



QUARTERLY PERFORMANCE REPORT

CITY OF FRESNO RETIREMENT
SYSTEMS

SEPTEMBER 30, 2022

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THIRD QUARTER 2022 SUMMARY

- **The US economy expanded (in real terms) at an annual rate of 2.6% in the third quarter**
- **The Fed increased rates by 1.50%, and the target Fed Funds rate moved up to 3.00% - 3.25%**
- **US stocks outperformed Non-US stocks with Emerging Market stocks underperforming Developed Markets**
- **US bonds were negative during the quarter as yields increased**
- **Net performance over the last 25 years is 6.5%, trailing the assumed rate of 7.00%**
 - Performance is ahead of the policy index over the last 25 years and trails since inception
- **Manager selection remains a positive contributor to relative performance long-term**



THIRD QUARTER 2022 SUMMARY

- **In the one-year ended September 30, 2022, the Total Fund returned -10.1%, outperforming the benchmark (net of fees) and ranking in the second quartile of peers**
 - Overweight positioning to Public Equities detracted from relative performance
 - International Equity manager selection detracted from relative performance while Private Equity, Private Credit, and Private Real Estate outperformed
 - Private Real Estate, Midstream Energy, Private Equity, Private Credit and Infrastructure performance have contributed to overall plan returns over the trailing 1-year period
- **Over the most recent quarter, the Total Fund returned -3.1%, outperforming the policy benchmark (net of fees) and ranking in the first quartile of peers**
 - International Equity manager selection detracted from relative performance
 - Midstream Energy, Private Equity, and Private Credit contributed to relative performance
- **Total fund volatility remained elevated relative to peers**



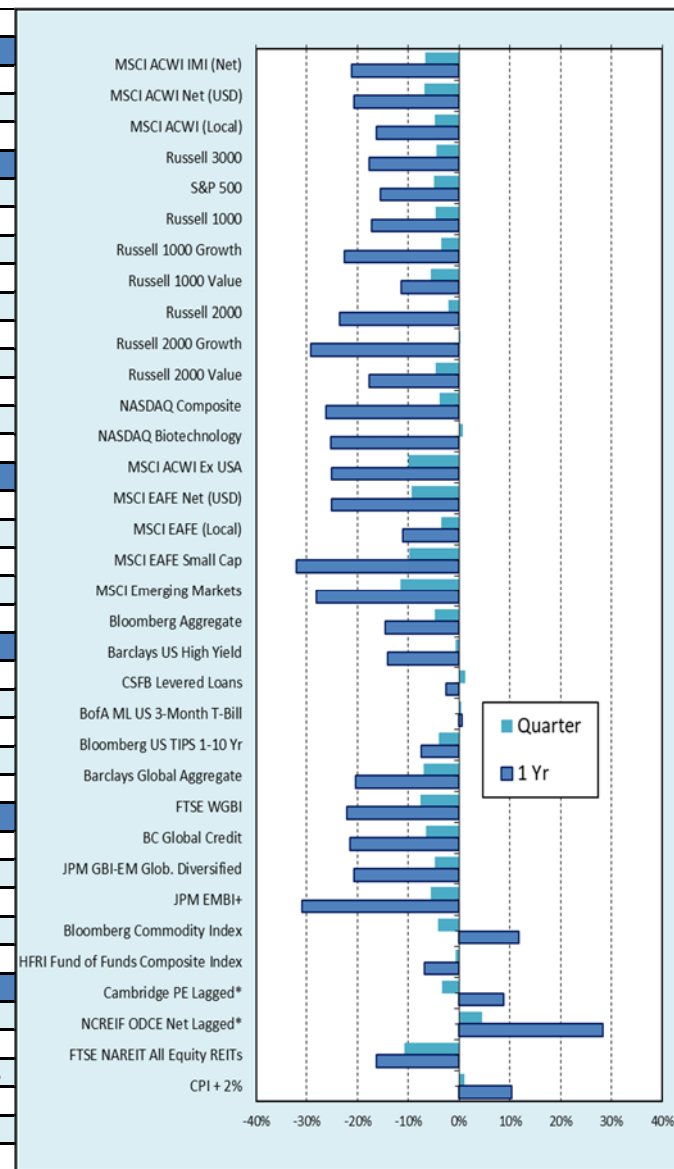
ECONOMIC ENVIRONMENT

- **Q3 Real GDP (advance estimate) increased at an annual rate of 2.6%.**
 - Retail sales ended August at +7.9% on a YoY basis. In the same period last year the YoY growth rate was +11.1%.
 - Corporate profits as a percent of GDP ended April 2022 at 12.1%, up from 9.3% in the same period last year and remain elevated relative to historical levels.
 - The inventory-to-sales ratio ended August was 1.33. Levels have remained relatively constant since early 2010 with a spike to 1.7 in April 2020.
 - The U.S. trade deficit widened in Q3, but remains elevated.
- **The unemployment rate was 3.5% ended Q3, down from 3.6% in Q2; U-6, a broader measure of unemployment, was unchanged in Q3 when compared to Q2 at 6.7%.**
 - The labor force participation rate ended Q3 at 62.3%, up from 62.2% in Q2 after declining to 60.2% in April 2020 and is at levels below the 10 year pre-pandemic average of 63.0%.
- **The Case-Shiller Home Price Index (ended August) declined to 303.76 from 308.43 in June and remains at levels higher than that of pre-financial crisis levels of 150.9.**
- **Rolling 12-month seasonally-adjusted CPI ended Q3 at 8.2% down from 9.1% in Q2. In the same period last year, it was 5.4%; Capacity Utilization slightly increased to 80.34% in Q3 from 80.30% in Q2.**
- **Fed Funds rate was increased in Q3 by 1.50% to a targeted range of 3.0%-to-3.25% up from 1.50%-to-1.75%. The 10-year Treasury Yield (constant maturity) finished Q3 at 3.52% up from 2.98% in Q2.**
- **The Fed continues scaling back asset purchases. The Fed continues to reduce the size of its balance sheet after a period of rapid growth post-pandemic.**
- **S&P valuations decreased in Q3 to 27.0x from 29.0x in Q2 and are lower than the 10-year average of 28.8x.**
 - Cyclically adjusted Shiller PE ratio remains above the long-term average of 16.98x.

MARKET ENVIRONMENT

Q3 2022 OVERVIEW

		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
World Equity Benchmarks						
MSCI ACWI IMI (Net)	World with Small Cap	-6.64%	-21.18%	3.64%	4.16%	7.25%
MSCI ACWI Net (USD)	World W/O Small Cap	-6.82%	-20.66%	3.75%	4.44%	7.28%
MSCI ACWI (Local)	World (Local Currency)	-4.86%	-16.24%	5.19%	5.70%	8.90%
Domestic Equity Benchmarks						
Russell 3000	Domestic All Cap	-4.46%	-17.63%	7.70%	8.62%	11.38%
S&P 500	Large Core	-4.88%	-15.47%	8.16%	9.24%	11.70%
Russell 1000	Large Core	-4.61%	-17.22%	7.94%	9.00%	11.60%
Russell 1000 Growth	Large Growth	-3.60%	-22.59%	10.67%	12.16%	13.70%
Russell 1000 Value	Large Value	-5.62%	-11.36%	4.36%	5.29%	9.17%
Russell 2000	Small Core	-2.19%	-23.50%	4.29%	3.55%	8.55%
Russell 2000 Growth	Small Growth	0.24%	-29.27%	2.93%	3.60%	8.81%
Russell 2000 Value	Small Value	-4.61%	-17.69%	4.72%	2.87%	7.94%
NASDAQ Composite	Large Growth	-3.91%	-26.26%	10.63%	11.25%	14.22%
NASDAQ Biotechnology	Biotech	0.69%	-25.26%	7.15%	2.17%	10.24%
International Equity Benchmarks						
MSCI ACWI Ex USA	World ex-US	-9.91%	-25.17%	-1.52%	-0.81%	3.01%
MSCI EAFE Net (USD)	Int'l Developed	-9.36%	-25.13%	-1.83%	-0.84%	3.67%
MSCI EAFE (Local)	Int'l Developed (Local Currency)	-3.59%	-11.11%	2.51%	2.83%	7.44%
MSCI EAFE Small Cap	Small Cap Int'l	-9.83%	-32.06%	-2.16%	-1.79%	5.28%
MSCI Emerging Markets	Emerging Equity	-11.57%	-28.11%	-2.07%	-1.81%	1.05%
Domestic Fixed Income Benchmarks						
Bloomberg Aggregate	Core Bonds	-4.75%	-14.60%	-3.26%	-0.27%	0.89%
Barclays US High Yield	High Yield	-0.65%	-14.14%	-0.45%	1.57%	3.94%
CSFB Levered Loans	Bank Loans	1.19%	-2.62%	2.12%	3.00%	3.70%
BofA ML US 3-Month T-Bill	Cash	0.46%	0.62%	0.59%	1.15%	0.68%
Bloomberg US TIPS 1-10 Yr	Inflation	-3.94%	-7.44%	1.79%	2.27%	1.17%
Global Fixed Income Benchmarks						
Barclays Global Aggregate	Global Core Bonds	-6.94%	-20.43%	-5.74%	-2.32%	-0.93%
FTSE WGBI	World Gov. Bonds	-7.61%	-22.14%	-7.03%	-3.07%	-1.76%
BC Global Credit	Global Bonds	-6.58%	-21.53%	-5.15%	-1.81%	0.28%
JPM GBI-EM Glob. Diversified	Em. Mkt. Bonds (Local Currency)	-4.73%	-20.63%	-7.06%	-3.92%	-2.43%
JPM EMBI+	Em. Mkt. Bonds	-5.52%	-30.93%	-9.87%	-5.52%	-0.86%
Alternative Benchmarks						
Bloomberg Commodity Index	Commodities	-4.11%	11.80%	13.45%	6.96%	-2.14%
HFRI Fund of Funds Composite Index	Fund of Hedge Funds	-0.70%	-6.84%	4.03%	3.00%	3.43%
Cambridge PE Lagged*	Private Equity	-3.43%	8.82%	19.90%	17.68%	15.53%
NCREIF ODCE Net Lagged*	Real Estate	4.58%	28.36%	11.68%	9.56%	10.16%
FTSE NAREIT All Equity REITs	REIT	-10.83%	-16.27%	-1.10%	4.10%	6.99%
CPI + 2%	Inflation/Real Assets	0.98%	10.37%	7.06%	5.86%	4.58%



* As of 6/30/2022

EXECUTIVE SUMMARY

	Market Value (\$)	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	7 Yrs (%)	10 Yrs (%)	15 Yrs (%)	25 Yr (%)	Inception (%)	Inception Date
Total Fund	3,321,612,568	-3.1 (9)	-13.8 (47)	-10.1 (48)	5.8 (31)	5.4 (38)	7.5 (23)	7.3 (33)	5.3 (33)	6.5 (25)	8.6 (29)	Oct-85
<i>Policy Index</i>		-3.6 (30)	-14.7 (55)	-10.5 (54)	4.9 (48)	5.0 (56)	7.0 (43)	6.9 (52)	5.4 (31)	6.5 (37)	8.9 (11)	
<i>60 MSCI World (Gross)/40 CITI WGBI</i>		-7.0 (100)	-23.6 (100)	-20.9 (100)	-0.1 (100)	2.0 (100)	4.4 (100)	4.1 (100)	3.5 (100)	5.0 (98)		
<i>InvMetrics Public DB > \$1 Billion Median</i>		-4.0	-14.1	-10.2	4.7	5.2	6.8	7.0	5.2	6.3	7.9	

5 Years Ending September 30, 2022				
	Return	Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	5.4 (38)	11.1 (81)	0.4 (45)	0.6 (45)
<i>Policy Index</i>	5.0 (56)	10.9 (69)	0.4 (63)	0.6 (63)
<i>60 MSCI World (Gross)/40 CITI WGBI</i>	2.0 (100)	11.5 (85)	0.1 (100)	0.2 (100)

7 Years Ending September 30, 2022				
	Return	Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	7.5 (23)	10.1 (83)	0.7 (50)	1.0 (50)
<i>Policy Index</i>	7.0 (43)	9.9 (75)	0.6 (60)	0.9 (56)
<i>60 MSCI World (Gross)/40 CITI WGBI</i>	4.4 (100)	10.4 (86)	0.4 (100)	0.5 (100)

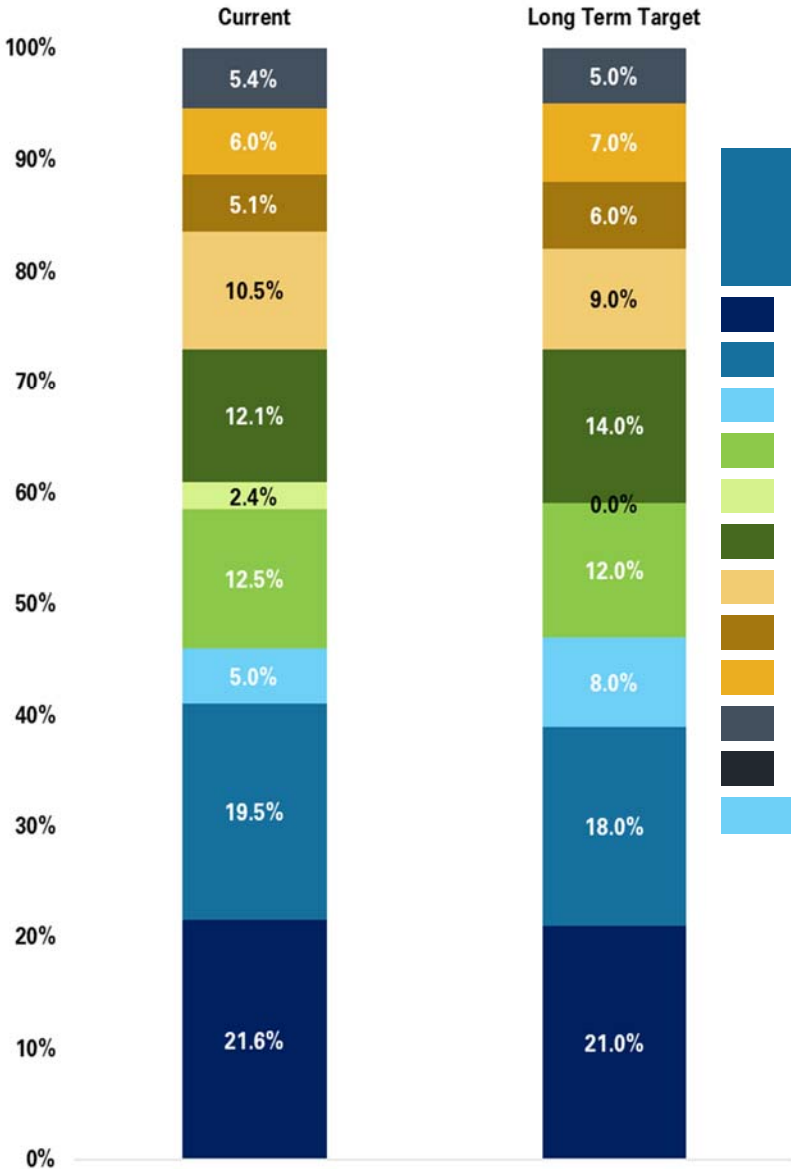
Over the past five years, the Fund returned 5.4% per annum, ranking in the 38th percentile of the Investment Metrics Public Funds > \$1 Billion net of fee universe. The Fund's return underperformed the actuarial rate of 7.0% and outperformed the policy index by 0.4%. The Fund's volatility was 11.1%, which ranks in the 81st percentile of its peers over this period. The Fund's risk-adjusted performance, as measured by the Sharpe Ratio, ranks in the 45th percentile of its peers.

For the year ending September 30, 2022, the Fund returned -10.1%, outperforming the policy index by 0.4% and ranking in the 48th percentile of its peers.

Over the past three years, the Fund returned 5.8% per annum, outperforming the policy index by 0.9% and ranking in the 31st percentile of its peer group. Over the past three years, the Fund's Sharpe Ratio of \$5 ranks in the 33rd percentile.



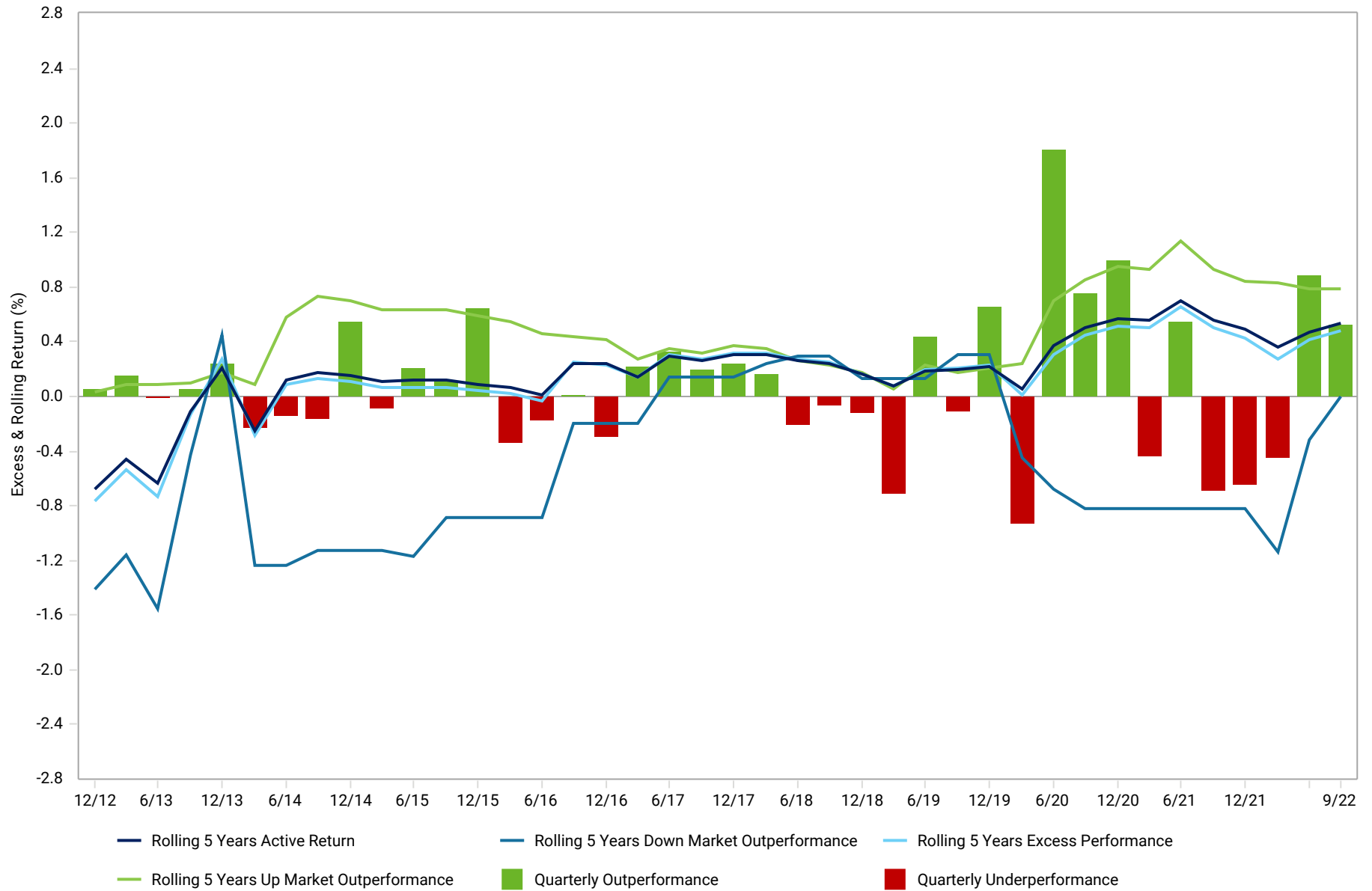
ASSET ALLOCATION VS. POLICY



	Current (\$)	Current (%)	Long Term Target (%)	Difference (%)	Policy Range (%)	Within Range
Domestic Equity	716,708,522	21.6	21.0	0.6	13.0 - 30.0	Yes
International Equity	646,143,162	19.5	18.0	1.5	10.0 - 20.0	Yes
Private Equity	164,783,206	5.0	8.0	-3.0	0.0 - 10.0	Yes
Core Fixed Income	414,932,032	12.5	12.0	0.5	5.0 - 20.0	Yes
High Yield	81,258,616	2.4	0.0	2.4	0.0 - 5.0	Yes
Private Debt	401,162,828	12.1	14.0	-1.9	5.0 - 20.0	Yes
Core Real Estate	348,862,481	10.5	9.0	1.5	5.0 - 15.0	Yes
Value Add/Opportunistic Real Estate	169,773,938	5.1	6.0	-0.9	2.0 - 8.0	Yes
Infrastructure	199,321,434	6.0	7.0	-1.0	2.0 - 10.0	Yes
Diversifying/Thematic	177,775,859	5.4	5.0	0.4	0.0 - 7.0	Yes
Cash	890,490	0.0	0.0	0.0	0.0 - 2.0	Yes
Total	3,321,612,568	100.0	100.0	0.0		



TOTAL FUND VS. POLICY INDEX



TOTAL FUND PERFORMANCE DETAIL - SHORT - TERM - NET OF FEES

	Allocation		Performance (%)									
	Market Value (\$)	% of Portfolio	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	7 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date	
Total Fund	3,321,612,568	100.0	-3.1 (9)	-13.8 (48)	-10.1 (49)	5.8 (33)	5.4 (39)	7.5 (23)	7.3 (32)	8.6 (29)	Oct-85	
<i>Policy Index</i>			<u>-3.6</u> (31)	<u>-14.7</u> (56)	<u>-10.5</u> (55)	<u>4.9</u> (49)	<u>5.0</u> (57)	<u>7.0</u> (43)	<u>6.9</u> (51)	<u>8.9</u> (11)		
Over/Under			0.5	0.9	0.4	0.9	0.4	0.5	0.4	-0.3		
<i>60 MSCI World (Gross)/40 CITI WGBI</i>			<u>-7.0</u> (100)	<u>-23.6</u> (100)	<u>-20.9</u> (100)	<u>-0.1</u> (100)	<u>2.0</u> (100)	<u>4.4</u> (100)	<u>4.1</u> (100)			
Over/Under			3.9	9.8	10.8	5.9	3.4	3.1	3.2			
<i>InvMetrics Public DB > \$1 Billion Median</i>			-4.0	-14.1	-10.2	4.9	5.2	6.8	6.9	7.9		
Total Equity Composite	1,527,634,890	46.0	-6.2	-26.5	-22.5	4.4	4.4	7.9	8.0	7.7	Nov-95	
<i>MSCI AC World All Cap Index (Net)</i>			<u>-6.7</u>	<u>-25.8</u>	<u>-21.3</u>	<u>3.6</u>	<u>4.1</u>	<u>7.3</u>	<u>7.2</u>			
Over/Under			0.5	-0.7	-1.2	0.8	0.3	0.6	0.8			
Domestic Equity Composite	716,708,522	21.6	-4.4	-25.5	-19.1	7.2	7.7	10.2	10.8	9.7	Apr-03	
<i>Domestic Equity Index</i>			<u>-4.5</u>	<u>-24.6</u>	<u>-17.6</u>	<u>7.9</u>	<u>7.9</u>	<u>10.6</u>	<u>11.0</u>	<u>9.8</u>		
Over/Under			0.1	-0.9	-1.5	-0.7	-0.2	-0.4	-0.2	-0.1		
<i>NTAM Russell 3000</i>	716,708,522	21.6	<u>-4.4</u> (25)	<u>-25.1</u> (72)	<u>-17.8</u> (75)	<u>7.7</u> (34)	<u>8.9</u> (33)			<u>10.4</u> (30)	Oct-16	
<i>Russell 3000 Index</i>			<u>-4.5</u> (26)	<u>-24.6</u> (65)	<u>-17.6</u> (72)	<u>7.7</u> (33)	<u>8.6</u> (37)	<u>10.9</u> (30)	<u>11.4</u> (29)	<u>10.2</u> (36)		
Over/Under			0.1	-0.5	-0.2	0.0	0.3			0.2		
<i>eV US Large Cap Core Equity Median</i>			-5.1	-23.1	-15.6	6.9	8.1	10.1	10.7	9.7		
Private Equity	164,783,206	5.0	-2.1	4.1	16.6	21.0				17.9	Apr-19	
<i>Pantheon PE Fund of 1</i>	159,295,790	4.8	-2.2	4.1	16.7	21.0				18.4	May-19	
<i>Private Equity Index</i>			<u>-15.5</u>	<u>-14.6</u>	<u>-15.3</u>	<u>7.6</u>	<u>9.9</u>	<u>10.4</u>	<u>13.1</u>	<u>9.6</u>		
Over/Under			13.3	18.7	32.0	13.4				8.8		
<i>Pantheon Co 2022</i>	5,487,416	0.2	0.0							0.0	Jul-22	
<i>Private Equity Index</i>			<u>-15.5</u>	<u>-14.6</u>	<u>-15.3</u>	<u>7.6</u>	<u>9.9</u>	<u>10.4</u>	<u>13.1</u>	<u>-15.5</u>		
Over/Under			15.5							15.5		

Fiscal year end: June 30



TOTAL FUND PERFORMANCE DETAIL - SHORT - TERM - NET OF FEES

	Allocation		Performance (%)													
	Market Value (\$)	% of Portfolio	3 Mo (%)	YTD (%)		1 Yr (%)		3 Yrs (%)		5 Yrs (%)		7 Yrs (%)		10 Yrs (%)		Inception (%)
International Equity Composite	646,143,162	19.5	-8.9	-32.0	-31.2	-1.7	-0.7	3.8	3.8	3.8	3.6	4.9				Apr-94
International Equity Index			<u>-9.8</u>	<u>-26.2</u>	<u>-24.8</u>	<u>-0.4</u>	<u>-0.2</u>	<u>3.9</u>	<u>3.6</u>	<u>4.9</u>						
Over/Under			0.9	-5.8	-6.4	-1.3	-0.5	-0.1	0.2							
Baillie Gifford	183,104,612	5.5	-9.4 (46)	-36.8 (84)	-37.2 (85)	-3.2 (83)	-1.0 (63)	4.4 (37)	4.2 (49)	5.0 (38)						Oct-08
MSCI AC World ex USA index			<u>-9.8</u> (55)	<u>-26.2</u> (30)	<u>-24.8</u> (29)	<u>-1.1</u> (57)	<u>-0.3</u> (47)	<u>3.8</u> (50)	<u>3.5</u> (69)	<u>3.7</u> (67)						
Over/Under			0.4	-10.6	-12.4	-2.1	-0.7	0.6	0.7	1.3						
eV All ACWI ex-US Equity Median			-9.6	-28.8	-26.9	-0.8	-0.5	3.8	4.2	4.5						
Baillie Gifford Smaller Cos.	44,405,285	1.3	-9.4 (56)	-46.3 (94)	-45.2 (91)								-37.8 (91)			Jul-21
MSCI EAFE + Canada Small Cap Index			<u>-9.4</u> (54)	<u>-30.8</u> (37)	<u>-30.5</u> (38)	<u>-0.9</u> (59)	<u>-0.8</u> (59)	<u>4.0</u> (60)	<u>5.2</u> (57)	<u>-24.7</u> (35)						
Over/Under			0.0	-15.5	-14.7											
eV ACWI ex-US Small Cap Equity Median			-9.1	-34.0	-34.1	-0.1	-0.6	4.6	5.5	-27.9						
BlackRock ACWI ex US	227,396,410	6.8	-9.7 (53)	-26.7 (33)	-25.5 (37)	-1.4 (61)	-0.6 (55)	3.5 (55)	3.2 (79)	2.1 (77)						Mar-11
MSCI AC World ex USA index			<u>-9.8</u> (55)	<u>-26.2</u> (30)	<u>-24.8</u> (29)	<u>-1.1</u> (57)	<u>-0.3</u> (47)	<u>3.8</u> (50)	<u>3.5</u> (69)	<u>2.3</u> (69)						
Over/Under			0.1	-0.5	-0.7	-0.3	-0.3	-0.3	-0.3	-0.2						
eV All ACWI ex-US Equity Median			-9.6	-28.8	-26.9	-0.8	-0.5	3.8	4.2	3.1						
Principal Global	191,053,505	5.8	-7.3 (12)	-28.7 (49)	-26.4 (44)	-0.5 (47)	-0.3 (44)	3.1 (68)	4.6 (33)	4.0 (31)						Sep-08
MSCI AC World ex USA index			<u>-9.8</u> (55)	<u>-26.2</u> (30)	<u>-24.8</u> (29)	<u>-1.1</u> (57)	<u>-0.3</u> (47)	<u>3.8</u> (50)	<u>3.5</u> (69)	<u>2.5</u> (70)						
Over/Under			2.5	-2.5	-1.6	0.6	0.0	-0.7	1.1	1.5						
eV All ACWI ex-US Equity Median			-9.6	-28.8	-26.9	-0.8	-0.5	3.8	4.2	3.4						
Sanctioned Assets	178,266	0.0	-22.2										-22.2			Jul-22
MSCI EAFE (Net)			<u>-9.4</u>	<u>-27.1</u>	<u>-25.1</u>	<u>-1.8</u>	<u>-0.8</u>	<u>2.8</u>	<u>3.7</u>	<u>-9.4</u>						
Over/Under			-12.8													



TOTAL FUND PERFORMANCE DETAIL - SHORT - TERM - NET OF FEES

	Allocation		Performance (%)									Inception Date
	Market Value (\$)	% of Portfolio	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	7 Yrs (%)	10 Yrs (%)	Inception (%)		
Total Fixed Income Composite	897,353,476	27.0	-2.5	-8.0	-7.7	1.8	3.1	3.9	3.6	5.4	Nov-95	
<i>Fixed Income Index</i>			<i>-1.7</i>	<i>-9.0</i>	<i>-8.7</i>	<i>0.0</i>	<i>1.9</i>	<i>2.9</i>	<i>2.7</i>	<i>4.9</i>		
Over/Under			<i>-0.8</i>	<i>1.0</i>	<i>1.0</i>	<i>1.8</i>	<i>1.2</i>	<i>1.0</i>	<i>0.9</i>	<i>0.5</i>		
Core Fixed Composite	414,932,032	12.5	-4.4	-14.7	-14.8	-2.6	0.2	1.4	1.5	3.4	Apr-03	
<i>Blmbg. U.S. Aggregate Index</i>			<i>-4.8</i>	<i>-14.6</i>	<i>-14.6</i>	<i>-3.3</i>	<i>-0.3</i>	<i>0.5</i>	<i>0.9</i>	<i>3.0</i>		
Over/Under			<i>0.4</i>	<i>-0.1</i>	<i>-0.2</i>	<i>0.7</i>	<i>0.5</i>	<i>0.9</i>	<i>0.6</i>	<i>0.4</i>		
Dodge & Cox	207,957,068	6.3	-4.0 (13)	-13.5 (17)	-13.7 (18)	-1.5 (4)	1.0 (3)	2.0 (1)	2.2 (2)	3.9 (6)	Jan-03	
<i>Blmbg. U.S. Aggregate Index</i>			<i>-4.8 (73)</i>	<i>-14.6 (51)</i>	<i>-14.6 (50)</i>	<i>-3.3 (76)</i>	<i>-0.3 (77)</i>	<i>0.5 (80)</i>	<i>0.9 (78)</i>	<i>3.0 (75)</i>		
Over/Under			<i>0.8</i>	<i>1.1</i>	<i>0.9</i>	<i>1.8</i>	<i>1.3</i>	<i>1.5</i>	<i>1.3</i>	<i>0.9</i>		
<i>eV US Core Fixed Inc Median</i>			<i>-4.6</i>	<i>-14.6</i>	<i>-14.6</i>	<i>-3.0</i>	<i>0.0</i>	<i>0.8</i>	<i>1.1</i>	<i>3.2</i>		
PGIM	206,974,964	6.2	-4.8 (73)	-15.8 (93)	-15.8 (90)	-3.5 (92)	-0.4 (86)	0.5 (84)	0.9 (79)	3.2 (57)	Apr-03	
<i>Blmbg. U.S. Aggregate Index</i>			<i>-4.8 (73)</i>	<i>-14.6 (51)</i>	<i>-14.6 (50)</i>	<i>-3.3 (76)</i>	<i>-0.3 (77)</i>	<i>0.5 (80)</i>	<i>0.9 (78)</i>	<i>3.0 (75)</i>		
Over/Under			<i>0.0</i>	<i>-1.2</i>	<i>-1.2</i>	<i>-0.2</i>	<i>-0.1</i>	<i>0.0</i>	<i>0.0</i>	<i>0.2</i>		
<i>eV US Core Fixed Inc Median</i>			<i>-4.6</i>	<i>-14.6</i>	<i>-14.6</i>	<i>-3.0</i>	<i>0.0</i>	<i>0.8</i>	<i>1.1</i>	<i>3.2</i>		
High Yield Composite	81,258,616	2.4	-1.1	-16.4	-16.5	-0.8	0.9	3.3	3.5	5.9	Sep-04	
<i>Blmbg. U.S. Corp: High Yield Index</i>			<i>-0.6</i>	<i>-14.7</i>	<i>-14.1</i>	<i>-0.5</i>	<i>1.6</i>	<i>4.1</i>	<i>3.9</i>	<i>6.1</i>		
Over/Under			<i>-0.5</i>	<i>-1.7</i>	<i>-2.4</i>	<i>-0.3</i>	<i>-0.7</i>	<i>-0.8</i>	<i>-0.4</i>	<i>-0.2</i>		
Loomis Sayles	81,258,616	2.4	-1.1 (82)	-16.4 (95)	-16.6 (96)	-0.8 (70)	0.8 (85)	3.3 (67)	3.7 (49)	6.1 (17)	Sep-04	
<i>Blmbg. U.S. Corp: High Yield Index</i>			<i>-0.6 (56)</i>	<i>-14.7 (75)</i>	<i>-14.1 (75)</i>	<i>-0.5 (55)</i>	<i>1.6 (48)</i>	<i>4.1 (20)</i>	<i>3.9 (28)</i>	<i>6.1 (18)</i>		
Over/Under			<i>-0.5</i>	<i>-1.7</i>	<i>-2.5</i>	<i>-0.3</i>	<i>-0.8</i>	<i>-0.8</i>	<i>-0.2</i>	<i>0.0</i>		
<i>eV US High Yield Fixed Inc Median</i>			<i>-0.6</i>	<i>-13.6</i>	<i>-13.0</i>	<i>-0.4</i>	<i>1.5</i>	<i>3.6</i>	<i>3.6</i>	<i>5.6</i>		



TOTAL FUND PERFORMANCE DETAIL - SHORT - TERM - NET OF FEES

	Allocation		Performance (%)								Inception (%)	Inception Date
	Market Value (\$)	% of Portfolio	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	7 Yrs (%)	10 Yrs (%)			
Private Credit	401,162,828	12.1	-1.2	3.9	5.8	9.1	8.6	8.7	8.1	Sep-15		
<i>Private Credit Index</i>			<u>-2.5</u>	<u>-14.0</u>	<u>-13.5</u>	<u>-0.8</u>	<u>2.6</u>	<u>4.1</u>	<u>4.1</u>			
Over/Under			1.3	17.9	19.3	9.9	6.0	4.6	4.0			
Crescent Capital	38,911,719	1.2	1.6	10.9	10.7	8.4	8.3	8.2	7.6	Sep-15		
<i>Private Credit Index</i>			<u>-2.5</u>	<u>-14.0</u>	<u>-13.5</u>	<u>-0.8</u>	<u>2.6</u>	<u>4.1</u>	<u>4.1</u>			
Over/Under			4.1	24.9	24.2	9.2	5.7	4.1	3.5			
Arcmont Euro Private Debt	88,544,819	2.7	-0.2	5.3	5.3				7.4	Apr-21		
<i>Private Credit Index</i>			<u>-2.5</u>	<u>-14.0</u>	<u>-13.5</u>	<u>-0.8</u>	<u>2.6</u>	<u>4.1</u>	<u>-7.2</u>			
Over/Under			2.3	19.3	18.8				14.6			
Monroe Capital	177,847,085	5.4	1.2	3.6	6.3	9.7	8.9		9.7	Apr-16		
<i>Private Credit Index</i>			<u>-2.5</u>	<u>-14.0</u>	<u>-13.5</u>	<u>-0.8</u>	<u>2.6</u>	<u>4.1</u>	<u>3.8</u>			
Over/Under			3.7	17.6	19.8	10.5	6.3		5.9			
PIMCO COF II	17,478,001	0.5	-11.2	-0.8	3.2	8.0	8.5		9.2	Aug-16		
<i>Private Credit Index</i>			<u>-2.5</u>	<u>-14.0</u>	<u>-13.5</u>	<u>-0.8</u>	<u>2.6</u>	<u>4.1</u>	<u>3.6</u>			
Over/Under			-8.7	13.2	16.7	8.8	5.9		5.6			
PIMCO COF III	78,381,204	2.4	-6.2	0.8	4.8				41.0	May-20		
<i>Private Credit Index</i>			<u>-2.5</u>	<u>-14.0</u>	<u>-13.5</u>	<u>-0.8</u>	<u>2.6</u>	<u>4.1</u>	<u>-1.0</u>			
Over/Under			-3.7	14.8	18.3				42.0			

TOTAL FUND PERFORMANCE DETAIL - SHORT - TERM - NET OF FEES

	Allocation		Performance (%)									Inception Date
	Market Value (\$)	% of Portfolio	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	7 Yrs (%)	10 Yrs (%)	Inception (%)		
Real Assets	717,957,853	21.6	0.8	11.6	19.4	10.3	9.3	9.4	10.5	9.9	Jan-96	
JP Morgan RE	169,643,340	5.1	-1.5	9.4	18.2	10.4	8.2	8.0	9.4	9.0	Jan-96	
<i>NCREIF Fund Index-Open End Diversified Core Equity (VW) (Net)</i>			<u>0.3</u>	<u>12.4</u>	<u>21.0</u>	<u>11.4</u>	<u>9.3</u>	<u>8.9</u>	<u>9.9</u>	<u>8.5</u>		
Over/Under			-1.8	-3.0	-2.8	-1.0	-1.1	-0.9	-0.5	0.5		
CFRSR-Carlyle CPI Fund	179,219,141	5.4	4.6	22.1	33.2					18.7	Jul-20	
<i>NCREIF Fund Index-Open End Diversified Core Equity (VW) (Net)</i>			<u>0.3</u>	<u>12.4</u>	<u>21.0</u>	<u>11.4</u>	<u>9.3</u>	<u>8.9</u>	<u>9.9</u>	<u>15.3</u>		
Over/Under			4.3	9.7	12.2					3.4		
Private Real Estate Composite	169,773,938	5.1	0.9	13.5	23.4	13.1	13.3	13.4	13.2	10.4	Jan-96	
<i>NCREIF Fund Index-Open End Diversified Core Equity (VW) (Net)</i>			<u>0.3</u>	<u>12.4</u>	<u>21.0</u>	<u>11.4</u>	<u>9.3</u>	<u>8.9</u>	<u>9.9</u>	<u>8.5</u>		
Over/Under			0.6	1.1	2.4	1.7	4.0	4.5	3.3	1.9		
Oaktree Value Add	11,460,308	0.3	-0.5	7.8	16.6	9.8	16.6			15.6	Dec-16	
<i>NCREIF ODCE + 1%</i>			<u>0.6</u>	<u>13.2</u>	<u>22.2</u>	<u>12.5</u>	<u>10.4</u>	<u>10.0</u>	<u>11.0</u>	<u>10.2</u>		
Over/Under			-1.1	-5.4	-5.6	-2.7	6.2			5.4		
PCCP Value Add	25,172,473	0.8	2.8	21.3	36.7	19.6	18.2			19.6	Oct-16	
<i>NCREIF ODCE + 1%</i>			<u>0.6</u>	<u>13.2</u>	<u>22.2</u>	<u>12.5</u>	<u>10.4</u>	<u>10.0</u>	<u>11.0</u>	<u>9.9</u>		
Over/Under			2.2	8.1	14.5	7.1	7.8			9.7		
PIMCO Bravo III	45,840,728	1.4	-1.2	6.9	17.2	9.6	10.0			9.7	Nov-16	
<i>NCREIF ODCE + 1%</i>			<u>0.6</u>	<u>13.2</u>	<u>22.2</u>	<u>12.5</u>	<u>10.4</u>	<u>10.0</u>	<u>11.0</u>	<u>10.1</u>		
Over/Under			-1.8	-6.3	-5.0	-2.9	-0.4			-0.4		
Alidade Capital V	8,079,197	0.2	4.6	-0.2						-0.2	Dec-21	
<i>NCREIF ODCE + 1%</i>			<u>0.6</u>	<u>13.2</u>	<u>22.2</u>	<u>12.5</u>	<u>10.4</u>	<u>10.0</u>	<u>11.0</u>	<u>22.0</u>		
Over/Under			4.0	-13.4						-22.2		
Artemis AREPF III	12,174,513	0.4	10.3	31.1	49.6	31.1				16.7	Jan-19	
<i>NCREIF ODCE + 1%</i>			<u>0.6</u>	<u>13.2</u>	<u>22.2</u>	<u>12.5</u>	<u>10.4</u>	<u>10.0</u>	<u>11.0</u>	<u>11.0</u>		
Over/Under			9.7	17.9	27.4	18.6				5.7		
Brookfield SREP III	43,683,093	1.3	-0.9	11.7	16.3	11.1				6.9	May-19	
<i>NCREIF ODCE + 1%</i>			<u>0.6</u>	<u>13.2</u>	<u>22.2</u>	<u>12.5</u>	<u>10.4</u>	<u>10.0</u>	<u>11.0</u>	<u>11.6</u>		
Over/Under			-1.5	-1.5	-5.9	-1.4				-4.7		
Blue Vista BVREP V	13,070,373	0.4	0.2	46.5	61.2					19.4	Mar-20	
<i>NCREIF ODCE + 1%</i>			<u>0.6</u>	<u>13.2</u>	<u>22.2</u>	<u>12.5</u>	<u>10.4</u>	<u>10.0</u>	<u>11.0</u>	<u>13.9</u>		
Over/Under			-0.4	33.3	39.0					5.5		
Kayne Anderson VI	10,293,253	0.3	4.0	-4.3						-4.3	Nov-21	
<i>NCREIF ODCE + 1%</i>												
Over/Under												



TOTAL FUND PERFORMANCE DETAIL - SHORT - TERM - NET OF FEES

	Allocation		Performance (%)								
	Market Value (\$)	% of Portfolio	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	7 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Infrastructure	199,321,434	6.0	-0.9	2.5	4.8	5.0				4.8	Oct-18
CPI + 4% (Unadjusted)			<u>1.2</u>	<u>9.6</u>	<u>12.5</u>	<u>9.1</u>	<u>7.9</u>	<u>7.3</u>	<u>6.6</u>	<u>8.3</u>	
Over/Under			-2.1	-7.1	-7.7	-4.1				-3.5	
JP Morgan IIF	102,379,296	3.1	-2.1	-0.6	1.8	5.0				4.8	Oct-18
CPI + 4% (Unadjusted)			<u>1.2</u>	<u>9.6</u>	<u>12.5</u>	<u>9.1</u>	<u>7.9</u>	<u>7.3</u>	<u>6.6</u>	<u>8.3</u>	
Over/Under			-3.3	-10.2	-10.7	-4.1				-3.5	
Ullico UIF	96,942,138	2.9	0.9	7.5	9.5	5.4				5.3	Dec-18
CPI + 4% (Unadjusted)			<u>1.2</u>	<u>9.6</u>	<u>12.5</u>	<u>9.1</u>	<u>7.9</u>	<u>7.3</u>	<u>6.6</u>	<u>8.5</u>	
Over/Under			-0.3	-2.1	-3.0	-3.7				-3.2	
Midstream Energy	166,125,388	5.0	6.5	19.9	22.2	8.0				6.0	Jul-19
Alerian Midstream Energy Index			<u>-1.0</u>	<u>12.1</u>	<u>11.7</u>	<u>6.7</u>	<u>5.0</u>	<u>6.9</u>		<u>5.6</u>	
Over/Under			7.5	7.8	10.5	1.3				0.4	
Tortoise	77,769,030	2.3	6.4	18.5	20.2	7.0				5.5	Aug-19
Alerian Midstream Energy Index			<u>-1.0</u>	<u>12.1</u>	<u>11.7</u>	<u>6.7</u>	<u>5.0</u>	<u>6.9</u>		<u>6.2</u>	
Over/Under			7.4	6.4	8.5	0.3				-0.7	
Harvest	88,356,358	2.7	6.6	21.1	24.0	8.7				6.8	Jul-19
Alerian Midstream Energy Index			<u>-1.0</u>	<u>12.1</u>	<u>11.7</u>	<u>6.7</u>	<u>5.0</u>	<u>6.9</u>		<u>5.6</u>	
Over/Under			7.6	9.0	12.3	2.0				1.2	

TOTAL FUND PERFORMANCE DETAIL - SHORT - TERM - NET OF FEES

	Allocation		Performance (%)								
	Market Value (\$)	% of Portfolio	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	7 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Cash & Equivalents Composite	890,490	0.0	-5.8	-1.0	3.2	1.5	1.7	1.4	1.0	1.6	Oct-03
<i>90 Day U.S. Treasury Bill</i>			<u>0.5</u>	<u>0.6</u>	<u>0.6</u>	<u>0.6</u>	<u>1.1</u>	<u>0.9</u>	<u>0.7</u>	<u>1.2</u>	
Over/Under			-6.3	-1.6	2.6	0.9	0.6	0.5	0.3	0.4	
Payroll Account	312,220	0.0	-5.8	-1.0	-1.0	0.1	0.9	0.8	0.6	1.8	Apr-99
<i>90 Day U.S. Treasury Bill</i>			<u>0.5</u>	<u>0.6</u>	<u>0.6</u>	<u>0.6</u>	<u>1.1</u>	<u>0.9</u>	<u>0.7</u>	<u>1.7</u>	
Over/Under			-6.3	-1.6	-1.6	-0.5	-0.2	-0.1	-0.1	0.1	
Operating Funds	578,270	0.0	-5.8	-1.0	-1.0	0.0	0.8	0.7	0.6	1.3	Oct-03
<i>90 Day U.S. Treasury Bill</i>			<u>0.5</u>	<u>0.6</u>	<u>0.6</u>	<u>0.6</u>	<u>1.1</u>	<u>0.9</u>	<u>0.7</u>	<u>1.2</u>	
Over/Under			-6.3	-1.6	-1.6	-0.6	-0.3	-0.2	-0.1	0.1	

Fiscal year end: June 30

Composite rankings are used for Total Equity Composite (InvMetrics Public DB US Eq), Domestic Equity Composite (InvMetrics Public DB Total Eq), International Equity Composite (InvMetrics Public DB ex- US Eq), International Developed Equity Composite (InvMetrics Public DB Dev Mkt ex-US), International Emerging Markets Equity (InvMetrics Public DB Emg Mkt Eq), Total Fixed Income (InvMetrics Public DB Total Fix Inc), Core Fixed Composite (InvMetrics Public DB US Fix Inc), High Yield Composite (InvMetrics Public DB US Fix Inc) and Total Real Estate (InvMetrics Public DB Real Estate Pub+Priv).

Manager rankings are used for Large Cap Equity Composite (eA US Large Cap Equity), Small Cap Equity Composite (eA US Small Cap Equity), ACWI ex US Equity Composite (eA ACWI ex-US Equity), EAFE Equity Composite (eA All EAFE Equity) and Public Real Estate Composite (eA US REIT).





APPENDIX

CALENDAR YEAR INDEX PERFORMANCE

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Sep	Q3	YTD
S&P 500	16.0%	32.4%	13.7%	1.4%	12.0%	21.8%	-4.4%	31.5%	18.4%	28.7%	-9.2%	-4.9%	-23.9%
Russell 1000	16.4%	33.1%	13.2%	0.9%	12.1%	21.7%	-4.8%	31.4%	21.0%	26.5%	-9.3%	-4.6%	-24.6%
Russell 2000	16.3%	38.8%	4.9%	-4.4%	21.3%	14.6%	-11.0%	25.5%	20.0%	14.8%	-9.6%	-2.2%	-25.1%
Russell 2500	17.9%	36.8%	7.1%	-2.9%	17.6%	16.8%	-10.0%	27.8%	20.0%	18.2%	-9.5%	-2.8%	-24.0%
MSCI EAFE	17.3%	22.8%	-4.9%	-0.8%	1.0%	25.0%	-13.8%	22.0%	7.8%	11.3%	-9.4%	-9.4%	-27.1%
MSCI EM	18.2%	-2.6%	-2.2%	-14.9%	11.2%	37.3%	-14.6%	18.4%	18.3%	-2.5%	-11.7%	-11.6%	-27.2%
MSCI ACWI	16.1%	22.8%	4.2%	-2.4%	7.9%	24.0%	-9.4%	26.6%	16.3%	18.5%	-9.6%	-6.8%	-25.6%
Private Equity	9.5%	12.6%	22.3%	14.6%	10.4%	10.3%	21.0%	13.1%	17.2%	45.0%	-	-	-1.3%
BBG TIPS	7.0%	-8.6%	3.6%	-1.4%	4.7%	3.0%	-1.3%	8.4%	11.0%	6.0%	-6.6%	-5.1%	-13.6%
BBG Municipal	6.8%	-2.6%	9.1%	3.3%	0.2%	5.4%	1.3%	7.5%	5.2%	1.5%	-3.8%	-3.5%	-12.1%
BBG Muni High Yield	18.1%	-5.5%	13.8%	1.8%	3.0%	9.7%	4.8%	10.7%	4.9%	7.8%	-6.2%	-4.8%	-16.0%
BBG US Corporate HY	15.8%	7.4%	2.5%	-4.5%	17.1%	7.5%	-2.1%	14.3%	7.1%	5.3%	-4.0%	-0.6%	-14.7%
BBG US Agg Bond	4.2%	-2.0%	6.0%	0.5%	2.6%	3.5%	0.0%	8.7%	7.5%	-1.5%	-4.3%	-4.8%	-14.6%
BBG Global Agg	4.3%	-2.6%	0.6%	-3.2%	2.1%	7.4%	-1.2%	6.8%	9.2%	-4.7%	-5.1%	-6.9%	-19.9%
BBG Long Treasuries	3.6%	-12.7%	25.1%	-1.2%	1.3%	8.5%	-1.8%	14.8%	17.7%	-4.6%	-7.9%	-9.6%	-28.8%
BBG US Long Credit	12.7%	-6.6%	16.4%	-4.6%	10.2%	12.2%	-6.8%	23.4%	13.3%	-1.2%	-8.6%	-8.6%	-29.1%
BBG US STRIPS 20+ Yr	3.0%	-21.0%	46.4%	-3.7%	1.4%	13.7%	-4.1%	20.9%	24.0%	-5.2%	-10.6%	-13.1%	-38.1%
JPM GBI-EM Global Div	16.8%	-9.0%	-5.7%	-14.9%	9.9%	15.2%	-6.2%	13.5%	2.7%	-8.7%	-4.9%	-4.7%	-18.6%
JPM EMBI Glob Div	17.4%	-5.3%	7.4%	1.2%	10.2%	10.3%	-4.3%	15.0%	5.3%	-1.8%	-6.4%	-4.6%	-23.9%
CS Hedge Fund	7.7%	9.7%	4.1%	-0.7%	1.2%	7.1%	-3.2%	9.3%	6.4%	8.2%	-	1.0%	0.8%
BBG Commodity	-1.1%	-9.5%	-17.0%	-24.7%	11.8%	1.7%	-11.2%	7.7%	-3.1%	27.1%	-8.1%	-4.1%	13.6%
Alerian Midstream	-	-	16.4%	-37.3%	33.8%	-2.4%	-13.3%	24.0%	-23.4%	38.4%	-9.9%	-1.0%	12.1%
FTSE NAREIT Equity REITs	18.1%	2.5%	30.1%	3.2%	8.5%	5.2%	-4.6%	26.0%	-8.0%	43.2%	-12.2%	-9.9%	-28.1%

*Private Equity return represents calendar year pooled IRR and is subject to a one quarter lag
Source: FactSet, Barclays, Thomson One



TRAILING ANNUAL INDEX PERFORMANCE

Equity							
	Sep-22	Q3	YTD	1 YR	3 YR	5 YR	10 YR
MSCI ACWI	-9.6%	-6.8%	-25.6%	-20.7%	3.7%	4.4%	7.3%
S&P 500	-9.2%	-4.9%	-23.9%	-15.5%	8.2%	9.2%	11.7%
Russell 1000	-9.3%	-4.6%	-24.6%	-17.2%	7.9%	9.0%	11.6%
Russell 2000	-9.6%	-2.2%	-25.1%	-23.5%	4.3%	3.6%	8.6%
Russell 2500	-9.5%	-2.8%	-24.0%	-21.1%	5.4%	5.5%	9.6%
MSCI EAFE	-9.4%	-9.4%	-27.1%	-25.1%	-1.8%	-0.8%	3.7%
MSCI EM	-11.7%	-11.6%	-27.2%	-28.1%	-2.1%	-1.8%	1.0%

Credit							
	Sep-22	Q3	YTD	1 YR	3 YR	5 YR	10 YR
BBG Global Agg	-5.1%	-6.9%	-19.9%	-20.4%	-5.7%	-2.3%	-0.9%
BBG US Agg	-4.3%	-4.8%	-14.6%	-14.6%	-3.3%	-0.3%	0.9%
BBG Credit	-5.1%	-4.9%	-18.1%	-17.9%	-3.6%	0.0%	1.6%
BBG US HY	-4.0%	-0.6%	-14.7%	-14.1%	-0.5%	1.6%	3.9%
BBG Muni	-3.8%	-3.5%	-12.1%	-11.5%	-1.9%	0.6%	1.8%
BBG Muni HY	-6.2%	-4.8%	-16.0%	-15.1%	-1.4%	2.3%	3.5%
BBG TIPS	-6.6%	-5.1%	-13.6%	-11.6%	0.8%	2.0%	1.0%
BBG 20+ STRIPS	-10.6%	-13.1%	-38.1%	-34.8%	-11.9%	-2.5%	0.6%
BBG Long Treasuries	-7.9%	-9.6%	-28.8%	-26.6%	-8.5%	-1.6%	0.6%
BBG Long Credit	-8.6%	-8.6%	-29.1%	-28.0%	-7.0%	-1.2%	1.7%
BBG Govt/Credit 1-3 Yr	-1.2%	-1.5%	-4.5%	-5.1%	-0.4%	0.7%	0.8%
JPM EMBI Glob Div	-6.4%	-4.6%	-23.9%	-24.3%	-7.2%	-2.6%	1.1%
JPM GBI-EM Glob Div	-4.9%	-4.7%	-18.6%	-20.6%	-7.1%	-3.9%	-2.4%

Real Assets							
	Sep-22	Q3	YTD	1 YR	3 YR	5 YR	10 YR
BBG Commodity	-8.1%	-4.1%	13.6%	11.8%	13.5%	7.0%	-2.1%
Alerian Midstream Index	-9.9%	-1.0%	12.1%	11.7%	6.7%	5.0%	-
NAREIT Composite Index	-13.2%	-11.2%	-28.2%	-17.2%	-1.7%	3.5%	6.5%



Source: S&P, MSCI, Russell, Bloomberg, JPM, Alerian, FTSE, FactSet

City of Fresno Retirement Systems

TOTAL FUND PERFORMANCE NOTES

Policy Index currently consists of 49% MSCI ACWI IMI, 25% Fixed Income Index, 22% 80% NCREIF ODCE / 20% CPI, 4% Russell 3000 - 2%.

Domestic Equity Index currently consists of Russell 3000.

International Equity Index currently consists of MSCI ACWI ex USA.

Fixed Income Index currently consists of 50% Bloomberg US Aggregate TR and 50.0% S&P/LSTA Leveraged Loan.

Private Credit Index consists of 100% 50% BBgBarc US Agg / 50% BBgBarc US High Yield + 1%.

Private Equity Index consists of ACWI IMI + 150 quarter lag.



GLOSSARY OF INVESTMENT TERMINOLOGY— RISK STATISTICS

- **Alpha**
 - Measures the relationship between the fund performance and the performance of another fund or benchmark index and equals the excess return while the other fund or benchmark index is zero.
- **Alpha Jensen**
 - The average return on a portfolio over and above that predicted by the capital asset pricing model (CAPM), given the portfolio's beta and the average market return. Also known as the abnormal return or the risk adjusted excess return.
- **Annualized Excess Return over Benchmark**
 - Annualized fund return minus the annualized benchmark return for the calculated return.
- **Annualized Return**
 - A statistical technique whereby returns covering periods greater than one year are converted to cover a 12 month time span.
- **Beta**
 - Measures the volatility or systematic risk and is equal to the change in the fund's performance in relation to the change in the assigned index's performance.
- **Information Ratio**
 - A measure of the risk adjusted return of a financial security, asset, or portfolio.
Formula:
(Annualized Return of Portfolio - Annualized Return of Benchmark) / Annualized Standard Deviation (Period Portfolio Return - Period Benchmark Return). To annualize standard deviation, multiply the deviation by the square root of the number of periods per year where monthly returns per year equals 12 and quarterly returns is four periods per year.
- **R-Squared**
 - Represents the percentage of a fund's movements that can be explained by movements in an index. R-Squared values range from 0 to 100. An R-Squared of 100 denotes that all movements of a fund are completely explained by movements in the index.
- **Sharpe Ratio**
 - A measure of the excess return or risk premium per unit of risk in an investment asset or trading strategy.
Formula:
(Annualized Return of Portfolio - Annualized Return of Risk Free) / Annualized Standard Deviation (Portfolio Returns)
- **Sortino Ratio**
 - A method to differentiate between good and bad volatility in the Sharpe Ratio. The differentiation of up and down volatility allows the calculation to provide a risk adjusted measure of a security or fund's performance without upward price change penalties.
Formula:
*Calculation Average (X-Y) / Downside Deviation (X-Y) * 2*
Where X=Return Series X Y = Return Series Y which is the risk free return (91 day T-bills)
- **Standard Deviation**
 - The standard deviation is a statistical term that describes the distribution of results. It is a commonly used measure of volatility of returns of a portfolio, asset class, or security. The higher the standard deviation the more volatile the returns are.
Formula:
(Annualized Return of Portfolio - Annualized Arithmetic Average of the Portfolio Returns) Squared / The number of periods- 1)



Source: InvestorForce

GLOSSARY OF INVESTMENT TERMINOLOGY— RISK STATISTICS

▪ Tracking Error

- Tracking error, also known as residual risk, is a measure of the degree to which a portfolio tracks its benchmark. It is also a measure of consistency of excess returns. Tracking error is computed as the annualized standard deviation of the difference between a portfolio's return and that of its benchmark.

Formula:

*Tracking Error = Standard Deviation (X-Y) * $\sqrt{\text{# of periods per year}}$*
Where X = periods portfolio return and Y = the period's BM return
For monthly returns, the periods per year = 12
For quarterly returns, the periods per year = 4

▪ Treynor Ratio

- A risk-adjusted measure of return based on systematic risk. Similar to the Sharpe ratio with the difference being the Treynor ratio uses beta as the measurement of volatility.

Formula:

(Portfolio Average Return - Average Return of Risk-Free Rate)/Portfolio Beta

▪ Up/Down Capture Ratio

- A measure of what percentage of a market's returns is "captured" by a portfolio. For example, if the market declines 10% over some period, and the manager declines only 9%, then his or her capture ratio is 90%. In down markets, it is advantageous for a manager to have as low a capture ratio as possible. For up markets, the higher the capture ratio the better. Looking at capture ratios can provide insight into how a manager achieves excess returns. A value manager might typically have a lower capture ratio in both up and down markets, achieving excess returns by protecting on the downside, whereas a growth manager might fall more than the overall market in down markets, but achieve above-market returns in a rising market.

Upside Capture:

Total Return (Fund Returns) / Total Returns (BM Return) when Period Benchmark Return is ≥ 0

Downside Capture:

Total Return (Fund Returns) / Total Returns (BM Return) when Benchmark Return < 0

Source: InvestorForce



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Past performance is no guarantee of future results.

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A “since inception” return, if reported, begins with the first full month after funding, although actual inception dates (e.g. the middle of a month) and the timing of cash flows are taken into account in Composite return calculations.

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Source of private fund performance benchmark data: Cambridge Associates, via Refinitiv