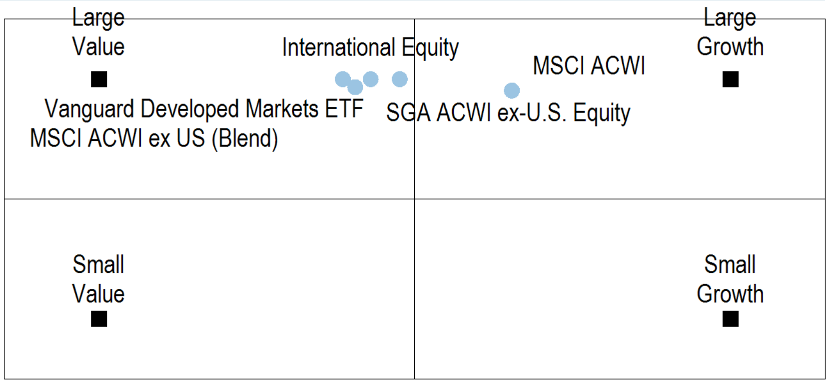


Risk/Return - S.I.

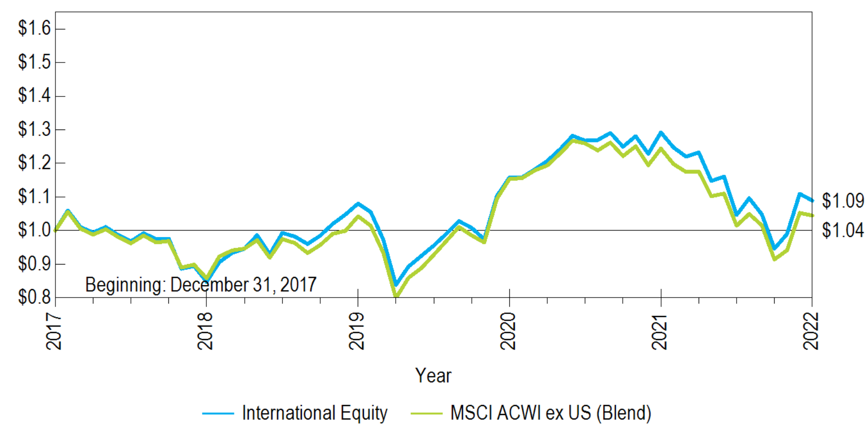


Performance shown is net-of-fees and since inception. Annualized Return is not available for managers without a history longer than one year.

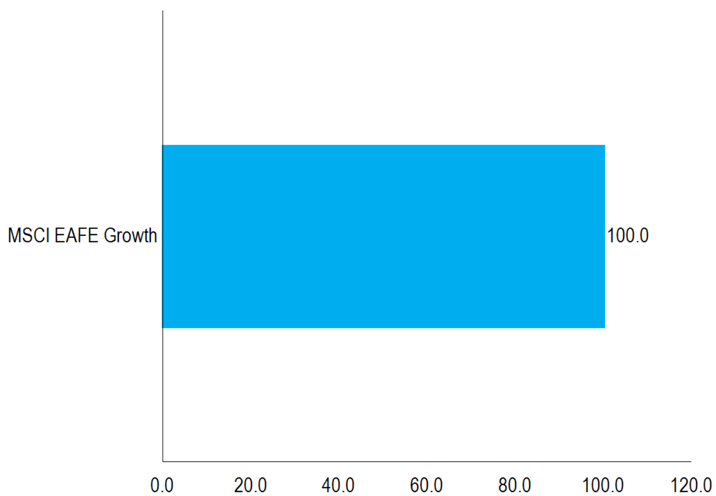
Non U.S. Effective Style Map vs. EAFE



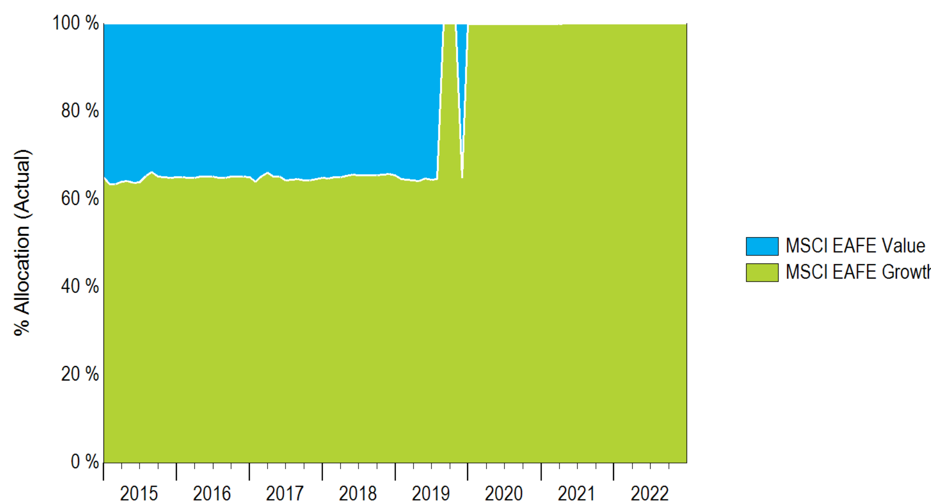
Growth of a Dollar
5 Years Ending December 31, 2022



Style Exposure

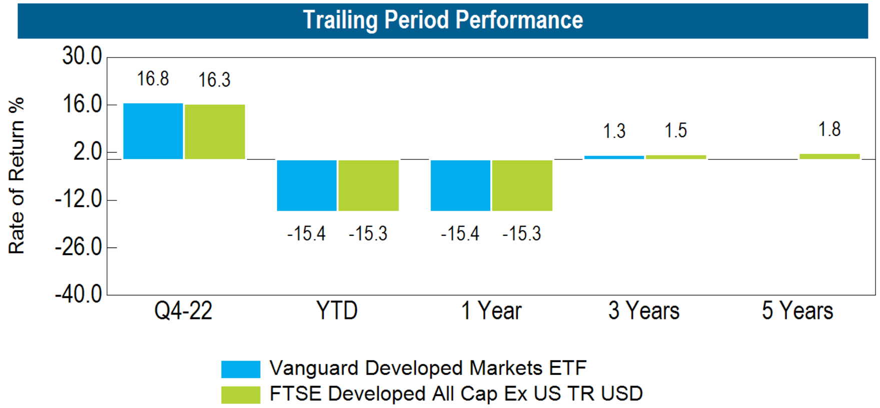


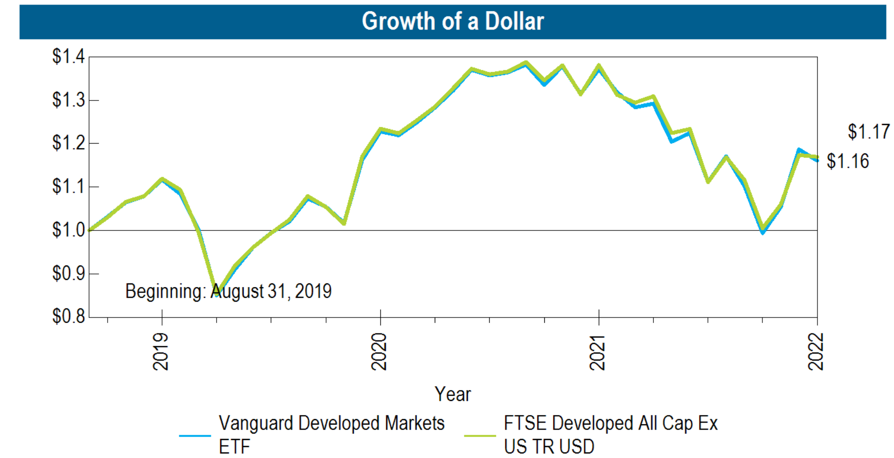
Style History (5-Year)

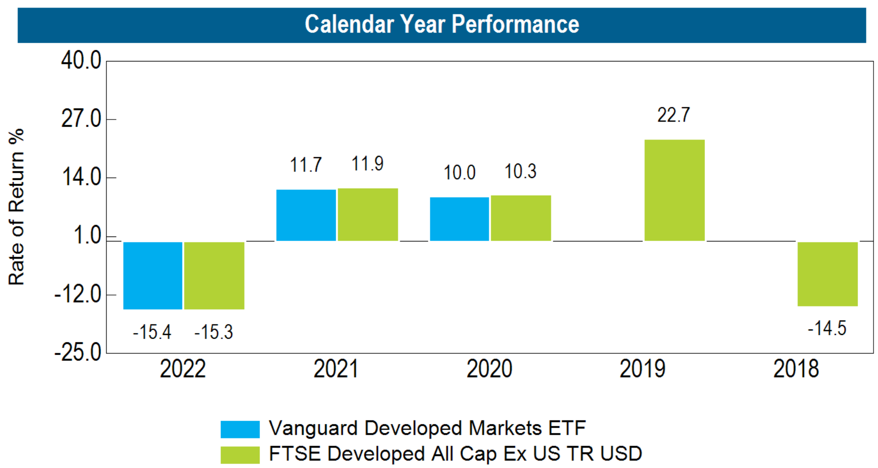


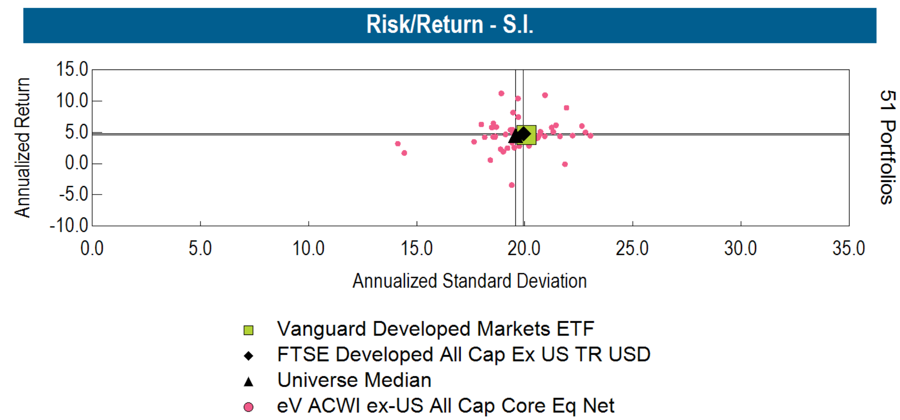
Vanguard Developed Markets ETF | As of December 31, 2022

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Vanguard Developed Markets ETF	4.6%	20.1%	0.0%	1.0	-0.1	2.5%	102.4%	101.7%
FTSE Developed All Cap Ex US TR USD	4.8%	19.9%	0.0%	1.0	--	0.0%	100.0%	100.0%





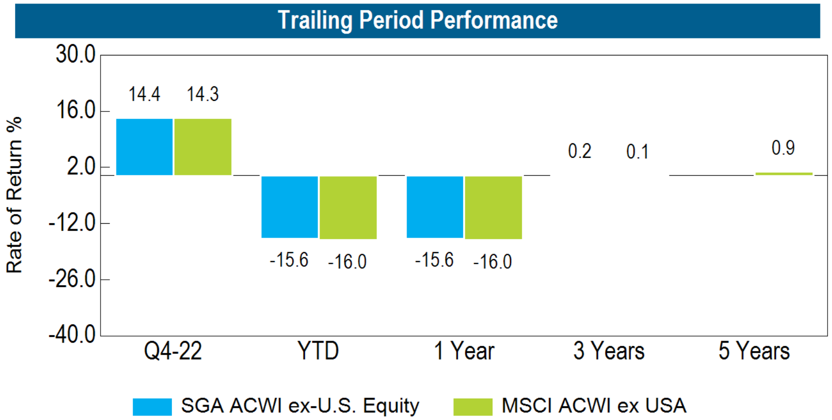


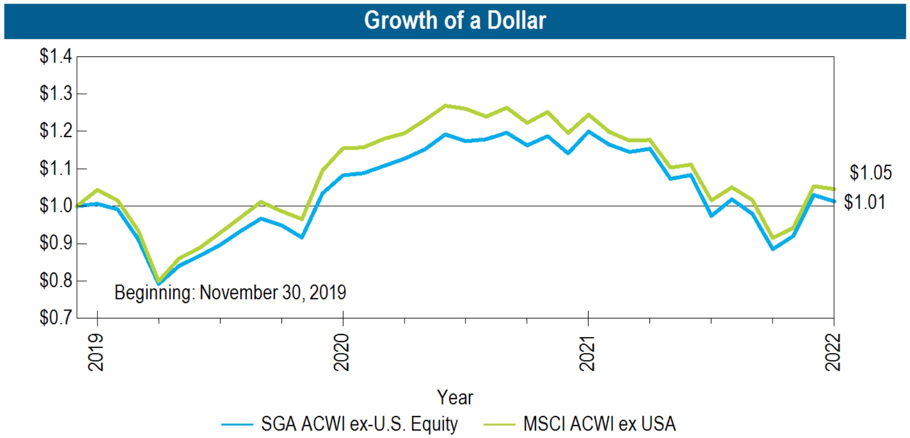


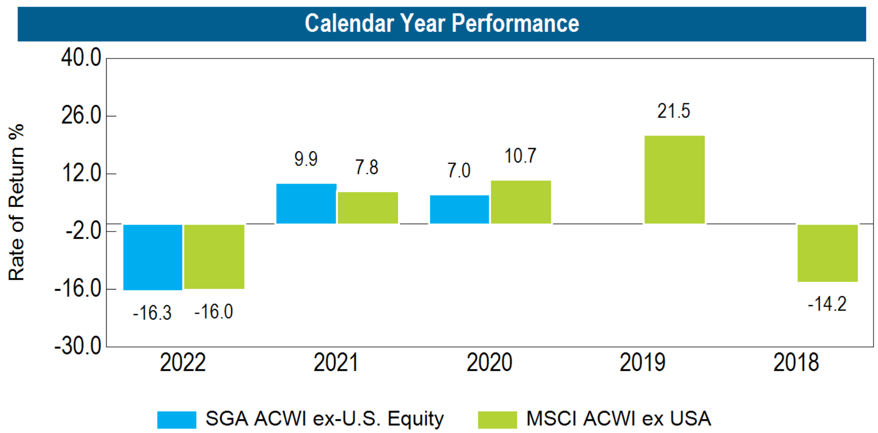
Performance shown is net-of-fees and since inception.

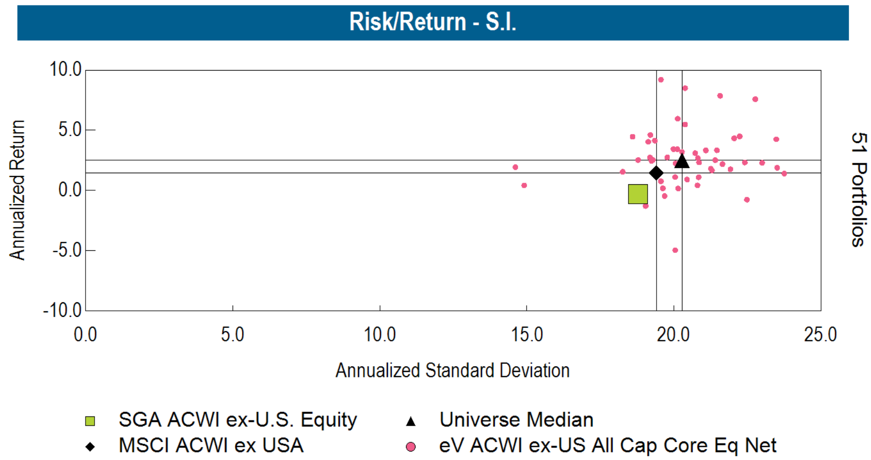
SGA ACWI ex-U.S. Equity | As of December 31, 2022

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
SGA ACWI ex-U.S. Equity	-0.3%	18.8%	-0.1%	1.0	-0.5	3.6%	89.1%	99.2%
MSCI ACWI ex USA	1.5%	19.4%	0.0%	1.0	--	0.0%	100.0%	100.0%



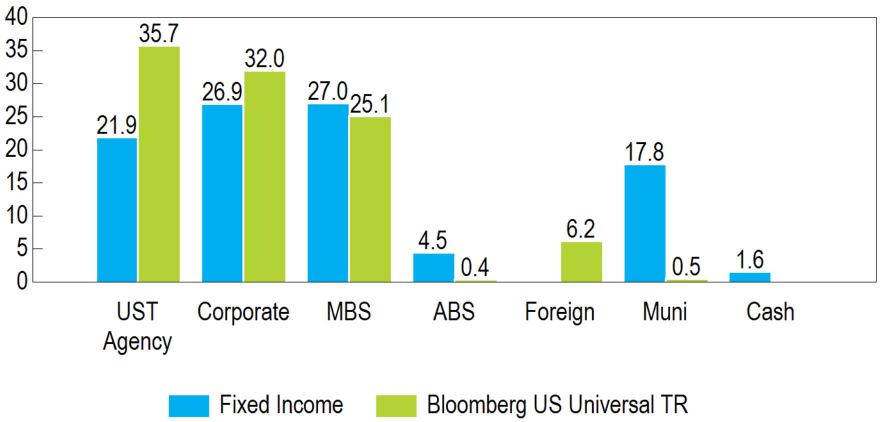




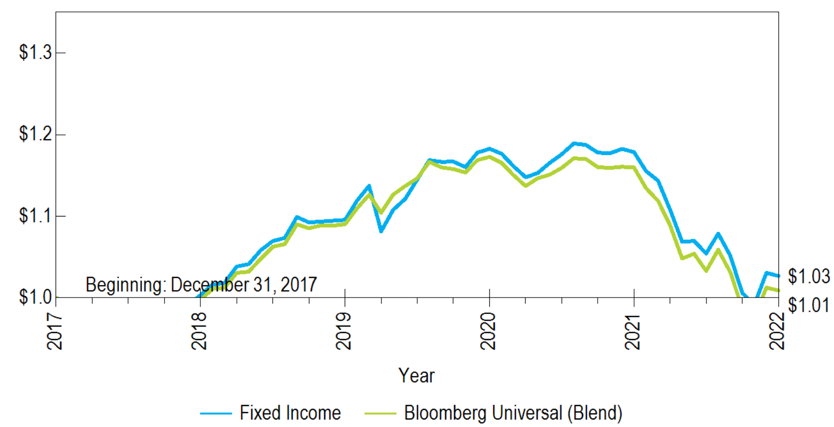


Performance shown is net-of-fees and since inception.

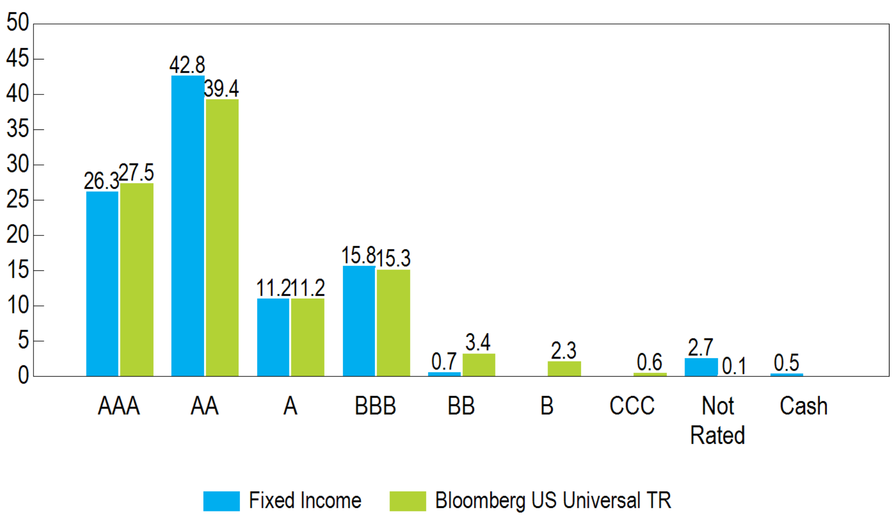
US Sector Allocation



Growth of a Dollar
5 Years Ending December 31, 2022

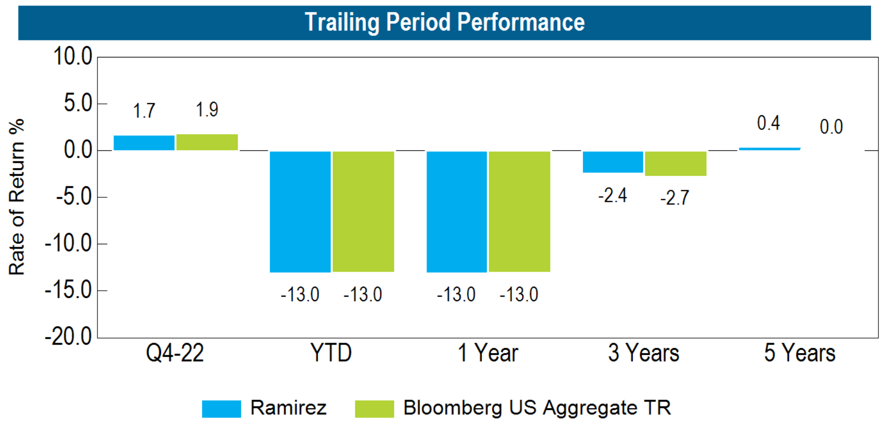


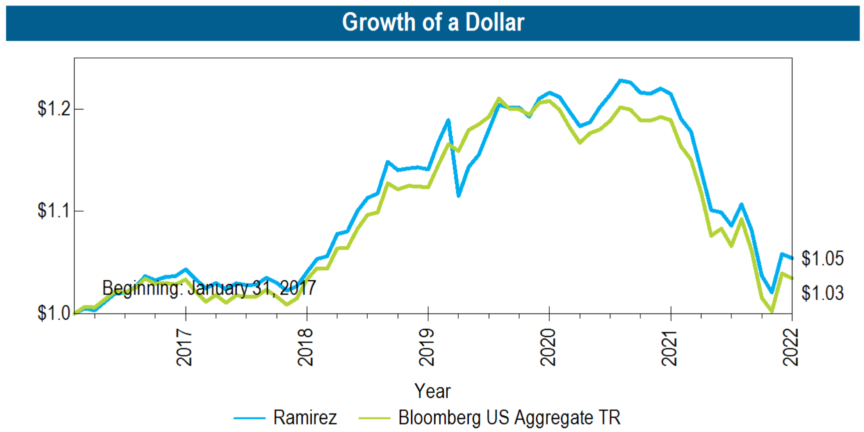
Credit Quality Allocation

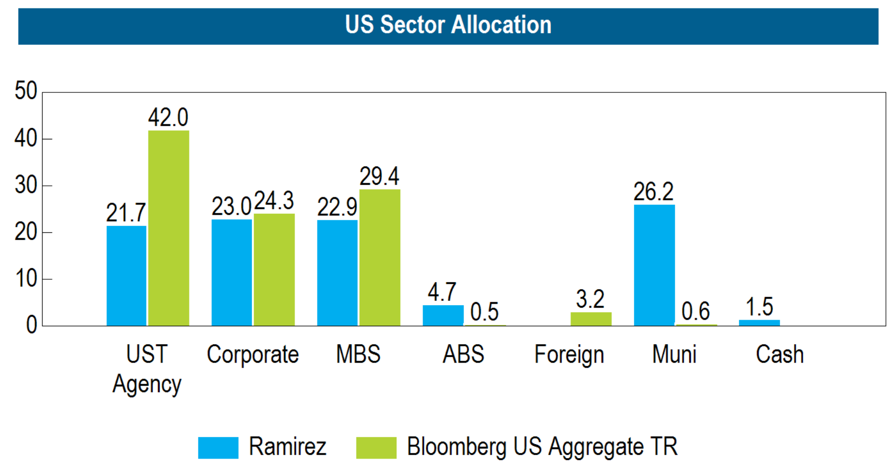


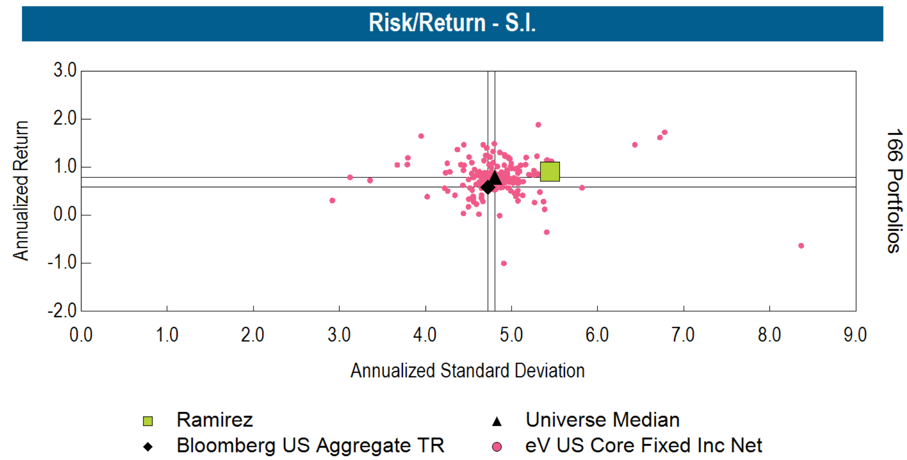
Fixed Income Fixed Income Characteristics vs. Bloomberg US Universal TR	Portfolio Q4-22	Index Q4-22
Fixed Income Characteristics		
Yield to Maturity	5.25	5.11
Average Duration	6.22	6.00
Average Quality	AA	AA
Weighted Average Maturity	8.99	12.20

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Ramirez	0.9%	5.4%	0.0%	1.0	0.1	2.6%	115.3%	106.7%
Bloomberg US Aggregate TR	0.6%	4.7%	0.0%	1.0	--	0.0%	100.0%	100.0%



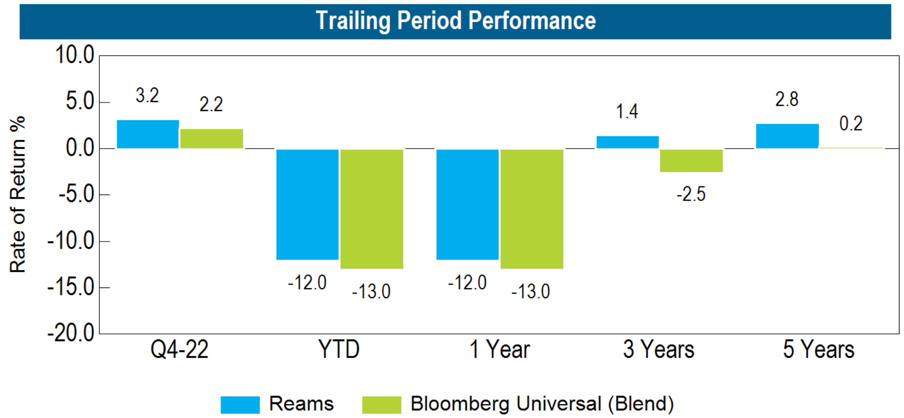


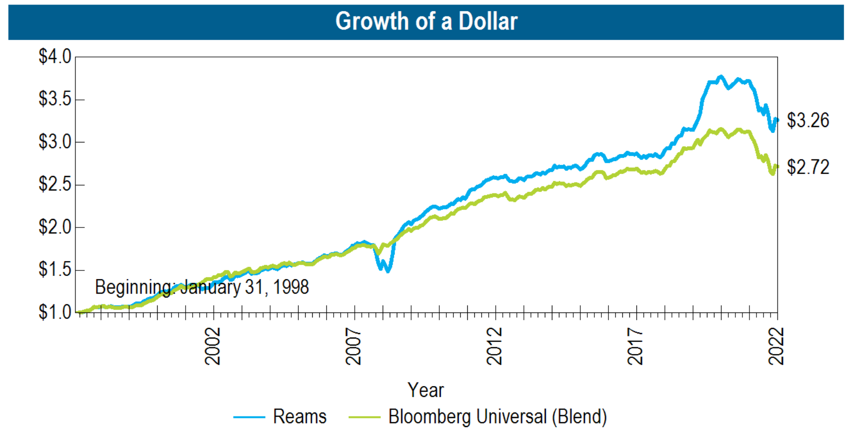


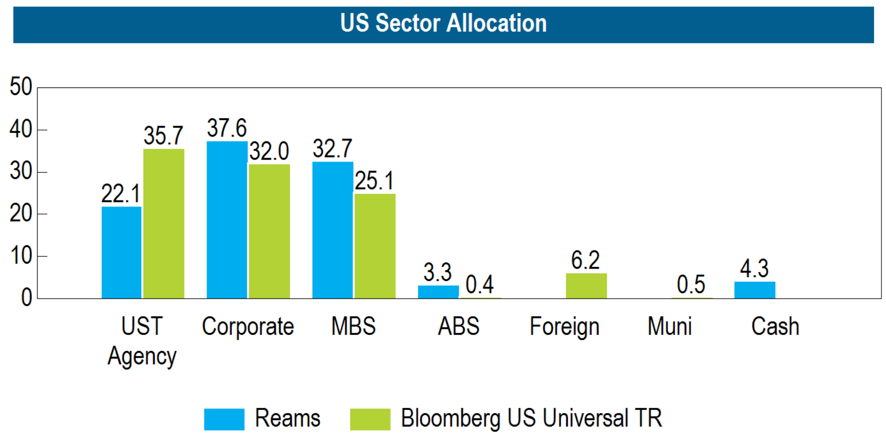


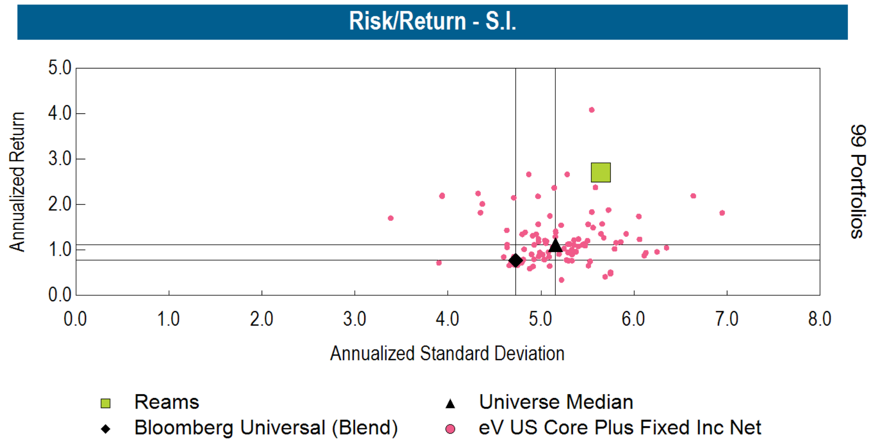
Performance shown is net-of-fees and since inception.

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Reams	4.9%	5.6%	0.0%	1.1	0.2	3.8%	124.3%	100.2%
Bloomberg Universal (Blend)	4.1%	3.8%	0.0%	1.0	--	0.0%	100.0%	100.0%





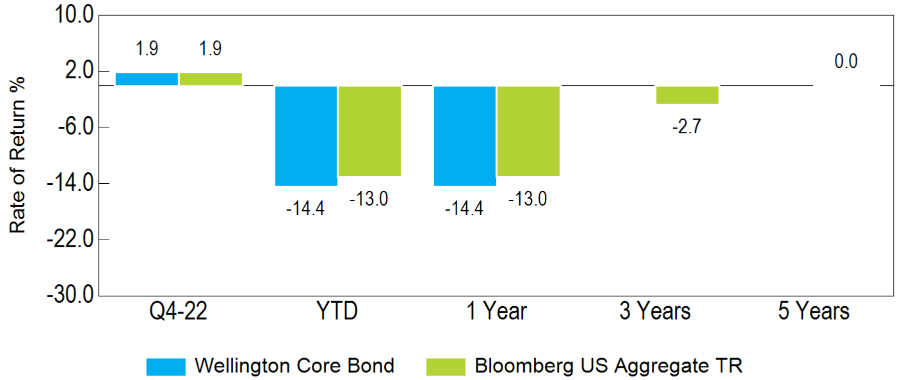




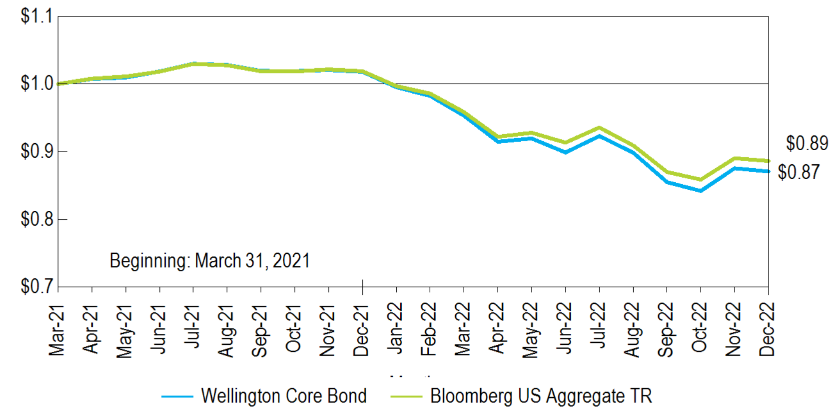
Performance shown is net-of-fees and since inception.

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Wellington Core Bond	-7.6%	7.3%	0.0%	1.1	-1.2	0.8%	103.2%	108.3%
Bloomberg US Aggregate TR	-6.7%	6.7%	0.0%	1.0	--	0.0%	100.0%	100.0%

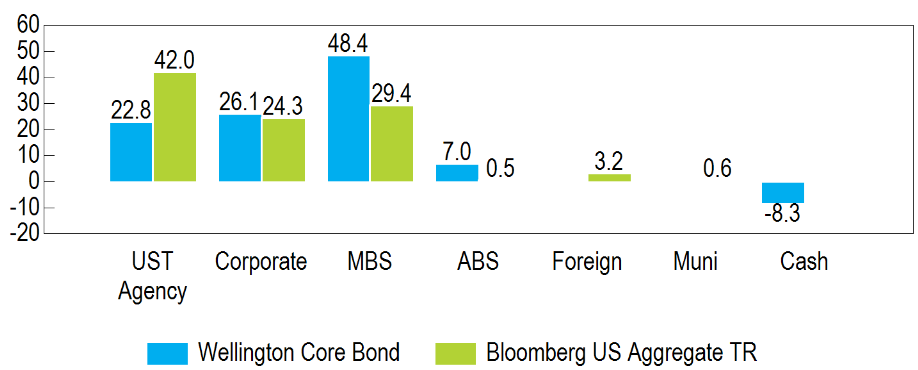
Trailing Period Performance



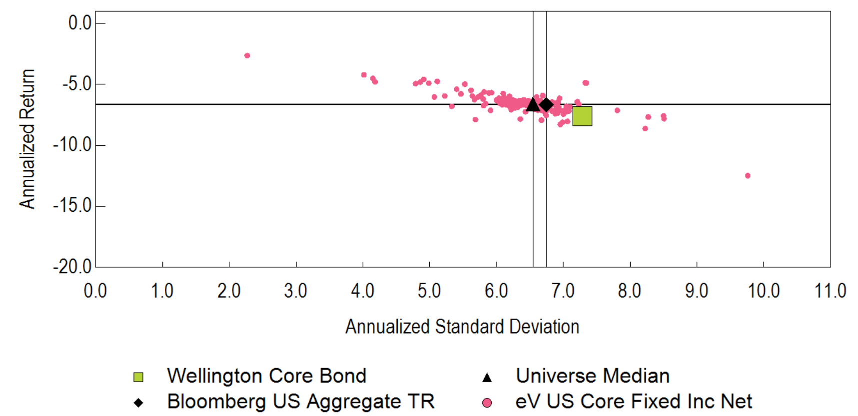
Growth of a Dollar



US Sector Allocation



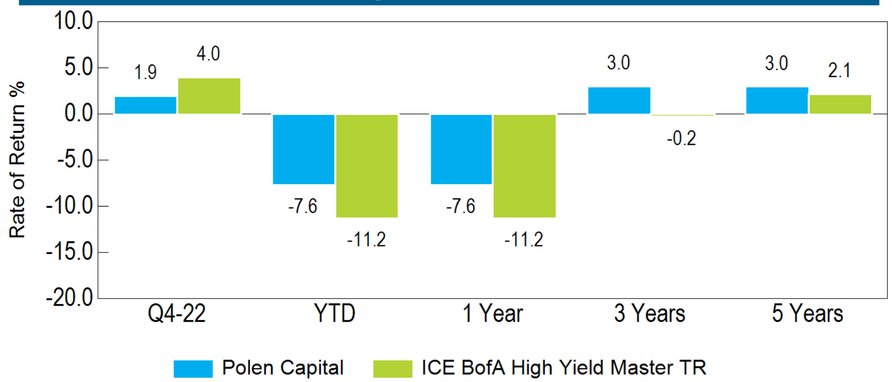
Risk/Return - S.I.



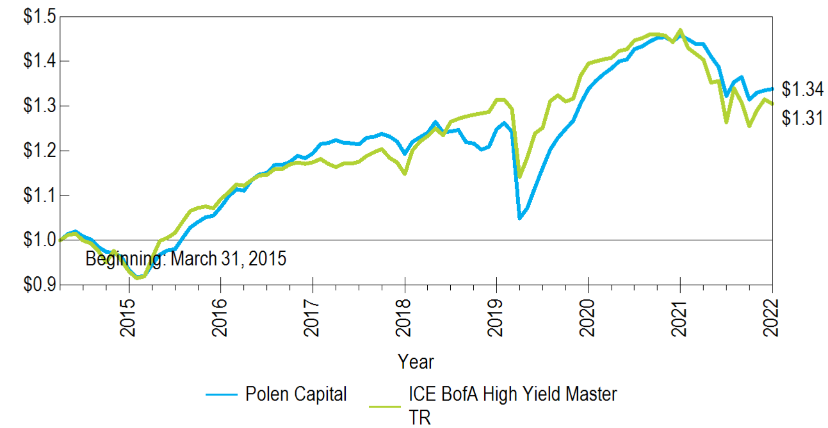
Performance shown is net-of-fees and since inception.

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Polen Capital	4.0%	7.9%	0.1%	0.8	0.1	4.3%	77.7%	78.6%
ICE BofA High Yield Master TR	3.7%	8.1%	0.0%	1.0	--	0.0%	100.0%	100.0%

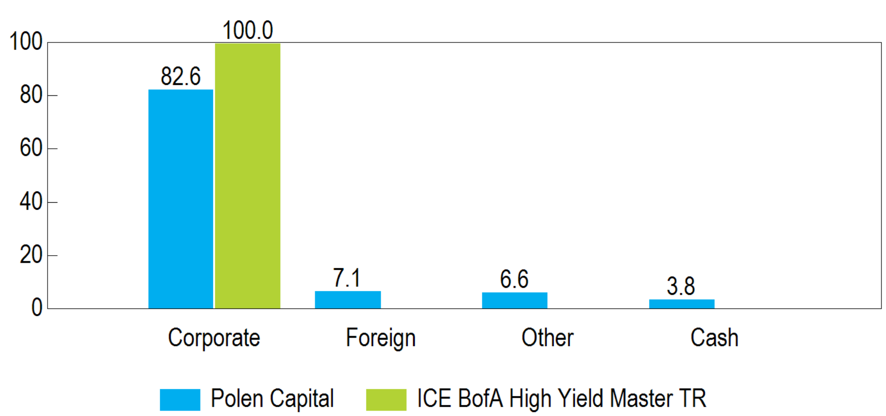
Trailing Period Performance



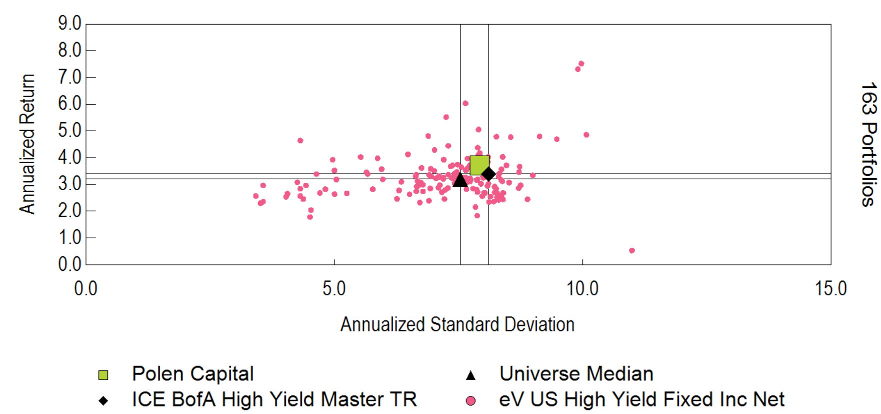
Growth of a Dollar



US Sector Allocation

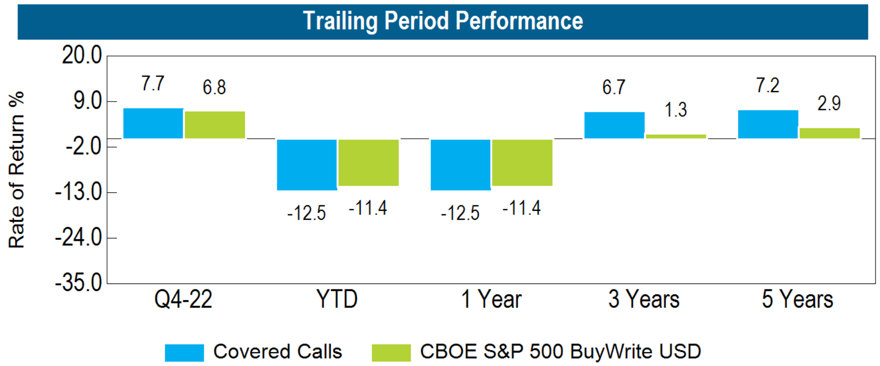


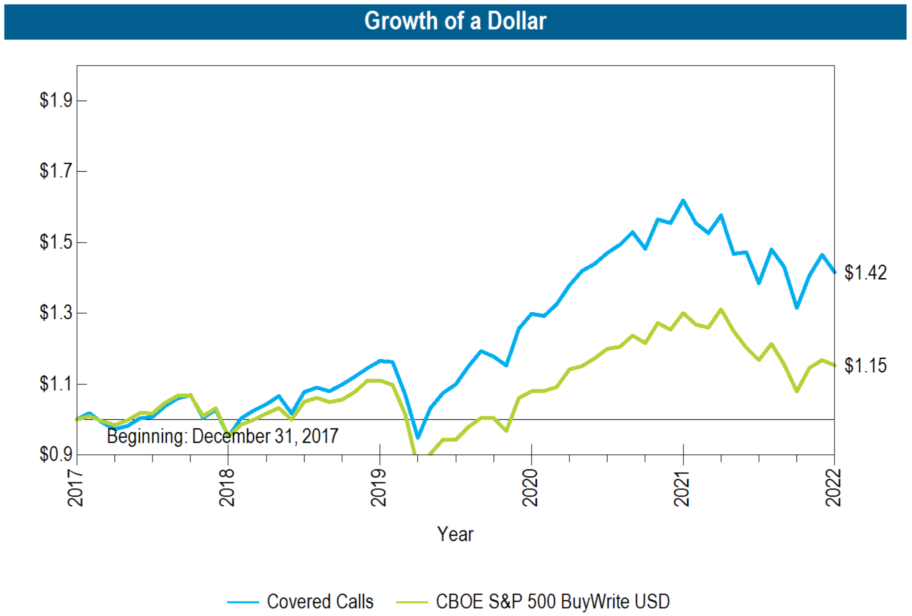
Risk/Return - S.I.

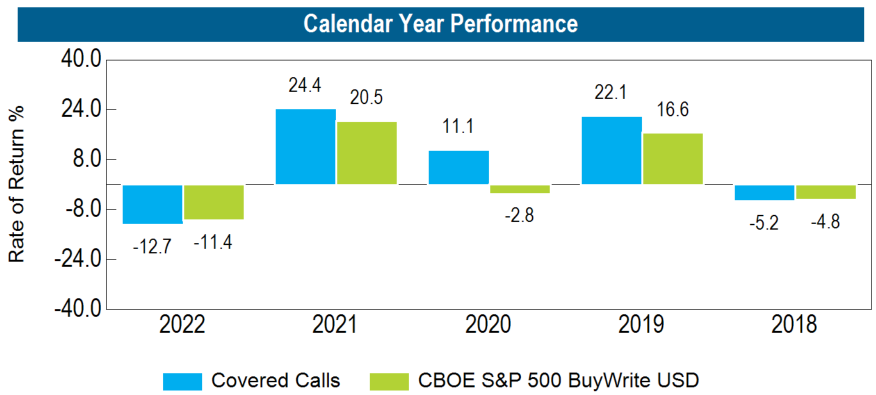


Performance shown is net-of-fees and since inception.

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Covered Calls	7.9%	11.8%	0.2%	1.0	0.7	4.1%	144.2%	102.3%
CBOE S&P 500 BuyWrite USD	4.9%	10.9%	0.0%	1.0	--	0.0%	100.0%	100.0%
Parametric BXM	6.2%	9.7%	0.2%	0.9	0.4	3.3%	96.5%	91.1%
CBOE S&P 500 BuyWrite USD	4.9%	10.9%	0.0%	1.0	--	0.0%	100.0%	100.0%
Parametric DeltaShift	9.7%	14.1%	0.3%	1.2	0.8	6.3%	205.3%	110.5%
CBOE S&P 500 BuyWrite USD	4.9%	10.9%	0.0%	1.0	--	0.0%	100.0%	100.0%





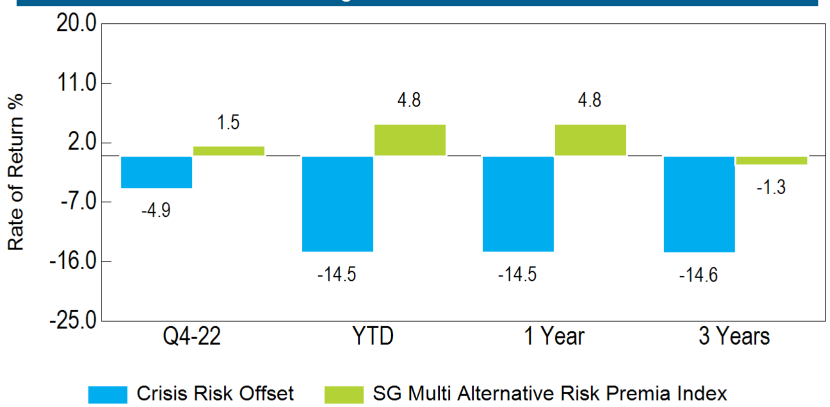


Performance shown is net-of-fees and since inception.

Crisis Risk Offset | As of December 31, 2022

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Crisis Risk Offset	-10.92%	11.54%	-0.87%	0.57	-0.89	11.31%	-36.38%	98.57%
SG Multi Alternative Risk Premia Index	-0.84%	6.03%	0.00%	1.00	--	0.00%	100.00%	100.00%
Kepos Alternative Risk Premia	--	--	--	--	--	--	--	--
SG Multi Alternative Risk Premia Index	-0.84%	6.03%	0.00%	1.00	--	0.00%	100.00%	100.00%
Versor Trend Following	--	--	--	--	--	--	--	--
SG Trend Index	14.45%	12.82%	0.00%	1.00	--	0.00%	100.00%	100.00%
Vanguard Long-Term Treasury ETF	-5.68%	14.71%	-0.01%	1.01	-0.19	1.17%	101.45%	101.21%
Bloomberg US Govt Long TR	-5.46%	14.52%	0.00%	1.00	--	0.00%	100.00%	100.00%

Trailing Period Performance



Correlation Matrix
1 Year Ending December 31, 2022

	Crisis Risk Offset	MSCI ACWI	S&P 500	Bloomberg Global Aggregate TR
Crisis Risk Offset	1.00	--	--	--
MSCI ACWI	-0.55	1.00	--	--
S&P 500	-0.58	0.98	1.00	--
Bloomberg Global Aggregate TR	-0.24	0.79	0.69	1.00

Performance shown is net-of-fees and since inception.

Benchmark History
As of December 31, 2022

OPFRS Total Plan		
6/1/2022	Present	40% Russell 3000 / 12% MSCI ACWI ex USA / 31% Bloomberg US Universal TR / 5% CBOE BXM / 10% SG Multi Alternative Risk Premia Index / 2% Bloomberg US High Yield TR
1/1/2019	5/31/2022	40% Russell 3000 / 12% MSCI ACWI ex USA Gross / 33% Bloomberg US Universal TR / 5% CBOE BXM / 6.7% SG Multi Alternative Risk Premia Index / 3.3% Bloomberg US Treasury Long TR
5/1/2016	12/31/2018	48% Russell 3000 / 12% MSCI ACWI ex USA Gross / 20% Bloomberg US Universal TR / 20% CBOE BXM
10/1/2015	4/30/2016	43% Russell 3000 / 12% MSCI ACWI ex USA Gross / 20% Bloomberg US Universal TR / 15% CBOE BXM / 10% CPI - All Urban Consumers (unadjusted) +3%
1/1/2014	9/30/2015	48% Russell 3000 / 12% MSCI ACWI ex USA Gross / 20% Bloomberg US Universal TR / 10% CBOE BXM / 10% CPI - All Urban Consumers (unadjusted) +3%
3/1/2013	12/31/2013	40% Russell 3000 / 10% MSCI ACWI ex USA Gross / 17% Bloomberg US Universal TR / 33% ICE BofA 3M US Treasury TR USD
8/1/2012	2/28/2013	20% Russell 3000 / 7% MSCI ACWI ex USA Gross / 18% Bloomberg US Universal TR / 55% ICE BofA 3M US Treasury TR USD
10/1/2007	7/31/2012	53% Russell 3000 / 17% MSCI ACWI ex USA Gross / 30% Bloomberg US Universal TR
4/1/2006	9/30/2007	35% Russell 3000 / 15% MSCI ACWI ex USA Gross / 50% Bloomberg US Universal TR
1/1/2005	3/31/2006	35% Russell 3000 / 15% MSCI ACWI ex USA Gross / 50% Bloomberg US Aggregate TR
4/1/1998	12/31/2004	50% Bloomberg US Aggregate TR / 10% Russell 1000 / 20% Russell 1000 Value / 5% Russell MidCap / 15% MSCI EAFE
12/1/1988	3/31/1998	40% S&P 500 / 55% Bloomberg US Aggregate TR / 5% FTSE T-Bill 3 Months TR

Benchmark History

As of December 31, 2022

Domestic Equity		
1/1/2005	Present	Russell 3000
4/1/1998	12/31/2004	28.57% Russell 1000 / 57.14% Russell 1000 Value / 14.29% Russell MidCap
6/1/1997	3/31/1998	S&P 500
International Equity		
1/1/2005	Present	MSCI ACWI ex USA
1/1/1998	12/31/2004	MSCI EAFE Gross
Fixed Income		
4/1/2006	Present	Bloomberg US Universal TR
12/31/1993	3/31/2006	Bloomberg US Aggregate TR
Covered Calls		
4/1/2014	Present	CBOE S&P 500 BuyWrite USD
Crisis Risk Offset		
8/1/2018	Present	SG Multi Alternative Risk Premia Index
Cash		
3/1/2011	Present	FTSE T-Bill 3 Months TR

Disclaimer, Glossary, and Notes

WE HAVE PREPARED THIS REPORT (THIS “REPORT”) FOR THE SOLE BENEFIT OF THE INTENDED RECIPIENT (THE “RECIPIENT”).

SIGNIFICANT EVENTS MAY OCCUR (OR HAVE OCCURRED) AFTER THE DATE OF THIS REPORT AND THAT IT IS NOT OUR FUNCTION OR RESPONSIBILITY TO UPDATE THIS REPORT. ANY OPINIONS OR RECOMMENDATIONS PRESENTED HEREIN REPRESENT OUR GOOD FAITH VIEWS AS OF THE DATE OF THIS REPORT AND ARE SUBJECT TO CHANGE AT ANY TIME. ALL INVESTMENTS INVOLVE RISK. THERE CAN BE NO GUARANTEE THAT THE STRATEGIES, TACTICS, AND METHODS DISCUSSED HERE WILL BE SUCCESSFUL.

INFORMATION USED TO PREPARE THIS REPORT WAS OBTAINED FROM INVESTMENT MANAGERS, CUSTODIANS, AND OTHER EXTERNAL SOURCES. WHILE WE HAVE EXERCISED REASONABLE CARE IN PREPARING THIS REPORT, WE CANNOT GUARANTEE THE ACCURACY OF ALL SOURCE INFORMATION CONTAINED HEREIN.

CERTAIN INFORMATION CONTAINED IN THIS REPORT MAY CONSTITUTE “FORWARD - LOOKING STATEMENTS,” WHICH CAN BE IDENTIFIED BY THE USE OF TERMINOLOGY SUCH AS “MAY,” “WILL,” “SHOULD,” “EXPECT,” “AIM”, “ANTICIPATE,” “TARGET,” “PROJECT,” “ESTIMATE,” “INTEND,” “CONTINUE” OR “BELIEVE,” OR THE NEGATIVES THEREOF OR OTHER VARIATIONS THEREON OR COMPARABLE TERMINOLOGY. ANY FORWARD-LOOKING STATEMENTS, FORECASTS, PROJECTIONS, VALUATIONS, OR RESULTS IN THIS PRESENTATION ARE BASED UPON CURRENT ASSUMPTIONS. CHANGES TO ANY ASSUMPTIONS MAY HAVE A MATERIAL IMPACT ON FORWARD - LOOKING STATEMENTS, FORECASTS, PROJECTIONS, VALUATIONS, OR RESULTS. ACTUAL RESULTS MAY THEREFORE BE MATERIALLY DIFFERENT FROM ANY FORECASTS, PROJECTIONS, VALUATIONS, OR RESULTS IN THIS PRESENTATION.

PERFORMANCE DATA CONTAINED HEREIN REPRESENT PAST PERFORMANCE. PAST PERFORMANCE IS NO GUARANTEE OF FUTURE RESULTS.

Credit Risk: Refers to the risk that the issuer of a fixed income security may default (i.e., the issuer will be unable to make timely principal and/or interest payments on the security.)

Duration: Measure of the sensitivity of the price of a bond to a change in its yield to maturity. Duration summarizes, in a single number, the characteristics that cause bond prices to change in response to a change in interest rates. For example, the price of a bond with a duration of three years will rise by approximately 3% for each 1% decrease in its yield to maturity. Conversely, the price will decrease 3% for each 1% increase in the bond's yield. Price changes for two different bonds can be compared using duration. A bond with a duration of six years will exhibit twice the percentage price change of a bond with a three-year duration. The actual calculation of a bond's duration is somewhat complicated, but the idea behind the calculation is straightforward. The first step is to measure the time interval until receipt for each cash flow (coupon and principal payments) from a bond. The second step is to compute a weighted average of these time intervals. Each time interval is measured by the present value of that cash flow. This weighted average is the duration of the bond measured in years.

Information Ratio: This statistic is a measure of the consistency of a portfolio's performance relative to a benchmark. It is calculated by subtracting the benchmark return from the portfolio return (excess return), and dividing the resulting excess return by the standard deviation (volatility) of this excess return. A positive information ratio indicates outperformance versus the benchmark, and the higher the information ratio, the more consistent the outperformance.

Jensen's Alpha: A measure of the average return of a portfolio or investment in excess of what is predicted by its beta or "market" risk. Portfolio Return- [Risk Free Rate+Beta*(market return-Risk Free Rate)].

Market Capitalization: For a firm, market capitalization is the total market value of outstanding common stock. For a portfolio, market capitalization is the sum of the capitalization of each company weighted by the ratio of holdings in that company to total portfolio holdings; thus it is a weighted-average capitalization. Meketa Investment Group considers the largest 65% of the broad domestic equity market as large capitalization, the next 25% of the market as medium capitalization, and the smallest 10% of stocks as small capitalization.

Market Weighted: Stocks in many indices are weighted based on the total market capitalization of the issue. Thus, the individual returns of higher market-capitalization issues will more heavily influence an index's return than the returns of the smaller market-capitalization issues in the index.

Maturity: The date on which a loan, bond, mortgage, or other debt/security becomes due and is to be paid off.

Prepayment Risk: The risk that prepayments will increase (homeowners will prepay all or part of their mortgage) when mortgage interest rates decline; hence, investors' monies will be returned to them in a lower interest rate environment. Also, the risk that prepayments will slow down when mortgage interest rates rise; hence, investors will not have as much money as previously anticipated in a higher interest rate environment. A prepayment is any payment in excess of the scheduled mortgage payment.

Price-Book Value (P/B) Ratio: The current market price of a stock divided by its book value per share. Meketa Investment Group calculates P/B as the current price divided by Compustat's quarterly common equity. Common equity includes common stock, capital surplus, retained earnings, and treasury stock adjusted for both common and nonredeemable preferred stock. Similar to high P/E stocks, stocks with high P/B's tend to be riskier investments.

Price-Earnings (P/E) Ratio: A stock's market price divided by its current or estimated future earnings. Lower P/E ratios often characterize stocks in low growth or mature industries, stocks in groups that have fallen out of favor, or stocks of established blue chip companies with long records of stable earnings and regular dividends. Sometimes a company that has good fundamentals may be viewed unfavorably by the market if it is an industry that is temporarily out of favor. Or a business may have experienced financial problems causing investors to be skeptical about is future. Either of these situations would result in lower relative P/E ratios. Some stocks exhibit above-average sales and earnings growth or expectations for above average growth. Consequently, investors are willing to pay more for these companies' earnings, which results in elevated P/E ratios. In other words, investors will pay more for shares of companies whose profits, in their opinion, are expected to increase faster than average. Because future events are in no way assured, high P/E stocks tend to be riskier and more volatile investments. Meketa Investment Group calculates P/E as the current price divided by the I/B/E/S consensus of twelve-month forecast earnings per share.

Quality Rating: The rank assigned a security by such rating services as Fitch, Moody's, and Standard & Poor's. The rating may be determined by such factors as (1) the likelihood of fulfillment of dividend, income, and principal payment of obligations; (2) the nature and provisions of the issue; and (3) the security's relative position in the event of liquidation of the company. Bonds assigned the top four grades (AAA, AA, A, BBB) are considered investment grade because they are eligible bank investments as determined by the controller of the currency.

Sharpe Ratio: A commonly used measure of risk-adjusted return. It is calculated by subtracting the risk free return (usually three-month Treasury bill) from the portfolio return and dividing the resulting excess return by the portfolio's total risk level (standard deviation). The result is a measure of return per unit of total risk taken. The higher the Sharpe ratio, the better the fund's historical risk adjusted performance.

STIF Account: Short-term investment fund at a custodian bank that invests in cash-equivalent instruments. It is generally used to safely invest the excess cash held by portfolio managers.

Standard Deviation: A measure of the total risk of an asset or a portfolio. Standard deviation measures the dispersion of a set of numbers around a central point (e.g., the average return). If the standard deviation is small, the distribution is concentrated within a narrow range of values. For a normal distribution, about two thirds of the observations will fall within one standard deviation of the mean, and 95% of the observations will fall within two standard deviations of the mean.

Style: The description of the type of approach and strategy utilized by an investment manager to manage funds. For example, the style for equities is determined by portfolio characteristics such as price-to-book value, price-to-earnings ratio, and dividend yield. Equity styles include growth, value, and core.

Tracking Error: A divergence between the price behavior of a position or a portfolio and the price behavior of a benchmark, as defined by the difference in standard deviation.

Yield to Maturity: The yield, or return, provided by a bond to its maturity date; determined by a mathematical process, usually requiring the use of a "basis book." For example, a 5% bond pays $5 a year interest on each $100 par value. To figure its current yield, divide $5 by $95—the market price of the bond—and you get 5.26%. Assume that the same bond is due to mature in five years. On the maturity date, the issuer is pledged to pay $100 for the bond that can be bought now for $95. In other words, the bond is selling at a discount of 5% below par value. To figure yield to maturity, a simple and approximate method is to divide 5% by the five years to maturity, which equals 1% pro rata yearly. Add that 1% to the 5.26% current yield, and the yield to maturity is roughly 6.26%.

$$\frac{5\%\ (\text{discount})}{5\ (\text{yrs. to maturity})} = \begin{array}{l}1\%\ \text{pro rata, plus}\\ 5.26\%\ (\text{current yield})\end{array} = 6.26\%\ (\text{yield to maturity})$$

Yield to Worst: The lowest potential yield that can be received on a bond without the issuer actually defaulting. The yield to worst is calculated by making worst-case scenario assumptions on the issue by calculating the returns that would be received if provisions, including prepayment, call, or sinking fund, are used by the issuer.

NCREIF Property Index (NPI): Measures unleveraged investment performance of a very large pool of individual commercial real estate properties acquired in the private market by tax-exempt institutional investors for investment purposes only. The NPI index is capitalization-weighted for a quarterly time series composite total rate of return.

NCREIF Fund Index - Open End Diversified Core Equity (NFI-ODCE): Measures the investment performance of 28 open-end commingled funds pursuing a core investment strategy that reflects funds' leverage and cash positions. The NFI-ODCE index is equal-weighted and is reported gross and net of fees for a quarterly time series composite total rate of return.

Sources: Investment Terminology, International Foundation of Employee Benefit Plans, 1999.
The Handbook of Fixed Income Securities, Fabozzi, Frank J., 1991

The Russell Indices®, TM, SM are trademarks/service marks of the Frank Russell Company.

Throughout this report, numbers may not sum due to rounding.

Returns for periods greater than one year are annualized throughout this report.

Values shown are in millions of dollars, unless noted otherwise.

ATTACHMENT B:

Oakland Police and Fire System Actuarial Valuation Report

Classic Values, Innovative Advice

Celebrating 20 years

Oakland Police and Fire Retirement System

Actuarial Valuation Report as of July 1, 2022

Produced by Cheiron

December 2022

TABLE OF CONTENTS

December 6, 2022

City of Oakland Police and Fire
Retirement System Board
150 Frank H. Ogawa Plaza
Oakland, CA 94612

Dear Members of the Board:

At your request, we have conducted an actuarial valuation of the Oakland Police and Fire Retirement System (PFRS, the Plan) as of July 1, 2022. This report contains information on the Plan's assets and liabilities. This report also discloses the employer contributions in accordance with the funding agreement between the City of Oakland and PFRS, based on the current financial status of the Plan. Your attention is called to the Foreword in which we refer to the general approach employed in the preparation of this report.

The purpose of this report is to present the results of the annual actuarial valuation of the Plan. This report is for the use of the Retirement Board and the auditors in preparing financial reports in accordance with applicable law and accounting requirements. Other users of this report are not intended users as defined in the Actuarial Standards of Practice, and Cheiron assumes no duty or liability to such other users.

The assumptions used in this report were adopted by the Board of Administration with our input at the February 28, 2018 Board meeting based on recommendations from our experience study covering plan experience for the period from July 1, 2014 through June 30, 2017. We believe these assumptions are reasonable for the purpose of the valuation.

The funding ratios in this report are for the purpose of establishing contribution rates. These measures are not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.

Cheiron utilizes ProVal actuarial valuation software leased from Winklevoss Technologies (WinTech) to calculate liabilities and project benefit payments. We have relied on WinTech as the developer of ProVal. We have a basic understanding of ProVal and have used ProVal in accordance with its original intended purpose. We have not identified any material inconsistencies in assumptions or output of ProVal that would affect this valuation.

Deterministic projections in this valuation report were developed using P-scan, a proprietary tool used to illustrate the impact of changes in assumptions, methods, plan provisions, or actual experience (particularly investment experience) on the future financial status of the Plan. P-scan uses standard roll-forward techniques. Because P-scan does not automatically capture how changes in one variable affect all other variables, some scenarios may not be consistent.

Stochastic projections in this valuation report were developed using R-scan, our proprietary tool for assessing the probability of different outcomes based on a range of potential investment returns. We relied on Cheiron colleagues for the development of the model. The stochastic projections of investment returns assume that each future year's investment return is independent from all other years and is identically distributed according to a lognormal distribution. The standard deviation used in the stochastic projection of investment returns was provided by the Plan's investment consultant.

Future actuarial measurements may differ significantly from the current measurements due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; and changes in plan provisions or applicable law.

This report and its contents have been prepared in accordance with generally recognized and accepted actuarial principles and practices and our understanding of the Code of Professional Conduct and applicable Actuarial Standards of Practice set out by the Actuarial Standards Board as well as applicable laws and regulations. Furthermore, as credentialed actuaries, we meet the Qualification Standards of the American Academy of Actuaries to render the opinion contained in this report. This report does not address any contractual or legal issues. We are not attorneys, and our firm does not provide any legal services or advice.

Sincerely,
Cheiron

Graham Schmidt

Graham A. Schmidt, ASA, EA, FCA, MAAA
Consulting Actuary

Timothy S. Doyle

Timothy S. Doyle, ASA, EA, MAAA
Associate Actuary

FOREWORD

Cheiron has performed the actuarial valuation of the Oakland Police and Fire Retirement System (PFRS, the Plan) as of July 1, 2022. The valuation is organized as follows:

- In Section I, the **Executive Summary,** we describe the purpose of an actuarial valuation, summarize the key results found in this valuation, and disclose important trends.

- The **Main Body** of the report presents details on the Plan's

  - Section II – Identification and Assessment of Risks
  - Section III – Assets
  - Section IV – Liabilities
  - Section V – Contributions
  - Section VI – Head Count and Benefit Payment Projections

- In the **Appendices**, we conclude our report with detailed information describing plan membership (Appendix A), actuarial assumptions and methods employed in the valuation (Appendix B), a summary of pertinent plan provisions (Appendix C), and a glossary of key actuarial terms (Appendix D).

The results of this report rely on future experience conforming to the underlying assumptions. To the extent that actual plan experience deviates from the underlying assumptions, the results would vary accordingly.

In preparing our report, we relied on information (some oral and some written) supplied by the Plan's staff. This information includes, but is not limited to, plan provisions, employee data, and financial information. We performed an informal examination of the obvious characteristics of the data for reasonableness and consistency in accordance with Actuarial Standard of Practice No. 23.

SECTION I – EXECUTIVE SUMMARY

The primary purpose of the actuarial valuation and this report is to measure, describe, and identify the following as of the valuation date:

- The financial condition of the Plan,
- Past and expected trends in the financial progress of the Plan,
- Calculation of the actuarially determined contributions for years beginning in Fiscal Year 2023-2024, and
- An assessment and disclosure of key risks.

In the balance of this Executive Summary, we present (A) the basis upon which this year's valuation was completed, (B) the key findings of this valuation including a summary of all key financial results, (C) an examination of the historical trends, and (D) the projected financial outlook for the Plan.

A. Valuation Basis

This valuation estimates the projected employer contributions in accordance with the funding agreement dated July 1, 2012 between the City of Oakland and the PFRS. Based on that agreement, employer contributions were suspended until fiscal year 2017-2018, at which time they resumed at a level based upon the recommendation of the actuary. Section V of this report shows the development of the employer contribution for fiscal year 2023-2024.

The Plan's funding policy is to contribute an amount equal to the sum of:

- The normal cost under the Entry Age Normal Cost Method (which is zero, as there are no active members),
- Amortization of the Unfunded Actuarial Liability, and
- The Plan's expected administrative expenses.

This valuation was prepared based on the plan provisions shown in Appendix C. There have been no changes in plan provisions since the prior valuation.

A summary of the assumptions and methods used in the current valuation is shown in Appendix B. There have been no changes to the actuarial assumptions or methods since the prior valuation, with the exception that we have modified the percentage of disabled deaths assumed to be duty related and the associated survivor benefit percentage.

B. Key Findings of this Valuation

The key results of the July 1, 2022 actuarial valuation are as follows:

- The actuarially determined employer contribution amount for Fiscal Year 2023-2024 is $40.8 million, based on projecting the Actuarial Liabilities and the Actuarial Value of Assets to the end of the 2022-2023 Fiscal Year. This represents an increase of $10.0 million from the estimated amount in the prior valuation for the same Fiscal Year. The contribution is assumed to be paid in equal installments throughout the year, or on average at approximately January 1, 2024.

- During the year ended June 30, 2022, the return on Plan assets was -10.56% on a market value basis net of investment expenses, as compared to the 6.00% assumption for the 2021-2022 Plan year. This resulted in a market value loss on investments of $75.2 million. The Actuarial Value of Assets (AVA) is calculated as the expected AVA plus 20% of the difference between the market value and the expected AVA, which is restricted to be between 90% and 110% of the MVA. This smoothed value of assets returned 4.70%, for an actuarial asset loss of $5.3 million.

- The Plan experienced a gain on the Actuarial Liability of $1.8 million, the net result of changes in the population and changes in benefits. The primary factor was an excess of deaths above the number expected. Combining the liability gain and asset loss, the Plan experienced a total loss of $3.5 million.

- New Memorandums of Understanding (MOUs) went into effect for both Fire and Police members since the previous valuation, changing the retirees' Cost-of-Living Adjustments (COLAs). This change in COLAs increased the Fire Actuarial Liability by $6.8 million since the scheduled increases under the new MOUs were higher than the amounts originally assumed, in aggregate, while the Police Actuarial Liability decreased by $1.4 million due to the new MOUs increasing benefits less than originally assumed.

- The assumption that 30% of all disabled retiree deaths were duty-related was removed. This change decreased the Actuarial Liability by $3.9 million.

- The Plan's smoothed funded ratio, the ratio of Actuarial Value of Assets over Actuarial Liability, increased from 72.2% last year to 76.5% as of June 30, 2022.

- The Plan's funded ratio decreased from 80.2% to 72.6% on a Market Value of Assets (MVA) basis.

- The Unfunded Actuarial Liability (UAL) is the excess of the Plan's Actuarial Liability over the Actuarial Value of Assets. The Plan experienced a decrease in the UAL from $159.3 million to $130.2 million as of July 1, 2022.

SECTION I – EXECUTIVE SUMMARY

- Overall participant membership decreased compared to last year. 29 members died, 10 of whom had their benefits continue to a surviving spouse. In addition, 18 surviving beneficiaries died. There are no active members of the Plan.

- If the contribution were determined using a projected asset value based on the current market (i.e., non-smoothed) value of assets, the contribution for FY 2023-2024 would be $47.1 million. The contribution is larger than that determined using the projected AVA, because the current market value reflects the full amount of prior investment losses, while under the AVA projection, a portion of those losses are deferred until years after FY 2023-2024.

Below we present Table I-1 that summarizes all the key results of the valuation with respect to membership, assets and liabilities, and contributions. The results are presented and compared for both the current and prior plan year.

Table I-1
Summary of Principal Plan Results
($ in thousands)

	July 1, 2021	July 1, 2022	% Change
Participant Counts			
Active Participants	0	0	
Participants Receiving a Benefit	723	686	-5.1%
Total	**723**	**686**	**-5.1%**
Total Annual Benefits	$ 78,806	$ 81,463	3.4%
Assets and Liabilities			
Actuarial Liability (AL)	$ 571,942	$ 552,966	-3.3%
Actuarial Value of Assets (AVA)	412,680	422,762	2.4%
Unfunded Actuarial Liability (UAL)	$ 159,262	$ 130,204	-18.2%
Funded Ratio (AVA)	72.2%	76.5%	4.3%
Funded Ratio (MVA)	80.2%	72.6%	-7.6%
Contributions			
Employer Contribution (FY2022-23)	$ 32,712	N/A	
Employer Contribution (FY2023-24)	$ 30,803	$ 40,763	32.3%

SECTION I – EXECUTIVE SUMMARY

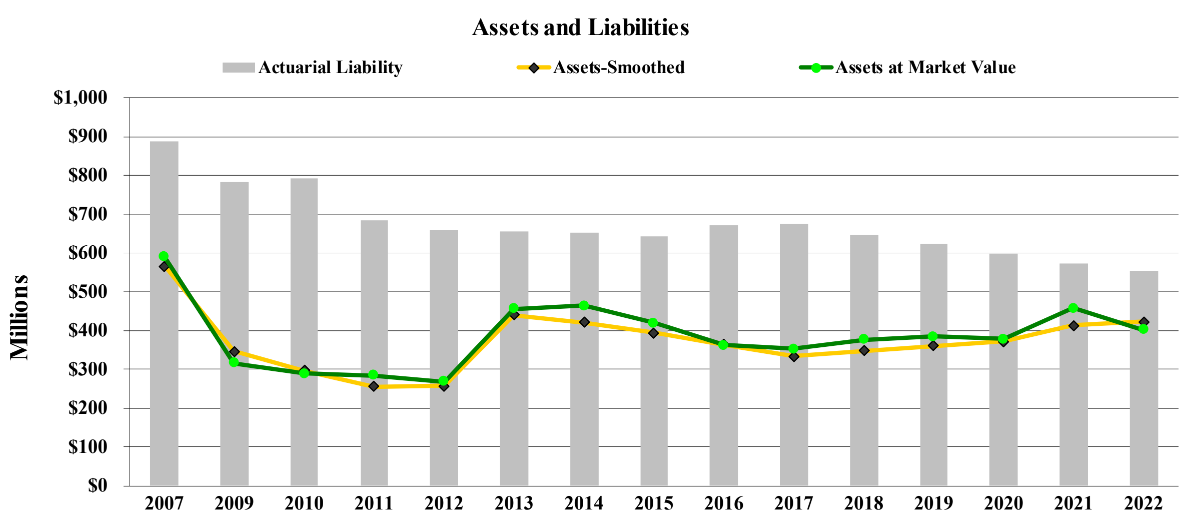
C. Historical Trends

Despite the fact that for most retirement plans the greatest attention is given to the current valuation results and in particular, the size of the current Unfunded Actuarial Liability and the employer contribution, it is important to remember that each valuation is merely a snapshot in the long-term progress of a pension fund. It is more important to judge a current year's valuation results relative to historical trends, as well as trends expected into the future.

Assets and Liabilities

The chart below compares the Market Value of Assets (MVA) and Actuarial Value of Assets (AVA) to the Actuarial Liabilities. The percentages shown in the table below the chart are the ratios of the Actuarial Value of Assets to the Actuarial Liability (the funded ratio). We note that for the GASB disclosure report, this ratio is disclosed using the MVA.

The funded ratio declined from 63.7% in 2007 to 37.5% in 2011 due to negative market returns and no contributions being made in that period ($417 million in proceeds from a POB were deposited in 1997 that acted as prepayments for 15 years of contributions). The funded ratio increased between 2012 and 2013 due to a $210 million contribution in July 2012. The funded ratio decreased from 67.2% to 49.5% between 2013 and 2017 due to assumption changes, liability losses, new Police MOUs, and the lack of contributions since the July 2012 payment. The funded ratio has increased from 49.5% to 76.5% over the past five years due to recommencement of contributions, the FYE 2021 asset gain, and to a lesser extent other asset and liability gains and assumption changes.

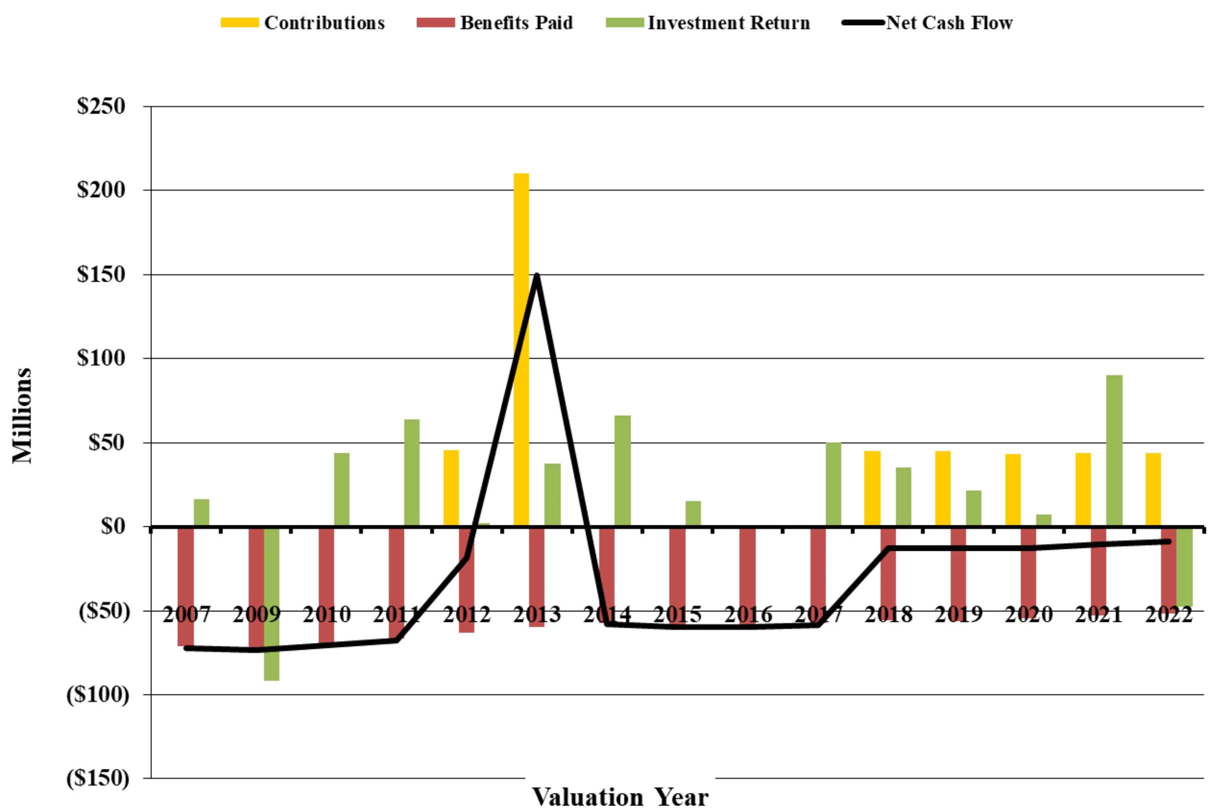


Valuation Year	2007	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2022
AVA Funded Ratio	63.7%	44.4%	37.6%	37.5%	39.1%	67.2%	64.6%	61.4%	54.0%	49.5%	53.7%	58.0%	62.2%	76.5%
UAL (Millions)	$ 322.1	$ 435.3	$ 494.4	$ 426.8	$ 401.1	$ 215.0	$ 230.2	$ 247.5	$ 309.4	$ 340.1	$ 299.8	$ 261.8	$ 225.5	$ 130.2

SECTION I – EXECUTIVE SUMMARY

Cash Flows

The chart below shows the Plan's cash flow, excluding investment returns (i.e., contributions less benefit payments and expenses). This is a critical measure, as it reflects the ability to have funds available to meet benefit payments without having to make difficult investment decisions, especially during volatile markets.



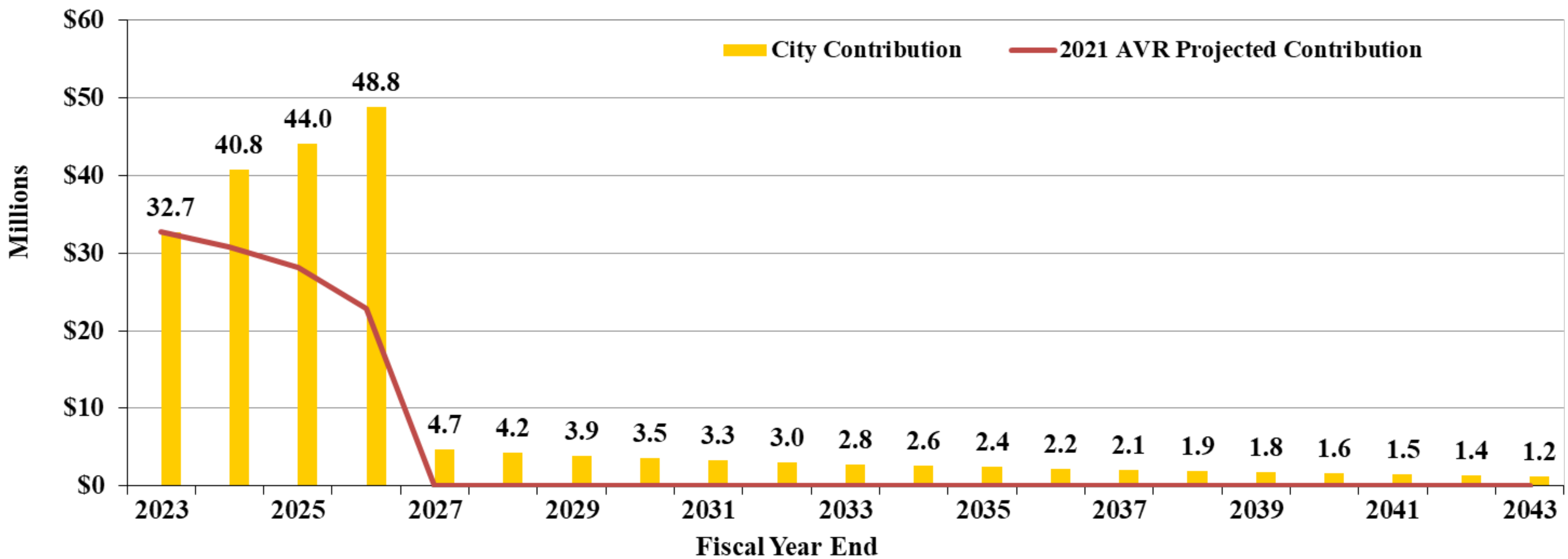
The contributions, benefit payments, investment returns, and Net Cash Flow (NCF) excluding investment returns and related investment expenses are represented by the scale on the left. The Plan's net cash flow has been negative 14 of the last 15 fiscal years, primarily due to the lack of contributions except in 2013 and in the most recent four years. Even with the recommencing of contributions under the Plan's funding policy, benefit payments exceeded contributions for the prior four years, with a negative cash flow rate of around 2-3% of plan assets per year.

A negative cash flow magnifies the losses during a market decline, hindering the Plan in its ability to absorb market fluctuations. The implications of a plan in negative cash flow are that the impact of market fluctuations can be more severe: as assets are being depleted to pay benefits in down markets, there is less principal available to be reinvested during favorable return periods. The Plan is expected to have a growing negative cash flow position going forward, since the Plan is closed and the assets are expected to decline as the remaining benefits are paid out.

D. Future Expected Financial Trends

The analysis of projected financial trends is perhaps the most important component of this valuation. In this section, we present our assessment of the implications of the July 1, 2022 valuation results in terms of benefit security (assets over liabilities) and contribution levels. All the projections in this section are based on the assumption that the Plan will exactly achieve the assumed rate of return each year (6.0% per year until 2027, then trending down to an annual return of 3.25% over 10 years).

Projection of Employer Contributions



The above graph shows a projection of the City's required contributions compared to the same projections from last year's report. The City's required contribution increased from $32.7 million in fiscal year 2023 to $40.8 million in fiscal year 2024, and then is expected to increase by about $3 million next year and by almost $5 million the year after as the current unfunded liability is fully amortized and recent asset losses are recognized. This assumes that the annual payments by the City will equal the administrative expenses, plus

SECTION I – EXECUTIVE SUMMARY

an amount needed to amortize the remaining unfunded liability as a level percentage of overall Safety payroll by July 1, 2026, as is required under the City's charter.

After July 1, 2026, the UAL is expected to be fully amortized, and the contribution would generally be equal to the administrative expense, beginning in 2026-2027. However, under the current asset smoothing method there are still expected to be some deferred asset losses, which will not be recognized until after 2026; the deferred recognition of these losses is expected to result in a low level of additional contributions in addition to the administrative expenses in the final years of the graph on the previous page.

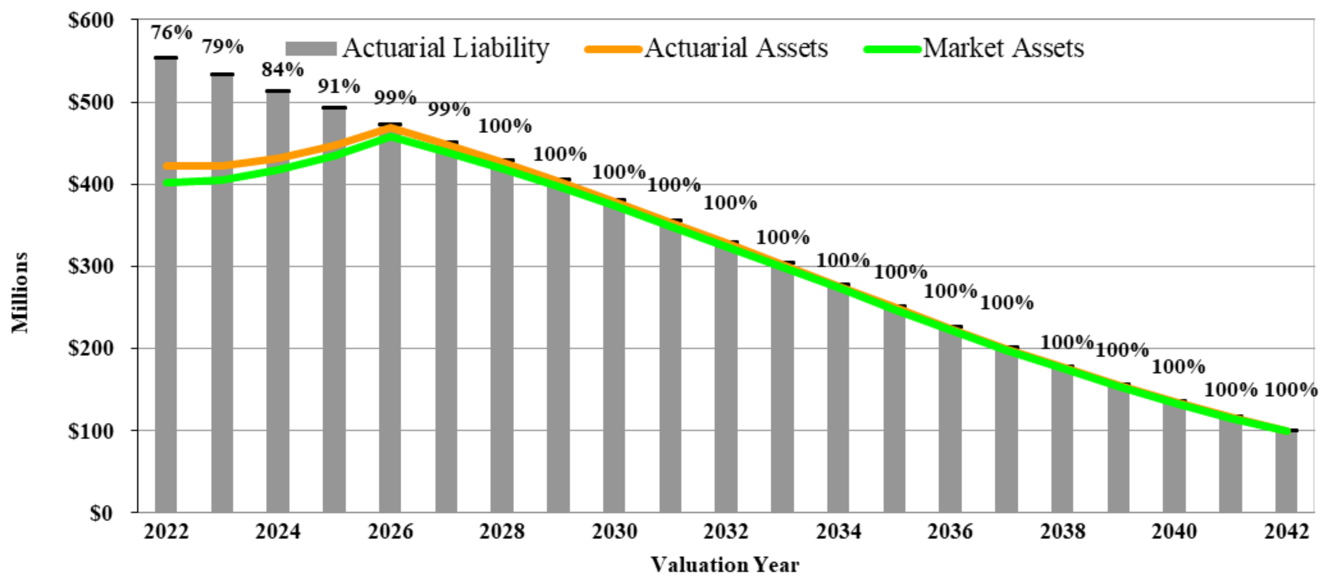
Note that the graph on the previous page does not forecast any future actuarial gains or losses or changes to the amortization policy. Even relatively modest losses could push the employer contribution over $50 million in the next few years. We also note that the occurrence of any future gains or losses in the years leading up to or following the required full amortization date (July 1, 2026) may require a reconsideration of the funding policy for those gains or losses, as otherwise these changes would need to be recognized over an extremely short period.

SECTION I – EXECUTIVE SUMMARY

Asset and Liability Projections:

The following graph shows the projection of assets and liabilities, assuming that assets will earn the assumed rate of return each year during the projection period.

Projection of Assets and Liabilities



The graph shows that the projected funded status increases as the current unfunded liability is fully amortized, assuming all actuarial assumptions are met. Once the Plan is projected to reach 100% funding, both the assets and liabilities are expected to decline as the Plan continues to pay out benefits to the remaining members.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS

Actuarial valuations are based on a set of assumptions about future economic and demographic experience. These assumptions represent a reasonable estimate of future experience, but actual future experience will undoubtedly be different and may be significantly different. This section of the report is intended to identify the primary risks to the plan, provide some background information about those risks, and provide an assessment of those risks.

Identification of Risks

The fundamental risk to a pension plan is that the contributions needed to pay the benefits become unaffordable. While the Plan cannot determine on its own what contribution level is unaffordable, we can project expected contributions and illustrate the potential impact of key sources of risk on those contribution rates so the City can assess affordability. While there are a number of factors that could lead to contribution amounts becoming unaffordable, we believe the primary sources are:

- Investment risk,
- COLA risk,
- Longevity risk, and
- Contribution risk.

Other risks that we have not identified may also turn out to be important.

Investment Risk is the potential for investment returns to be different than expected. Lower investment returns than anticipated will increase the Unfunded Actuarial Liability, necessitating higher contributions in the future unless there are other gains that offset these investment losses. In contrast, higher investment returns than anticipated may create a potentially significant surplus that could be difficult to use until all benefits have been paid. Expected future investment returns and their potential volatility are determined by the Plan's asset allocation.

COLA Risk is the potential for future COLAs to increase contributions. Retirement allowances are based on the pensionable compensation attached to the average rank held during the three years immediately preceding retirement. Cost-of-living adjustments are therefore based on salary increases for current employees with the retiree's same rank at retirement. Salary increases less than or greater than those assumed cause gains or losses, respectively. COLA increases different from those expected over the last 10 years are reflected in the "MOU Changes" column in the chart on the next page.

Longevity risk is the potential for mortality experience to be different than expected. Generally, longevity risk emerges slowly over time and is often exceeded by other changes, particularly those due to investment returns. However, for a closed plan such as PFRS, the mortality experience will have a significant impact on future cash flows. The chart on the next page shows the liability gains and losses over the last 10 years compared to the total change in the UAL for each year, a portion of which is associated with mortality experience.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS

Contribution risk is the potential for actual future actuarially determined contributions to deviate from expected future contributions. The City Charter sets the Plan's contribution policy. It requires the unfunded liability of the plan to be fully amortized by June 30, 2026. The Actuarially Determined Contribution (ADC) is based on a short remaining amortization period. As a result, a significant loss or change in assumptions may cause a large increase in the ADC.

The table below shows a 10-year history of changes in the UAL by source.

Table II-1
UAL Change by Source
($ in Thousands)

FYE	MOU Changes	Assumption Changes	Contributions vs. Tread Water	Investments	Liability Experience	Total UAL Change
2013	$ 4,091	$ 0	$ (188,922)	$ (3,803)	$ 2,592	$ (186,042)
2014	0	30,598	15,146	(10,729)	(19,869)	15,147
2015	0	0	17,023	(6,171)	6,522	17,374
2016	43,480	0	15,033	486	2,830	61,829
2017	0	22,730	22,888	(4,958)	(9,959)	30,702
2018	(1,475)	0	(24,214)	(7,128)	(7,467)	(40,284)
2019	(7,173)	0	(26,691)	(5,919)	1,797	(37,986)
2020	(6,541)	0	(27,417)	(1,877)	(417)	(36,252)
2021	0	0	(29,775)	(29,872)	(6,637)	(66,284)
2022	5,389	(3,926)	(34,056)	5,319	(1,784)	(29,059)
Total	**$ 37,771**	**$ 49,402**	**$ (260,983)**	**$ (64,652)**	**$ (32,392)**	**$ (270,854)**

The UAL was reduced by approximately $270.9 million over the last ten years. Contributions in excess of the "tread water" level (i.e., interest on the UAL plus administrative expenses) reduced the UAL by $261.0 million, liability experience reduced the UAL by $32.4 million, and investment returns decreased the UAL by $64.7 million. Meanwhile changes to MOUs increased the UAL by $37.8 million and assumption changes increased the UAL by $49.4 million.

Plan Maturity Measures

The future financial condition of a mature pension plan is more sensitive to each of the risks identified above than a less mature plan. Before assessing each of these risks, it is important to understand the maturity of the plan.

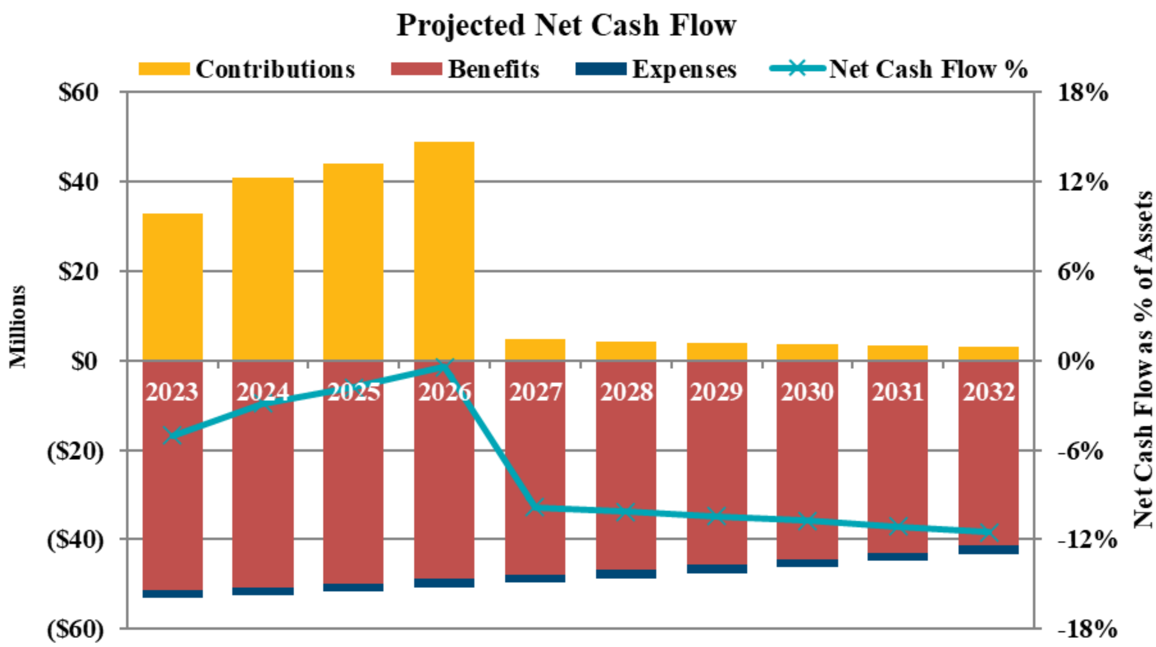
Plan maturity can be measured in a variety of ways, but they all get at one basic dynamic – the larger the plan is compared to the contribution or revenue base that supports it; the more sensitive the plan will be to risk. Given that the Plan has been closed to new entrants since 1976 with no remaining active members, the Plan considered as a standalone entity is very mature, though because of the diminishing benefit cash flows it is expected to have a declining impact on overall City finances.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS

Net Cash Flow

The net cash flow of the plan as a percentage of the beginning of year assets indicates the sensitivity of the plan to short-term investment returns. Net cash flow is equal to contributions less benefit payments and administrative expenses. Mature plans can have large amounts of benefit payments compared to contributions, particularly if they are well funded.

The chart below shows the projected net cash flow for the next 10 fiscal years. The bars represent the dollar amounts of the different components of the projected net cash flow, and the line represents the net cash flow as a percentage of the assets as of the beginning of the fiscal year.



The Plan's contributions are expected to drop significantly following the 2025-2026 Fiscal Year once the unfunded liability has been paid off, with the exception of some residual losses resulting from the current asset smoothing policy. Beyond that point, the negative net cash flows are expected to continue until all benefits are paid.

The first issue this change presents to the Plan is a need for liquidity in the investments so that benefits can be paid. When the cash flow was positive or close to neutral, benefits could be paid out of contributions without liquidating investments. As net cash flow becomes increasingly negative, the benefit payments will require liquidation of some investments.

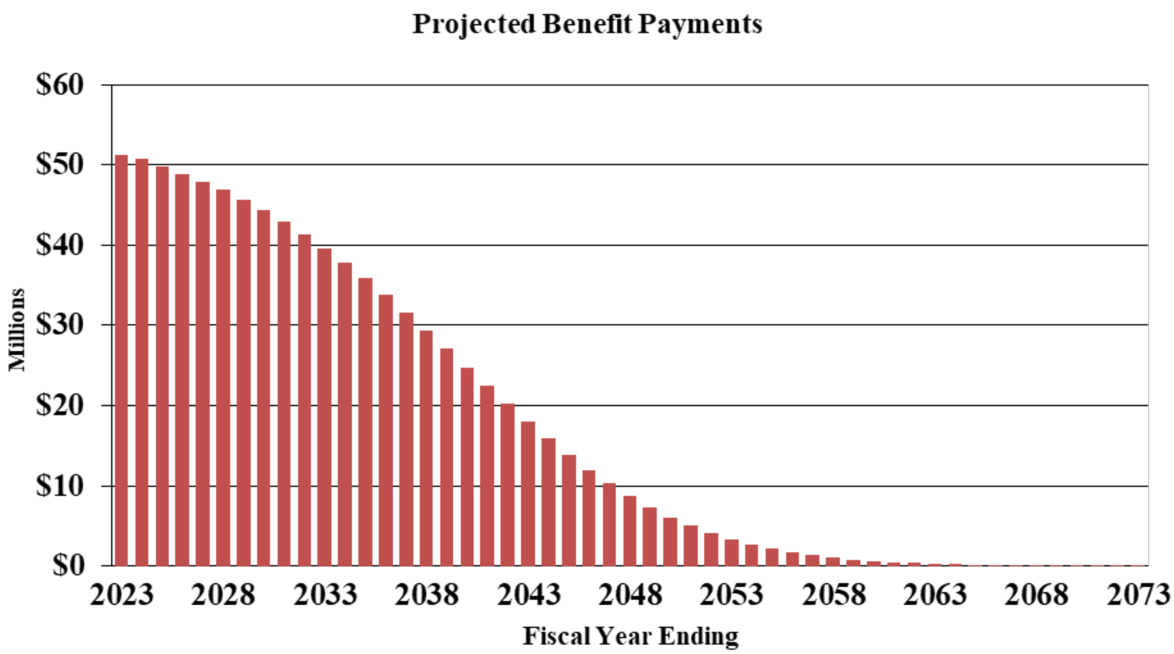
The other change of note is the sensitivity to short-term investment returns. Investment losses in the short term are compounded by the net withdrawal from the plan leaving a smaller asset base to try to recover from the investment losses. On the other hand, large investment gains in the short term also tend to have a longer beneficial effect as any future losses are relative to a smaller liability base due to the negative cash flow.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS

Assessing Costs and Risks

A closed pension plan will ultimately either end up with excess assets after all benefits have been paid or run out of assets before all benefits have been paid. The declining investment return assumption adopted by the Board implies an expectation the Plan will pursue a strategy of de-risking the Plan to minimize the impact of these scenarios, potentially by reducing the risk in its investment portfolio, immunizing investments, and/or purchasing annuities to settle the remaining obligation.

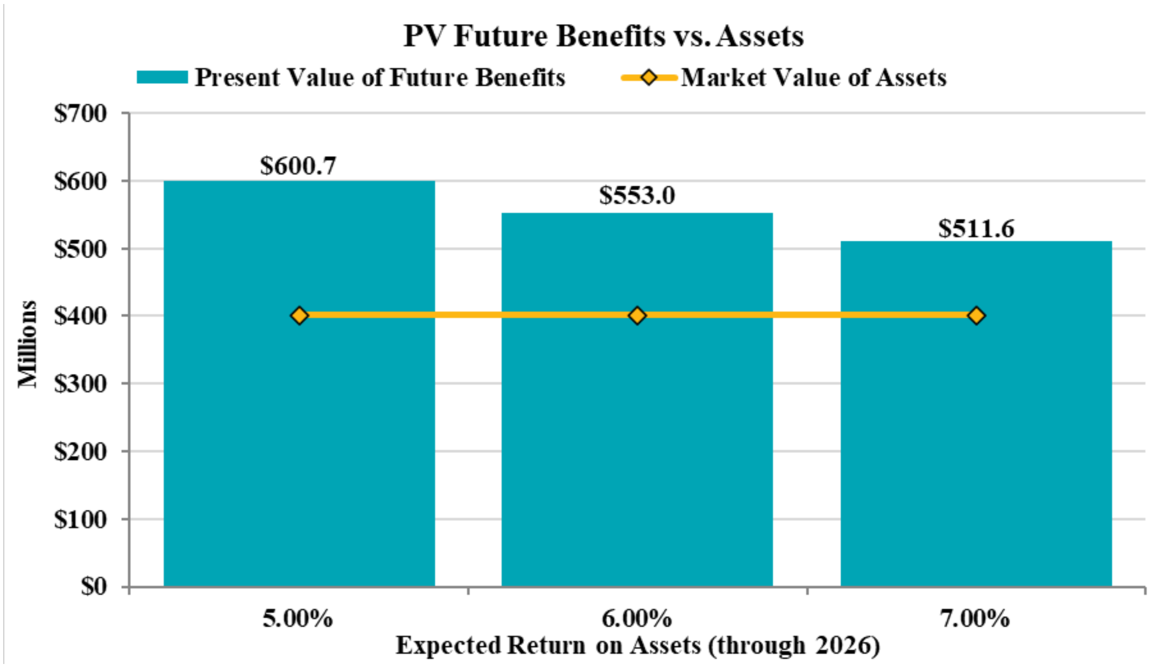
However, even if the Plan were to run out of assets, PFRS would be forced to pay benefits directly on a pay-as-you-go basis. As long as PFRS (and the City) can afford the pay-as-you-go costs, benefits would remain secure. The chart below shows a projection of expected benefit payments for the closed plan.



Sensitivity to Investment Returns

The chart on the next page compares assets to the present value of all projected future benefits discounted at the current expected rates of return – starting at 6.00% through 2026 and trending down to 3.25% over the following 10 years – and at investment returns 100 basis points above and below the expected rates of return for all years. The present value of future benefits is shown as a teal bar and the Market Value of Assets is shown by the gold line.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS



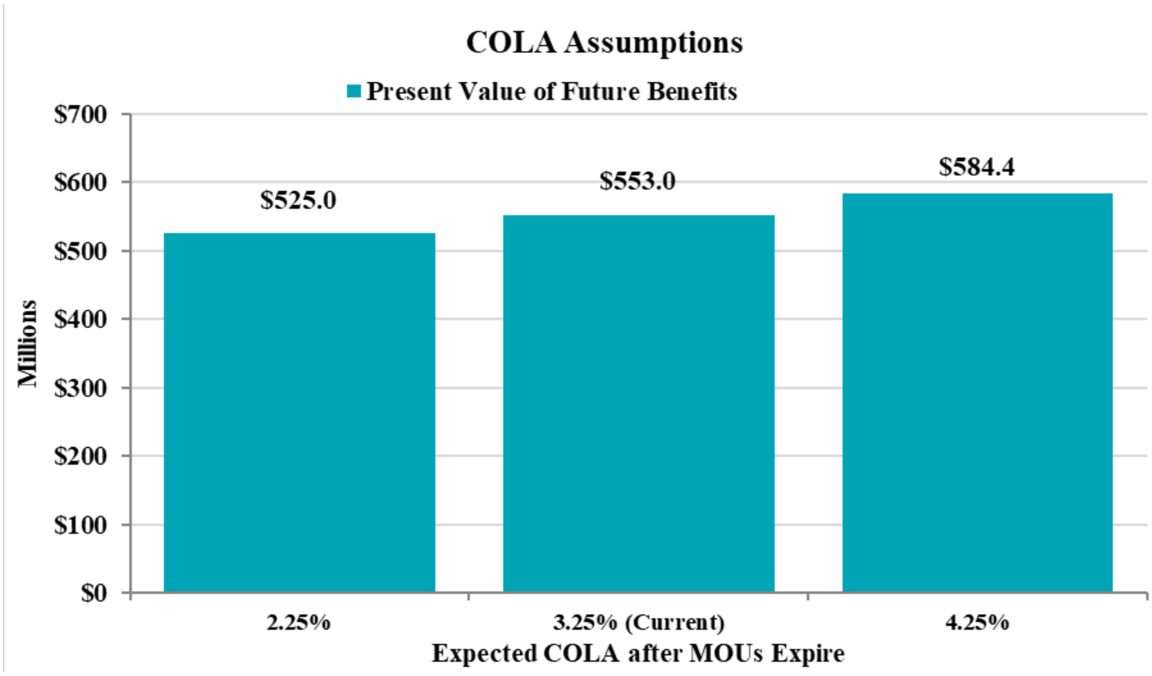
If actual investment returns meet the expected returns annually, the Plan would need approximately $553 million in assets today to pay all projected benefits compared to current assets of $401 million. If investment returns are 100 basis points lower each year, the Plan would need approximately $601 million in assets today, and if investment returns are 100 basis points higher, the Plan would need approximately $512 million in assets today.

Sensitivity to COLA Changes

The present value of future benefits shown above assumes annual COLA increases of 3.25% per year once the current MOUs have expired. If COLA inflation is higher (because of higher-than-expected increases in the salaries of active employees); more assets would be needed to pay the benefits, and if COLA inflation is lower; fewer assets would be needed to pay benefits.

The chart on the next page shows the present value of all projected future benefits (discounted using the current expected rates of return) based on annual COLA increases of 3.25% per year once the current MOUs have expired – and at COLA increases 100 basis points above and below the current COLA assumptions.

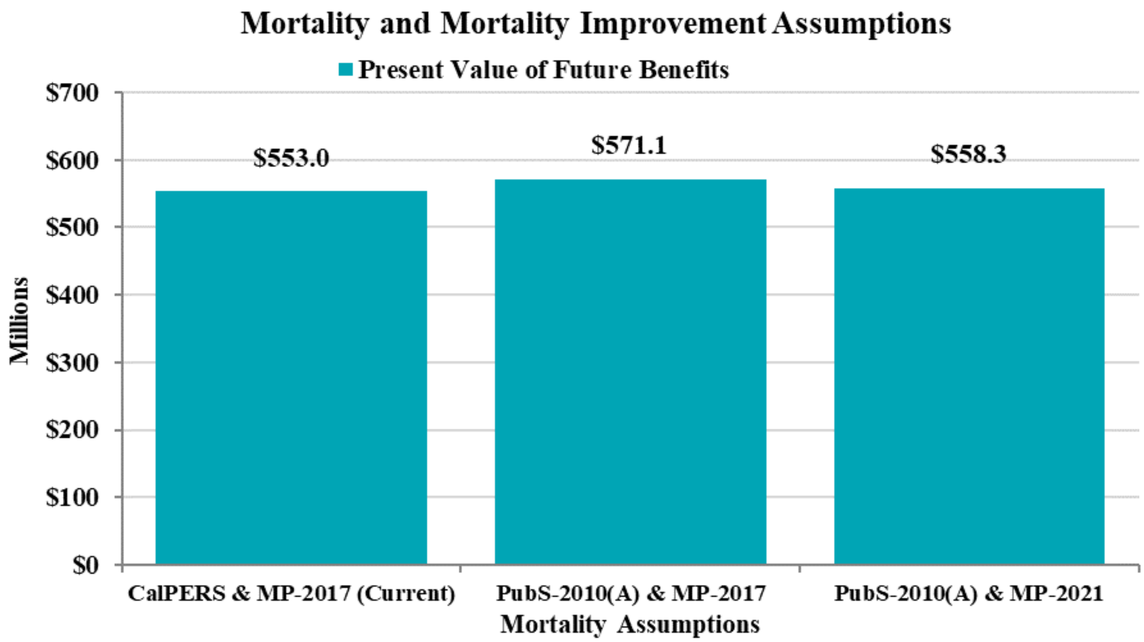
SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS



Sensitivity to Mortality Assumption Changes

The following chart on the next page shows the sensitivity of the Plan to longevity / mortality experience. In the first bar, we have shown the present value of benefits using the Plan's current mortality assumptions (i.e., using the 2017 CalPERS mortality assumptions, with projections for generational improvements using the Society of Actuary's MP-2017 improvement scales). In the second bar, we have shown the impact on the present value of benefits if actual longevity experience follows an alternative set of assumptions, reflecting more recent tables that have been developed using the experience of Public Safety employees of U.S. public employers. In the third bar, we have shown an additional alternative, using the Public Sector table described above, but also reflecting a slower rate of future improvements in longevity, as reflected by the Society of Actuary's latest improvement scale (MP-2021). As always, actual experience will drive costs, but this exhibit provides an example of the level of sensitivity of the Plan's liabilities to recent changes in outlooks on mortality.

SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS

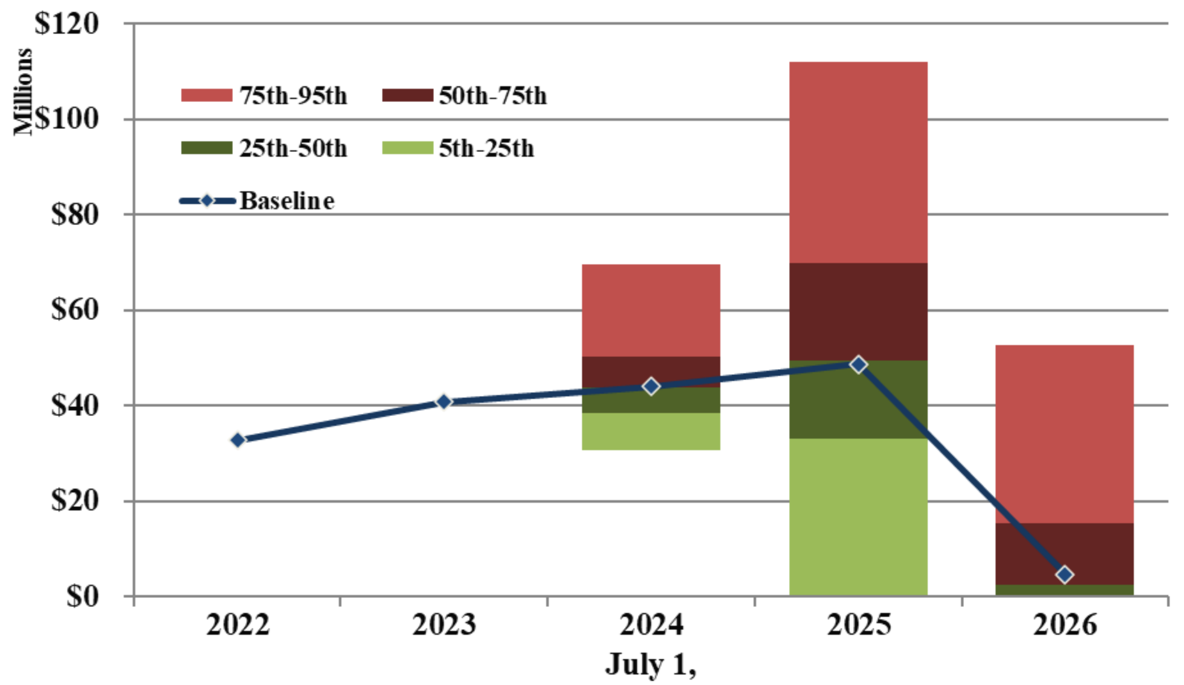


Stochastic Projections

The stochastic projections of contributions through the full funded date (June 30, 2026) in the chart on the following page shows a very wide range in future ADC's. This range is driven both by the volatility of investment returns (assumed to be 10.2% in these projections, based on previous information provided by Meketa) and by the short amortization period used to calculate the ADC. We note that if the Plan is required to remain fully funded after 2026, the contributions required will also vary widely.

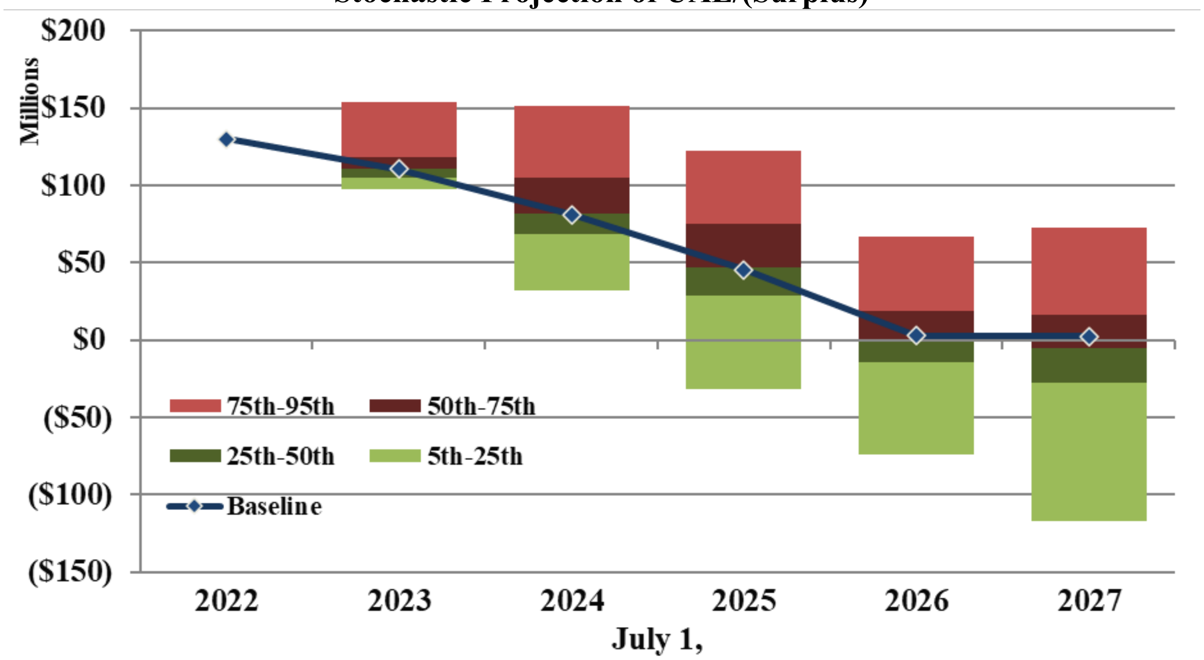
SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS

Stochastic Projection of Actuarially Determined Contribution (ADC)



The chart below shows the projection of the UAL through the full funding date. While the UAL is projected in the baseline to be essentially eliminated by 2026, because of the statutory requirement to fully fund the Plan by that time, there is still a wide range of potential outcomes.

Stochastic Projection of UAL/(Surplus)



SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS

More Detailed Assessment

A detailed assessment of risk would be valuable in understanding the risks identified above, especially given the closed nature of the plan. We encourage the Board to consider a more detailed analysis of some of the risks identified above, particularly for developing a funding strategy to deal with changes in the UAL after the required full funding date.

SECTION III – ASSETS

Pension Plan assets play a key role in the financial operation of the Plan and in the decisions the Board may make with respect to future deployment of those assets. The level of assets, the allocation of assets among asset classes, and the methodology used to measure assets will likely impact benefit levels, employer contributions, and the ultimate security of participants' benefits.

In this section, we present detailed information on Plan assets including:

- **Disclosure** of Plan assets as of June 30, 2021 and June 30, 2022,
- Statement of the **changes** in market values during the year, and
- Development of the **Actuarial Value of Assets**.

Disclosure

There are two types of asset values disclosed in the valuation, the Market Value of Assets and the Actuarial Value of Assets. The market value represents "snapshot" or "cash out" values, which provide the principal basis for measuring financial performance from one year to the next. Market values, however, can fluctuate widely with corresponding swings in the marketplace. As a result, market values are sometimes not as suitable for long-range planning as the Actuarial Value of Assets, which reflects smoothing of annual investment returns.

Table III-1 discloses and compares each component of the market asset value as of June 30, 2021 and June 30, 2022.

Table III-1
Statement of Assets at Market Value
June 30,
(in thousands)

		2021		**2022**
Cash and Cash Equivalents	$	6,324	$	7,495
Receivables		2,462		6,219
Investments, at Fair Value		503,781		448,338
Total Assets	$	512,567	$	462,051
Liabilities		54,034		60,564
Market Value of Assets	**$**	**458,533**	**$**	**401,487**

SECTION III – ASSETS

Table III-1
Statement of Assets at Market Value
June 30,
(in thousands)

	2021	2022
Cash and Cash Equivalents:	$ 6,324	$ 7,495
Receivables:		
Interest Receivable	$ 759	$ 813
Dividends Receivable	272	280
Investments Receivable	1,221	4,912
Retired Members and Beneficiaries	104	103
Miscellaneous	107	111
Total Receivables	2,462	6,219
Investments, at Fair Value:		
Short-term Investments	7,787	7,474
Bonds	134,381	130,127
Domestic Equities and Mutual Funds	210,506	158,145
International Equities and Mutual Funds	58,540	47,911
Alternative Investments	44,016	56,335
Securities Lending Collateral	48,551	48,346
Total Investments	503,781	448,338
Total Assets	512,567	462,051
Liabilities:		
Accounts Payable	1	3
Benefits Payable	4,295	4,184
Investments Payable	423	7,701
Accrued Investment Management Fees	361	301
Securities Lending Liabilities	48,954	48,376
Total Liabilities	54,034	60,564
Market Value of Assets	**$ 458,533**	**$ 401,487**

Changes in Market Value

The components of asset change are:

- Contributions (employer and employee),
- Benefit payments,
- Administrative Expenses, and
- Investment income (realized and unrealized, net of investment expenses).

Table III-2 below shows the components of a change in the Market Value of Assets during 2021 and 2022.

Table III-2
Changes in Market Values
June 30,
(in thousands)

	2021	2022
Contributions		
Contributions of Plan Members	$ 0	$ 0
Contributions from the City	43,648	43,820
Total Contributions	43,648	43,820
Investment Income		
Miscellaneous Income	1	0
Investment Income	90,191	(47,955)
Total Investment Income	90,192	(47,955)
Disbursements		
Benefit Payments	(52,697)	(51,450)
Administrative Expenses	(1,585)	(1,461)
Total Disbursements	(54,282)	(52,911)
Net increase (Decrease)	79,558	(57,045)
Net Assets Held in Trust for Benefits:		
Beginning of Year	378,975	458,533
End of Year	$ 458,533	$ 401,487
Approximate Return	24.14%	-10.56%

Actuarial Value of Assets (AVA)

The Actuarial Value of Assets represents a "smoothed" value developed by the actuary to reduce the volatile results, which could develop due to short-term fluctuations in the Market Value of Assets. For this Plan, the Actuarial Value of Assets is calculated on a modified market-related value. The Actuarial Value of Assets recognizes one-fifth of the difference between the expected asset value (based on the 6.00% return assumption from 2021-2022) and the actual market value each year. The actuarial value is restricted to fall between 90% and 110% of the market value.

Table III-3
Development of Actuarial Value of Assets
(in thousands)

1. Calculate Expected Actuarial Value of Assets	
a. Value of Actuarial Value of Assets - July 1, 2021	$ 412,680
b. Total Contributions and Misc Income	43,820
c. Administrative Expense	(1,461)
d. Benefit Payments	(51,450)
e. Expected Investment Earnings	24,492
f. Expected Actuarial Value of Assets - July 1, 2022 [1a + 1b + 1c + 1d + 1e]	$ 428,081
2. Calculate Final Actuarial Value of Assets	
a. Value of Market Value of Assets - July 1, 2022	$ 401,487
b. Excess of MVA over Expected AVA [2a - 1f]	(26,594)
c. Preliminary AVA [1f + 0.2 * 2b]	422,762
d. 90% of MVA [90% * 2a]	361,339
e. 110% of MVA [110% * 2a]	441,636
3. Final Actuarial Value of Assets [2c, not less than 2d or greater than 2e]	**$ 422,762**

Investment Performance

The following table calculates the investment related gain/loss for the plan year on both a market value and an actuarial value basis. The market value gain/loss is an appropriate measure for comparing the actual asset performance to the previous valuation's 6.00% assumption.

Table III-4
Asset Gain/(Loss)
(in thousands)

		Market Value		Actuarial Value
July 1, 2021 value	$	**458,533**	$	**412,680**
Contributions of Plan Members		0		0
Contributions from the City		43,820		43,820
Benefit Payments		(51,450)		(51,450)
Administrative Expenses		(1,461)		(1,461)
Expected Investment Earnings (6.00%)		27,243		24,492
Expected Value June 30, 2022	$	**476,685**	$	**428,081**
Investment Gain / (Loss)		(75,198)		(5,319)
July 1, 2022 value		**401,487**	$	**422,762**
Return		-10.56%		4.70%

SECTION IV – LIABILITIES

In this section, we present detailed information on Plan liabilities including:

- **Disclosure** of Plan liabilities on July 1, 2021 and July 1, 2022
- Statement of **changes** in these liabilities during the year

Disclosure

Several types of liabilities are typically shown in an actuarial valuation report. Each type is distinguished by the people ultimately using the figures and the purpose for which they are using them. Note that these liabilities are not applicable for settlement purposes, including the purchase of annuities and the payment of lump sums.

- **Present Value of Future Benefits:** Used for measuring all future Plan obligations, the obligations of the Plan earned as of the valuation date and those to be earned in the future by current plan participants under the current Plan provisions, if all assumptions are met.

- **Actuarial Liability:** Used for funding calculations, this liability is calculated taking the present value of future benefits and subtracting the present value of future normal costs under an acceptable actuarial funding method. Because the Plan has no active members, the Actuarial Liability is equal to the present value of future benefits (i.e., all benefits are fully accrued).

- **Unfunded Actuarial Liability:** The excess of the Actuarial Liability over the Actuarial Value of Assets.

Table IV-1 on the next page discloses each of these liabilities for the current and prior valuations.

SECTION IV – LIABILITIES

Table IV-1
Liabilities/Net (Surplus)/Unfunded
(in thousands)

	July 1, 2021	July 1, 2022
Present Value of Future Benefits		
Active Participant Benefits	$ 0	$ 0
Retiree and Inactive Benefits	571,942	552,966
Present Value of Future Benefits (PVB)	**$ 571,942**	**$ 552,966**
Actuarial Liability		
Present Value of Future Benefits (PVB)	$ 571,942	$ 552,966
Present Value of Future Normal Costs (PVFNC)	0	0
Actuarial Liability (AL = PVB – PVFNC)	**$ 571,942**	**$ 552,966**
Actuarial Value of Assets (AVA)	412,680	422,762
Net (Surplus)/Unfunded (AL – AVA)	**$ 159,262**	**$ 130,204**

SECTION IV – LIABILITIES

Changes in Liabilities

Each of the liabilities disclosed in the prior table is expected to change at each valuation. The components of that change, depending upon which liability is analyzed, can include:

- New hires since the last valuation (not applicable for this Plan)
- Benefits accrued since the last valuation (not applicable for this Plan)
- Plan amendments
- Passage of time which adds interest to the prior liability
- Benefits paid to retirees since the last valuation
- Participants retiring, terminating, dying, or receiving COLA adjustments at rates different than expected
- A change in actuarial or investment assumptions
- A change in the actuarial funding method or software

Unfunded liabilities will change because of all of the above and also due to changes in Plan assets resulting from:

- Employer contributions different than expected
- Investment earnings different than expected
- A change in the method used to measure plan assets

Table IV-2
Changes in Actuarial Liability
(in thousands)

Actuarial Liability at July 1, 2021	$ 571,942
Actuarial Liability at July 1, 2022	$ 552,966
Liability Increase (Decrease)	$ (18,976)
Change due to:	
Plan Design Changes (MOU)	$ 5,389
Assumption Change	(3,926)
Accrual of Benefits	0
Actual Benefit Payments	(51,450)
Interest	32,796
Data Corrections	0
Actuarial Liability (Gain)/Loss	$ (1,785)

SECTION IV – LIABILITIES

Table IV-3
Liabilities by Group as of July 1, 2022
(in thousands)

	Police	Fire	Total
Actuarial Accrued Liability			
Active	$ 0	$ 0	$ 0
Service Retirees	207,816	68,097	275,913
Disabled Retirees	75,297	74,886	150,183
Beneficiaries	72,859	54,011	126,870
Total Accrued Liability	$ 355,972	$ 196,994	$ 552,966

SECTION IV – LIABILITIES

Table IV-4
Development of Actuarial Gain / (Loss)
(in thousands)

1. Unfunded Actuarial Liability at Start of Year (not less than zero)	$	159,262
2. Employer Normal Cost at Start of Year		0
3. Interest on 1. and 2. to End of Year		9,556
4. Contributions and Miscellaneous Income for Prior Year		43,820
5. Administrative Expenses		(1,461)
6. Interest on 4. and 5. to End of Year		1,252
7. Change in Unfunded Actuarial Liability Due to Changes in Assumptions		(3,926)
8. Change in Unfunded Actuarial Liability Due to Changes in Actuarial Methods		0
9. Change in Unfunded Actuarial Liability Due to Changes in Plan Design		5,389
10. Change in Unfunded Actuarial Liability Due to Data Corrections		0
11. Expected Unfunded Actuarial Liability at End of Year [1. + 2. + 3. - 4. - 5. - 6. + 7. + 8. + 9. + 10.]	$	126,669
12. Actual Unfunded Actuarial Liability at End of Year (not less than zero)		130,204
13. Unfunded Actuarial Liability Gain / (Loss) [11. – 12.]	$	(3,535)

SECTION V – CONTRIBUTIONS

In the process of evaluating the financial condition of any pension plan, the actuary analyzes the assets and liabilities to determine what level (if any) of contributions is needed to properly maintain the funding status of the Plan. Typically, the actuarial process will use a funding technique that will result in a pattern of contributions that are both stable and predictable.

For this Plan, the actuarial funding method used to determine the normal cost and the Unfunded Actuarial Liability is the **Entry Age Normal Cost Method**.

The normal cost rate is determined with the normal cost percentage equal to the total projected value of benefits at entry age, divided by present value of future salary at entry age. Since there are no longer any active employees, the normal cost for this plan is $0.

The Unfunded Actuarial Liability is the difference between the EAN Actuarial Liability and the Actuarial Value of Assets. For the contribution projections, the UAL payment is based on the unfunded liability of the Plan being fully amortized by June 30, 2026, in accordance with the City Charter. Amortization payments are determined based on an assumption that payments will increase by 3.25% each year, reflecting the assumed ultimate rate of increase in overall City Safety member salaries.

An amount equal to the expected administrative expenses for the Plan is added directly to the actuarial cost calculation.

Table V-1 on the next page shows the employer contribution amount for the 2023-2024 Fiscal Year. The projected assets and liabilities assume that all actuarial assumptions are met and that contributions are made as expected between now and June 30, 2023.

For this calculation, we have shown the contribution amount using both the projected actuarial and Market Value of Assets. The current funding policy uses the AVA to determine the UAL and the associated amortization payment. We have included the contribution amount as determined using the current Market Value of Assets to demonstrate what the actuarial cost would be if all deferred asset gains were fully recognized at the time the contributions commence. In both cases, the contribution is based on an assumption that the investment returns will exactly equal the assumed rate of return during the 2022-2023 Fiscal Year.

SECTION V – CONTRIBUTIONS

Table V-1
Development of Projected 2023-2024 Employer Contribution Amount
(in thousands)

	Actuarial Value of Assets	Market Value of Assets
1. Value of Assets at June 30, 2022:	$ 422,762	$ 401,487
a. Expected Contributions and Misc Income	$ 32,712	$ 32,712
b. Expected Administrative Expense	$ (1,741)	$ (1,741)
c. Expected Benefit Payments	$ (51,056)	$ (51,056)
d. Expected Investment Earnings	$ 24,772	$ 23,495
2. Expected Value of Assets at June 30, 2023:	$ 427,450	$ 404,898
a. Excess of Expected MVA over Expected AVA	$ (22,551)	
b. Preliminary AVA [Expected AVA + 20% * 2a]	$ 422,939	
c. 90% of Expected MVA	$ 364,409	
d. 110% of Expected MVA	$ 445,388	
3. Final Expected AVA [2b, not less than 2c or greater than 2d]	$ 422,939	
4. Entry Age Liability at June 30, 2022	$ 552,966	$ 552,966
5. Expected Benefit Payments	$ (51,056)	$ (51,056)
6. Expected Interest	$ 31,669	$ 31,669
7. Expected Entry Age Liability at June 30, 2023	$ 533,579	$ 533,579
8. Projected Unfunded Actuarial Liability: (7) - (3)	$ 110,639	$ 128,680
9. Funded Ratio: (3) / (7)	79.3%	75.9%
10. Unfunded Actuarial Liability Amortization at Middle of Year as a Level Percentage of Payroll (3 Years Remaining) as of June 30, 2023	$ 38,972	$ 45,327
11. Expected Administrative Expenses for Fiscal 2023-2024	$ 1,790	$ 1,790
12. Total Contribution: (10) + (11)	$ 40,763	$ 47,118

SECTION VI – HEADCOUNT AND BENEFIT PAYMENT PROJECTIONS

Table VI-1
Benefit Payment and Headcount Projection

Fiscal Year Ending June 30,	Police Count	Police Benefits (in thousands)	Fire Count	Fire Benefits (in thousands)	Total Count	Total Benefits (in thousands)
2023	422.0	$ 31,316	264.0	$ 19,740	686.0	$ 51,056
2024	407.8	$ 31,170	251.9	$ 19,367	659.8	$ 50,537
2025	393.7	$ 30,824	239.6	$ 18,851	633.3	$ 49,675
2026	379.5	$ 30,421	227.2	$ 18,293	606.7	$ 48,714
2027	365.1	$ 30,027	214.9	$ 17,740	580.0	$ 47,766
2028	350.5	$ 29,557	202.7	$ 17,148	553.1	$ 46,705
2029	335.6	$ 29,005	190.6	$ 16,522	526.2	$ 45,527
2030	320.3	$ 28,363	178.7	$ 15,862	499.0	$ 44,225
2031	304.7	$ 27,625	167.0	$ 15,170	471.7	$ 42,795
2032	288.6	$ 26,785	155.5	$ 14,446	444.1	$ 41,231
2033	272.1	$ 25,842	144.2	$ 13,692	416.4	$ 39,534
2034	255.3	$ 24,795	133.1	$ 12,911	388.4	$ 37,706
2035	238.1	$ 23,649	122.3	$ 12,105	360.4	$ 35,754
2036	220.8	$ 22,411	111.7	$ 11,279	332.4	$ 33,690
2037	203.3	$ 21,089	101.4	$ 10,440	304.7	$ 31,530
2038	185.9	$ 19,699	91.4	$ 9,595	277.2	$ 29,295
2039	168.6	$ 18,256	81.8	$ 8,753	250.4	$ 27,008
2040	151.8	$ 16,778	72.6	$ 7,921	224.4	$ 24,699
2041	135.4	$ 15,285	63.9	$ 7,110	199.4	$ 22,395
2042	119.7	$ 13,801	55.8	$ 6,328	175.6	$ 20,128
2043	104.9	$ 12,344	48.3	$ 5,583	153.2	$ 17,927
2044	91.0	$ 10,935	41.5	$ 4,884	132.5	$ 15,819
2045	78.2	$ 9,591	35.3	$ 4,234	113.5	$ 13,825
2046	66.5	$ 8,326	29.7	$ 3,639	96.2	$ 11,966
2047	56.0	$ 7,153	24.8	$ 3,101	80.8	$ 10,254
2048	46.6	$ 6,081	20.5	$ 2,620	67.2	$ 8,701
2049	38.4	$ 5,115	16.8	$ 2,195	55.2	$ 7,310
2050	31.3	$ 4,259	13.7	$ 1,823	45.0	$ 6,082
2051	25.3	$ 3,509	11.0	$ 1,503	36.3	$ 5,013
2052	20.2	$ 2,863	8.8	$ 1,231	29.0	$ 4,094

SECTION VI – HEADCOUNT AND BENEFIT PAYMENT PROJECTIONS

Table VI-1
Benefit Payment and Headcount Projection (Continued)

Fiscal Year Ending June 30,	Police Count	Police Benefits (in thousands)	Fire Count	Fire Benefits (in thousands)	Total Count	Total Benefits (in thousands)
2053	15.9	$ 2,313	7.0	$ 1,001	22.9	$ 3,314
2054	12.5	$ 1,850	5.5	$ 809	18.0	$ 2,660
2055	9.7	$ 1,467	4.3	$ 650	14.0	$ 2,117
2056	7.4	$ 1,153	3.4	$ 520	10.8	$ 1,673
2057	5.7	$ 899	2.6	$ 413	8.3	$ 1,312
2058	4.3	$ 697	2.0	$ 326	6.3	$ 1,023
2059	3.2	$ 536	1.5	$ 257	4.7	$ 793
2060	2.4	$ 410	1.2	$ 201	3.6	$ 611
2061	1.8	$ 312	0.9	$ 157	2.7	$ 468
2062	1.3	$ 235	0.7	$ 121	2.0	$ 356
2063	1.0	$ 176	0.5	$ 92	1.4	$ 268
2064	0.7	$ 130	0.4	$ 70	1.1	$ 200
2065	0.5	$ 96	0.3	$ 52	0.8	$ 148
2066	0.4	$ 69	0.2	$ 38	0.5	$ 107
2067	0.2	$ 49	0.1	$ 27	0.4	$ 77
2068	0.2	$ 34	0.1	$ 19	0.3	$ 53
2069	0.1	$ 23	0.1	$ 13	0.2	$ 36
2070	0.1	$ 14	0.0	$ 8	0.1	$ 23
2071	0.0	$ 9	0.0	$ 5	0.1	$ 14
2072	0.0	$ 5	0.0	$ 3	0.0	$ 8
2073	0.0	$ 2	0.0	$ 2	0.0	$ 4
2074	0.0	$ 1	0.0	$ 1	0.0	$ 2
2075	0.0	$ 0	0.0	$ 0	0.0	$ 1
2076	0.0	$ 0	0.0	$ 0	0.0	$ 0
2077	0.0	$ 0	0.0	$ 0	0.0	$ 0
2078	0.0	$ 0	0.0	$ 0	0.0	$ 0
2079	0.0	$ 0	0.0	$ 0	0.0	$ 0
2080	0.0	$ 0	0.0	$ 0	0.0	$ 0
2081	0.0	$ 0	0.0	$ 0	0.0	$ 0

APPENDIX A – MEMBERSHIP INFORMATION

Summary of Participant Data as of

	July 1, 2021			July 1, 2022		
Active Participants	**Police**	**Fire**	**Total**	**Police**	**Fire**	**Total**
Number	0	0	0	0	0	0
Number Vested	0	0	0	0	0	0
Average Age	0.0	0.0	0.0	0.0	0.0	0.0
Average Service	0.0	0.0	0.0	0.0	0.0	0.0
Average Pay	\$0	\$0	\$0	\$0	\$0	\$0
Service Retirees						
Number	220	90	310	209	81	290
Average Age	77.5	81.8	78.7	78.2	82.0	79.2
Average Annual Benefit	\$81,398	\$84,427	\$82,277	\$83,999	\$87,236	\$84,903
Disabled Retirees						
Number	88	92	180	85	86	171
Average Age	76.7	78.0	77.4	77.6	78.5	78.1
Average Annual Benefit	\$77,184	\$78,644	\$77,931	\$80,234	\$82,135	\$81,190
Beneficiaries						
Number	131	102	233	128	97	225
Average Age	80.2	82.7	81.3	80.8	82.9	81.7
Average Annual Benefit	\$55,989	\$58,723	\$57,186	\$58,518	\$62,679	\$60,312
All Inactives						
Number	439	284	723	422	264	686
Average Age	78.1	80.9	79.2	78.8	81.2	79.8
Average Annual Benefit	\$72,971	\$73,322	\$73,109	\$75,512	\$76,552	\$75,912

Data pertaining to active and inactive Members and their beneficiaries as of the valuation date was supplied by the Plan Administrator.

APPENDIX A – MEMBERSHIP INFORMATION

Changes in Plan Membership: Police

	Actives	Service Retirees	Disabled Retirees	Beneficiaries	Total
July 1, 2021	0	220	88	131	439
Retired	0	0	0	0	0
Disabled	0	0	0	0	0
Deceased	0	(11)	(3)	(9)	(23)
New Beneficiary	0	0	0	6	6
July 1, 2022	**0**	**209**	**85**	**128**	**422**

Changes in Plan Membership: Fire

	Actives	Service Retirees	Disabled Retirees	Beneficiaries	Total
July 1, 2021	0	90	92	102	284
Retired	0	0	0	0	0
Disabled	0	0	0	0	0
Deceased	0	(9)	(6)	(9)	(24)
New Beneficiary	0	0	0	4	4
July 1, 2022	**0**	**81**	**86**	**97**	**264**

Changes in Plan Membership: All

	Actives	Service Retirees	Disabled Retirees	Beneficiaries	Total
July 1, 2021	0	310	180	233	723
Retired	0	0	0	0	0
Disabled	0	0	0	0	0
Deceased	0	(20)	(9)	(18)	(47)
New Beneficiary	0	0	0	10	10
July 1, 2022	**0**	**290**	**171**	**225**	**686**

APPENDIX A – MEMBERSHIP INFORMATION

Service Retired Participants

	Police		Fire		Total	
Age	Number	Total Annual Benefit	Number	Total Annual Benefit	Number	Total Annual Benefit
< 50	0	$0	0	$0	0	$0
50-54	0	$0	0	$0	0	$0
55-59	0	$0	0	$0	0	$0
60-64	0	$0	0	$0	0	$0
65-69	10	$828,375	0	$0	10	$828,375
70-74	47	$4,199,209	8	$607,418	55	$4,806,627
75-79	91	$7,142,202	34	$2,985,590	125	$10,127,793
80-84	43	$3,604,990	16	$1,377,508	59	$4,982,499
85-89	10	$1,067,084	11	$1,079,456	21	$2,146,539
90-94	7	$610,810	8	$700,516	15	$1,311,326
95-99	0	$0	3	$248,231	3	$248,231
100+	1	$103,088	1	$67,402	2	$170,490
Total	209	$17,555,759	81	$7,066,121	290	$24,621,880

Disability Retired Participants

	Police		Fire		Total	
Age	Number	Total Annual Benefit	Number	Total Annual Benefit	Number	Total Annual Benefit
< 50	0	$0	0	$0	0	$0
50-54	0	$0	0	$0	0	$0
55-59	0	$0	0	$0	0	$0
60-64	0	$0	0	$0	0	$0
65-69	0	$0	0	$0	0	$0
70-74	25	$2,098,696	24	$1,834,759	49	$3,933,455
75-79	40	$3,046,081	31	$2,502,282	71	$5,548,364
80-84	13	$1,078,059	22	$1,928,506	35	$3,006,565
85-89	5	$397,807	7	$614,779	12	$1,012,587
90-94	2	$199,239	2	$183,278	4	$382,517
95-99	0	$0	0	$0	0	$0
100+	0	$0	0	$0	0	$0
Total	85	$6,819,882	86	$7,063,605	171	$13,883,487

APPENDIX A – MEMBERSHIP INFORMATION

Beneficiaries

	Police		Fire		Total	
Age	Number	Total Annual Benefit	Number	Total Annual Benefit	Number	Total Annual Benefit
< 50	0	$0	0	$0	0	$0
50-54	0	$0	0	$0	0	$0
55-59	1	$54,175	0	$0	1	$54,175
60-64	2	$127,560	2	$155,679	4	$283,239
65-69	7	$463,906	7	$468,590	14	$932,496
70-74	25	$1,334,943	13	$850,382	38	$2,185,325
75-79	32	$1,815,652	14	$861,685	46	$2,677,337
80-84	24	$1,369,104	17	$1,057,484	41	$2,426,589
85-89	13	$822,468	22	$1,327,729	35	$2,150,197
90-94	13	$873,190	16	$977,380	29	$1,850,570
95-99	9	$494,129	4	$257,715	13	$751,844
100+	2	$135,171	2	$123,255	4	$258,427
Total	128	$7,490,299	97	$6,079,900	225	$13,570,200

APPENDIX B – STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS

The assumptions and methods used in the actuarial valuation as of July 1, 2022 are:

Actuarial Method

The Entry Age Normal Actuarial Cost Method is used. Under this method, the Plan's Actuarial Liability (AL) is determined as the Present Value of Future Benefits (PVFB) less the Present Value of Future Normal Costs (PVFNC). Since all of the Plan's members are retired, the AL and the PVFB are the same.

The excess of the AL over the Actuarial Value of Assets (AVA) is the Unfunded Actuarial Liability (UAL). In accordance with the Plan's funding agreement with the City of Oakland, the UAL must be amortized by July 1, 2026, with contributions resuming in the 2017-2018 fiscal year. The projected fiscal year 2023-2024 contribution has been calculated using level percent of pay amortization, based on total projected City payroll for all Safety employees.

Actuarial Value of Plan Assets

In determining the recommended employer contribution to the PFRS, we use a smoothed Actuarial Value of Assets. The asset smoothing method dampens the volatility in asset values that could occur because of the fluctuations in market conditions. Use of an asset smoothing method is consistent with the long-term nature of the actuarial valuation process. Assets are assumed to be used exclusively for the provision of retirement benefits and expenses.

The Actuarial Value of Assets is equal to 100% of the *expected Actuarial Value of Assets* plus 20% of the difference between the current Market Value of Assets and the expected Actuarial Value of Assets. In no event will the Actuarial Value of Assets ever be less than 90% of the Market Value of Assets or greater than 110% of the Market Value of Assets.

The expected Actuarial Value of Assets is equal to the prior year's Actuarial Value of Assets increased with actual contributions made, decreased with actual disbursements made, all items (prior assets, contributions, and disbursements) further adjusted with expected investment returns for the year.

APPENDIX B – STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS

Actuarial Assumptions

The assumptions used in this report reflect the results of an experience study performed by Cheiron covering the period from July 1, 2014 through June 30, 2017 and adopted by the Board. More details on the rationale for the demographic and economic assumptions can be found in the experience analysis presented to the Board on February 28, 2018.

1. **Rate of Return**

   The expected annual rates of return, net of investment expenses, on all Plan assets are shown in the table below. The equivalent single discount rate for these returns using the Plan's expected projected benefit payments is 5.19%.

Benefit Payment Year	Expected Return
2022-2026	6.000%
2027	5.725%
2028	5.450%
2029	5.175%
2030	4.900%
2031	4.625%
2032	4.350%
2033	4.075%
2034	3.800%
2035	3.525%
2036+	3.250%

2. **Inflation**

   The assumed rate of general inflation is 2.75% (entire US) and local inflation is 2.85% (Bay Area). The general inflation rate is used in the determination of the investment return assumptions. The local inflation rate is used in the determination of the growth in expenses and salaries (which determine the COLA increases).

3. **Administrative Expenses**

   Administrative expenses for the Fiscal Year Ending June 30, 2023 are assumed to be $1,740,736, growing at 2.85% per year.

4. **Cost-of-Living Adjustments and Long-Term Salary Increases**

   Cost-of-living adjustments are based on salary increases for a retiree's rank at retirement.

APPENDIX B – STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS

The long-term rate of salary increase is assumed to be 3.25% (2.85% inflation plus 0.4% productivity). This rate is used to project cost of living increases after the expiration of the current contracts, as well as representing the expected level of overall Safety payroll growth used to calculate the unfunded liability amortization payment. The following schedule shows salary increases based on the current Police and Fire contracts that expire on June 30, 2026. All increases shown after that date are assumptions.

Post-Retirement Benefit Increases (Based on Salary Increases for Rank at Retirement)		
Date of Increase	Police	Fire
July 1, 2022	3.50%	3.50%
July 1, 2023	3.50%	3.50%
July 1, 2024	3.00%	3.00%
July 1, 2025	3.00%	3.00%
Annual Increases Starting July 1, 2026	3.25%	3.25%

5. **Rates of Termination**

   None.

6. **Rates of Disability**

   None.

7. **Rates of Retirement**

   None.

8. **Rates of Mortality for Healthy Lives**

   CalPERS Healthy Annuitant Table from the 2012-2015 experience study, excluding the 15-year projection using 90% of Scale MP-2016.

9. **Rates of Mortality for Disabled Retirees**

   CalPERS Industrial Disability Mortality Table from the 2012-2015 experience study, excluding the 15-year projection using 90% of Scale MP-2016.

APPENDIX B – STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS

10. Mortality Improvement

The mortality tables are projected to improve with MP-2017 generational mortality improvement tables, with improvements projected from a base year of 2014 (the mid-point of the CalPERS base tables).

11. Survivor Continuance

All retirees with a Benefit Form of "J&S" in the raw data are assumed to receive a 66-2/3% continuance.

12. Changes in Assumptions Since the Last Valuation

The assumption that 30% of all disabled retiree deaths are duty-related and the associated survivors would receive a 100% continuance was removed; all future beneficiaries are now assumed to receive a 66-2/3% continuance.

APPENDIX C – SUMMARY OF PLAN PROVISIONS

1. Plan Year

July 1 to June 30.

2. Membership

The Plan has been closed to new members since June 30, 1976.

3. Salary

Retirement allowances are based on the pensionable compensation attached to the average rank held during the three years immediately preceding retirement.

4. Employee Contributions

There are no active employees in the Plan, and thus no employee contributions.

5. Service Retirement

Eligibility
25 years of service, or 20 years of service and age 55, or age 65. A reduced early retirement is available with 20 years of service.

Benefit Amount
50% of Salary plus 1.67% for each additional year of service beyond that required for service retirement eligibility, to a maximum of 10 years. For retirements with less than 20 years of service, benefits are pro-rated.

6. Duty-Related Disability Retirement

Equivalent to service retirement benefit if 25 or more years of service.

7. Non-Duty Related Disability Retirement

Equivalent to service retirement benefit if age 55 is attained.

8. Post-Retirement Death Benefit

For retirees without a spouse at death, a $1,000 lump sum is paid to designated beneficiary.

9. Cost-of-Living Adjustments

Benefit increases are based on increases in salary for rank at retirement (see above definition of Salary).

APPENDIX C – SUMMARY OF PLAN PROVISIONS

10. Benefit Forms

Benefit is paid for the lifetime of the member. For deaths following a service retirement or non-duty disability, a 66-2/3% continuance is paid for the lifetime of the spouse. If the member retired under a duty-related disability, a continuance of 100% is paid.

11. Changes in Plan Provisions Since the Last Valuation

None.

APPENDIX D – GLOSSARY

1. Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs such as mortality, withdrawal, disability, retirement, changes in compensation, and rates of investment return.

2. Actuarial Cost Method

A procedure for determining the actuarial present value of pension plan benefits and expenses and for developing an allocation of such value to each year of service, usually in the form of a normal cost and an Actuarial Liability.

3. Actuarial Gain (Loss)

The difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, as determined in accordance with a particular actuarial cost method.

4. Actuarial Liability

The portion of the actuarial present value of projected benefits that will not be paid by future normal costs. It represents the value of the past normal costs with interest to the valuation date.

5. Actuarial Present Value (Present Value)

The value as of a given date of a future amount or series of payments. The actuarial present value discounts the payments to the given date at the assumed investment return and includes the probability of the payment being made.

6. Actuarial Valuation

The determination, as of a specified date, of the normal cost, Actuarial Liability, Actuarial Value of Assets, and related actuarial present values for a pension plan.

7. Actuarial Value of Assets

The value of cash, investments, and other property belonging to a pension plan as used by the actuary for the purpose of an actuarial valuation. The purpose of an Actuarial Value of Assets is to smooth out fluctuations in market values.

8. Actuarially Equivalent

Of equal actuarial present value, determined as of a given date, with each value based on the same set of actuarial assumptions.

APPENDIX D – GLOSSARY

9. Amortization Payment

The portion of the pension plan contribution that is designed to pay interest and principal on the Unfunded Actuarial Liability in order to pay for that liability in a given number of years.

10. Entry Age Normal Actuarial Cost Method

A method under which the actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings of the individual between entry age and assumed exit ages.

11. Funded Ratio

The ratio of the Actuarial Value of Assets to the Actuarial Liabilities.

12. Normal Cost

That portion of the actuarial present value of pension plan benefits and expenses that is allocated to a valuation year by the actuarial cost method.

13. Projected Benefits

Those pension plan benefit amounts which are expected to be paid in the future under a particular set of actuarial assumptions, taking into account such items as increases in future compensation and service credits.

14. Unfunded Actuarial Liability

The excess of the Actuarial Liability over the Actuarial Value of Assets.

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