



DISTRIBUTION DATE: March 21, 2022

MEMORANDUM

TO: HONORABLE MAYOR &
CITY COUNCIL

FROM: Erin Roseman,
Director of Finance

SUBJECT: Oakland PFRS's Investment
Portfolio and Actuary Valuation
Report

DATE: March 21, 2022

INFORMATION

As a continued best practice and in accordance with the City of Oakland Charter, the Finance Department will publish a quarterly informational report on the performance of Oakland Police and Fire Retirement System's ("PFRS") investment portfolio to the City Council.

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, 2021, PFRS had 707 retired members and no active members.

As of December 31, 2021, the PFRS Investment Portfolio had a balance of \$483.2 million and generated a quarterly return of 5.7 percent, gross of fees, overperforming its policy benchmark by 1.2 percent. The portfolio also outperformed its benchmark by 2.1 percent over the one-year period, 0.4 percent over the three-year period, and 0.6 percent over the five-year period. This is discussed in more detail in the attached Investment Quarterly report.

As of the most recent PFRS actuarial valuation dated July 1, 2021, the PFRS Funded Ratio (market value of assets divided by present value of future benefits) is 80.2 percent. The City is currently making annual required contributions to PFRS. The required contribution for fiscal year 2021/2022 is \$43.8 million. The City funds these contributions from a voter approved ad valorem tax on all property within the City of Oakland. This tax is specifically dedicated to fund PFRS pension obligations.

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, 2021. In addition, the Council is being provided the recently updated PFRS' Actuarial Valuation (*Attachment B*) as of July 1, 2021.

For questions regarding this report, please contact Teir Jenkins, Investment Officer, at (510) 238-6481.

Respectfully submitted,



ERIN ROSEMAN
Director of Finance

Attachments (2):

- A: Oakland Police and Fire System Quarterly Investment Performance Report as of December 31, 2021
- B: Oakland Police and Fire System Actuarial Valuation Report as of July 1, 2021

ATTACHMENT A

**OAKLAND PFRS
QUARTERLY INVESTMENT
PERFORMANCE REPORT
as of
DECEMBER 31, 2021**

Oakland Police and Fire Retirement System

Q4 2021 Performance Report

Agenda

1. Total Portfolio Summary
2. Economic and Market Update
3. Asset Class and Manager Commentary
4. 4Q 2021 Performance as of December 31, 2021
5. Manager Monitoring / Probation List
6. Disclaimer, Glossary, and Notes

Total Portfolio Summary

Total Portfolio Summary

As of December 31, 2021, the City of Oakland Police and Fire Retirement System (OPFRS) portfolio had an aggregate value of \$483.2M. This represents a \$26.7M increase in investment value after (\$3.2M) in benefit payments over the quarter. Over the one-year period (calendar year 2021), the OPFRS Total Portfolio value is higher by \$61.2M, after withdrawals totaling (\$12.7M) for benefit payments.

Asset Allocation Trends

- The asset allocation targets throughout this report reflect those as of December 31, 2021. Target weightings reflect the interim phase (CRO = 10%) of the Plan's previously approved asset allocation (effective 5/31/2017).
- Relative to policy targets, the portfolio ended the latest quarter overweight Equities, Covered Calls and Cash, while underweight Crisis Risk Offset and Fixed Income. The Crisis Risk Offset asset class was below its acceptable ranges from the policy target.

Recent Investment Performance

- During the most recent quarter, the OPFRS portfolio generated an absolute return of 5.7%, gross of fees, outperforming its policy benchmark by 1.2%. The portfolio also outperformed its benchmark over the 1-, 3-, and 5-year periods, by 2.1%, 0.4%, and 0.6% respectively.

Total Portfolio Summary

- In comparison to its peers, the OPFRS portfolio outperformed the Median fund's return over the quarter and 1-year trailing period by 1.6% and 0.3% respectively. Over the intermediate 3-year trailing period, the OPFRS portfolio trailed the Median fund by (0.7%); however, over the long-term 5-year trailing period, the portfolio is on par with its peers.

	Quarter	CYTD	1 Year	3 Year	5 Year
Total Portfolio ¹	5.7%	13.9%	13.9%	14.8%	11.3%
Policy Benchmark ²	4.5%	11.8%	11.8%	14.4%	10.7%
Excess Return	1.2%	2.1%	2.1%	0.4%	0.6%
Reference: Median Fund ³	4.1%	13.6%	13.6%	15.5%	11.3%
Reference: Total Net of Fees ⁴	5.6%	13.6%	13.6%	14.5%	10.9%

- Over the quarter, positive absolute return was driven by the domestic equity segment following a strong earnings season and general optimism around the reopening of the US economy. Reflecting the broad fixed income market's ups and downs during the quarter, OPFRS's fixed income segment stayed flat over the quarter.

¹ Gross of Fees. Performance since 2005 includes securities lending.

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.

³ Investment Metrics < \$1 Billion Public Plan Universe.

⁴ Longer-term (>1 year) Net of fee returns include estimates based on OPFRS manager fee schedule (approximately 34 bps).

Economic and Market Update

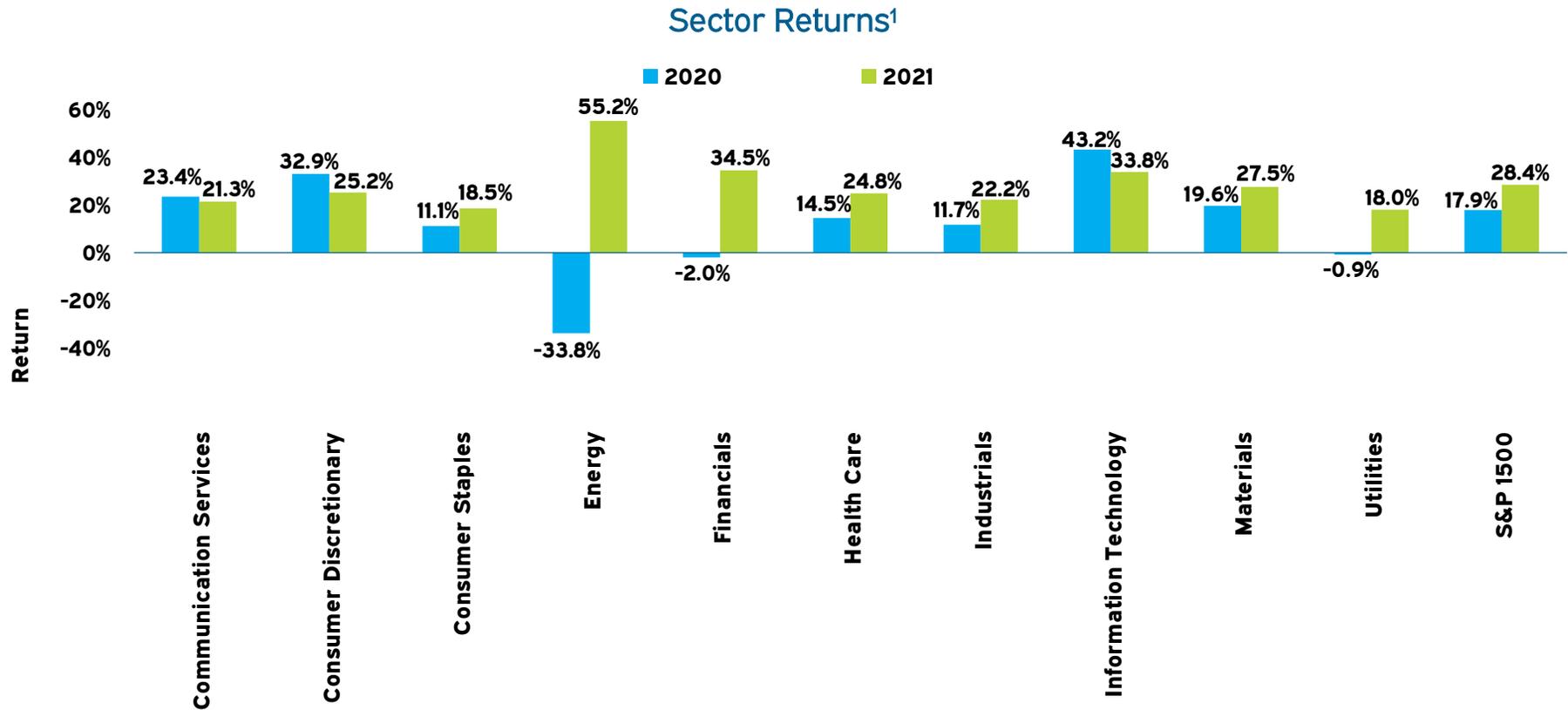
Data as of December 31, 2021

Market Returns¹

Indices	December	1 Year	3 Year	5 Year	10 Year
S&P 500	4.5%	28.7%	26.1%	18.5%	16.6%
MSCI EAFE	5.1%	11.3%	13.5%	9.6%	8.0%
MSCI Emerging Markets	1.9%	-2.5%	10.9%	9.9%	5.5%
MSCI China	-3.2%	-21.7%	7.8%	9.4%	7.2%
Bloomberg Barclays Aggregate	-0.3%	-1.5%	4.8%	3.6%	2.9%
Bloomberg Barclays TIPS	0.3%	6.0%	8.4%	5.3%	3.1%
Bloomberg Barclays High Yield	1.9%	5.3%	8.8%	6.3%	6.8%
10-year US Treasury	-0.4%	-3.6%	5.1%	3.5%	2.4%
30-year US Treasury	-2.1%	-4.6%	9.7%	7.0%	4.4%

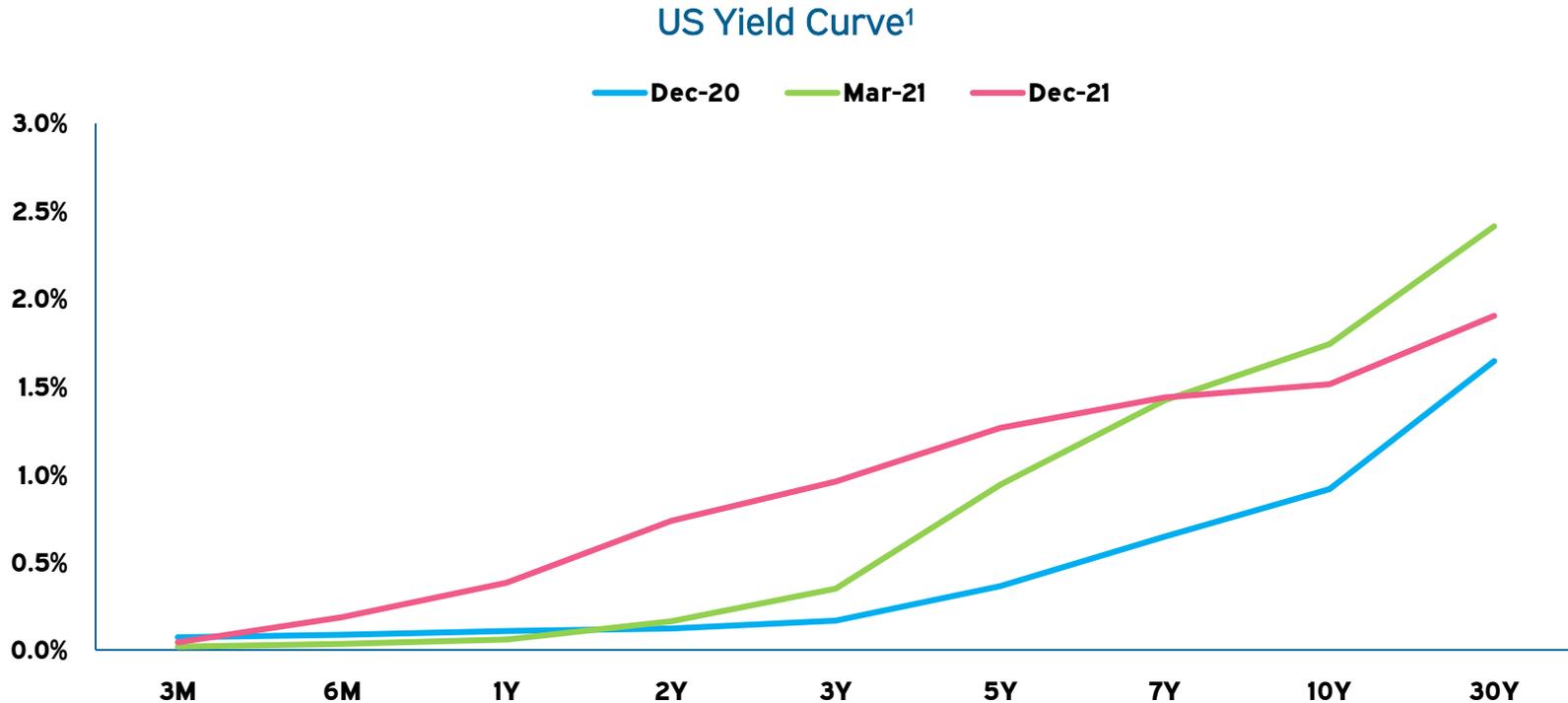
- Declining fears over the Omicron variant and expectations for continued corporate strength contributed to global equity markets posting positive returns for December. Developed markets led the way with international equities (MSCI EAFE) outpacing US equities (S&P 500). Emerging markets lagged mainly due to continued concerns related to China. Overall in 2021, US equities had the best results given continued policy support, relative success in reopening the economy, and strong corporate fundamentals.
- In December, rising inflation and expectations for less accommodative policy led to the US bond market (Bloomberg Barclays Aggregate) declining slightly, while high yield bonds increased in the risk-on environment. For the year, TIPS led the way in bonds, up 6%, followed by high yield with the broad bond market index declining by 1.5%.

¹ Source: Investment Metrics and Bloomberg. Data is as of December 31, 2021.



- All sectors advanced in 2021 with energy leading the way followed by financials, a reversal of the 2020 trend.
- The technology sector also produced strong results last year building on the 40%+ returns in the prior year.

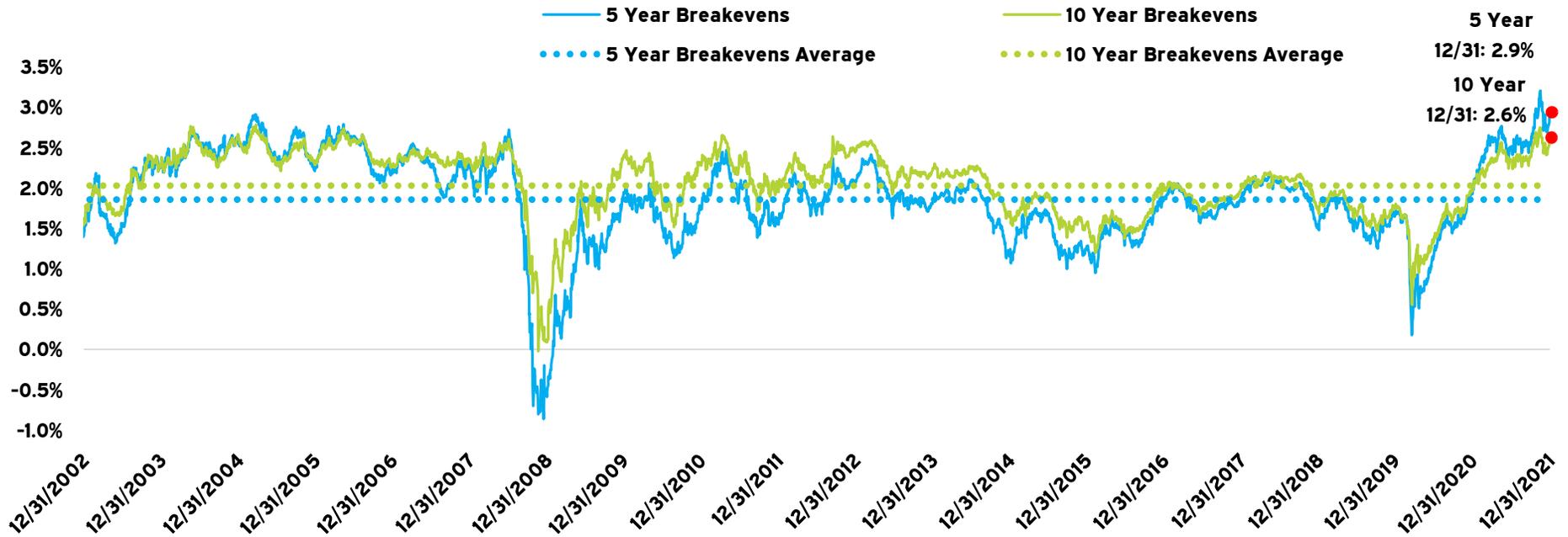
¹ Source: Bloomberg. Data is as of December 31, 2021.



- During the first half of 2021, the Treasury yield curve steepened on both higher growth and inflation expectations as vaccines were deployed and economic growth prospects improved on the opening of the economy, while monetary policy anchored short-dated rates near 0%.
- Over the latter-half of the year, however, shorter-dated yields from 1- to 5-years rose sharply as the FOMC signaled that policy rates may be tightened more aggressively than previously anticipated.

¹ Source: Bloomberg. Data is as of December 31, 2021.

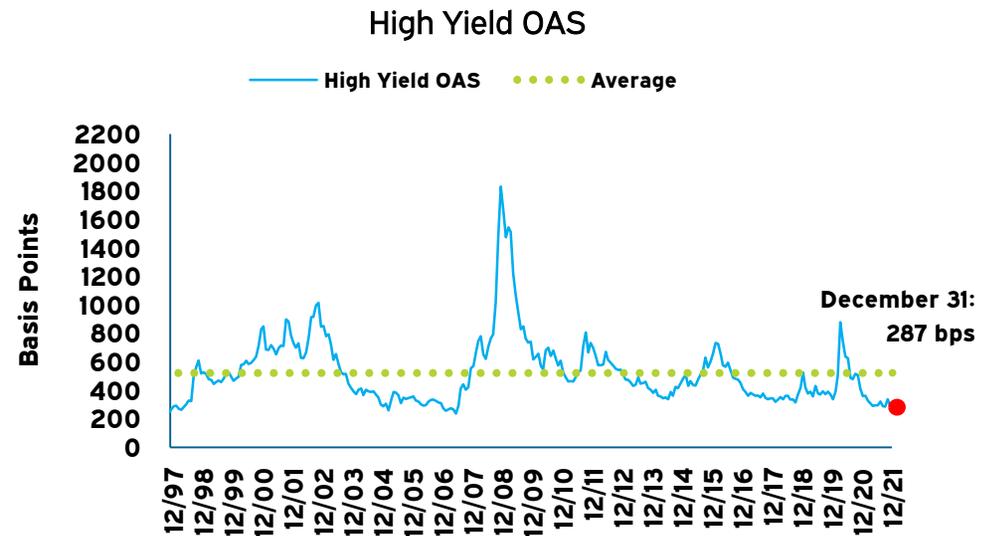
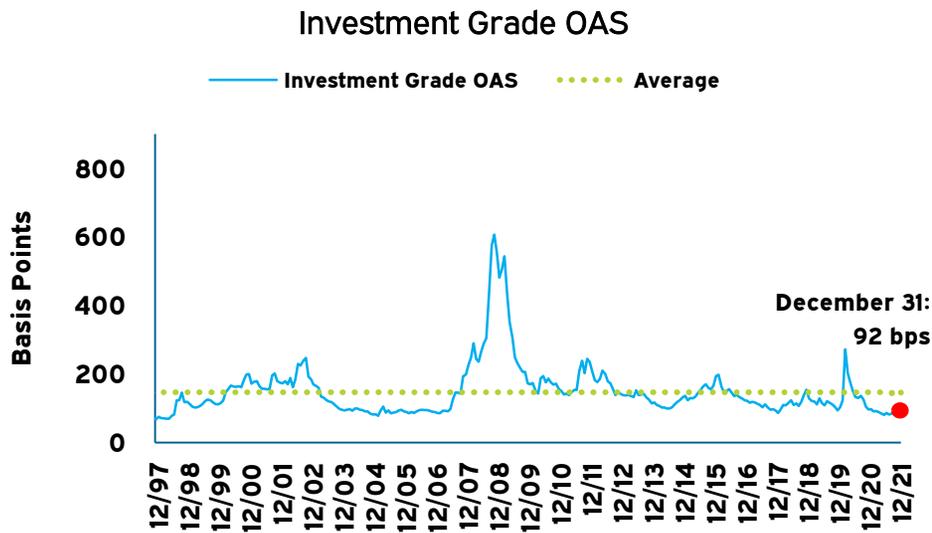
Breakeven Inflation¹



- Inflation expectations finished the year higher than they started, ending at a level well above the Fed’s 2% target.
- Supply chain issues potentially persisting as new variants of the virus increase the risk of re-shuttering sectors of the global economy and wage pressures remain key drivers of inflation expectations.
- Additionally, changes to Fed policy focused on an average inflation target may play a role in inflation market dynamics and, specifically, the risk that consumer inflation expectations get entrenched at higher inflation growth rates.

¹ Source: Bloomberg. Data is as of December 31, 2021.

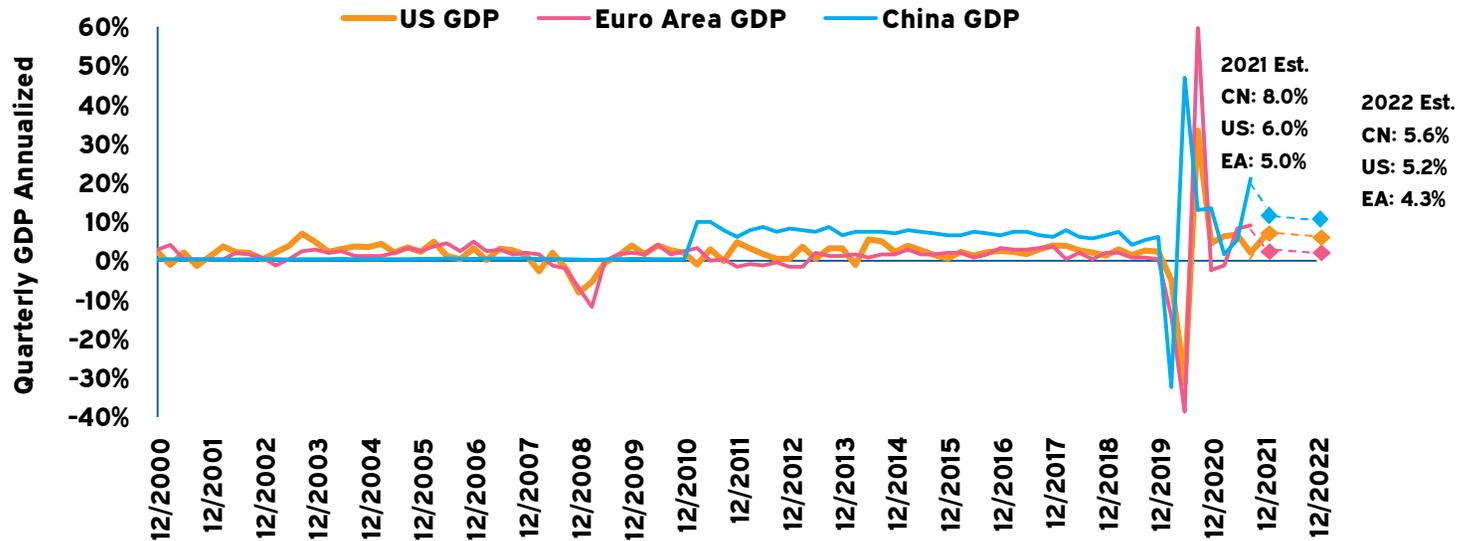
Credit Spreads (High Yield & Investment Grade)¹



- Credit spreads (the yield spread above a comparable maturity Treasury) narrowed in December after the modest widening in November on the discovery of the new virus variant (Omicron).
- Policy support, strong corporate fundamentals, and the search for yield in a low-rate environment have been key drivers in the decline in US credit spreads to well below long-term averages, particularly for high yield issuers.

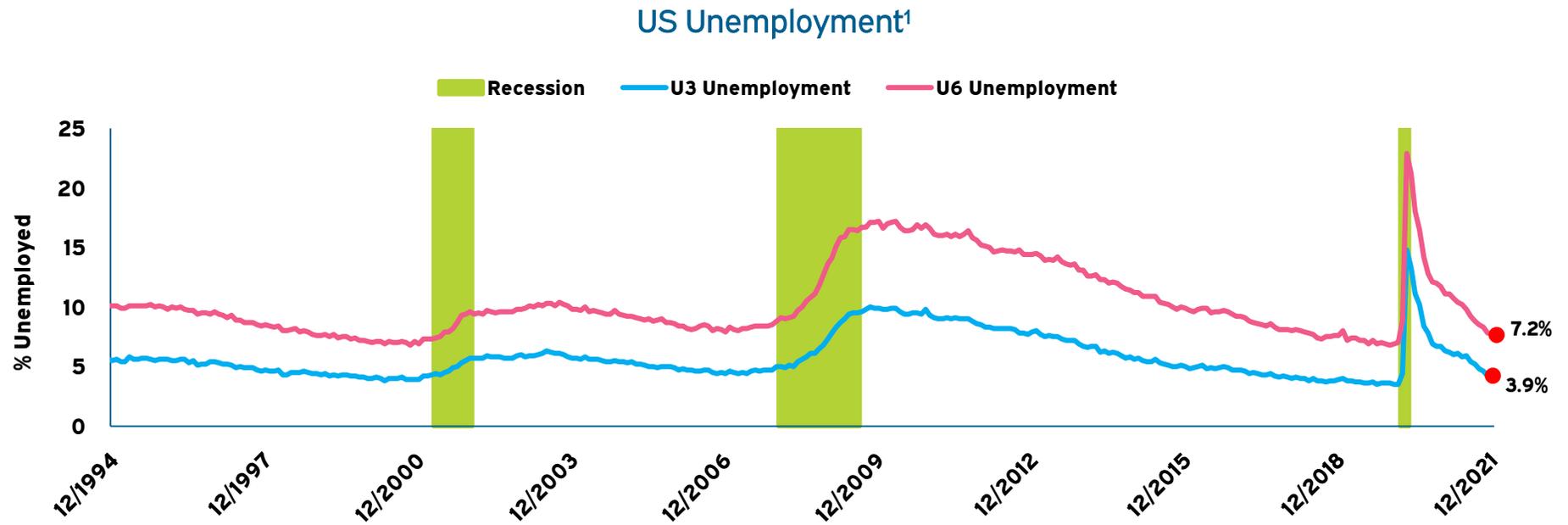
¹ Source: Barclays Live. Data represents OAS and is as of December 31, 2021.

GDP Data Shows Slowing Growth in 2022¹



- In late 2020 and early 2021, major economies grew at rates far above potential. These high rates of growth are expected to decline slightly, with projections continuing to decline due to supply disruptions, reopening trends moderating, and some countries continuing to struggle with the virus.
- The US is expected to grow faster than the euro area again in 2022, with some growth pulled forward due to the relative success in distributing the vaccine and a substantially larger fiscal stimulus response to the pandemic.
- China is projected to grow at 8.0% in 2021 and 5.6% in 2022, both above the expected US growth rate. Questions remain, though, about the highly levered property market and increased government regulations.

¹ Source: Bloomberg, and IMF; Euro Area and China figures annualized by Meketa. Projections via October 2021 IMF World Economic Outlook and represent annual numbers.



- The US labor market continues to recover, and the unemployment rate (U3) fell from 4.2% to 3.9% in December. It still remains slightly above pre-pandemic levels though, but far below the pandemic peak.
- The broader measure of unemployment (U6) that includes discouraged and underemployed workers also continued to decline but is much higher at 7.2%. Also, the labor force participation rate remains quite low at 61.9% and is below the 63.4% level of January 2020.
- Continued improvements in the labor market have contributed to recent expectations that the Federal Reserve will increase its pace of policy removal in 2022.

¹ Source: Bloomberg. Data is as of December 31, 2021. Bars represent recessions as observed by the National Bureau of Economic Research.

Asset Class and Manager Commentary

Domestic Equity

- Over the quarter ending December 31, 2021, domestic equity returned 9.8%, outperforming the Russell 3000 benchmark by 0.5%. The passive strategies, namely Northern Trust Russell 1000 and iShares Edge MSCI Minimum Volatility, performed in line with their respective benchmarks with acceptable tracking error. The active managers, namely Earnest Partners, Rice Hall James, and Brown Fundamental, all outperformed their respective benchmarks and earned above average quarterly ranking in their respective peer groups.
- **Earnest Partners**, the Plan's active mid cap core manager, returned 11.3%, outperforming the Russell Midcap benchmark by 4.9%, and placing in the 16th percentile of its peer group for the quarter. Earnest has also outperformed its benchmark over all other time periods measured as of December 31.
- **Rice Hall James**, the Plan's active small cap growth manager, returned 4.6%, outperforming the Russell 2000 Growth benchmark, which virtually stayed flat in Q4, by 4.6%, and placing in the 33rd percentile for the quarter. The manager also outperformed its benchmark over the 1-year trailing period and since inception by 13.4% and 0.4% respectively. Due to its performance in 2018, Rice Hall James trailed its benchmark by (1.4%) over the 3-year trailing period.
- **Brown Fundamental**, the Plan's active small cap value manager funded in April 2021, returned 9.9% over the quarter outperforming its Russell 2000 Value benchmark by 5.5%, placing it in the 10th percentile amongst its peers.

International Equity

- For the quarter, the international equity segment returned 2.9%, outperforming the MSCI ACWI ex US benchmark by 1.0%. Within this portfolio, the Vanguard passive international developed markets portfolio posted 1.1%. Due to Vanguard's fair-value pricing methodology, the strategy has deviated from its tracked index's return of 2.6%; however, this is expected to equalize over the longer term.
- **SGA MSCI ACWI ex US ETF**, the Plan's active core international equity manager, returned 3.2% outperforming its benchmark by 1.3% over the quarter ranking at 42nd percentile amongst its peers. It has also outperformed its benchmark over the 1-year trailing period by 2.5% even though it has trailed the benchmark by (2.5%) since inception in December 2019.

Fixed Income

- Over the quarter, the Fixed Income aggregate returned 0.1%, outperforming the Bloomberg Universal benchmark, which stayed virtually flat, by 0.1%. Reflecting the broad market trends, core fixed income managers in this portfolio posted virtually flat returns.
- **Ramirez** returned (0.1%) over the quarter, trailing the benchmark by (0.1%) placing in the 57th percentile of its peer group. However, Ramirez has outperformed its benchmark over the 1- and 3-year trailing periods by 1.6% and 0.7% respectively, and by 0.7% since inception in January 2017.

Fixed Income (continued)

- **Reams** posted modest positive returns for the quarter, trailing its benchmark by 0.4% and placing in the 9th percentile of its peer group. While it trailed the Bloomberg Universal benchmark by (0.1%) in the 1-year trailing period, it outperformed its benchmark by 3.5%, 2.4%, and 1.0% over 3- and 5-year trailing period and since inception respectively.
- **Wellington Core Bond**, the core fixed income manager funded in April 2021, returned (0.1%) over the quarter trailing the benchmark by (0.1%) ranking at the 67th percentile.

Covered Calls

- Over the quarter, the Covered Calls portfolio returned 9.2% outpacing its benchmark by 2.2%.
- **Parametric BXM**, the Plan's passive covered calls allocation returned 6.9%, trailing its benchmark, the CBOE BXM index, by (0.1%). Though the portfolio has trailed its benchmark over the most recent quarter and the trailing 1-year period, it has outperformed over the longer 3- and 5-year periods and since inception by 2.9%, 2.0%, and 1.6% respectively.
- **Parametric DeltaShift**, the Plan's active covered calls allocation returned 11.0%, outperforming its benchmark, the CBOE BXM, index by 4.0% over the quarter. Similarly, the portfolio has outperformed the benchmark over all other the time periods measured by 8.8%, 13.6%, 8.5%, and 6.7% over 1-, 3-, 5-year trailing periods and since inception respectively.

Credit

- With **DDJ Capital** as the Plan's sole High Yield & Bank Loan manager, the Credit portfolio returned 0.5% over the quarter, trailing its benchmark, Bloomberg US High Yield, by (0.2%). It outperformed the benchmark over the 1-year and 5-year periods by 4.3% and 0.7% respectively but trailed the benchmark by (1.2%) over the 3-year trailing period. Due to the recent acquisition of DDJ by Polen Capital, the manager will remain on the Watchlist to monitor its progress and organization changes.

Crisis Risk Offset

- Over the quarter, the Crisis Risk Offset portfolio posted 2.0%, modestly outperforming its benchmark by 0.5%. **Vanguard Long Duration ETF** is currently the only funded component of the Crisis Risk Offset portfolio as of December 31, 2021. The Alternative Risk Premia and Systematic Trend Following components of the Crisis Risk Offset portfolio are underway to be funded in coming quarters.

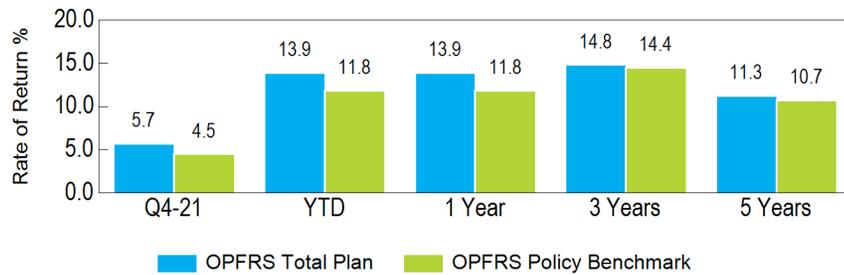
**4Q 2021 Performance
as of December 31, 2021**

OPFRS Total Plan | As of December 31, 2021

1 Year Ending December 31, 2021		
	Anlzd Return	Standard Deviation
OPFRS Total Plan	13.89%	1.86%
OPFRS Policy Benchmark	11.83%	1.68%
InvMetrics Public DB \$250mm-\$1B Gross Median	13.59%	1.68%

1 Year Ending December 31, 2021		
	Anlzd Return	Standard Deviation
OPFRS Total Plan	13.89%	1.86%
OPFRS Policy Benchmark	11.83%	1.68%

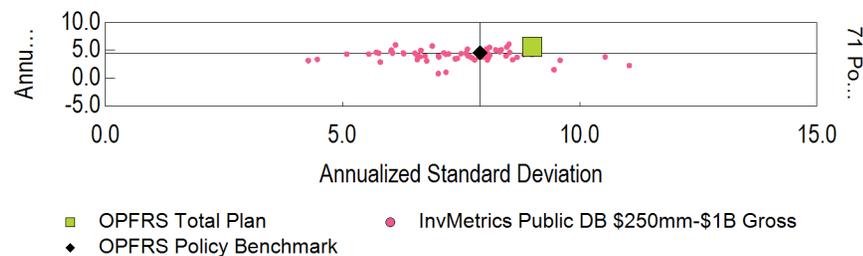
Return Summary Ending December 31, 2021



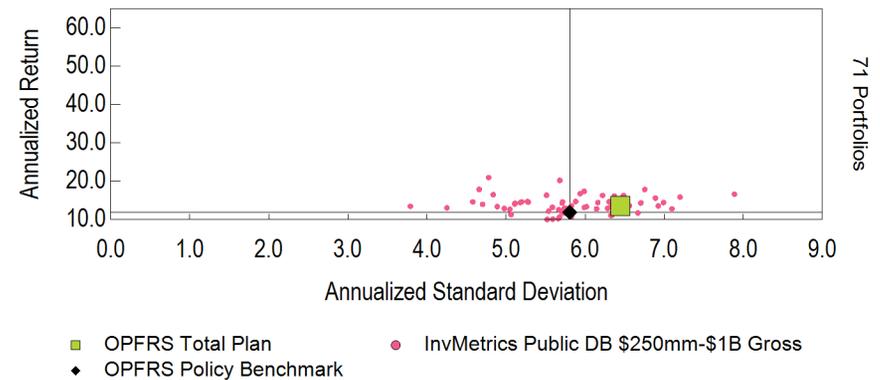
Summary of Cash Flows

	Quarter-To-Date	One Year
Beginning Market Value	\$459,712,578	\$434,118,470
Net Cash Flow	-\$3,188,809	-\$12,749,737
Capital Appreciation	\$26,697,208	\$61,851,965
Ending Market Value	\$483,220,978	\$483,220,978

Annualized Return vs. Annualized Standard Deviation 3 Months Ending December 31, 2021



Annualized Return vs. Annualized Standard Deviation 1 Year Ending December 31, 2021



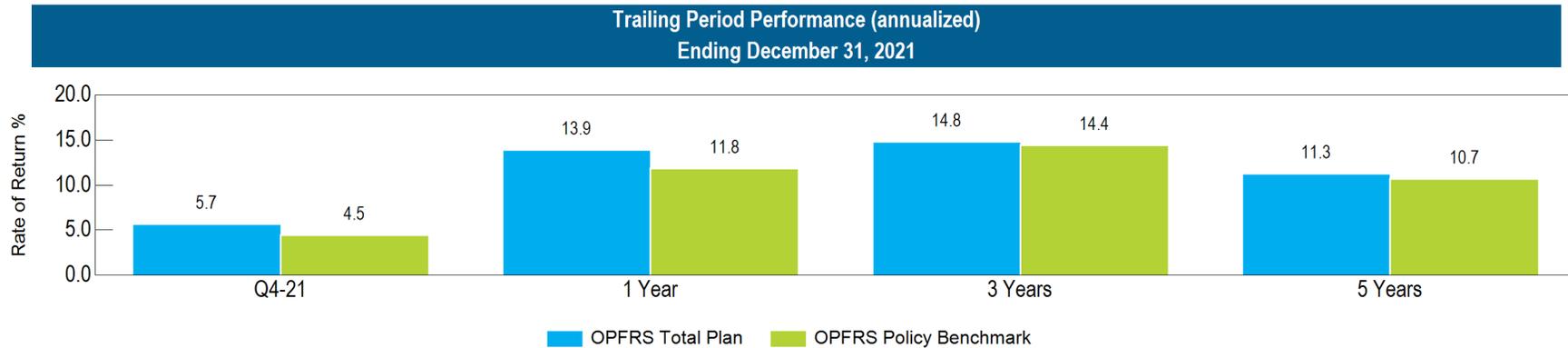
Evolving Policy Benchmark consists of 40% russell 3000, 12% MSCI ACWI ex U.S., 33% Bbg BC Universal, 5% CBOE BXM, 6.7% SG Multi Asset Risk Premia, 3.3% Bbg BC Long Treasury

Asset Class Performance (gross of fees) | As of December 31, 2021

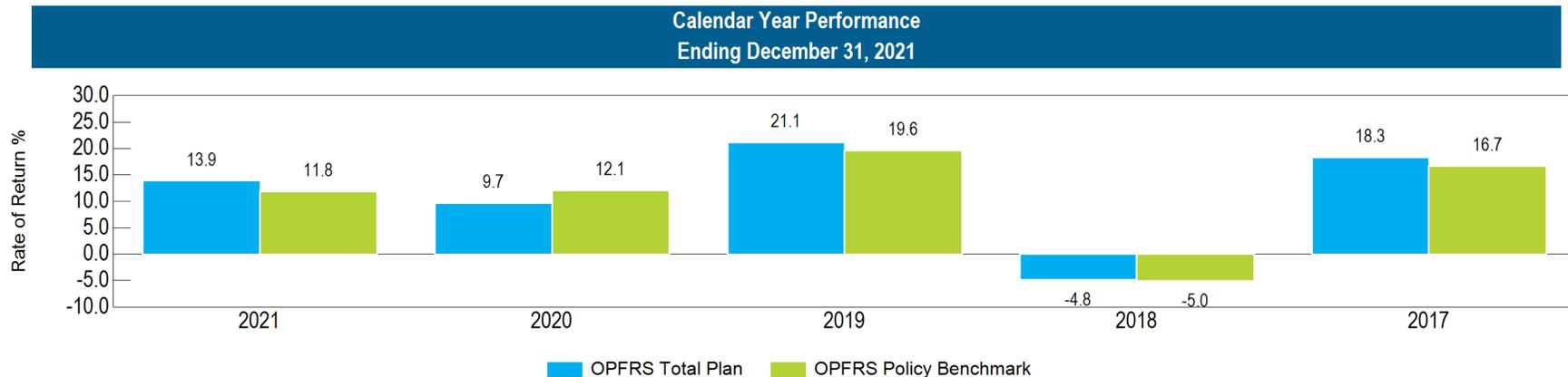
	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	7 Yrs (%)	10 Yrs (%)
OPFRS Total Plan	5.7	13.9	13.9	14.8	11.3	9.3	9.8
<i>OPFRS Policy Benchmark</i>	<u>4.5</u>	<u>11.8</u>	<u>11.8</u>	<u>14.4</u>	<u>10.7</u>	<u>9.0</u>	<u>9.3</u>
Excess Return	1.2	2.1	2.1	0.4	0.6	0.3	0.5
Domestic Equity	9.8	25.0	25.0	24.5	17.2	14.0	15.8
<i>Russell 3000 (Blend)</i>	<u>9.3</u>	<u>25.7</u>	<u>25.7</u>	<u>25.8</u>	<u>18.0</u>	<u>14.5</u>	<u>16.3</u>
Excess Return	0.5	-0.7	-0.7	-1.3	-0.8	-0.5	-0.5
International Equity	2.9	10.6	10.6	14.5	10.8	7.9	8.6
<i>MSCI ACWI ex US (Blend)</i>	<u>1.9</u>	<u>8.3</u>	<u>8.3</u>	<u>13.7</u>	<u>10.1</u>	<u>7.1</u>	<u>7.8</u>
Excess Return	1.0	2.3	2.3	0.8	0.7	0.8	0.8
Fixed Income	0.1	-0.3	-0.3	5.5	4.3	3.8	3.6
<i>Bloomberg Universal (Blend)</i>	<u>0.0</u>	<u>-1.1</u>	<u>-1.1</u>	<u>5.2</u>	<u>3.8</u>	<u>3.4</u>	<u>3.3</u>
Excess Return	0.1	0.8	0.8	0.3	0.5	0.4	0.3
Credit	0.5	9.6	9.6	7.6	7.0	--	--
<i>Bloomberg US High Yield TR</i>	<u>0.7</u>	<u>5.3</u>	<u>5.3</u>	<u>8.8</u>	<u>6.3</u>	--	--
Excess Return	-0.2	4.3	4.3	-1.2	0.7	--	--
Covered Calls	9.2	24.7	24.7	19.4	13.4	11.6	--
<i>CBOE S&P 500 BuyWrite USD</i>	<u>7.0</u>	<u>20.3</u>	<u>20.3</u>	<u>10.9</u>	<u>8.0</u>	<u>7.5</u>	--
Excess Return	2.2	4.4	4.4	8.5	5.4	4.1	--
Crisis Risk Offset	2.0	-6.7	-6.7	-6.8	--	--	--
<i>SG Multi Alternative Risk Premia Index</i>	<u>1.5</u>	<u>7.6</u>	<u>7.6</u>	<u>-1.7</u>	--	--	--
Excess Return	0.5	-14.3	-14.3	-5.1	--	--	--

1. Evolving Policy Benchmark consists of 40% Russell 3000, 12% MSCI Acwi ex U.S., 33% Bbg BC Universal, 5% CBOE BXM, 6.7% SG Multi Asset Risk Premia, 3.3% Bbg BC Long Treasury,
2. Domestic Equity Benchmark consists of S&P 500 thru 3/31/98 10% Russell 1000, 20% Russell 1000 Value, 5% RMC from 4/1/98 - 12/31/04 and Russell 3000 from 1/1/05 to present.
3. International Equity Benchmark consists of MSCI EAFE thru 12/31/04 and MSCI ACWI x US thereafter.
4. Fixed Income Benchmark consists of Bbg BC Aggregate prior to 4/1/06, and Bbg BC Universal thereafter.
5. Cash balances held in ETF accounts at the Custodian are reflected in the Cash account market value.

Portfolio Relative Performance Results | As of December 31, 2021



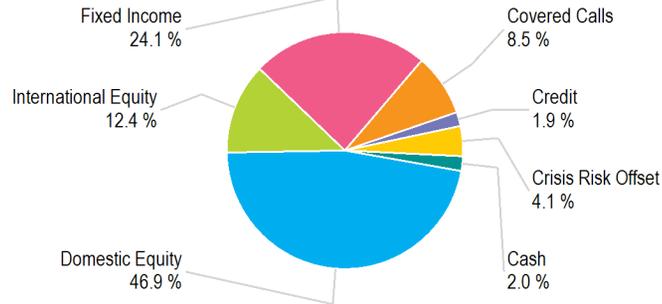
	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	2017 (%)	2018 (%)	2019 (%)	2020 (%)	2021 (%)
OPFRS Total Plan	5.7	13.9	13.9	14.8	11.3	18.3	-4.8	21.1	9.7	13.9
<i>OPFRS Policy Benchmark</i>	<i>4.5</i>	<i>11.8</i>	<i>11.8</i>	<i>14.4</i>	<i>10.7</i>	<i>16.7</i>	<i>-5.0</i>	<i>19.6</i>	<i>12.1</i>	<i>11.8</i>
<i>InvMetrics Public DB \$250mm-\$1B Gross Median</i>	<i>4.2</i>	<i>13.6</i>	<i>13.6</i>	<i>15.6</i>	<i>11.4</i>	<i>15.8</i>	<i>-4.1</i>	<i>18.6</i>	<i>13.1</i>	<i>13.6</i>



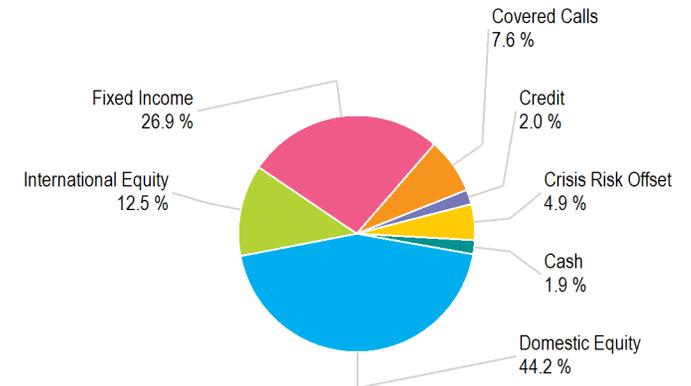
Asset Allocation vs. Target As Of December 31, 2021

	Current	%	Policy	Difference*
Domestic Equity	\$226,498,729	46.9%	40.0%	6.9%
International Equity	\$60,100,247	12.4%	12.0%	0.4%
Fixed Income	\$116,568,599	24.1%	31.0%	-6.9%
Covered Calls	\$41,091,899	8.5%	5.0%	3.5%
Credit	\$9,372,205	1.9%	2.0%	-0.1%
Crisis Risk Offset	\$19,890,317	4.1%	10.0%	-5.9%
Cash	\$9,698,983	2.0%	0.0%	2.0%

December 31, 2021: \$483,220,978



December 31, 2020: \$434,118,470



Cash balances held in ETF accounts at the Custodian are reflected in the Cash account market value.

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

Manager Performance - Gross of Fees | As of December 31, 2021

	Market Value	% of Portfolio	QTD	1 Yr	3 Yrs	5 Yrs	S.I.	S.I. Date
Domestic Equity	226,498,729	100.0	9.8	25.0	24.5	17.2	9.8	Jun-97
<i>Russell 3000 (Blend)</i>			<u>9.3</u>	<u>25.7</u>	<u>25.8</u>	<u>18.0</u>	<u>10.0</u>	<u>Jun-97</u>
Excess Return			0.5	-0.7	-1.3	-0.8	-0.2	
Northern Trust Russell 1000	122,696,981	54.2	9.8	26.5	26.2	18.4	15.8	Jun-10
<i>Russell 1000</i>			<u>9.8</u>	<u>26.5</u>	<u>26.2</u>	<u>18.4</u>	<u>15.8</u>	<u>Jun-10</u>
Excess Return			0.0	0.0	0.0	0.0	0.0	
<i>eV US Large Cap Core Equity Gross Rank</i>			64	65	37	42	41	Jun-10
EARNEST Partners	51,502,726	22.7	11.3	25.7	28.2	19.2	11.8	Apr-06
<i>Russell MidCap</i>			<u>6.4</u>	<u>22.6</u>	<u>23.3</u>	<u>15.1</u>	<u>10.2</u>	<u>Apr-06</u>
Excess Return			4.9	3.1	4.9	4.1	1.6	
<i>eV US Mid Cap Core Equity Gross Rank</i>			16	60	14	19	27	Apr-06
iShares Edge MSCI Min Vol ETF	23,024,059	10.2	10.4	20.8	--	--	28.0	Apr-20
<i>MSCI USA Minimum Volatility GR USD</i>			<u>10.4</u>	<u>21.0</u>	--	--	<u>28.2</u>	<u>Apr-20</u>
Excess Return			0.0	-0.2			-0.2	
<i>eV US Low Volatility Equity Gross Rank</i>			40	70	--	--	78	Apr-20
Rice Hall James	17,436,537	7.7	4.6	16.2	19.8	--	14.2	Jul-17
<i>Russell 2000 Growth</i>			<u>0.0</u>	<u>2.8</u>	<u>21.2</u>	--	<u>13.8</u>	<u>Jul-17</u>
Excess Return			4.6	13.4	-1.4		0.4	
<i>eV US Small Cap Growth Equity Gross Rank</i>			33	37	91	--	92	Jul-17

Manager Performance - Gross of Fees | As of December 31, 2021

	Market Value	% of Portfolio	QTD	1 Yr	3 Yrs	5 Yrs	S.I.	S.I. Date
International Equity	60,100,247	100.0	2.9	10.6	14.5	10.8	5.9	Jan-98
<i>MSCI ACWI ex US (Blend)</i>			<i>1.9</i>	<i>8.3</i>	<i>13.7</i>	<i>10.1</i>	<i>6.0</i>	<i>Jan-98</i>
Excess Return			1.0	2.3	0.8	0.7	-0.1	
SGA ACWI ex-U.S. Equity	42,401,389	70.6	3.2	10.8	--	--	9.1	Dec-19
<i>MSCI ACWI ex USA Gross</i>			<i>1.9</i>	<i>8.3</i>	--	--	<i>11.6</i>	<i>Dec-19</i>
Excess Return			1.3	2.5			-2.5	
<i>eV ACWI ex-US All Cap Core Eq Gross Rank</i>			<i>42</i>	<i>50</i>	--	--	<i>93</i>	<i>Dec-19</i>
Vanguard Developed Markets ETF	17,098,207	28.4	1.1	8.2	--	--	12.2	Sep-19
<i>FTSE Developed All Cap Ex US TR USD</i>			<i>2.6</i>	<i>11.9</i>	--	--	<i>14.8</i>	<i>Sep-19</i>
Excess Return			-1.5	-3.7			-2.6	
<i>eV ACWI ex-US All Cap Core Eq Gross Rank</i>			<i>78</i>	<i>81</i>	--	--	<i>89</i>	<i>Sep-19</i>

Total International Equity market value includes cash held in closed accounts Fisher and Hansberger.

Manager Performance - Gross of Fees | As of December 31, 2021

	Market Value	% of Portfolio	QTD	1 Yr	3 Yrs	5 Yrs	S.I.	S.I. Date
Fixed Income	116,568,599	100.0	0.1	-0.3	5.5	4.3	5.4	Dec-93
<i>Bloomberg Universal (Blend)</i>			<i>0.0</i>	<i>-1.1</i>	<i>5.2</i>	<i>3.8</i>	<i>5.2</i>	<i>Dec-93</i>
Excess Return			0.1	0.8	0.3	0.5	0.2	
Ramirez	79,372,600	68.1	-0.1	0.1	5.5	--	4.3	Jan-17
<i>Bloomberg US Aggregate TR</i>			<i>0.0</i>	<i>-1.5</i>	<i>4.8</i>	<i>--</i>	<i>3.6</i>	<i>Jan-17</i>
Excess Return			-0.1	1.6	0.7		0.7	
<i>eV US Core Fixed Inc Gross Rank</i>			<i>57</i>	<i>7</i>	<i>50</i>	<i>--</i>	<i>30</i>	<i>Jan-17</i>
Reams	29,560,445	25.4	0.4	-1.2	8.7	6.2	5.9	Feb-98
<i>Bloomberg Universal (Blend)</i>			<i>0.0</i>	<i>-1.1</i>	<i>5.2</i>	<i>3.8</i>	<i>4.9</i>	<i>Feb-98</i>
Excess Return			0.4	-0.1	3.5	2.4	1.0	
<i>eV US Core Plus Fixed Inc Gross Rank</i>			<i>9</i>	<i>94</i>	<i>3</i>	<i>4</i>	<i>43</i>	<i>Feb-98</i>

Manager Performance - Gross of Fees | As of December 31, 2021

	Market Value	% of Portfolio	QTD	1 Yr	3 Yrs	5 Yrs	S.I.	S.I. Date
Covered Calls	41,091,899	100.0	9.2	24.7	19.4	13.4	11.1	Apr-14
<i>CBOE S&P 500 BuyWrite USD</i>			<i>7.0</i>	<i>20.3</i>	<i>10.9</i>	<i>8.0</i>	<i>7.1</i>	<i>Apr-14</i>
Excess Return			2.2	4.4	8.5	5.4	4.0	
Parametric DeltaShift	23,455,117	57.1	11.0	29.1	24.5	16.5	13.8	Apr-14
<i>CBOE S&P 500 BuyWrite USD</i>			<i>7.0</i>	<i>20.3</i>	<i>10.9</i>	<i>8.0</i>	<i>7.1</i>	<i>Apr-14</i>
Excess Return			4.0	8.8	13.6	8.5	6.7	
<i>eV US Large Cap Core Equity Gross Rank</i>			<i>39</i>	<i>37</i>	<i>57</i>	<i>71</i>	<i>68</i>	<i>Apr-14</i>

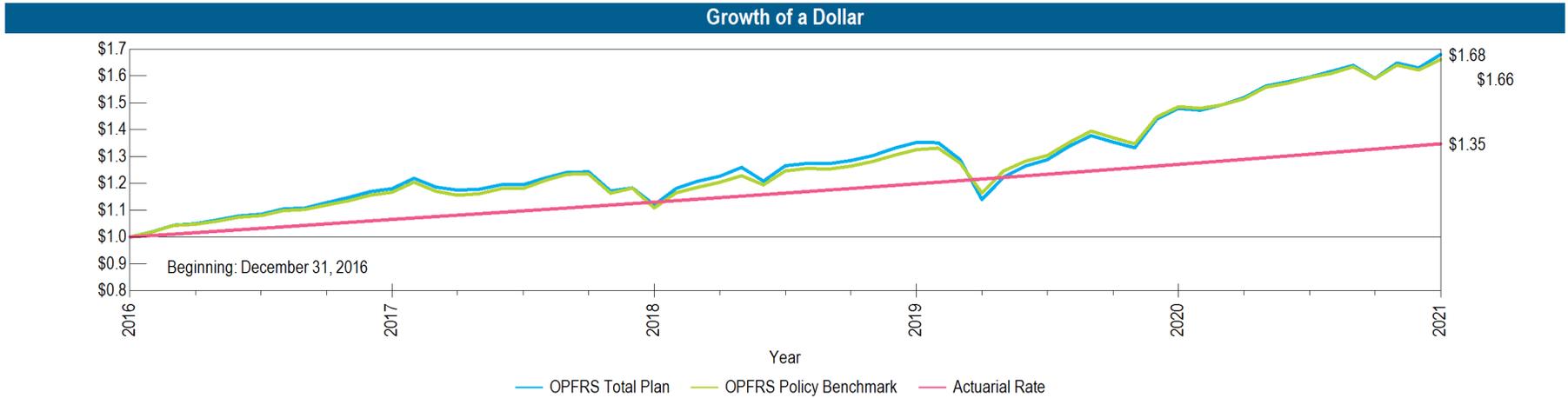
Manager Performance - Gross of Fees | As of December 31, 2021

	Market Value	% of Portfolio	QTD	1 Yr	3 Yrs	5 Yrs	S.I.	S.I. Date
Credit	9,372,205	100.0	0.5	9.6	7.6	7.0	6.6	Feb-15
<i>Bloomberg US High Yield TR</i>			<i>0.7</i>	<i>5.3</i>	<i>8.8</i>	<i>6.3</i>	<i>6.1</i>	<i>Feb-15</i>
Excess Return			-0.2	4.3	-1.2	0.7	0.5	
DDJ Capital	9,372,205	100.0	0.5	9.6	7.6	7.0	6.6	Feb-15
<i>ICE BofA High Yield Master TR</i>			<i>0.7</i>	<i>5.4</i>	<i>8.6</i>	<i>6.1</i>	<i>6.0</i>	<i>Feb-15</i>
Excess Return			-0.2	4.2	-1.0	0.9	0.6	
<i>eV US High Yield Fixed Inc Gross Rank</i>			<i>84</i>	<i>6</i>	<i>80</i>	<i>21</i>	<i>27</i>	<i>Feb-15</i>

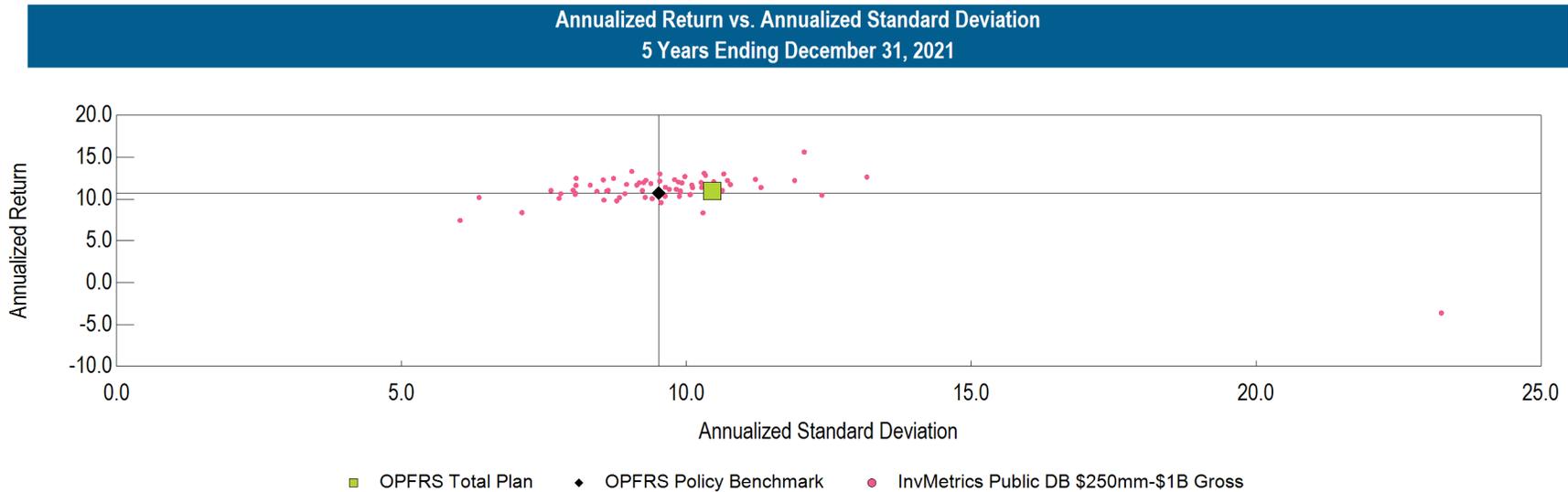
Manager Performance - Gross of Fees | As of December 31, 2021

	Market Value	% of Portfolio	QTD	1 Yr	3 Yrs	5 Yrs	S.I.	S.I. Date
Crisis Risk Offset	19,890,317	100.0	2.0	-6.7	-6.8	--	-8.0	Aug-18
<i>SG Multi Alternative Risk Premia Index</i>			<i>1.5</i>	<i>7.6</i>	<i>-1.7</i>	<i>--</i>	<i>-2.0</i>	<i>Aug-18</i>
Excess Return			0.5	-14.3	-5.1		-6.0	
Vanguard Long-Term Treasury ETF	19,890,317	100.0	2.0	-6.7	--	--	5.3	Jul-19
<i>Bloomberg US Govt Long TR</i>			<i>3.0</i>	<i>-4.6</i>	<i>--</i>	<i>--</i>	<i>6.1</i>	<i>Jul-19</i>
Excess Return			-1.0	-2.1			-0.8	
<i>eV US Long Duration - Gov/Cred Fixed Inc Net Rank</i>			<i>41</i>	<i>99</i>	<i>--</i>	<i>--</i>	<i>98</i>	<i>Jul-19</i>

Total Portfolio 5-Year Performance | As of December 31, 2021



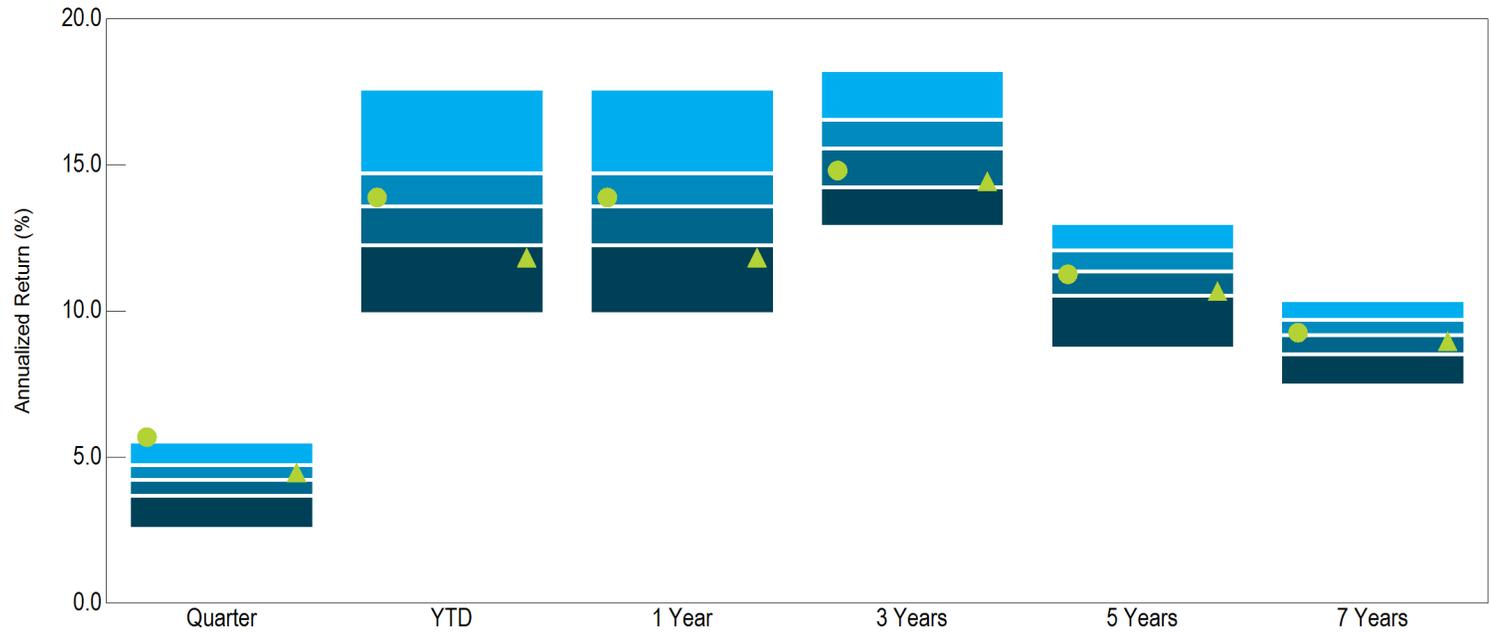
The actuarial expected rate of return was 8% through 6/30/2009, 7.5% through 6/30/2010, 7% through 6/30/2011, 6.75% through 6/30/2014, 6.5% through 2/31/2017 and 6.0% currently



67 Portfolios

Plan Sponsor Peer Group Analysis | As of December 31, 2021

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



	Return (Rank)											
	Quarter		YTD		1 Year		3 Years		5 Years		7 Years	
5th Percentile	5.5		17.6		17.6		18.2		13.0		10.4	
25th Percentile	4.7		14.7		14.7		16.6		12.1		9.7	
Median	4.2		13.6		13.6		15.6		11.4		9.2	
75th Percentile	3.7		12.3		12.3		14.2		10.5		8.5	
95th Percentile	2.6		9.9		9.9		12.9		8.7		7.5	
# of Portfolios	71		71		71		70		67		65	
● OPFRS Total Plan	5.7	(4)	13.9	(47)	13.9	(47)	14.8	(62)	11.3	(53)	9.3	(49)
▲ OPFRS Policy Benchmark	4.5	(34)	11.8	(81)	11.8	(81)	14.4	(72)	10.7	(71)	9.0	(59)

Manager Monitoring/Probation Status Return vs. Benchmark since Corrective Action (As of December 31, 2021)

Portfolio	Status	Concern	Months Since Corrective Action	Performance ¹ Since Corrective Action (Gross, %)	Peer Group Percentile Ranking ²	Date of Corrective Action ³
DDJ Capital	On Watch	Performance/ Org changes	30	7.1	6	5/29/2019
Ice BofAML US High Yield				7.0		
Rice Hall James	On Watch	Performance	30	20.5	37	5/29/2019
Russell 2000 Growth				19.7		
Parametric	On Watch	Org changes	12	33.8	NA	10/28/2020
CBOE S&P 500 BuyWrite USD				28.8		

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 ⁴ < 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 0.40% 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

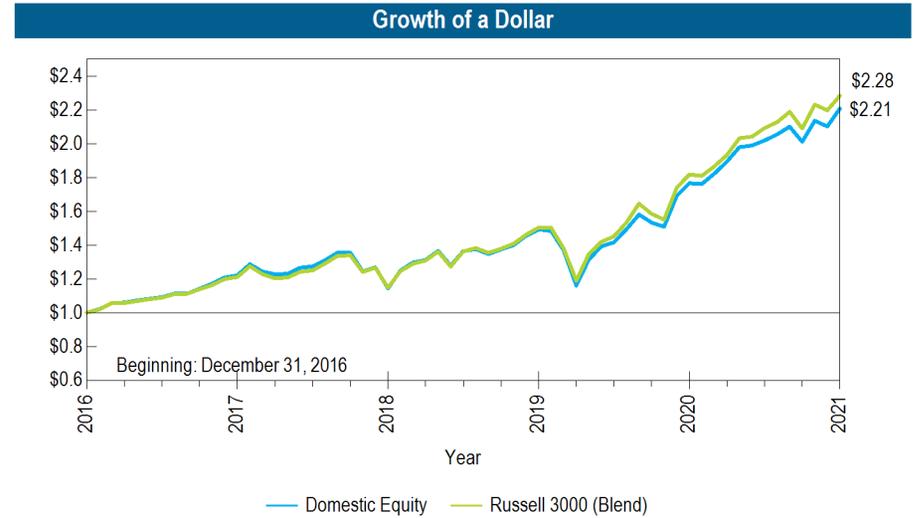
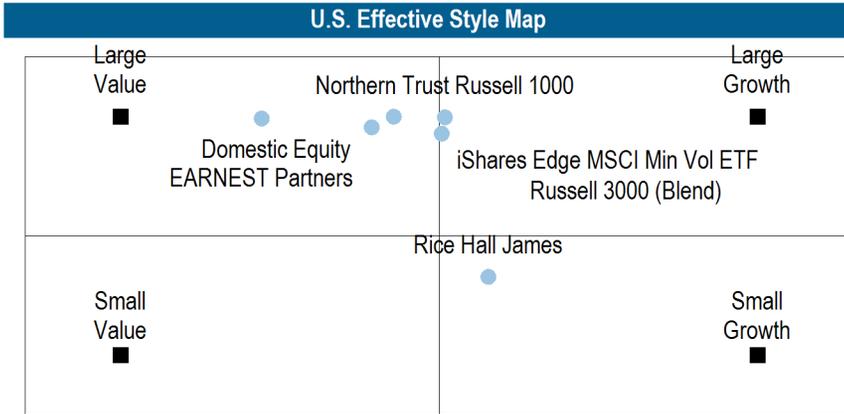
¹ Annualized performance if over one year

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.

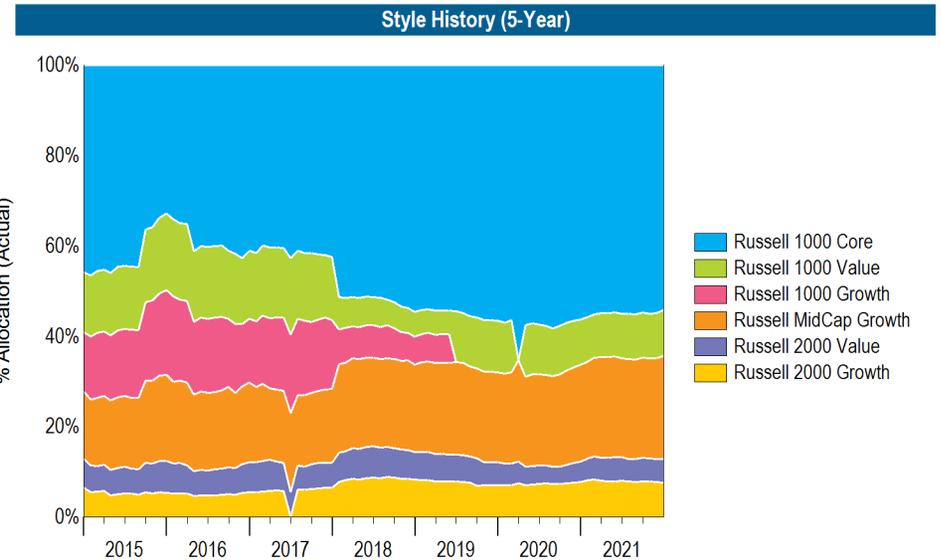
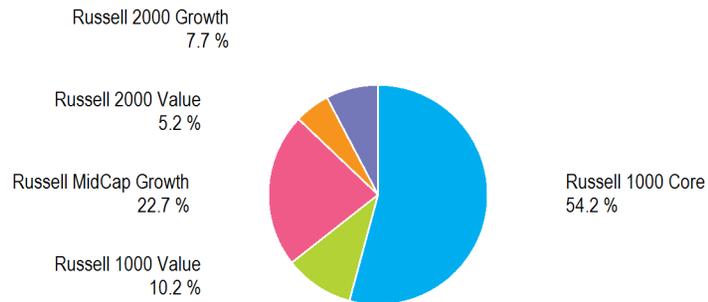
³ Approximate date based on when the Board voted to either monitor a manager at a heightened level or place it on probation.

⁴ VRR (Value Relative Ratio) is calculated as manager cumulative return/ benchmark return.

Domestic Equity | As of December 31, 2021

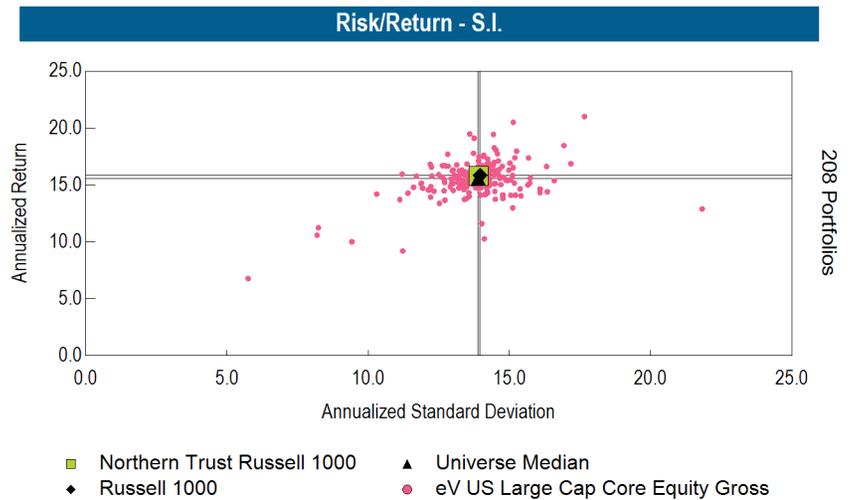
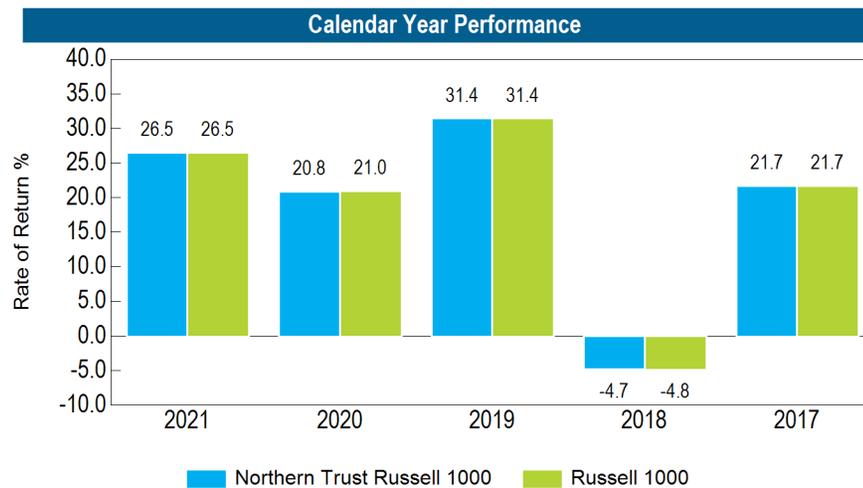
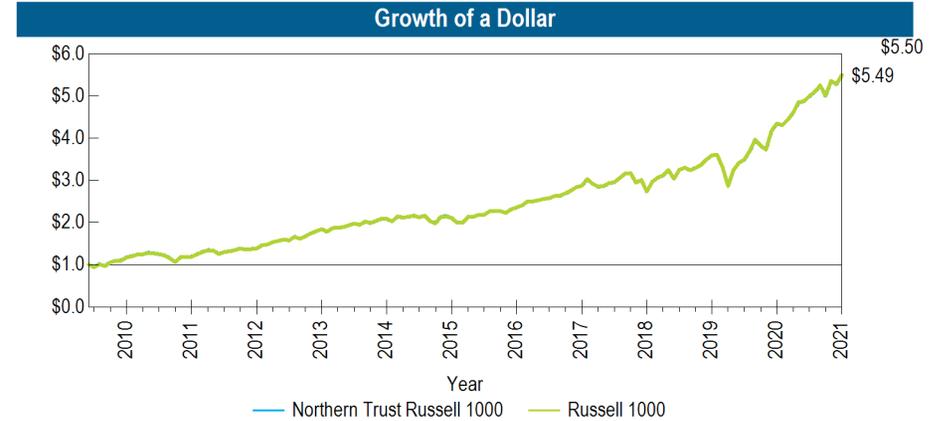
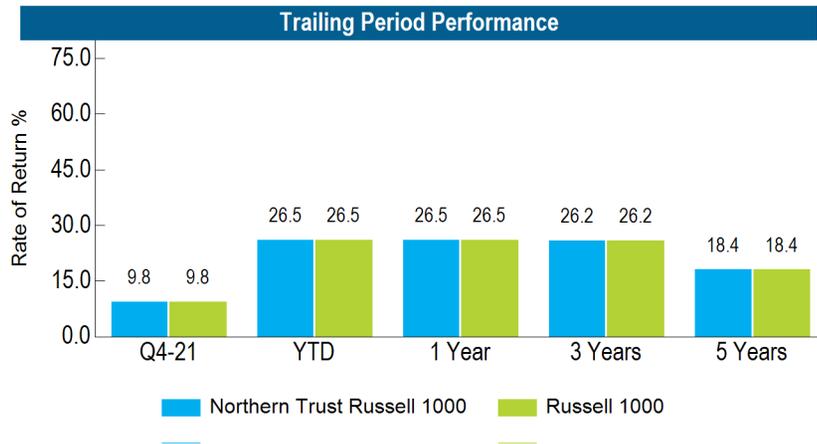


Style Exposure



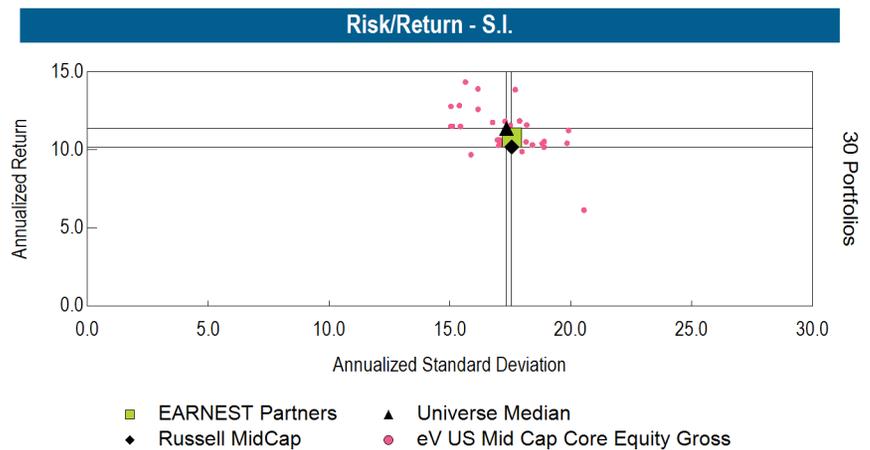
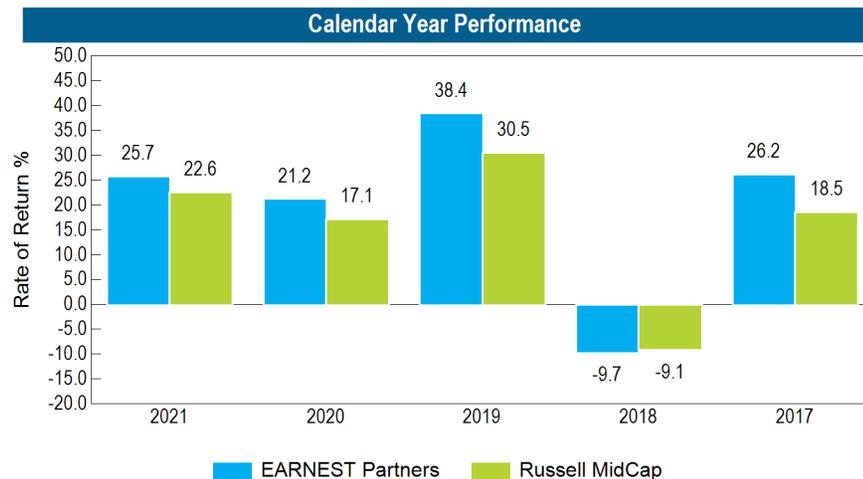
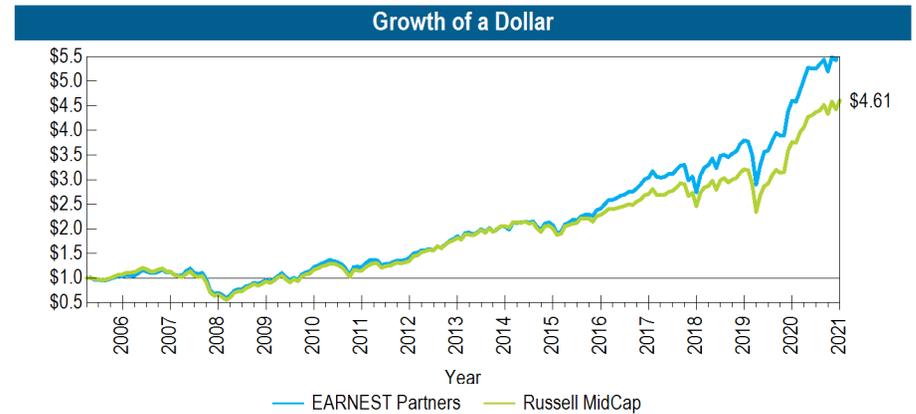
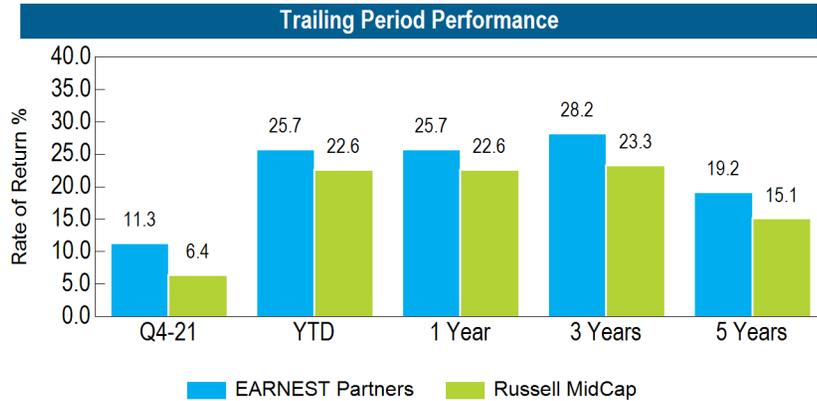
Northern Trust Russell 1000 | As of December 31, 2021

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Northern Trust Russell 1000	15.76%	13.91%	0.00%	1.00	0.13%	98.36%	99.77%
Russell 1000	15.85%	13.96%	0.00%	1.00	0.00%	100.00%	100.00%



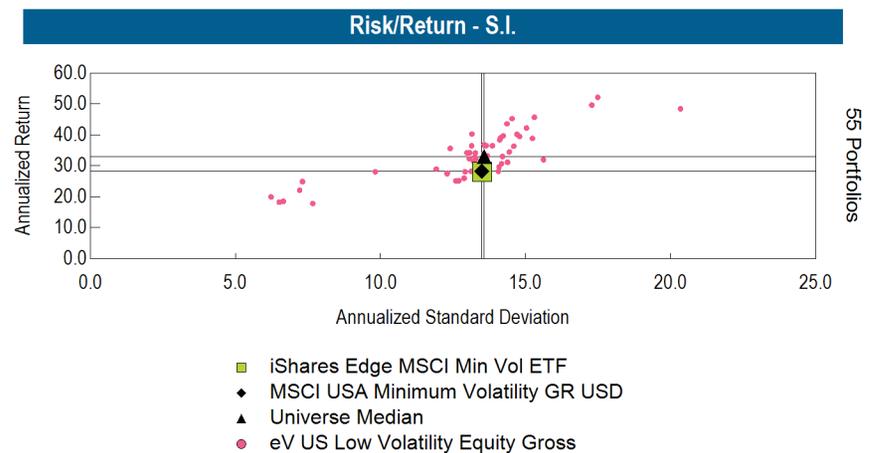
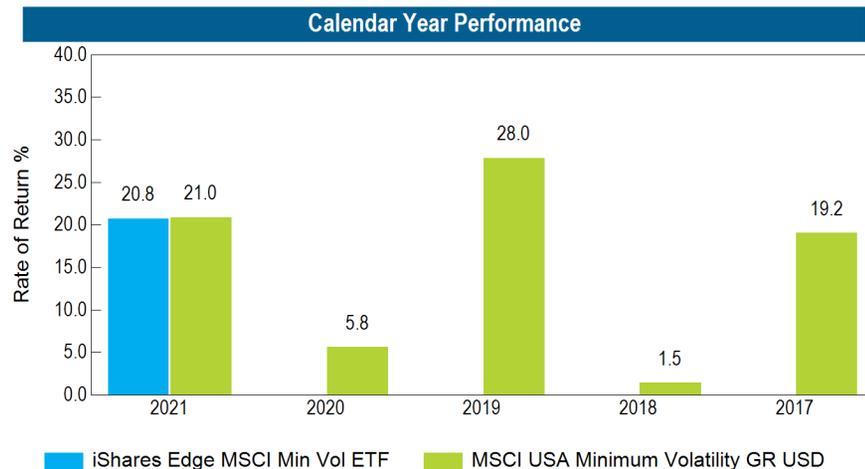
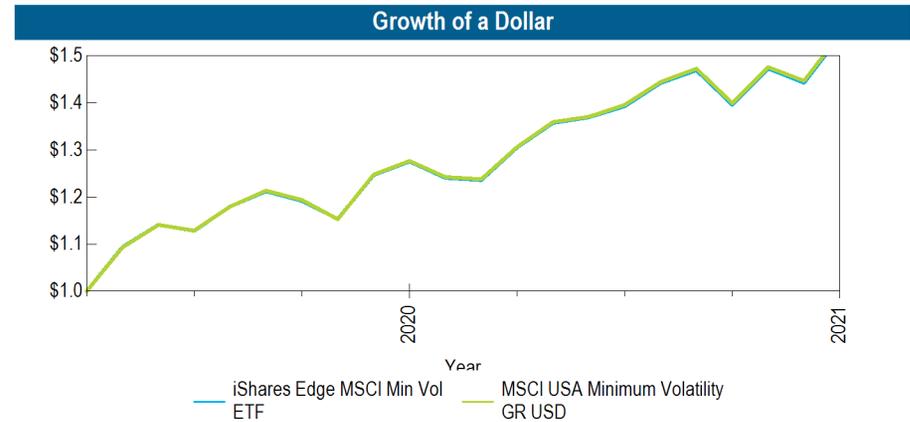
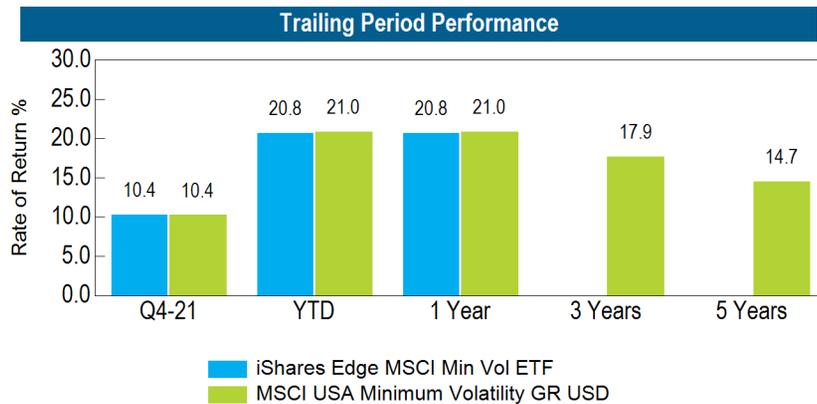
EARNEST Partners | As of December 31, 2021

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
EARNEST Partners	10.81%	17.58%	0.06%	0.98	0.18	3.45%	94.81%	99.03%
Russell MidCap	10.19%	17.56%	0.00%	1.00	--	0.00%	100.00%	100.00%



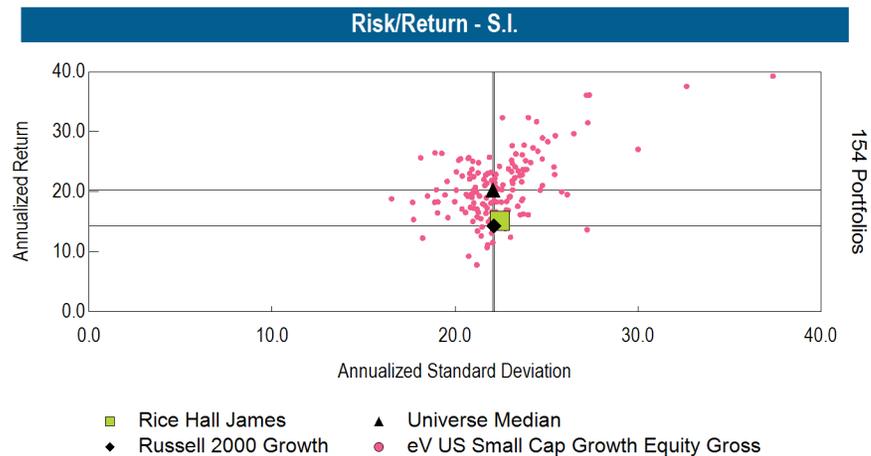
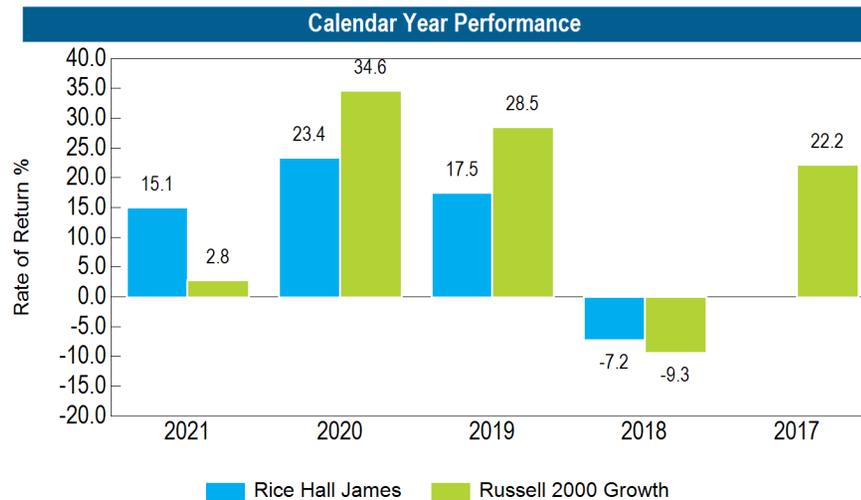
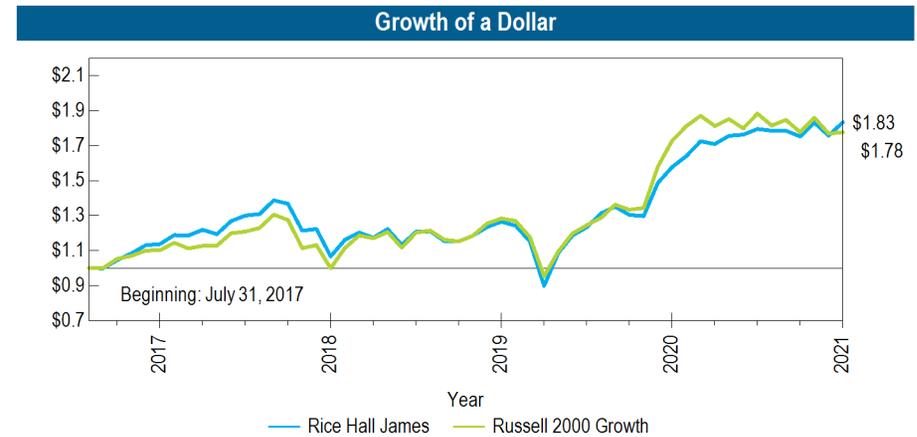
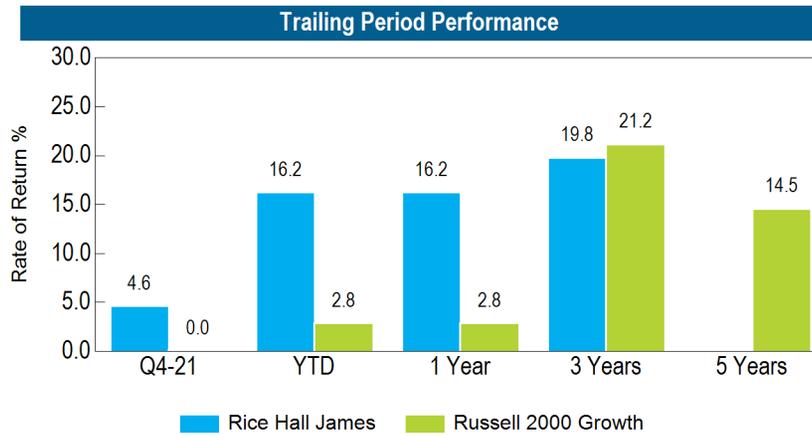
iShares Edge MSCI Min Vol ETF | As of December 31, 2021

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
iShares Edge MSCI Min Vol ETF	28.03%	13.50%	-0.01%	1.00	-0.59	0.28%	99.60%	100.27%
MSCI USA Minimum Volatility GR USD	28.20%	13.49%	0.00%	1.00	--	0.00%	100.00%	100.00%



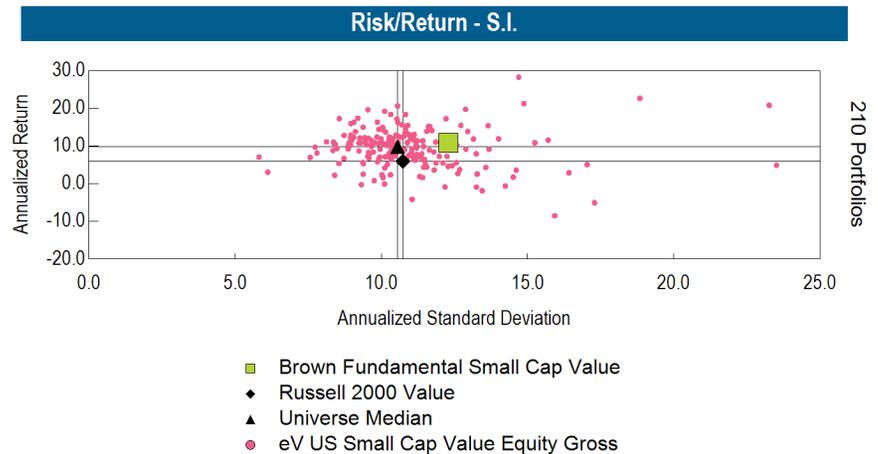
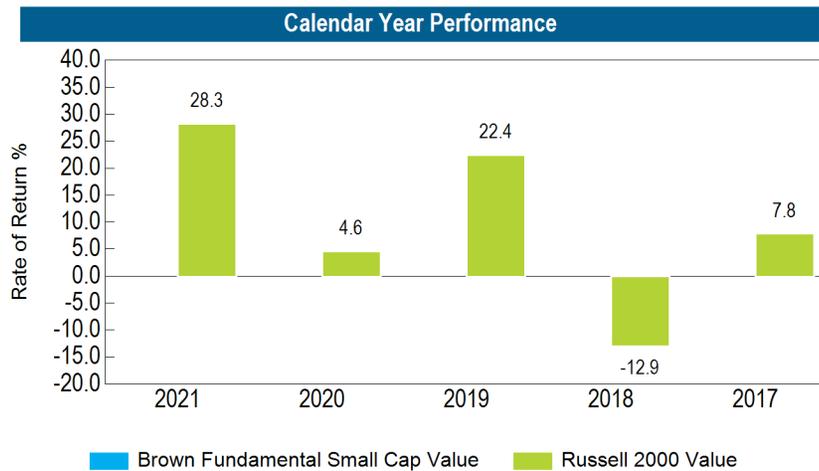
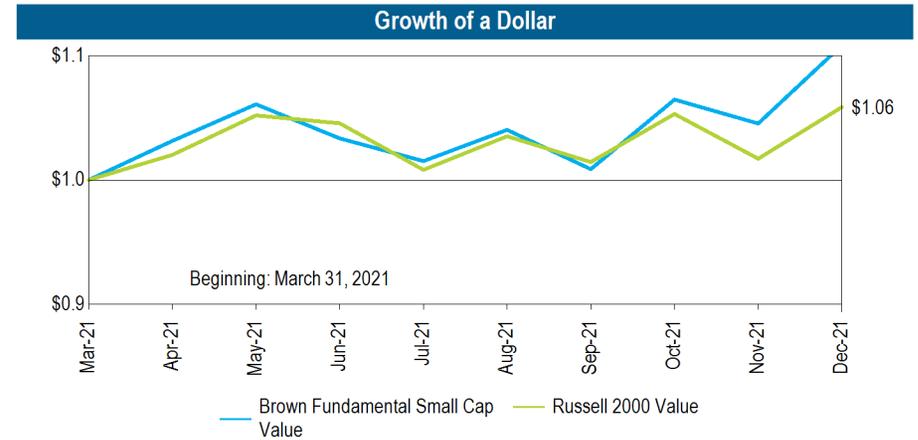
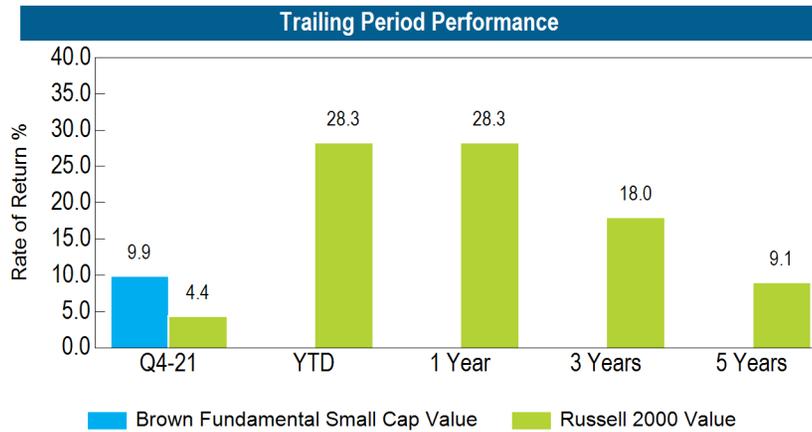
Rice Hall James | As of December 31, 2021

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Rice Hall James	13.56%	22.25%	0.03%	0.97	-0.05	6.82%	89.54%	95.36%
Russell 2000 Growth	13.90%	21.92%	0.00%	1.00	--	0.00%	100.00%	100.00%

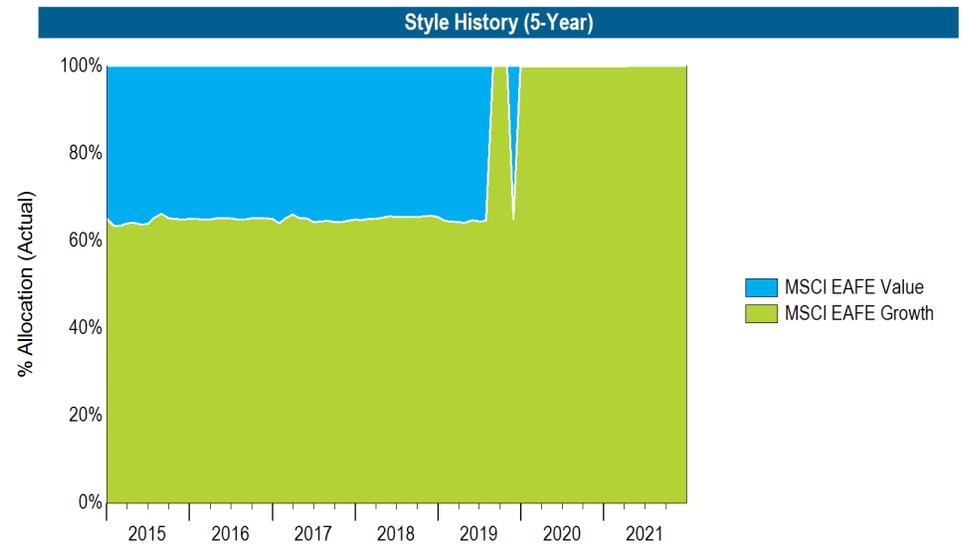
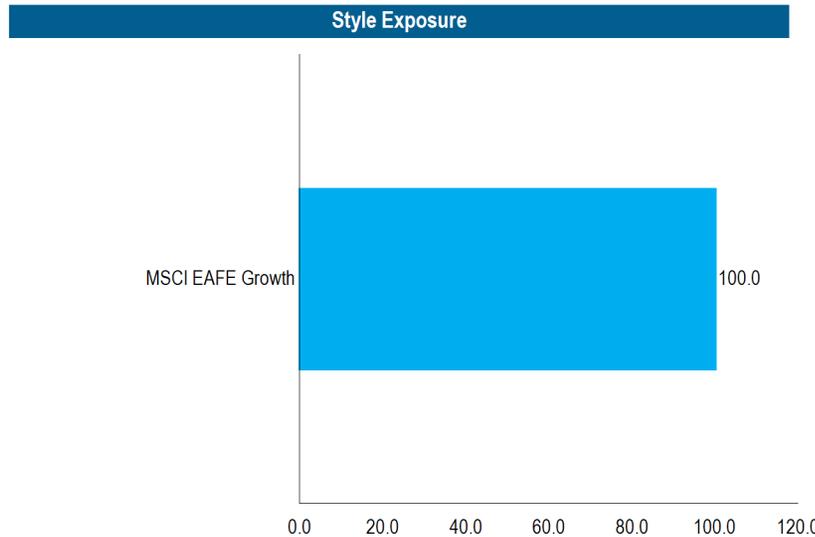
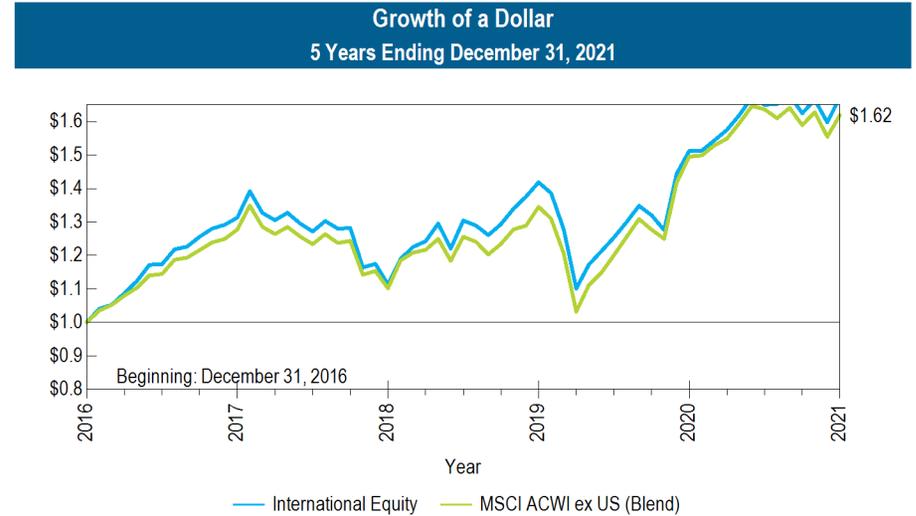
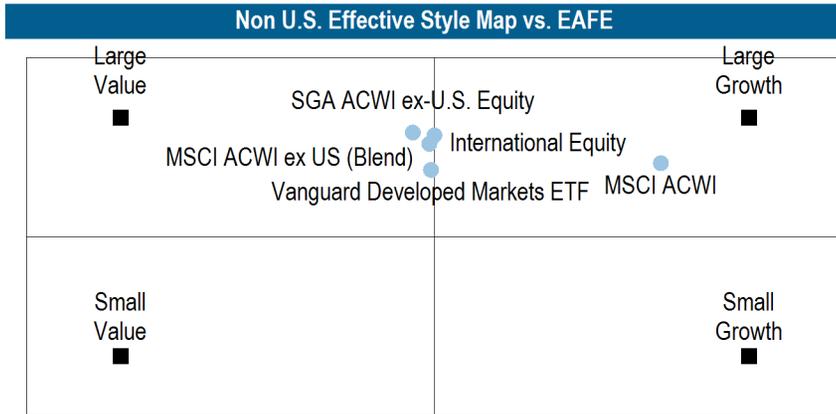


Brown Fundamental Small Cap Value | As of December 31, 2021

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Brown Fundamental Small Cap Value	10.14%	12.27%	0.43%	1.05	0.86	4.98%	127.14%	98.53%
Russell 2000 Value	5.86%	10.74%	0.00%	1.00	--	0.00%	100.00%	100.00%

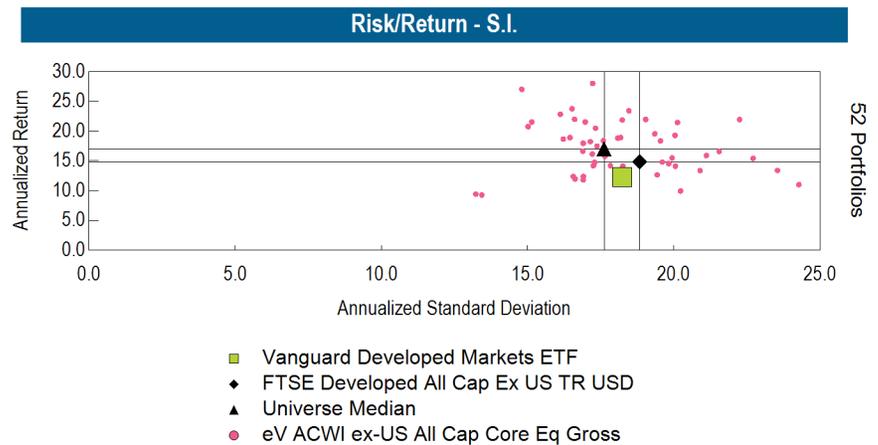
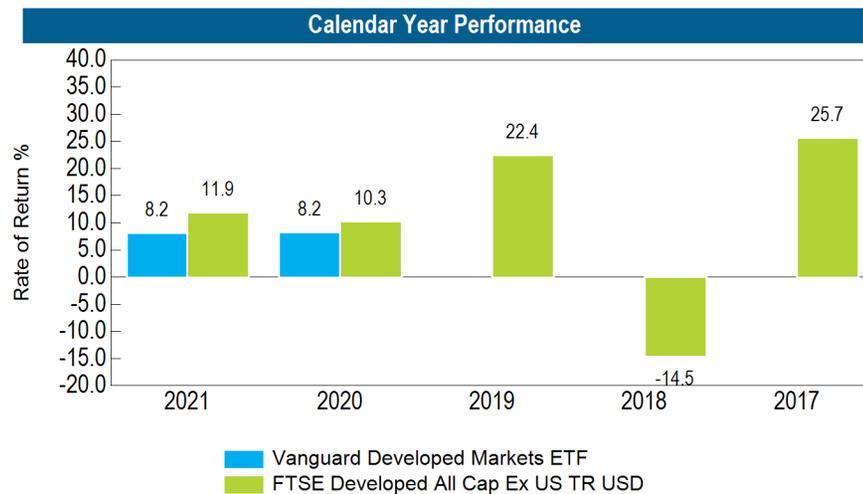
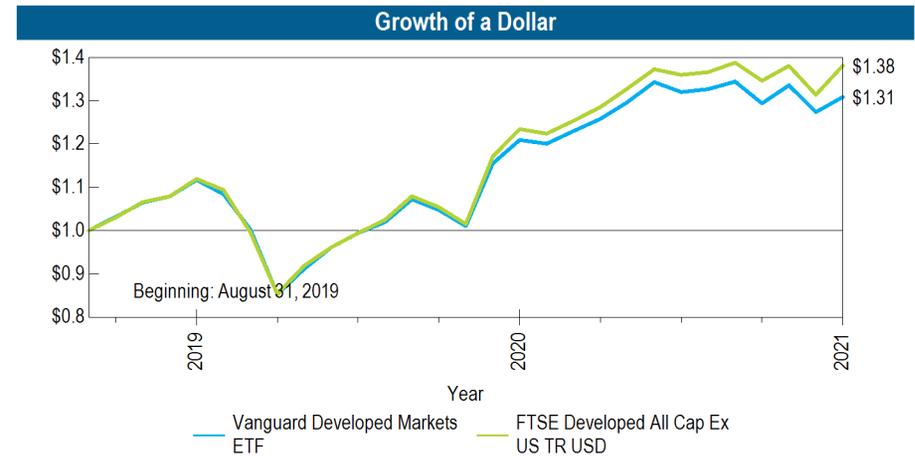
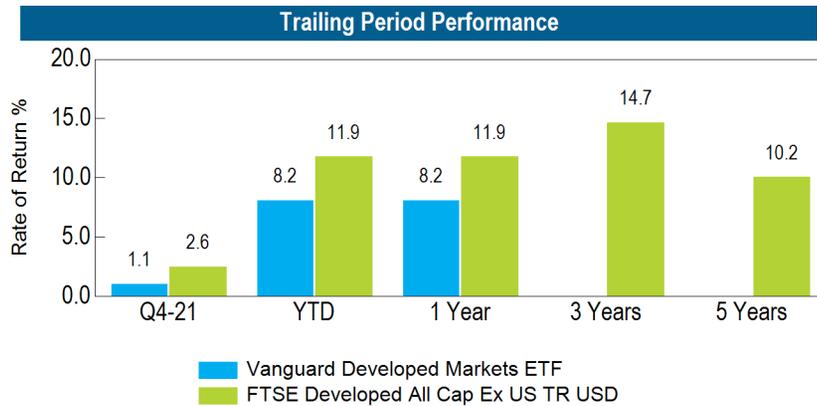


International Equity | As of December 31, 2021



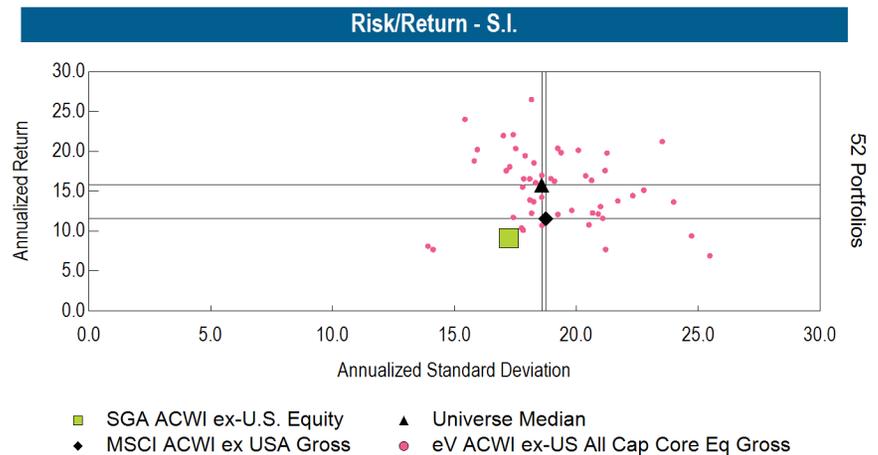
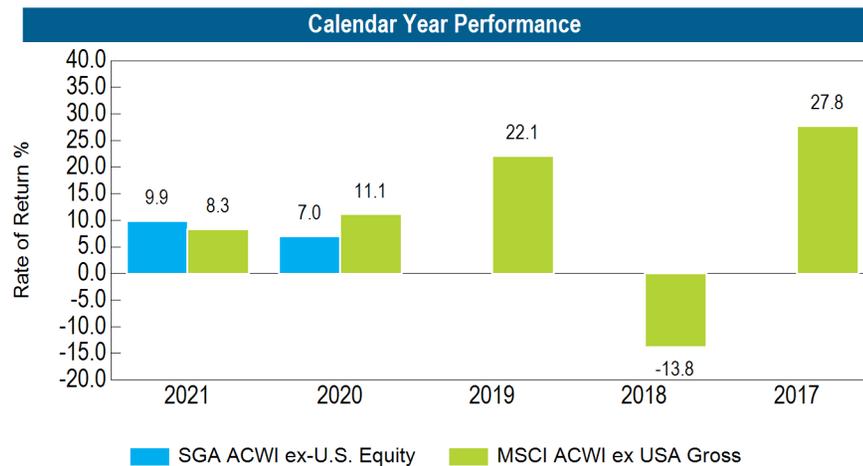
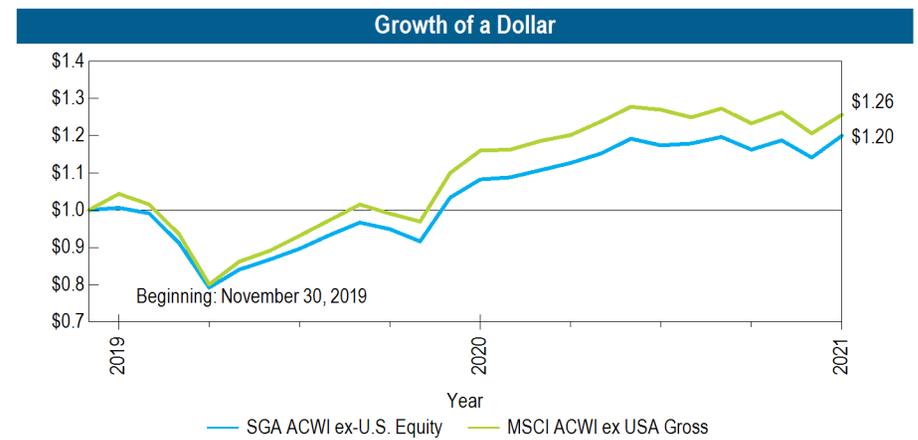
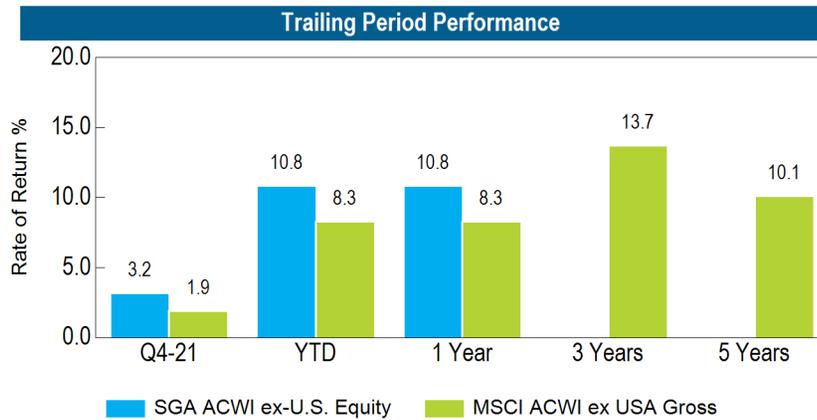
Vanguard Developed Markets ETF | As of December 31, 2021

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Vanguard Developed Markets ETF	12.17%	18.22%	-0.15%	0.96	-1.12	2.38%	91.50%	101.62%



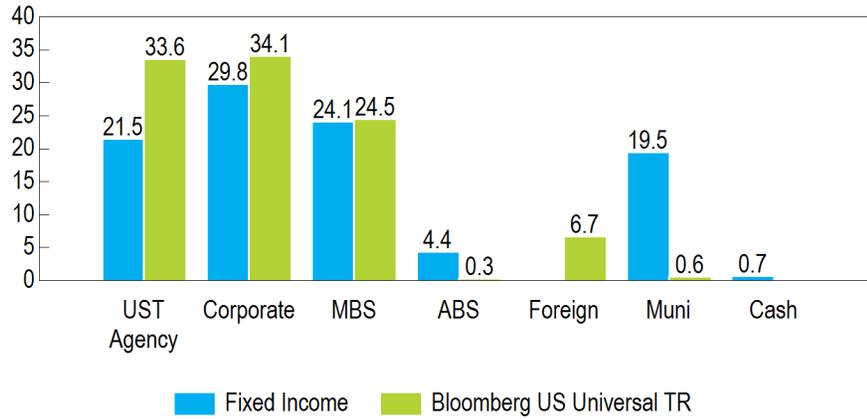
SGA ACWI ex-U.S. Equity | As of December 31, 2021

	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	8.42%	17.19%	-0.15%	0.90	-0.80	3.94%	80.95%	93.03%
MSCI ACWI ex USA Gross	11.56%	18.75%	0.00%	1.00	--	0.00%	100.00%	100.00%



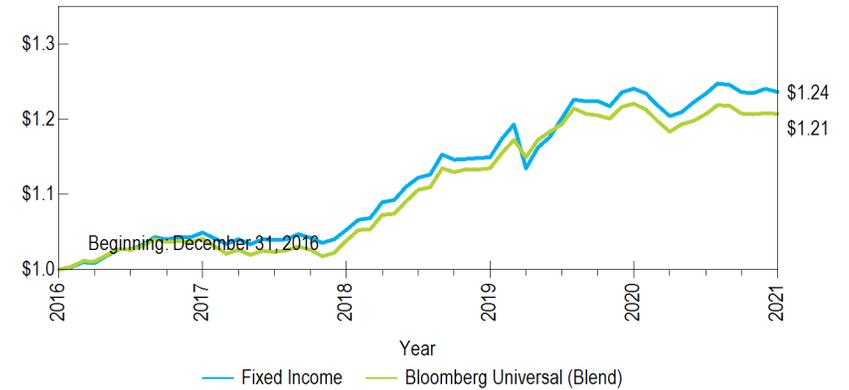
Fixed Income | As of December 31, 2021

US Sector Allocation

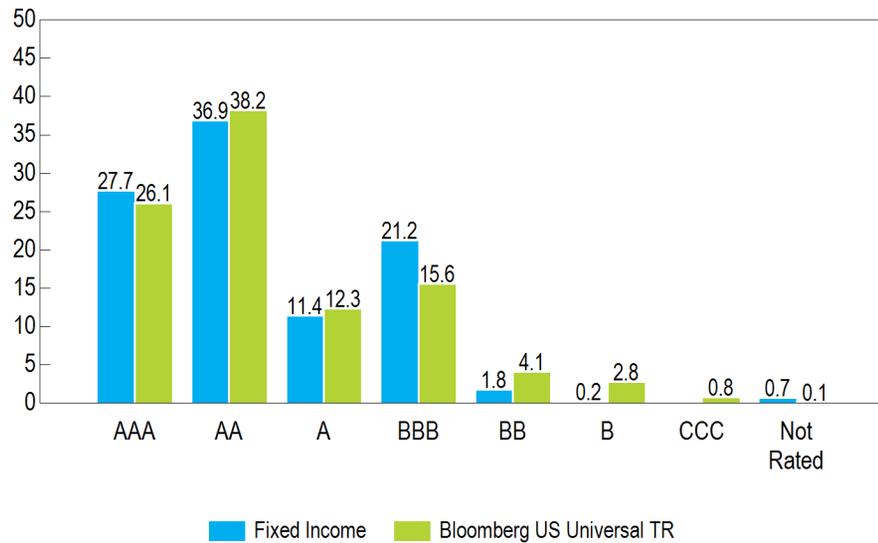


Growth of a Dollar

5 Years Ending December 31, 2021



Credit Quality Allocation

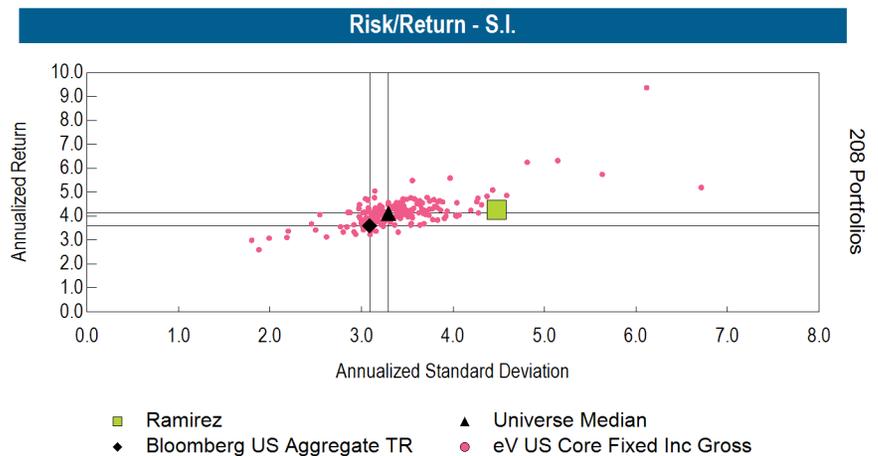
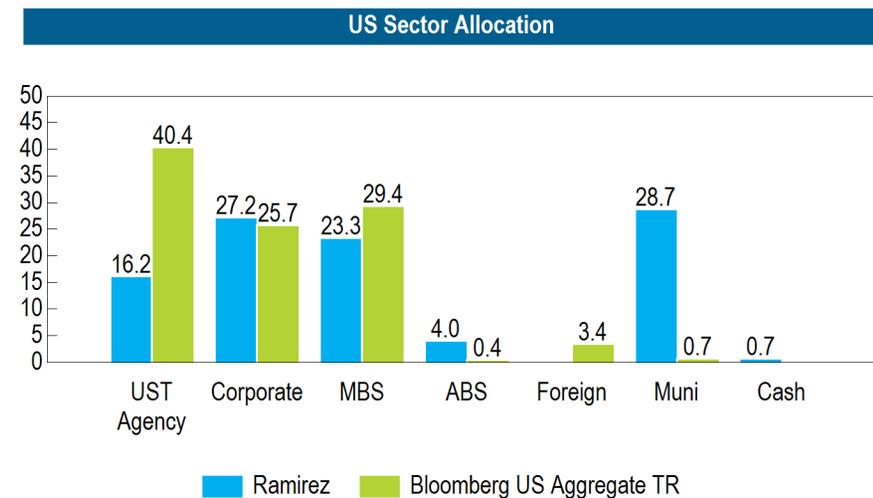
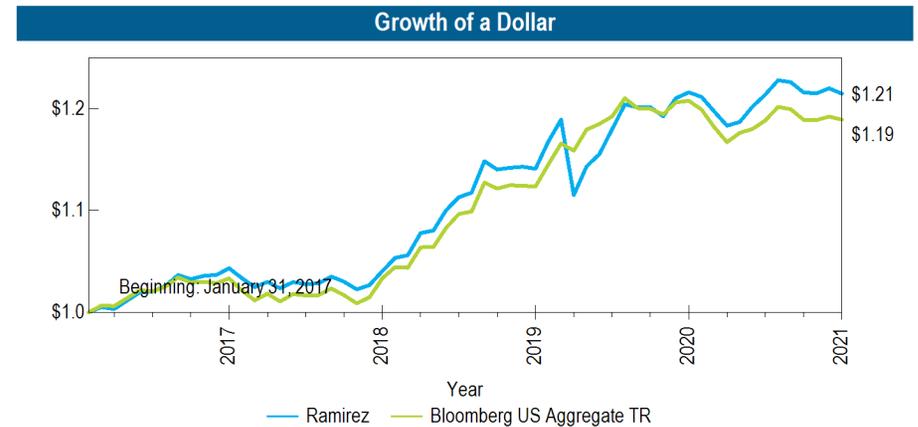
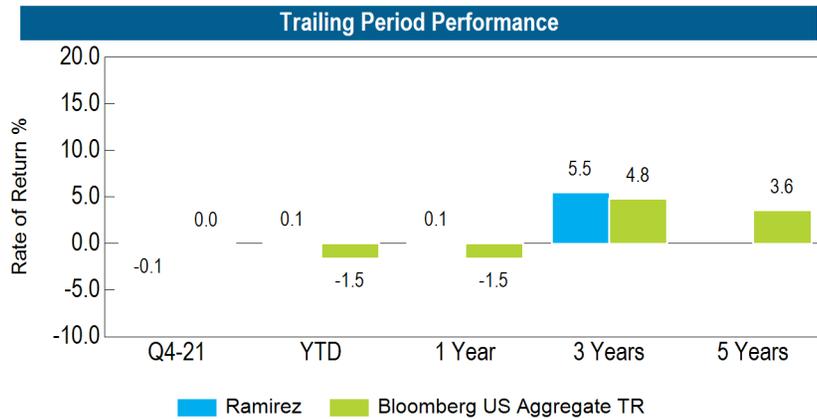


Fixed Income Fixed Income Characteristics vs. Bloomberg US Universal TR

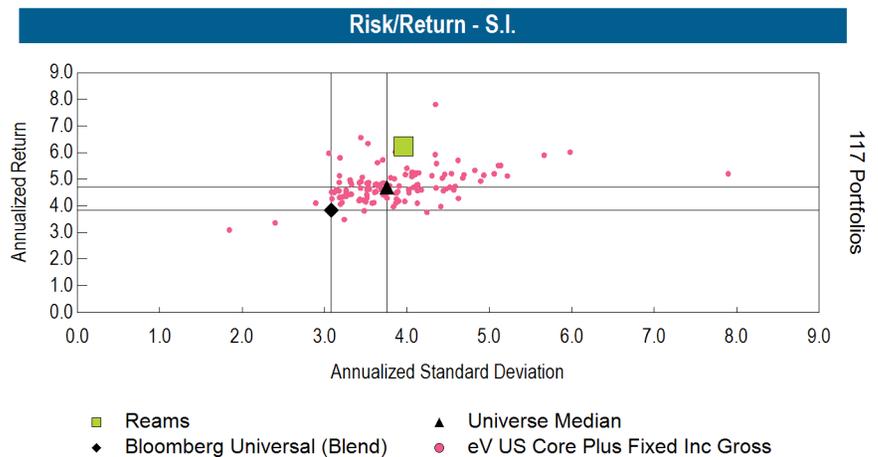
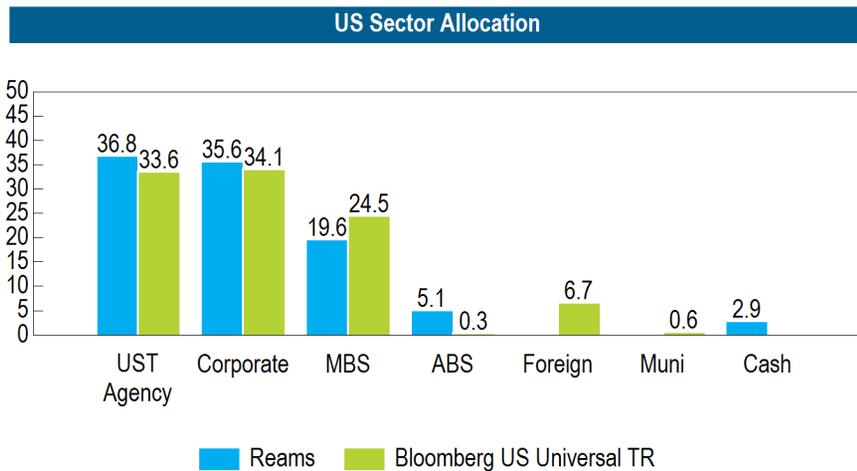
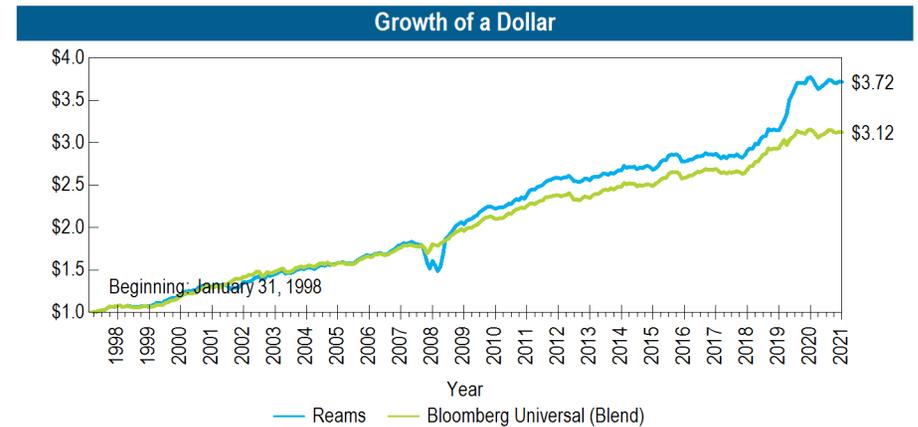
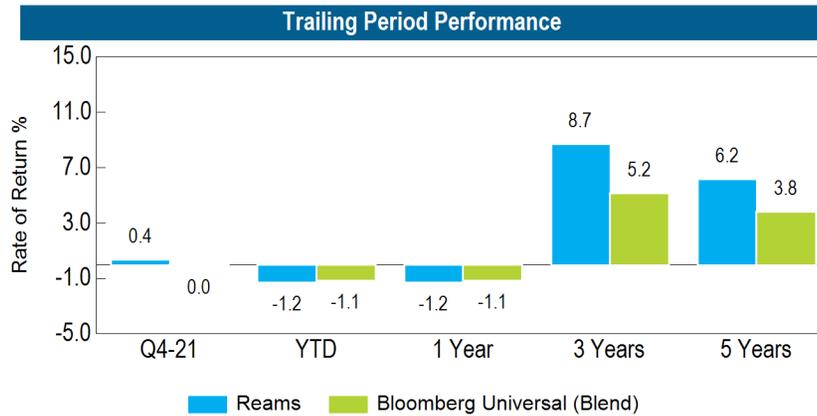
	Portfolio Q4-21	Index Q4-21
Fixed Income Characteristics		
Yield to Maturity	2.09	2.07
Average Duration	6.01	6.65
Average Quality	AA	AA
Weighted Average Maturity	8.81	12.84

Ramirez | As of December 31, 2021

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Ramirez	4.04%	4.47%	0.00%	1.13	0.16	2.83%	123.67%	127.93%
Bloomberg US Aggregate TR	3.59%	3.09%	0.00%	1.00	--	0.00%	100.00%	100.00%

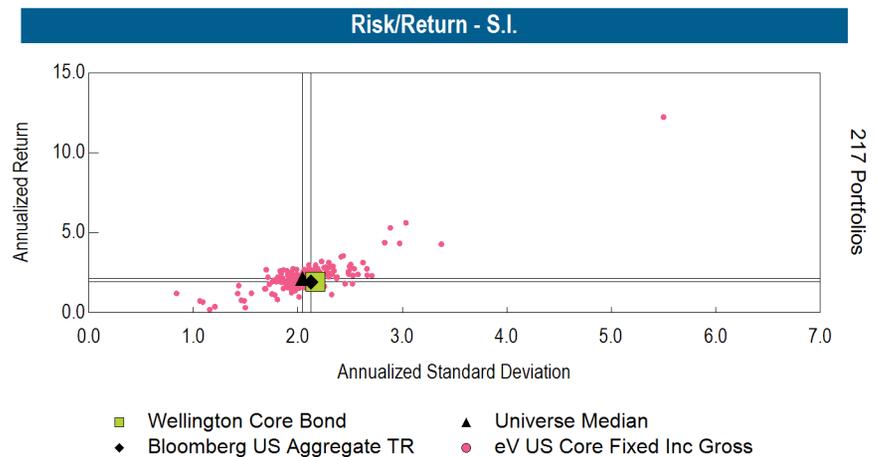
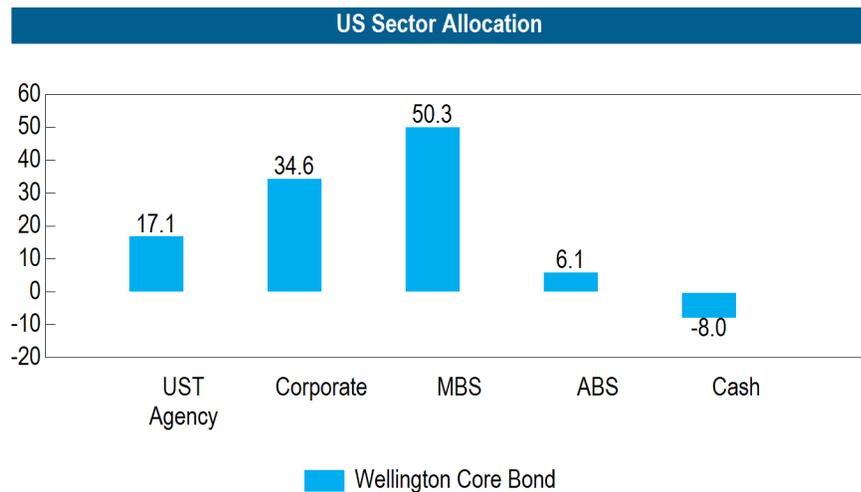
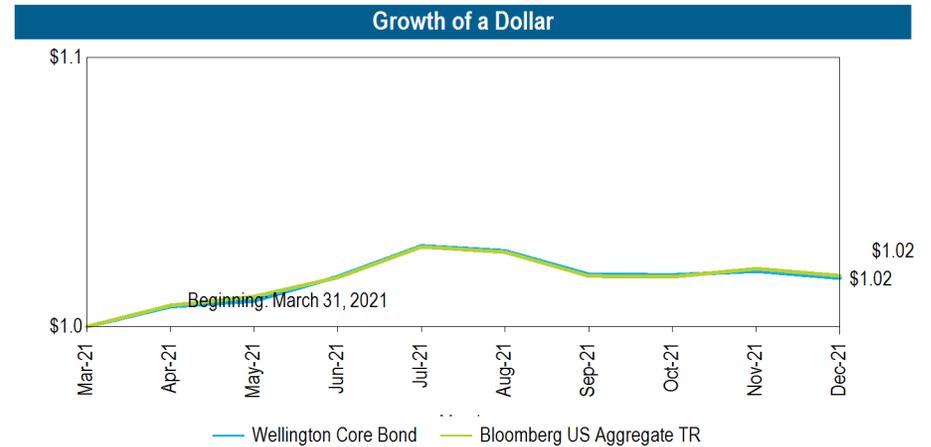
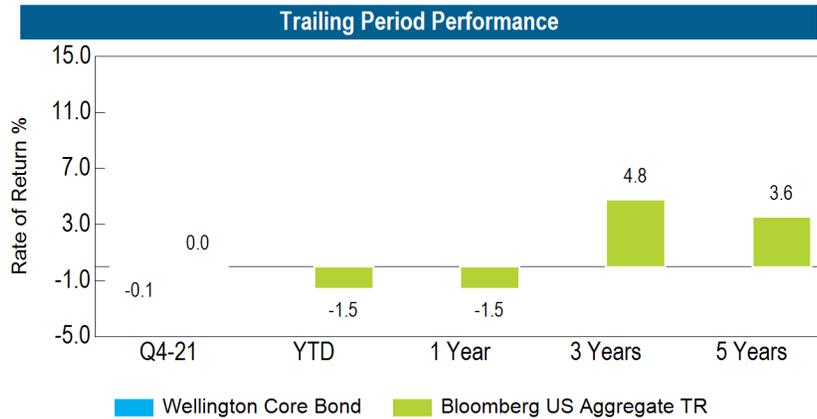


	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Reams	5.64%	5.27%	0.05%	1.05	0.20	3.91%	122.26%	99.36%
Bloomberg Universal (Blend)	4.87%	3.37%	0.00%	1.00	--	0.00%	100.00%	100.00%



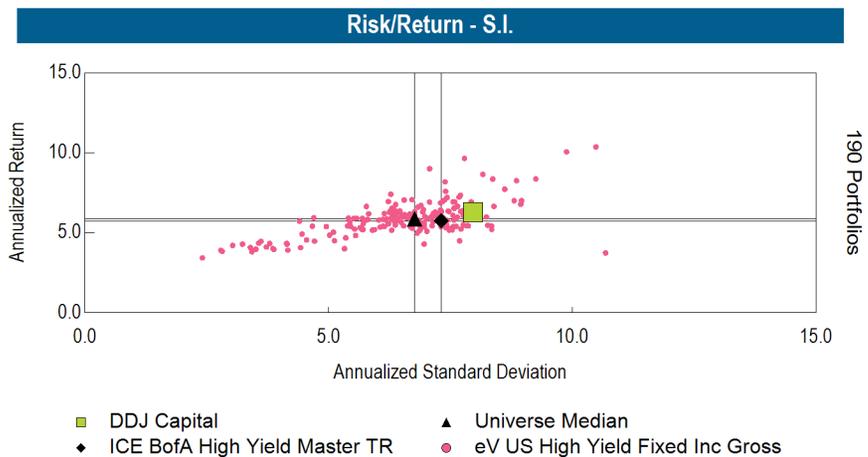
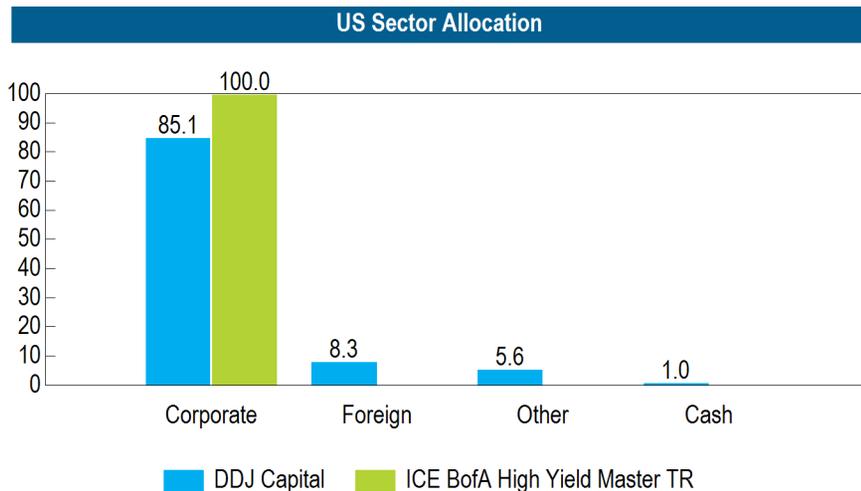
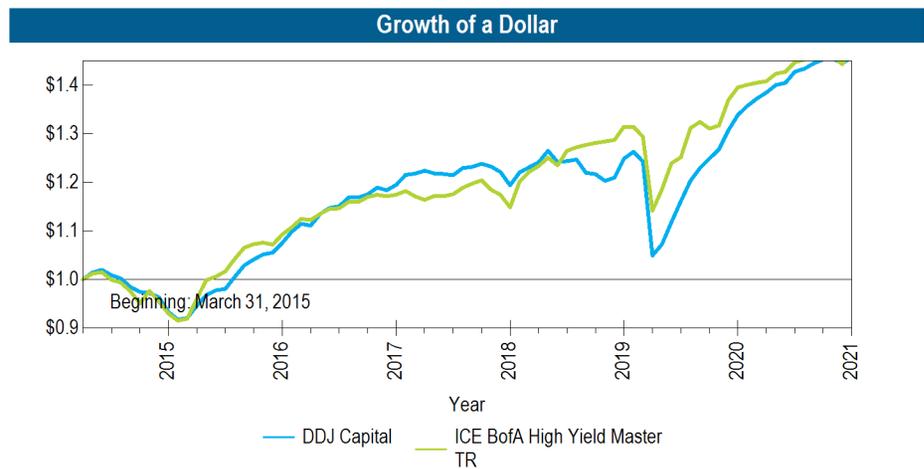
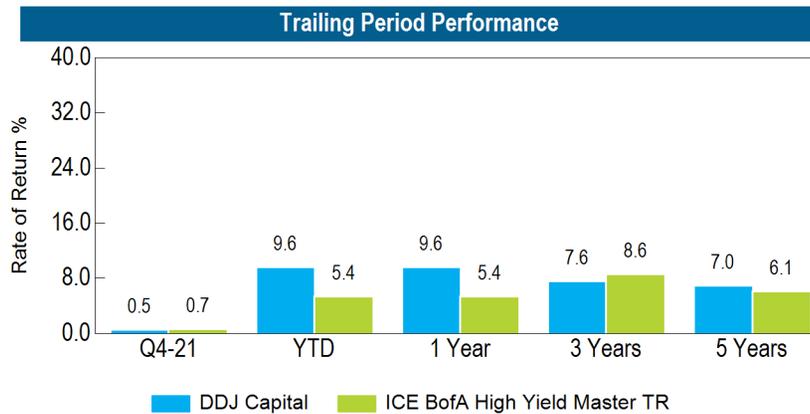
Wellington Core Bond | As of December 31, 2021

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Wellington Core Bond	1.81%	2.17%	-0.01%	1.01	-0.26	0.34%	96.21%	97.44%
Bloomberg US Aggregate TR	1.89%	2.13%	0.00%	1.00	--	0.00%	100.00%	100.00%



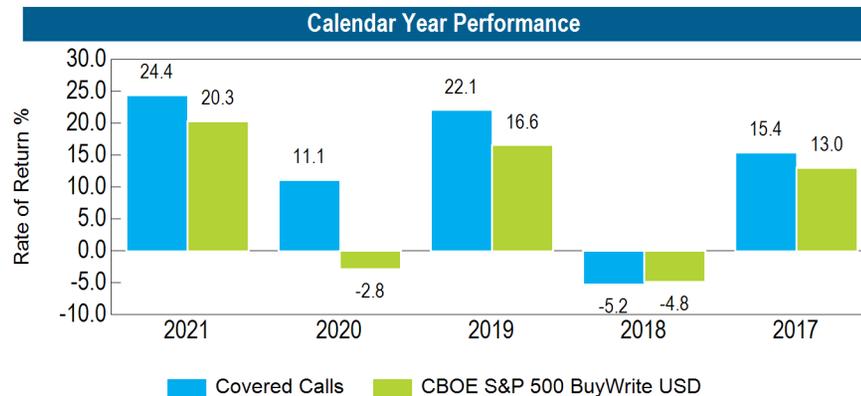
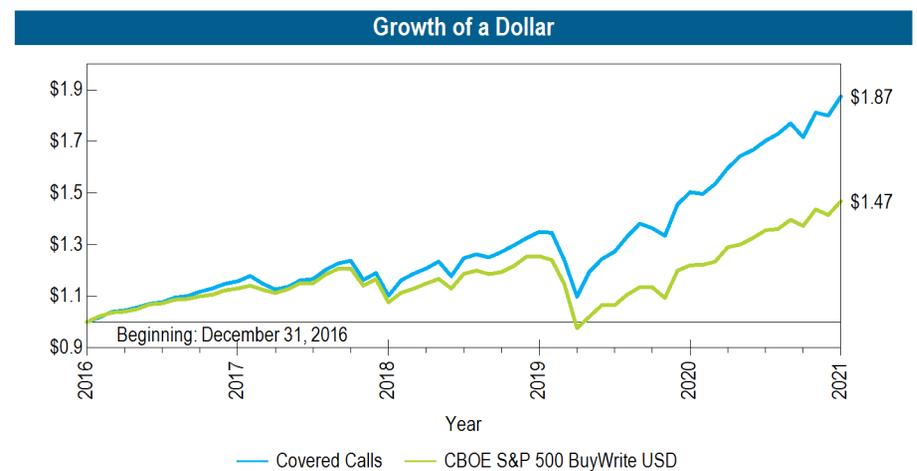
DDJ Capital | As of December 31, 2021

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
DDJ Capital	5.86%	7.94%	0.01%	0.96	-0.04	3.76%	90.03%	89.82%
ICE BofA High Yield Master TR	6.01%	7.30%	0.00%	1.00	--	0.00%	100.00%	100.00%



Covered Calls | As of December 31, 2021

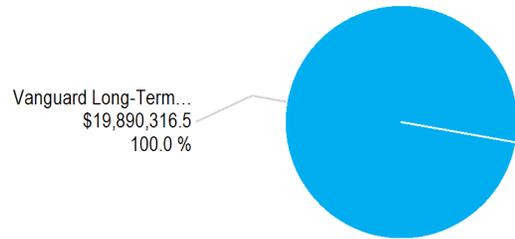
	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Covered Calls	10.84%	10.66%	0.30%	0.98	1.12	3.32%	138.13%	97.39%
CBOE S&P 500 BuyWrite USD	7.13%	10.33%	0.00%	1.00	--	0.00%	100.00%	100.00%
Parametric BXM	8.41%	8.90%	0.19%	0.83	0.44	2.88%	96.41%	87.43%
CBOE S&P 500 BuyWrite USD	7.13%	10.33%	0.00%	1.00	--	0.00%	100.00%	100.00%
Parametric DeltaShift	13.39%	12.66%	0.42%	1.12	1.18	5.32%	188.70%	104.54%



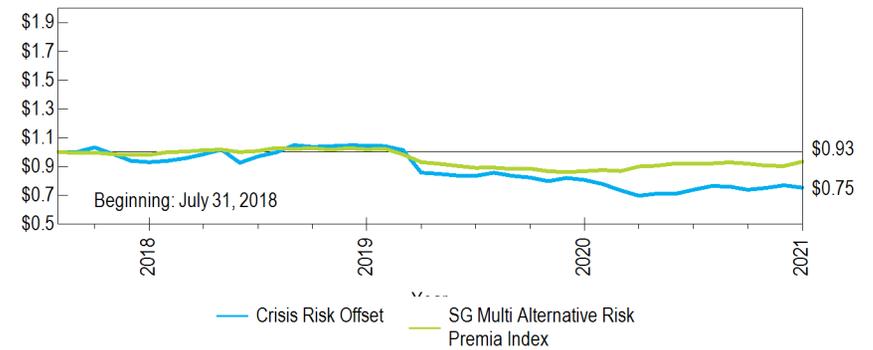
Crisis Risk Offset | As of December 31, 2021

	Anlzd Return	Anlzd Standard Deviation	Alpha	Beta	Information Ratio	Tracking Error	Sortino Ratio	Sharpe Ratio	R-Squared	Up Mkt Capture Ratio	Down Mkt Capture Ratio
Crisis Risk Offset	-8.28%	13.56%	-0.48%	1.02	-0.51	12.25%	-0.69	-0.69	0.18	45.06%	133.07%
SG Multi Alternative Risk Premia Index	-2.01%	5.69%	0.00%	1.00	--	0.00%	-0.47	-0.53	1.00	100.00%	100.00%
Vanguard Long-Term Treasury ETF	--	--	--	--	--	--	--	--	--	--	--

Current Allocation



Growth of a Dollar



Trailing Period Performance



Correlation Matrix

1 Year Ending December 31, 2021

	Crisis Risk Offset	MSCI ACWI	S&P 500	Bloomberg Global Aggregate TR
Crisis Risk Offset	1.00	--	--	--
MSCI ACWI	0.06	1.00	--	--
S&P 500	0.18	0.96	1.00	--
Bloomberg Global Aggregate TR	0.68	0.30	0.29	1.00

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. $\text{Portfolio Return} - [\text{Risk Free Rate} + \text{Beta} * (\text{market return} - \text{Risk Free Rate})]$.

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 its 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%.

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

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

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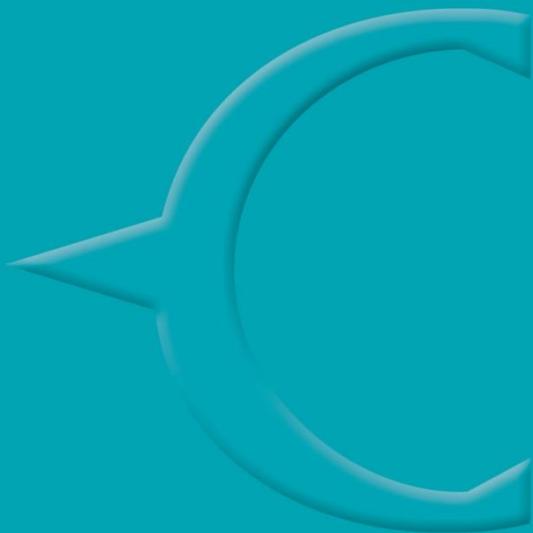
Throughout this report, numbers may not sum due to rounding.

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 PFRS
ACTUARY VALUATION
as of
JULY 1, 2021**



Oakland Police and Fire Retirement System

**Actuarial Valuation Report
as of July 1, 2021**

Produced by Cheiron

January 2022

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January 13, 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, 2021. 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 ending 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.

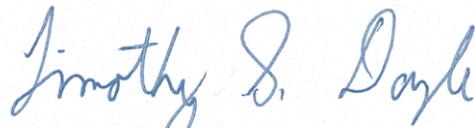
Future actuarial measurements may differ significantly from the current measurements due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; and, changes in plan provisions or applicable 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 A. Schmidt, ASA, EA, FCA, MAAA
Consulting Actuary



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

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

FOREWORD

Cheiron has performed the actuarial valuation of the Oakland Police and Fire Retirement System (PFRS, the Plan) as of July 1, 2021. 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.

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

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 2022-2023, 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 2022-2023.

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.

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

SECTION I – EXECUTIVE SUMMARY

B. Key Findings of this Valuation

The key results of the July 1, 2021 actuarial valuation are as follows:

- The actuarially determined employer contribution amount for Fiscal Year 2022-2023 is \$32.7 million, based on projecting the Actuarial Liabilities and the Actuarial Value of Assets to the end of the 2021-2022 Fiscal Year. This represents a decrease of \$12.1 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, 2023.
- During the year ended June 30, 2021, the return on Plan assets was 24.14% on a market value basis net of investment expenses, as compared to the 6.00% assumption for the 2020-2021 Plan year. This resulted in a market value gain on investments of \$67.8 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 14.16%, for an actuarial asset gain of \$29.9 million. Without the 10% corridor, the actuarial asset gain would have been \$15.1 million.
- The Plan experienced a gain on the Actuarial Liability of \$6.6 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 and asset gains, the Plan experienced a total gain of \$36.5 million.
- The Plan's smoothed funded ratio, the ratio of Actuarial Value of Assets over Actuarial Liability, increased from 62.2% last year to 72.2% as of June 30, 2021.
- The Plan's funded ratio increased from 63.5% to 80.2% 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 \$225.5 million to \$159.3 million as of July 1, 2021.
- Overall participant membership decreased compared to last year. 29 members died, 12 of whom had their benefits continue to a surviving spouse. In addition, 28 surviving beneficiaries died. There are no active members of the Plan.

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- If the contribution was determined using a projected asset value based on the current market (i.e., non-smoothed) value of assets, the contribution for FY 2022-2023 would be \$22.3 million. The contribution is smaller than that determined using the projected AVA, because the current market value reflects the full amount of prior investment gains, while under the AVA projection a portion of those gains are deferred until years after FY 2022-2023.

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, 2020	July 1, 2021	% Change
<u>Participant Counts</u>			
Active Participants	0	0	
Participants Receiving a Benefit	768	723	-5.9%
Total	768	723	-5.9%
Annual Pay of Active Members	\$ 0	\$ 0	
<u>Assets and Liabilities</u>			
Actuarial Liability (AL)	\$ 597,014	\$ 571,942	-4.2%
Actuarial Value of Assets (AVA)	371,467	412,680	11.1%
Unfunded Actuarial Liability (UAL)	\$ 225,547	\$ 159,262	-29.4%
Funded Ratio (AVA)	62.2%	72.2%	9.9%
Funded Ratio (MVA)	63.5%	80.2%	16.7%
<u>Contributions</u>			
Employer Contribution (FY2021-22)	\$ 43,820	N/A	
Employer Contribution (FY2022-23)	\$ 44,828	\$ 32,712	-27.0%

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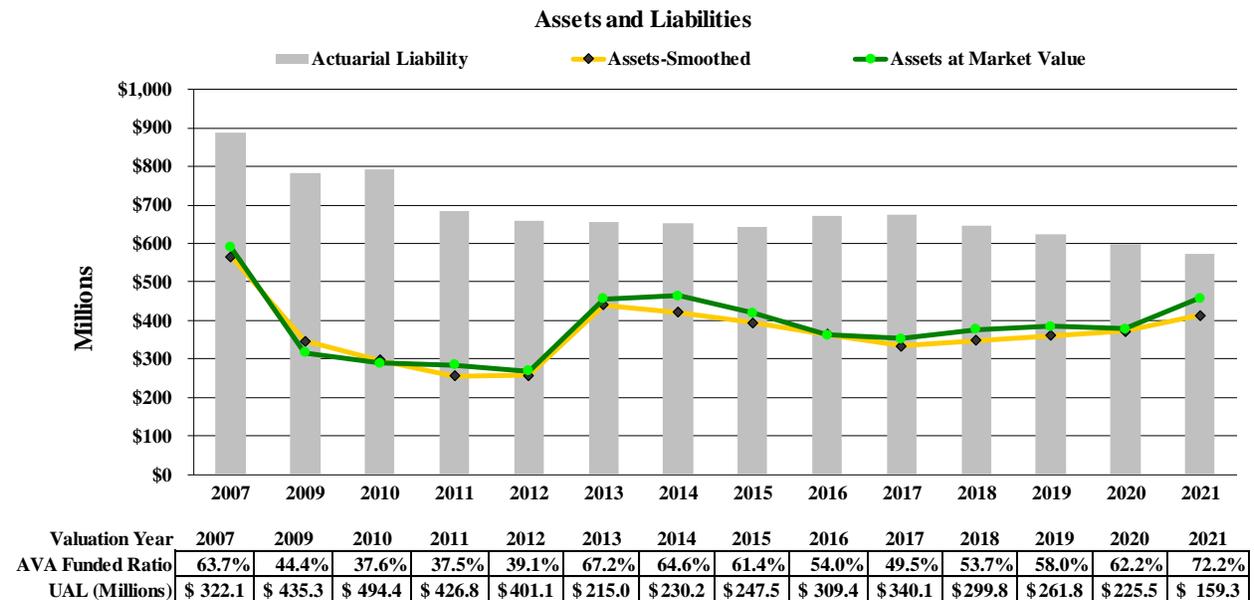
C. Historical Trends

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 result 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 72.2% over the past four years due to recommencement of contributions, the FYE 2021 asset gain, and to a lesser extent other asset and liability gains.

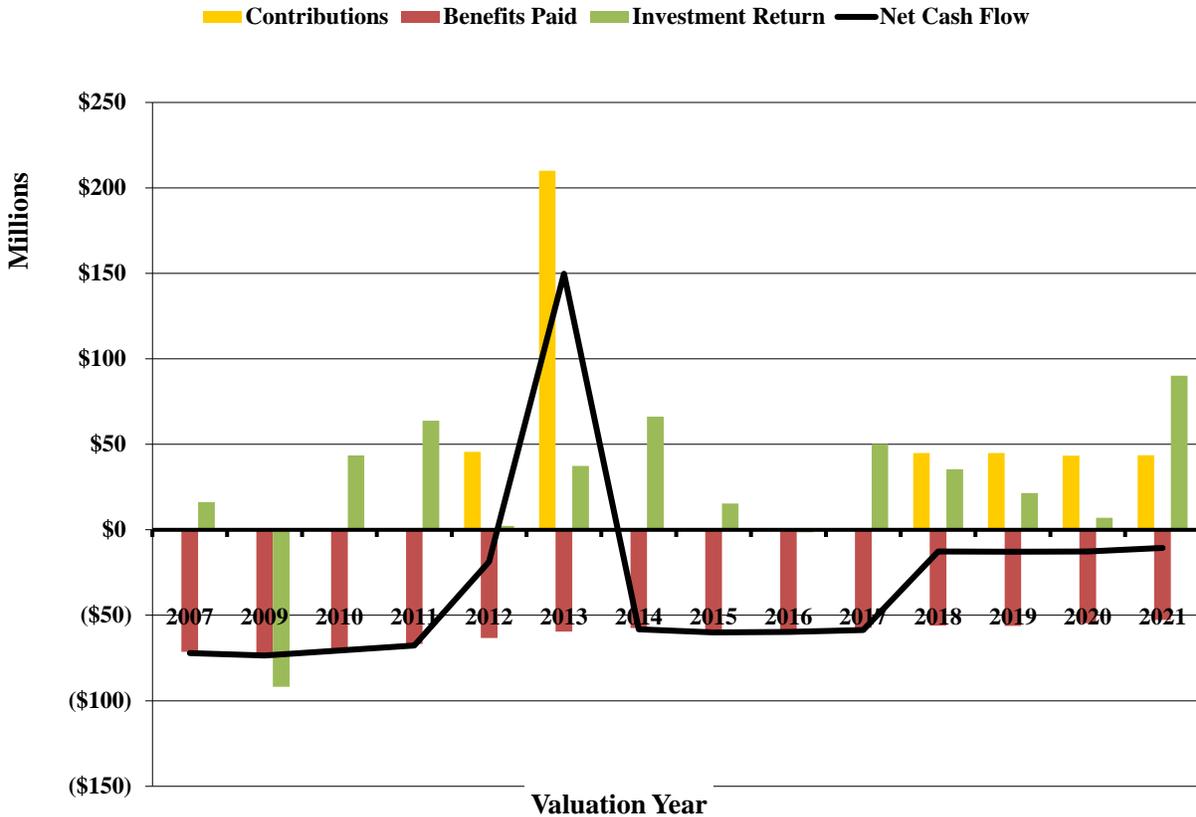


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Cash Flows

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 expenses are represented by the scale on the left. The Plan’s net cash flow has been negative 13 of the last 14 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 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.

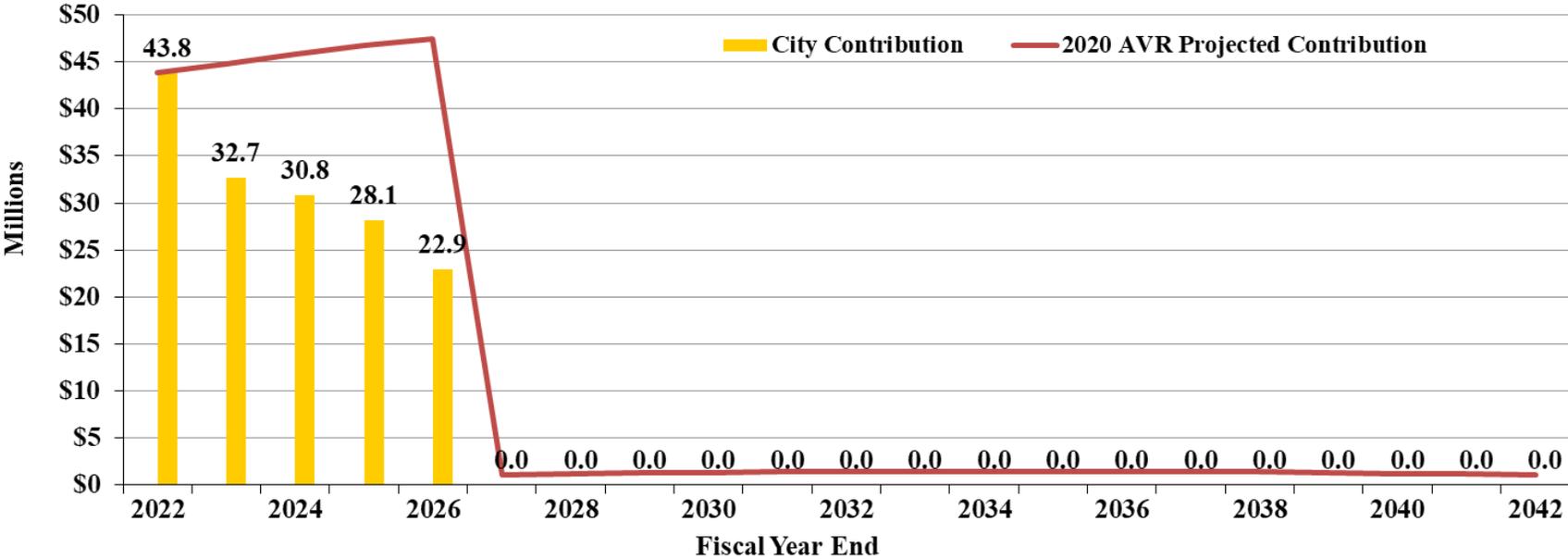
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D. Future Expected Financial Trends

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, 2021 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 decreased from \$43.8 million in fiscal year 2022 to \$32.7 million in fiscal year 2023, and then is expected to decrease by about \$2 million per year for the next two years and by \$5 million in the fourth year as the current unfunded liability is fully amortized and recent asset gains are recognized. This assumes that the annual payments by the City will equal the administrative



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expenses, plus 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 gains, which will not be recognized until after 2026; the deferred recognition of these gains is expected to offset all of 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 \$40 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.

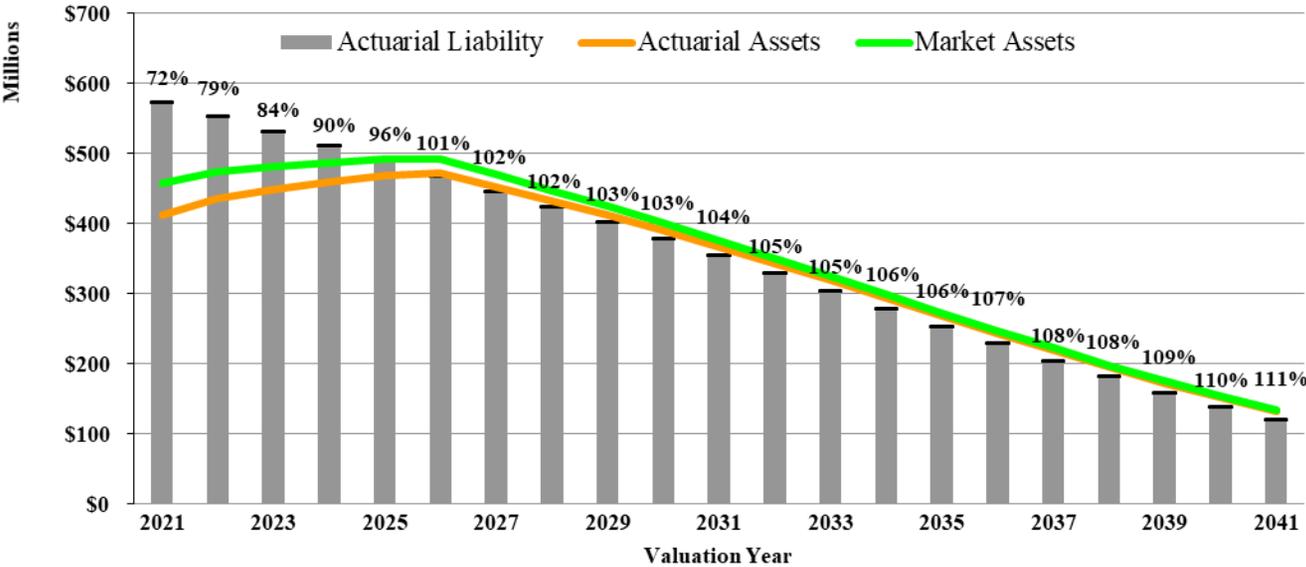
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Asset and Liability Projections:

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 mature.

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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 nine 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 nine years compared to the total change in the UAL for each year, a portion of which is associated with mortality experience.

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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 20, 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 nine-year history of changes in the UAL by source.

TABLE II-1 UAL Change by Source (\$ in Thousands)							
FYE	Contributions			Liability Experience	Total UAL Change		
	MOU Changes	Assumption Changes	vs. Tread Water				
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)	
Total	\$ 32,383	\$ 53,328	\$ (226,927)	\$ (69,971)	\$ (30,608)	\$ (241,796)	

The UAL was reduced by approximately \$241.8 million over the last nine years. Contributions in excess of the “tread water” level (i.e., interest on the UAL plus administrative expenses) reduced the UAL by \$226.9 million, liability experience reduced the UAL by \$30.6 million, and investment returns decreased the UAL by \$70.0 million. Meanwhile changes to MOUs increased the UAL by \$32.4 million and assumption changes increased the UAL by \$53.3 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.

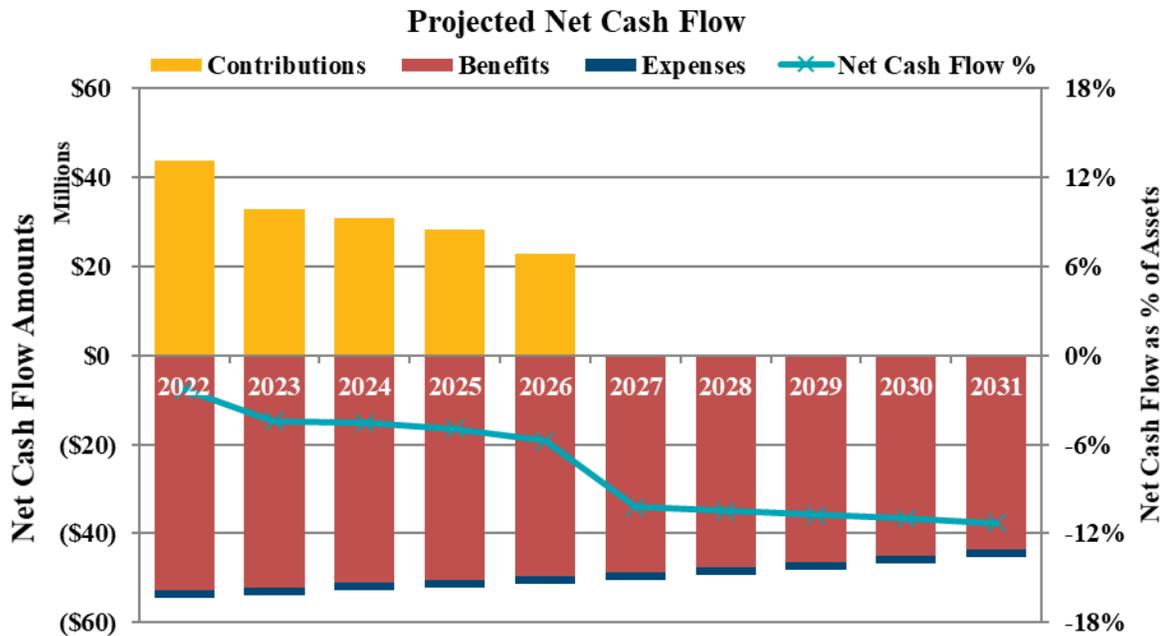
Plan maturity can be measured in a variety of ways, but they all get at one basic dynamic – the larger the plan is compared to the contribution or revenue base that supports it; the more sensitive the plan will be to risk. Given that the Plan has been closed to new entrants since 1976 with no remaining 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 the 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 cease following the 2025-2026 Fiscal Year once the unfunded liability has been paid off. 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.

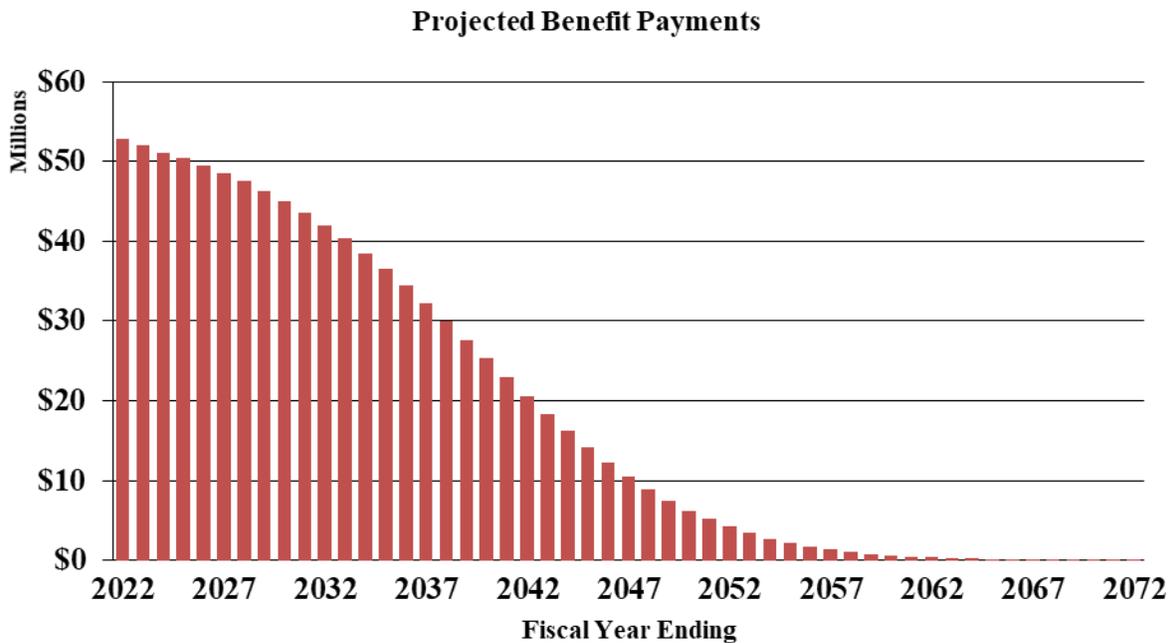
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SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS

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 purchase 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.

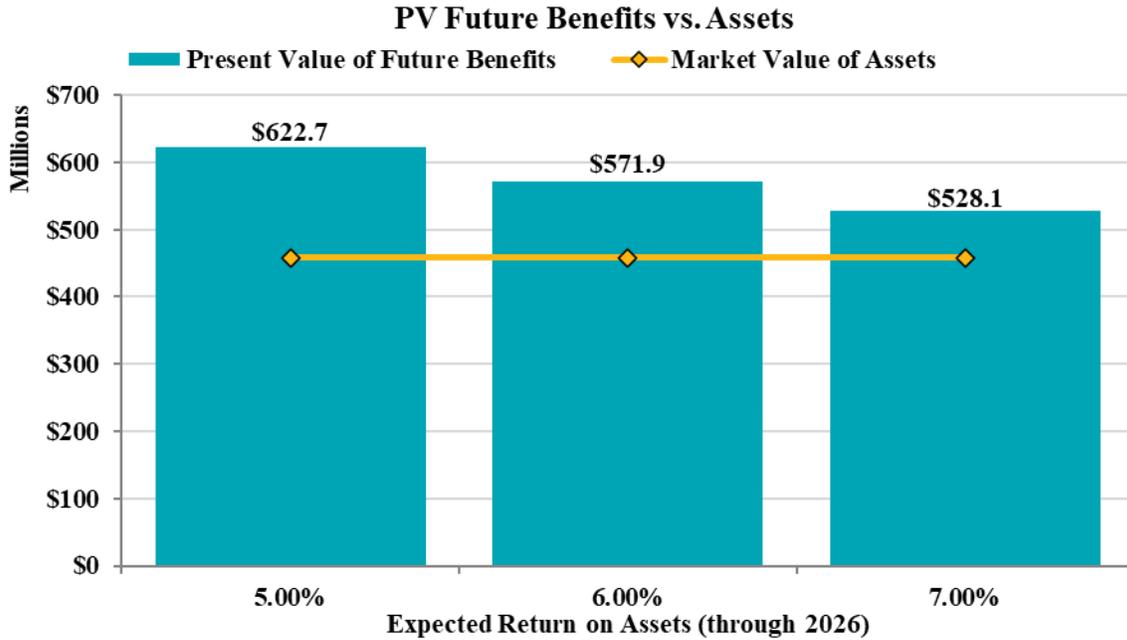


Sensitivity to Investment Returns

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.

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SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS



If actual investment returns meet the expected returns annually, the Plan would need approximately \$572 million in assets today to pay all projected benefits compared to current assets of \$458 million. If investment returns are 100 basis points lower each year, the Plan would need approximately \$623 million in assets today, and if investment returns are 100 basis points higher, the Plan would need approximately \$528 million in assets today.

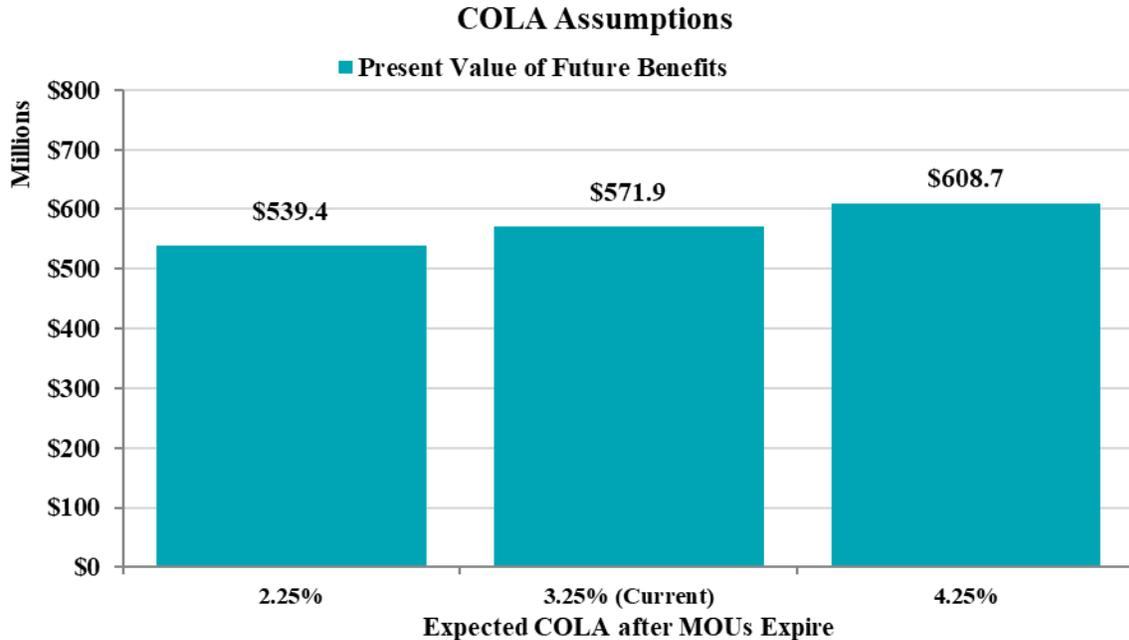
Sensitivity to COLA Changes

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.

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SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS



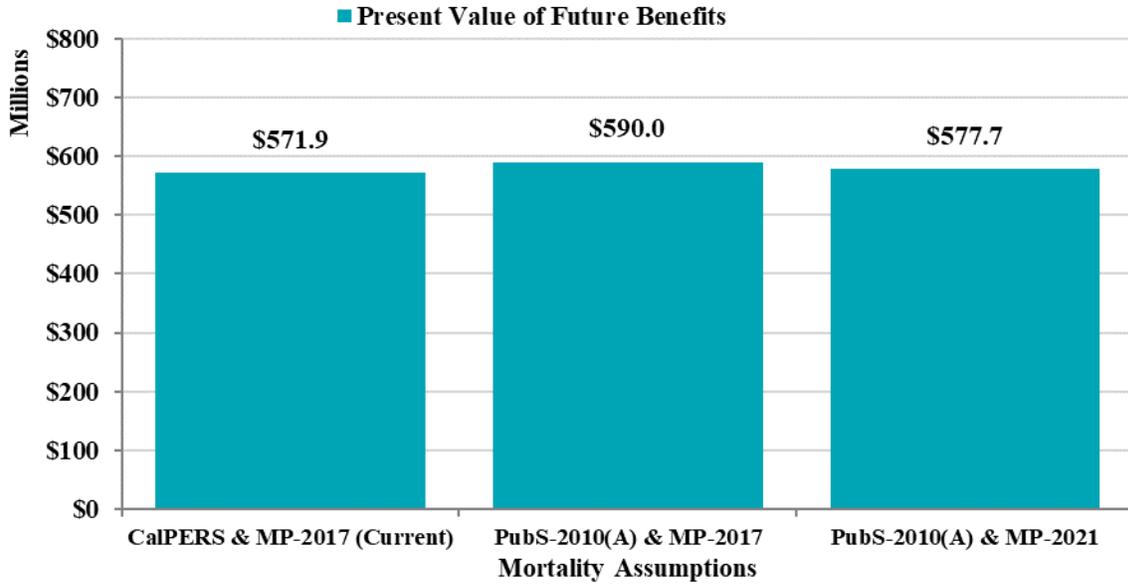
Sensitivity to Mortality Assumption Changes

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 new tables that have been developed using the experience 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.

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SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS

Mortality and Mortality Improvement Assumptions



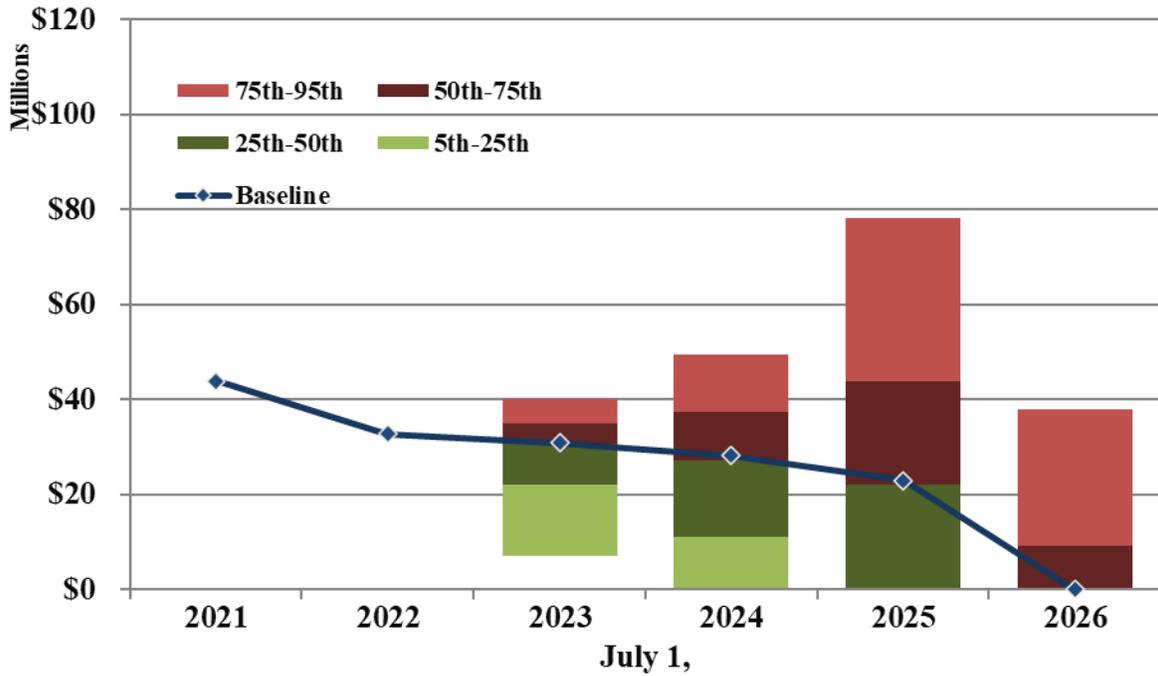
Stochastic Projections

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.

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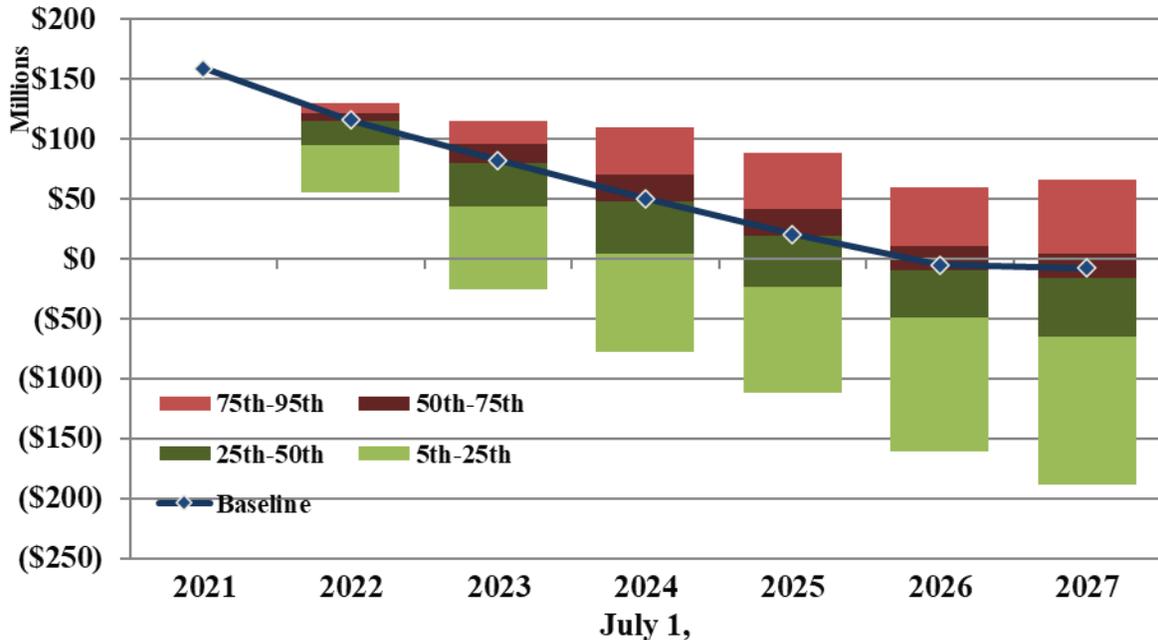
SECTION II – IDENTIFICATION AND ASSESSMENT OF RISKS

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 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)



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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, in particularly in developing a funding strategy to deal with changes in the UAL after the required full funding date.

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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, 2020 and June 30, 2021,
- 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 are the Actuarial Value of Assets, which reflect smoothing of annual investment returns.

Table III-1 discloses and compares each component of the market asset value as of June 30, 2020 and June 30, 2021.

TABLE III-1 Statement of Assets at Market Value June 30, (in thousands)			
		2020	2021
Cash and Cash Equivalents	\$	6,346	\$ 6,324
Receivables		8,079	2,462
Investments, at Fair Value		404,721	503,781
Total Assets	\$	419,146	\$ 512,567
Liabilities		40,171	54,034
Market Value of Assets	\$	378,975	\$ 458,533

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SECTION III – ASSETS

Changes in Market Value

The components of asset change are:

- Contributions (employer and employee)
- Benefit payments
- Administrative Expenses
- 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 2020 and 2021.

TABLE III-2		
Changes in Market Values		
June 30,		
(in thousands)		
	<u>2020</u>	<u>2021</u>
Contributions		
Contributions of Plan Members	\$ 0	\$ 0
Contributions from the City	<u>43,409</u>	<u>43,648</u>
Total Contributions	<u>43,409</u>	<u>43,648</u>
Investment Income		
Miscellaneous Income	0	1
Investment Income	<u>6,997</u>	<u>90,191</u>
Total Investment Income	<u>6,997</u>	<u>90,192</u>
Disbursements		
Benefit Payments	(54,619)	(52,697)
Administrative Expenses	<u>(1,523)</u>	<u>(1,585)</u>
Total Disbursements	<u>(56,142)</u>	<u>(54,282)</u>
Net increase (Decrease)	(5,736)	79,558
Net Assets Held in Trust for Benefits:		
Beginning of Year	<u>384,711</u>	<u>378,975</u>
End of Year	\$ <u><u>378,975</u></u>	\$ <u><u>458,533</u></u>
Approximate Return	1.85%	24.14%

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SECTION III – ASSETS

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 2020-2021) 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, 2020	\$ 371,467
b. Total Contributions and Misc Income	43,649
c. Administrative Expense	(1,585)
d. Benefit Payments	(52,697)
e. Expected Investment Earnings	<u>21,974</u>
f. Expected Actuarial Value of Assets - July 1, 2021	\$ 382,808
[1a + 1b + 1c + 1d + 1e]	
2. Calculate Final Actuarial Value of Assets	
a. Value of Market Value of Assets - July 1, 2021	\$ 458,533
b. Excess of MVA over Expected AVA [2a - 1f]	75,725
c. Preliminary AVA [1f + 0.2 * 2b]	397,953
d. 90% of MVA [90% * 2a]	412,680
e. 110% of MVA [110% * 2a]	504,386
3. Final Actuarial Value of Assets	\$ 412,680
[2c, not less than 2d or greater than 2e]	

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SECTION III – ASSETS

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, 2020 value	\$ 378,975	\$ 371,467
Contributions of Plan Members	0	0
Contributions from the City	43,648	43,648
Miscellaneous Income	1	1
Benefit Payments	(52,697)	(52,697)
Administrative Expenses	(1,585)	(1,585)
Expected Investment Earnings (6.00%)	22,424	21,974
Expected Value June 30, 2021	\$ 390,766	\$ 382,808
Investment Gain / (Loss)	<u>67,767</u>	<u>29,872</u>
July 1, 2021 value	458,533	412,680
Return	24.14%	14.16%

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

SECTION IV – LIABILITIES

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

- **Disclosure** of Plan liabilities on July 1, 2020 and July 1, 2021
- 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.

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

SECTION IV – LIABILITIES

TABLE IV-1		
Liabilities/Net (Surplus)/Unfunded		
(in thousands)		
	July 1, 2020	July 1, 2021
<u>Present Value of Future Benefits</u>		
Active Participant Benefits	\$ 0	\$ 0
Retiree and Inactive Benefits	<u>597,014</u>	<u>571,942</u>
Present Value of Future Benefits (PVB)	\$ 597,014	\$ 571,942
<u>Actuarial Liability</u>		
Present Value of Future Benefits (PVB)	\$ 597,014	\$ 571,942
Present Value of Future Normal Costs (PVFNC)	<u>0</u>	<u>0</u>
Actuarial Liability (AL = PVB – PVFNC)	\$ 597,014	\$ 571,942
Actuarial Value of Assets (AVA)	<u>371,467</u>	<u>412,680</u>
Net (Surplus)/Unfunded (AL – AVA)	\$ 225,547	\$ 159,262

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

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, 2020	\$ 597,014
Actuarial Liability at July 1, 2021	\$ 571,942
Liability Increase (Decrease)	\$ (25,072)
Change due to:	
Plan Design Changes	\$ 0
Assumption Change	0
Accrual of Benefits	0
Actual Benefit Payments	(52,697)
Interest	34,263
Data Corrections	0
Actuarial Liability (Gain)/Loss	\$ (6,638)

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

SECTION IV – LIABILITIES

TABLE IV-3			
Liabilities by Group as of July 1, 2021			
(in thousands)			
	Police	Fire	Total
Actuarial Accrued Liability			
Active	\$ 0	\$ 0	\$ 0
Service Retirees	217,349	71,416	288,765
Disabled Retirees	79,716	77,835	157,550
Beneficiaries	<u>72,994</u>	<u>52,633</u>	<u>125,627</u>
Total Accrued Liability	\$ 370,058	\$ 201,883	\$ 571,942

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

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)	\$	225,547
2. Employer Normal Cost at Start of Year		0
3. Interest on 1. and 2. to End of Year		13,533
4. Contributions and Miscellaneous Income for Prior Year		43,649
5. Administrative Expenses		(1,585)
6. Interest on 4. and 5. to End of Year		1,244
7. Change in Unfunded Actuarial Liability Due to Changes in Assumptions		0
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		0
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.]	\$	195,772
12. Actual Unfunded Actuarial Liability at End of Year (not less than zero)		159,262
13. Unfunded Actuarial Liability Gain / (Loss) [11. – 12.]	\$	36,509

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

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 2022-2023 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, 2022.

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 2021-2022 Fiscal Year.

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

SECTION V – CONTRIBUTIONS

**TABLE V-I
Development of Projected 2022-2023 Employer Contribution Amount
(in thousands)**

	Actuarial Value of Assets	Market Value of Assets
1. Value of Assets at June 30, 2021:	\$ 412,680	\$ 458,533
a. Expected Contributions and Misc Income	\$ 43,820	\$ 43,820
b. Expected Administrative Expense	\$ (1,693)	\$ (1,693)
c. Expected Benefit Payments	\$ (51,839)	\$ (51,839)
d. Expected Investment Earnings	<u>\$ 24,474</u>	<u>\$ 27,225</u>
2. Expected Value of Assets at June 30, 2022:	\$ 427,441	\$ 476,045
a. Excess of Expected MVA over Expected AVA	\$ 48,604	
b. Preliminary AVA [Expected AVA + 20% * 2a]	\$ 437,162	
c. 90% of Expected MVA	\$ 428,441	
d. 110% of Expected MVA	\$ 523,650	
3. Final Expected AVA [2b, not less than 2c or greater than 2d]	\$ 437,162	\$ 476,045
4. Entry Age Liability at June 30, 2021	\$ 571,942	\$ 571,942
5. Expected Benefit Payments	\$ (51,839)	\$ (51,839)
6. Expected Interest	<u>\$ 32,784</u>	<u>\$ 32,784</u>
7. Expected Entry Age Liability at June 30, 2022	\$ 552,886	\$ 552,886
8. Projected Unfunded Actuarial Liability: (7) - (3)	\$ 115,725	\$ 76,841
9. Funded Ratio: (3) / (7)	79.1%	86.1%
10. Unfunded Actuarial Liability Amortization at Middle of Year as a Level Percentage of Payroll (4 Years Remaining) as of June 30, 2022	\$ 30,971	\$ 20,565
11. Expected Administrative Expenses for Fiscal 2022-2023	<u>\$ 1,741</u>	<u>\$ 1,741</u>
12. Total Contribution: (10) + (11)	\$ 32,712	\$ 22,305

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

SECTION VI – HEADCOUNT AND BENEFIT PAYMENT PROJECTIONS

TABLE VI-1 Benefit Payment and Headcount Projection							
Fiscal Year Ending June 30,	<u>Police</u>		<u>Fire</u>		<u>Total</u>		
	Count	Benefits (in thousands)	Count	Benefits (in thousands)	Count	Benefits (in thousands)	
2022	439.0	\$ 31,507	284.0	\$ 20,333	723.0	\$ 51,839	
2023	424.8	\$ 31,419	270.6	\$ 19,654	695.3	\$ 51,072	
2024	410.6	\$ 31,287	257.1	\$ 18,788	667.6	\$ 50,076	
2025	396.3	\$ 31,030	243.6	\$ 18,441	640.0	\$ 49,471	
2026	382.0	\$ 30,713	230.4	\$ 17,905	612.4	\$ 48,618	
2027	367.5	\$ 30,330	217.3	\$ 17,340	584.8	\$ 47,670	
2028	352.7	\$ 29,870	204.5	\$ 16,747	557.2	\$ 46,617	
2029	337.6	\$ 29,327	192.0	\$ 16,126	529.6	\$ 45,453	
2030	322.2	\$ 28,691	179.7	\$ 15,478	501.9	\$ 44,170	
2031	306.4	\$ 27,958	167.7	\$ 14,803	474.1	\$ 42,760	
2032	290.1	\$ 27,120	156.0	\$ 14,099	446.1	\$ 41,219	
2033	273.5	\$ 26,176	144.5	\$ 13,368	418.0	\$ 39,544	
2034	256.5	\$ 25,126	133.2	\$ 12,611	389.7	\$ 37,737	
2035	239.2	\$ 23,973	122.2	\$ 11,831	361.4	\$ 35,804	
2036	221.6	\$ 22,724	111.5	\$ 11,033	333.1	\$ 33,757	
2037	204.0	\$ 21,391	101.1	\$ 10,221	305.1	\$ 31,611	
2038	186.4	\$ 19,985	91.1	\$ 9,402	277.5	\$ 29,388	
2039	169.0	\$ 18,524	81.5	\$ 8,585	250.5	\$ 27,109	
2040	152.0	\$ 17,026	72.3	\$ 7,778	224.3	\$ 24,804	
2041	135.6	\$ 15,513	63.6	\$ 6,989	199.2	\$ 22,502	
2042	119.8	\$ 14,006	55.6	\$ 6,228	175.4	\$ 20,234	
2043	104.9	\$ 12,528	48.1	\$ 5,502	153.0	\$ 18,030	
2044	91.0	\$ 11,097	41.2	\$ 4,819	132.2	\$ 15,916	
2045	78.1	\$ 9,731	35.1	\$ 4,184	113.2	\$ 13,915	
2046	66.4	\$ 8,447	29.5	\$ 3,601	95.9	\$ 12,048	
2047	55.8	\$ 7,255	24.7	\$ 3,073	80.5	\$ 10,329	
2048	46.5	\$ 6,167	20.4	\$ 2,600	66.8	\$ 8,767	
2049	38.3	\$ 5,186	16.7	\$ 2,182	55.0	\$ 7,368	
2050	31.2	\$ 4,317	13.6	\$ 1,816	44.8	\$ 6,133	
2051	25.1	\$ 3,557	11.0	\$ 1,500	36.1	\$ 5,057	

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

SECTION VI – HEADCOUNT AND BENEFIT PAYMENT PROJECTIONS

**TABLE VI-1
Benefit Payment and Headcount Projection (Continued)**

Fiscal Year Ending June 30,	Police		Fire		Total	
	Count	Benefits (in thousands)	Count	Benefits (in thousands)	Count	Benefits (in thousands)
2052	20.1	\$ 2,901	8.8	\$ 1,230	28.8	\$ 4,132
2053	15.8	\$ 2,343	7.0	\$ 1,002	22.8	\$ 3,346
2054	12.4	\$ 1,875	5.5	\$ 812	17.9	\$ 2,687
2055	9.6	\$ 1,486	4.3	\$ 654	13.9	\$ 2,140
2056	7.4	\$ 1,168	3.3	\$ 524	10.7	\$ 1,692
2057	5.6	\$ 911	2.6	\$ 417	8.2	\$ 1,328
2058	4.3	\$ 706	2.0	\$ 331	6.2	\$ 1,037
2059	3.2	\$ 543	1.5	\$ 261	4.7	\$ 804
2060	2.4	\$ 415	1.1	\$ 205	3.5	\$ 621
2061	1.8	\$ 316	0.9	\$ 160	2.6	\$ 476
2062	1.3	\$ 238	0.7	\$ 124	2.0	\$ 362
2063	1.0	\$ 178	0.5	\$ 95	1.4	\$ 273
2064	0.7	\$ 132	0.4	\$ 72	1.0	\$ 204
2065	0.5	\$ 97	0.3	\$ 54	0.8	\$ 151
2066	0.4	\$ 70	0.2	\$ 40	0.5	\$ 110
2067	0.2	\$ 50	0.1	\$ 29	0.4	\$ 78
2068	0.2	\$ 34	0.1	\$ 20	0.3	\$ 54
2069	0.1	\$ 23	0.1	\$ 14	0.2	\$ 37
2070	0.1	\$ 14	0.0	\$ 9	0.1	\$ 23
2071	0.0	\$ 9	0.0	\$ 6	0.1	\$ 14
2072	0.0	\$ 5	0.0	\$ 4	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

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

APPENDIX A – MEMBERSHIP INFORMATION

Summary of Participant Data as of

Active Participants	July 1, 2020			July 1, 2021		
	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	229	95	324	220	90	310
Average Age	76.6	81.5	78.1	77.5	81.8	78.7
Average Annual Benefit	\$78,850	\$81,876	\$79,737	\$81,398	\$84,427	\$82,277
Disabled Retirees						
Number	99	96	195	88	92	180
Average Age	75.9	77.1	76.5	76.7	78.0	77.4
Average Annual Benefit	\$74,864	\$75,923	\$75,385	\$77,184	\$78,644	\$77,931
Beneficiaries						
Number	132	117	249	131	102	233
Average Age	80.5	83.1	81.7	80.2	82.7	81.3
Average Annual Benefit	\$55,725	\$56,194	\$55,946	\$55,989	\$58,723	\$57,186
All Inactives						
Number	460	308	768	439	284	723
Average Age	77.6	80.8	78.8	78.1	80.9	79.2
Average Annual Benefit	\$71,356	\$70,265	\$70,919	\$72,971	\$73,322	\$73,109

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

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

APPENDIX A – MEMBERSHIP INFORMATION

Changes in Plan Membership: Police

	Actives	Service Retirees	Disabled Retirees	Beneficiaries	Total
July 1, 2020	0	229	99	132	460
Retired	0	0	0	0	0
Disabled	0	0	0	0	0
Deceased	0	(9)	(11)	(12)	(32)
New Beneficiary	0	0	0	11	11
July 1, 2021	0	220	88	131	439

Changes in Plan Membership: Fire

	Actives	Service Retirees	Disabled Retirees	Beneficiaries	Total
July 1, 2020	0	95	96	117	308
Retired	0	0	0	0	0
Disabled	0	0	0	0	0
Deceased	0	(5)	(4)	(16)	(25)
New Beneficiary	0	0	0	1	1
July 1, 2021	0	90	92	102	284

Changes in Plan Membership: All

	Actives	Service Retirees	Disabled Retirees	Beneficiaries	Total
July 1, 2020	0	324	195	249	768
Retired	0	0	0	0	0
Disabled	0	0	0	0	0
Deceased	0	(14)	(15)	(28)	(57)
New Beneficiary	0	0	0	12	12
July 1, 2021	0	310	180	233	723

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

APPENDIX A – MEMBERSHIP INFORMATION

Service Retired Participants

Age	Police		Fire		Total	
	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	14	\$1,079,118	0	\$0	14	\$1,079,118
70-74	61	\$5,242,761	17	\$1,238,231	78	\$6,480,992
75-79	91	\$6,963,191	32	\$2,724,679	123	\$9,687,870
80-84	34	\$2,688,651	12	\$1,057,125	46	\$3,745,776
85-89	9	\$955,482	13	\$1,153,800	22	\$2,109,282
90-94	8	\$665,829	11	\$990,570	19	\$1,656,399
95-99	2	\$213,433	5	\$434,021	7	\$647,454
100+	1	\$99,129	0	\$0	1	\$99,129
Total	220	\$17,907,594	90	\$7,598,426	310	\$25,506,020

Disability Retired Participants

Age	Police		Fire		Total	
	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	3	\$245,477	3	\$245,477
70-74	43	\$3,358,268	26	\$1,843,805	69	\$5,202,073
75-79	27	\$1,971,071	34	\$2,697,441	61	\$4,668,512
80-84	11	\$876,714	18	\$1,523,229	29	\$2,399,943
85-89	5	\$393,996	7	\$585,972	12	\$979,967
90-94	2	\$192,181	3	\$271,703	5	\$463,884
95-99	0	\$0	1	\$67,653	1	\$67,653
100+	0	\$0	0	\$0	0	\$0
Total	88	\$6,792,229	92	\$7,235,279	180	\$14,027,508

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

APPENDIX A – MEMBERSHIP INFORMATION

Beneficiaries

Age	Police		Fire		Total	
	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	\$52,095	0	\$0	1	\$52,095
60-64	3	\$175,604	2	\$148,362	5	\$323,966
65-69	9	\$576,640	7	\$446,609	16	\$1,023,248
70-74	30	\$1,542,683	14	\$852,980	44	\$2,395,663
75-79	32	\$1,701,659	18	\$1,073,595	50	\$2,775,254
80-84	15	\$797,091	16	\$917,976	31	\$1,715,067
85-89	16	\$1,026,060	21	\$1,216,295	37	\$2,242,356
90-94	17	\$1,022,988	18	\$967,371	35	\$1,990,359
95-99	7	\$359,375	6	\$366,607	13	\$725,981
100+	1	\$80,379	0	\$0	1	\$80,379
Total	131	\$7,334,574	102	\$5,989,793	233	\$13,324,367

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

APPENDIX B – STATEMENT OF ACTUARIAL ASSUMPTIONS AND METHODS

The assumptions and methods used in the actuarial valuation as of July 1, 2021 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 2022-2023 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.

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
ACTUARIAL VALUATION REPORT AS OF JULY 1, 2021**

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 5.28%.

Benefit Payment Year	Expected Return
2021-2026	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, 2022 are assumed to be \$1,692,500, 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.

**OAKLAND POLICE AND FIRE RETIREMENT SYSTEM
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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). The following schedule shows salary increases based on the current Police contract that expires on June 30, 2023 and the Fire contract that expires on December 31, 2023. All increases shown after those dates are assumptions.

Post-Retirement Benefit Increases (Based on Salary Increases for Rank at Retirement)		
Date of Increase	Police	Fire
July 1, 2021	3.00%	1.50%
January 1, 2022	N/A	2.00%
July 1, 2022	3.50%	1.00%
July 1, 2023	3.50%	0.00%
December 1, 2023	N/A	2.00%
Annual Increases		
Starting	3.25%	3.25%
July 1, 2024		

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.

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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

30% of disabled retirees' deaths are assumed to be related to injuries arising out of the performance of duty, entitling the surviving spouse to a 100% continuance.

12. Changes in Assumptions Since the Last Valuation

No changes have been made to the actuarial assumptions.

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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).

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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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