

City of Marlborough Contributory Retirement System

Meeting Materials
February 25, 2020

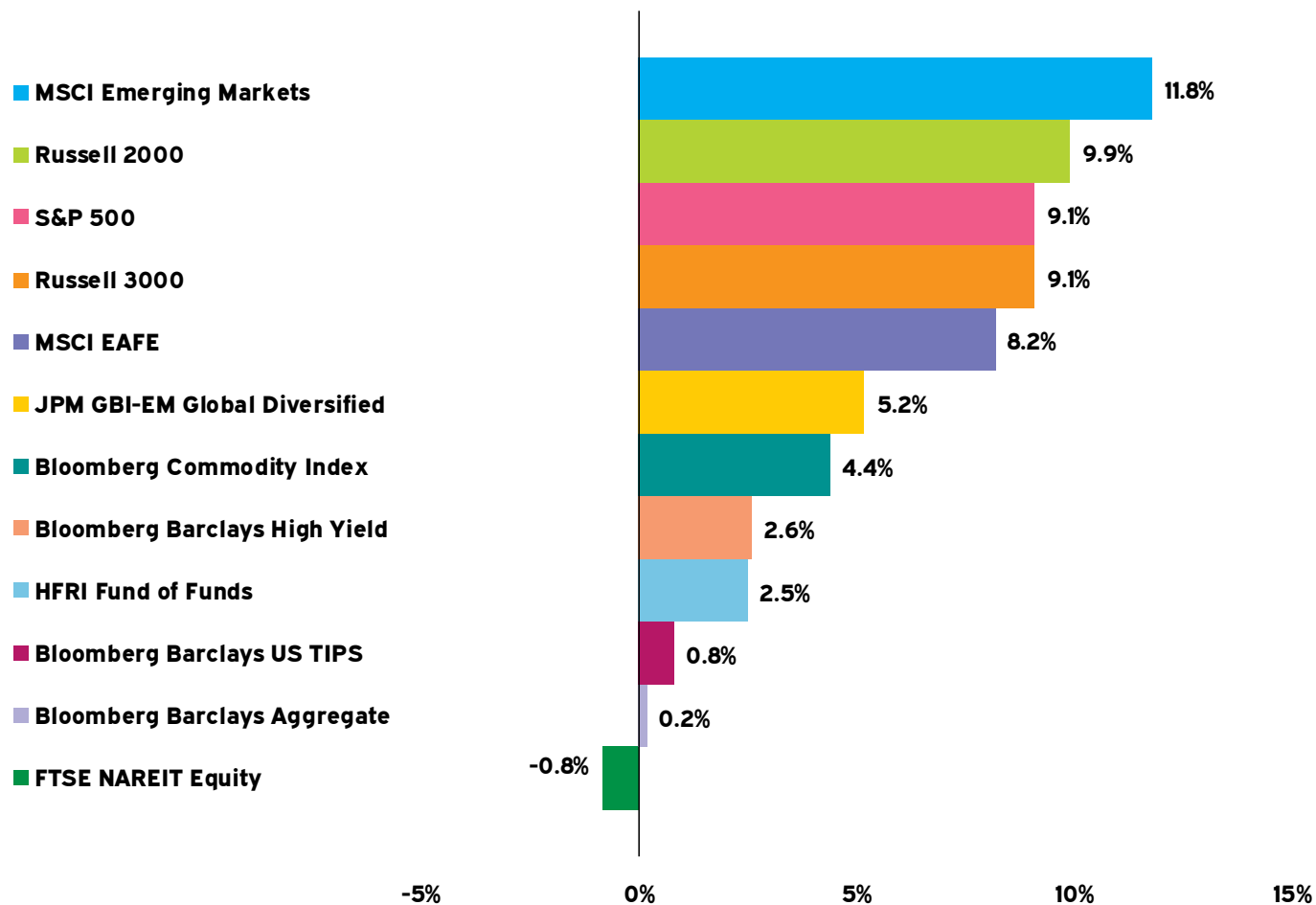
Fund Evaluation Report

Agenda

1. World Markets Fourth Quarter of 2019
2. Retirement System Interim Update
3. Retirement System Summary
 - Retirement System Detail
 - Portfolio Reviews
4. Current Issues
 - Asset Allocation Review
 - Peer Fee Review
5. Appendices
 - Corporate Update
 - Disclaimer, Glossary, and Notes

The World Markets Fourth Quarter of 2019

The World Markets¹ Fourth Quarter of 2019



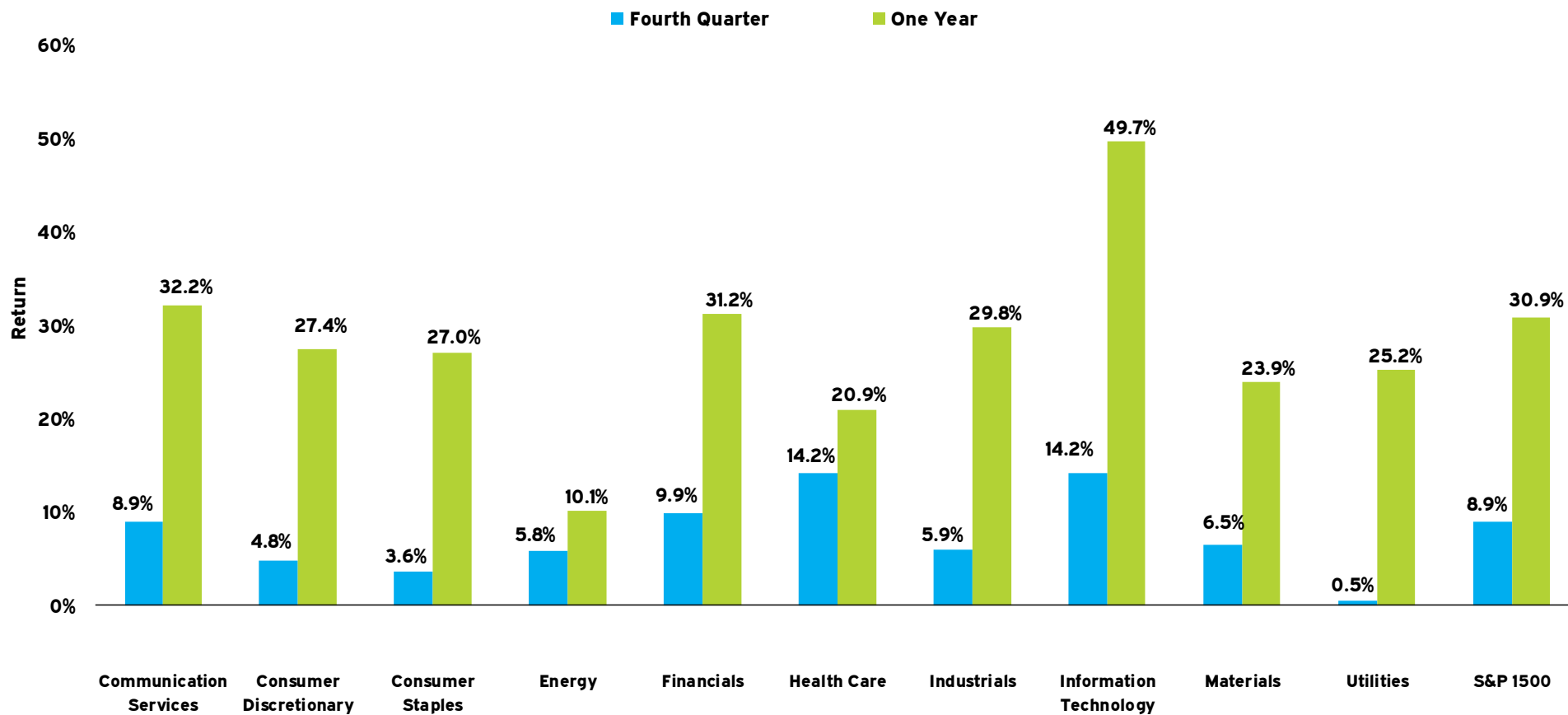
¹ Source: InvestorForce.

Index Returns¹

	4Q19 (%)	1 YR (%)	3 YR (%)	5 YR (%)	10 YR (%)
Domestic Equity					
S&P 500	9.1	31.5	15.3	11.7	13.6
Russell 3000	9.1	31.0	14.6	11.2	13.4
Russell 1000	9.0	31.4	15.0	11.5	13.5
Russell 1000 Growth	10.6	36.4	20.5	14.6	15.2
Russell 1000 Value	7.4	26.5	9.7	8.3	11.8
Russell MidCap	7.1	30.5	12.1	9.3	13.2
Russell MidCap Growth	8.2	35.5	17.4	11.6	14.2
Russell MidCap Value	6.4	27.1	8.1	7.6	12.4
Russell 2000	9.9	25.5	8.6	8.2	11.8
Russell 2000 Growth	11.4	28.5	12.5	9.3	13.0
Russell 2000 Value	8.5	22.4	4.8	7.0	10.6
Foreign Equity					
MSCI ACWI (ex. US)	8.9	21.5	9.9	5.5	5.0
MSCI EAFE	8.2	22.0	9.6	5.7	5.5
MSCI EAFE (Local Currency)	5.2	21.7	7.7	6.7	7.2
MSCI EAFE Small Cap	11.5	25.0	10.9	8.9	8.7
MSCI Emerging Markets	11.8	18.4	11.6	5.6	3.7
MSCI Emerging Markets (Local Currency)	9.5	18.1	11.5	7.5	6.1
Fixed Income					
Bloomberg Barclays Universal	0.5	9.3	4.3	3.4	4.1
Bloomberg Barclays Aggregate	0.2	8.7	4.0	3.0	3.7
Bloomberg Barclays US TIPS	0.8	8.4	3.3	2.6	3.4
Bloomberg Barclays High Yield	2.6	14.3	6.4	6.1	7.6
JPM GBI-EM Global Diversified	5.2	13.5	7.0	2.8	2.7
Other					
FTSE NAREIT Equity	-0.8	26.0	8.1	7.2	11.9
Bloomberg Commodity Index	4.4	7.7	-0.9	-3.9	-4.7
HFRI Fund of Funds	2.5	7.8	3.7	2.2	2.8

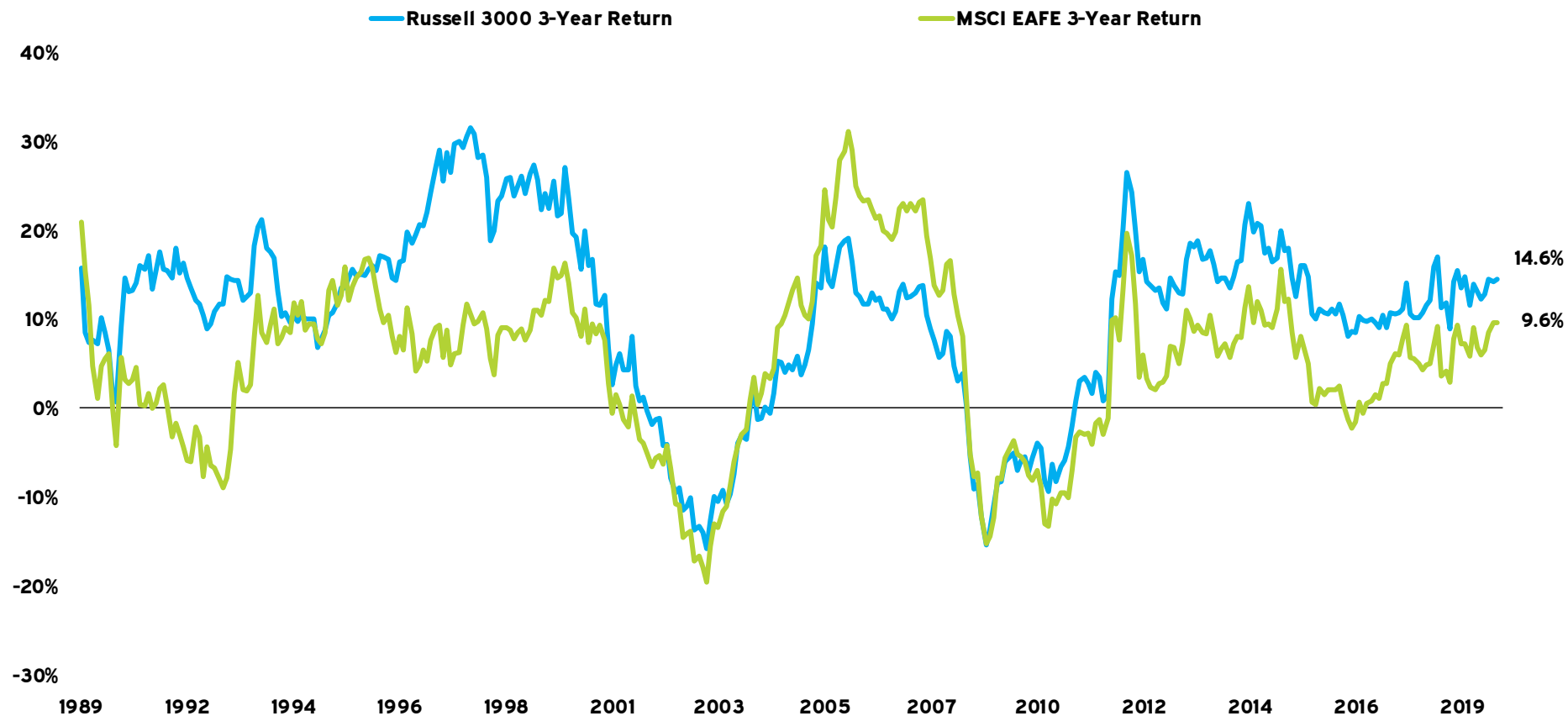
¹ Source: InvestorForce.

S&P Sector Returns¹



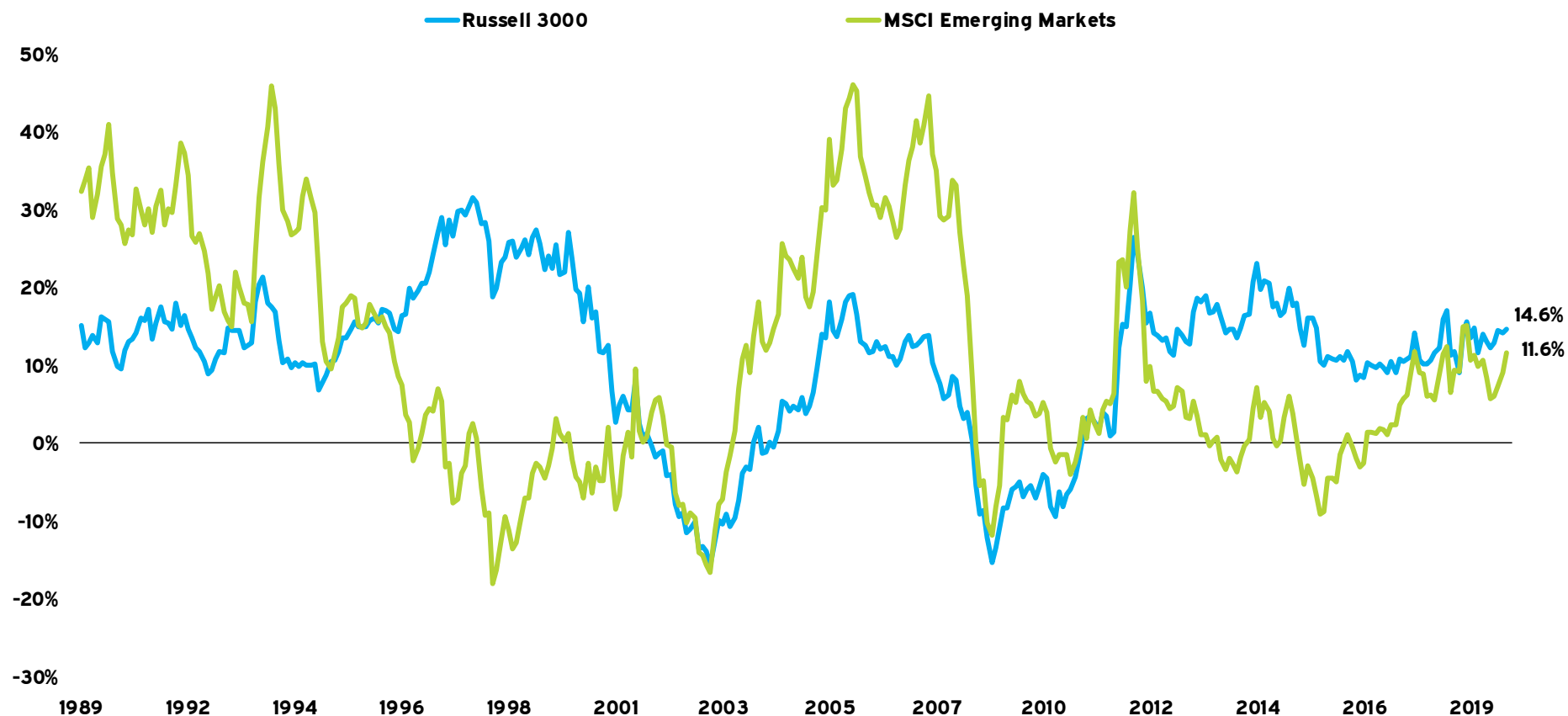
¹ Source: InvestorForce. Represents S&P 1500 (All Cap) data.

US and Developed Market Foreign Equity Rolling Three-Year Returns¹



¹ Source: InvestorForce.

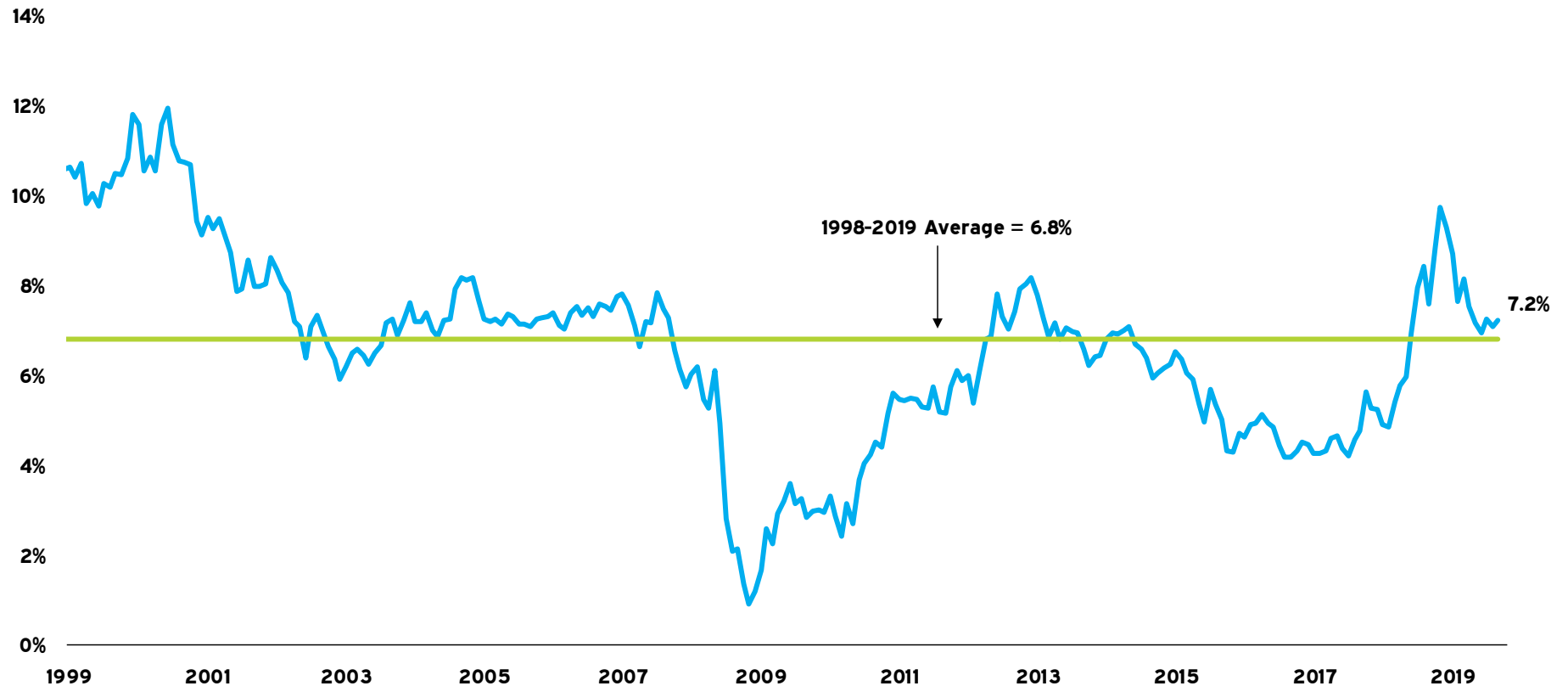
US and Emerging Market Equity Rolling Three-Year Returns¹



¹ Source: InvestorForce.

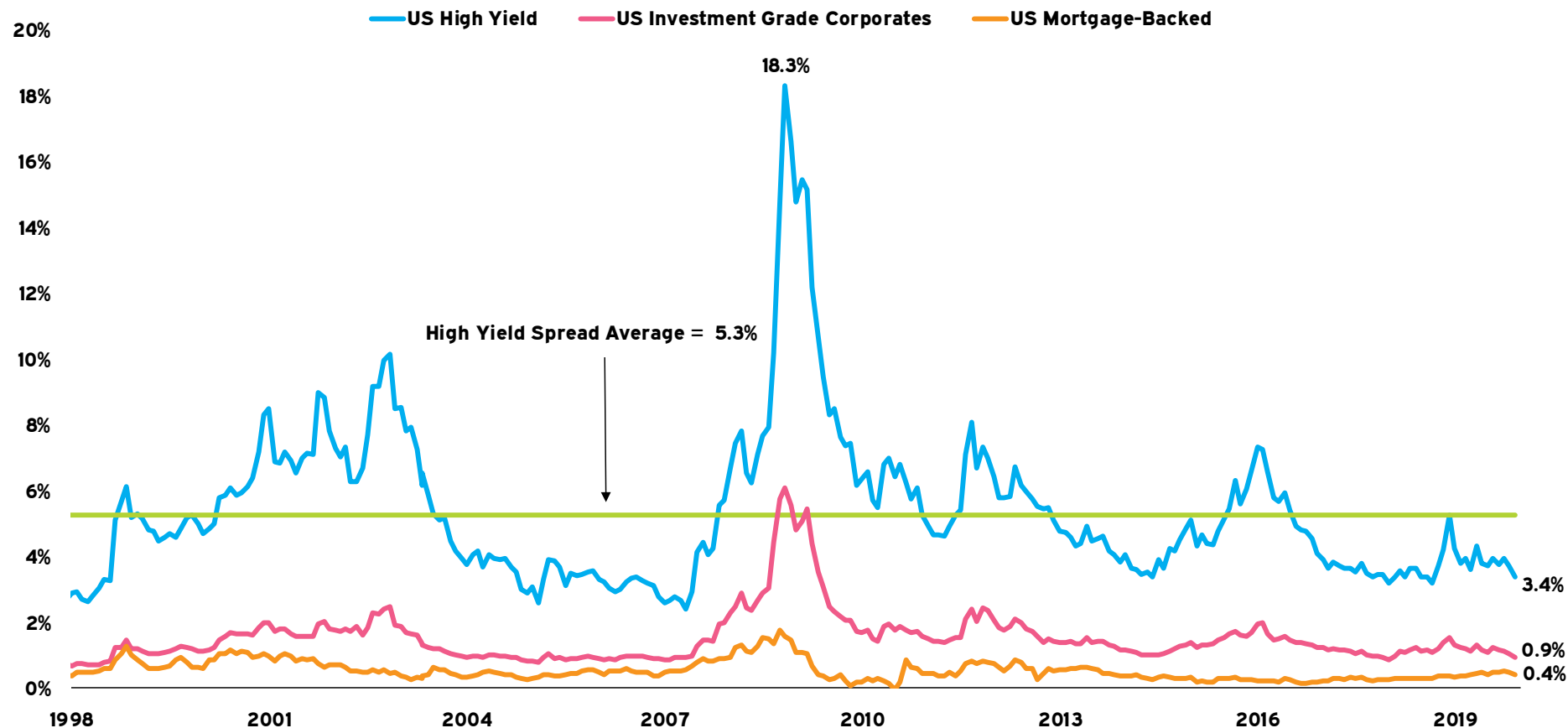
Rolling Ten-Year Returns: 65% Stocks and 35% Bonds¹

— 65% Stocks (MSCI ACWI) / 35% Bonds (Bloomberg Barclays Aggregate) 10-Year Rolling Return



¹ Source: InvestorForce.

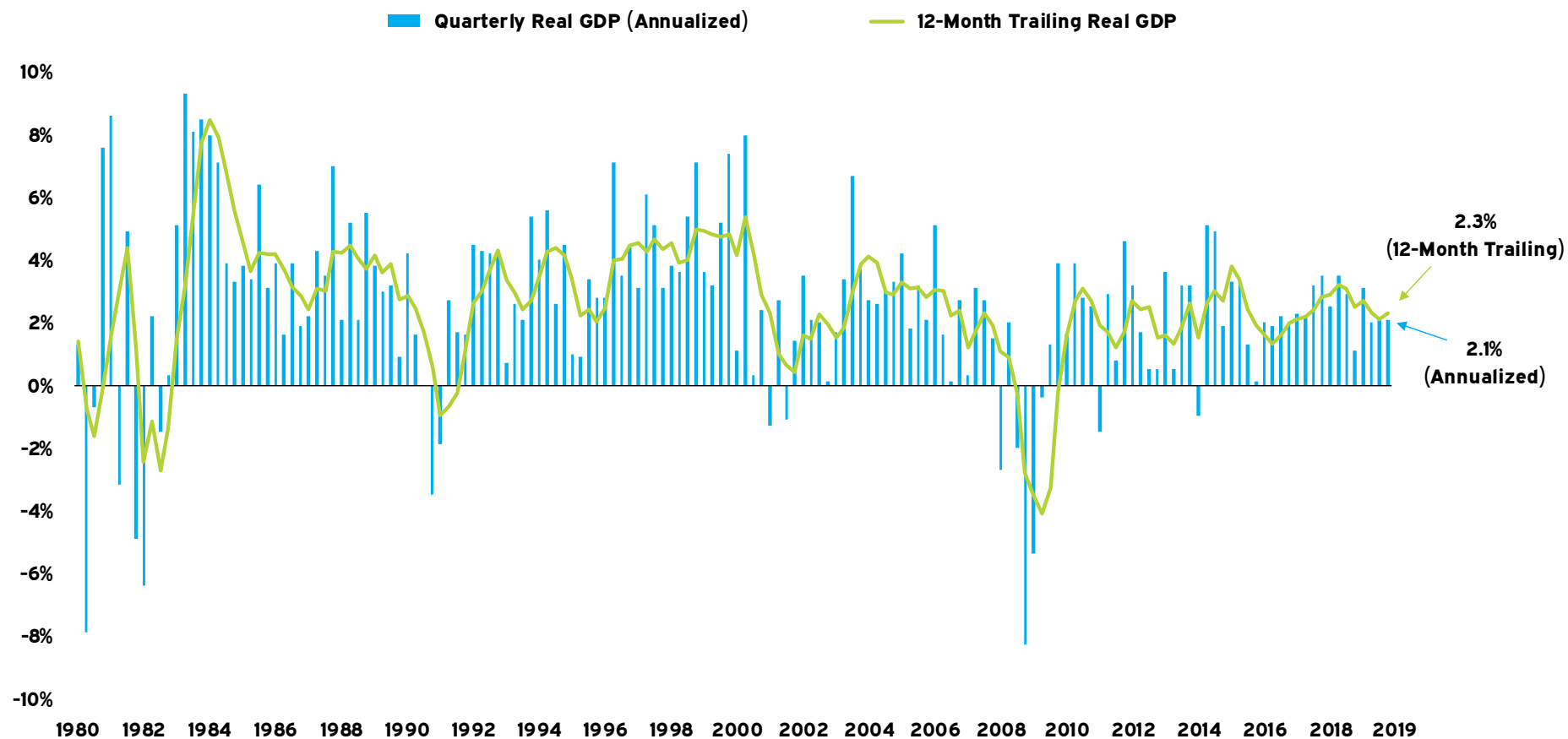
Credit Spreads vs. US Treasury Bonds^{1,2}



¹ Source: Barclays Live. Data represents the OAS.

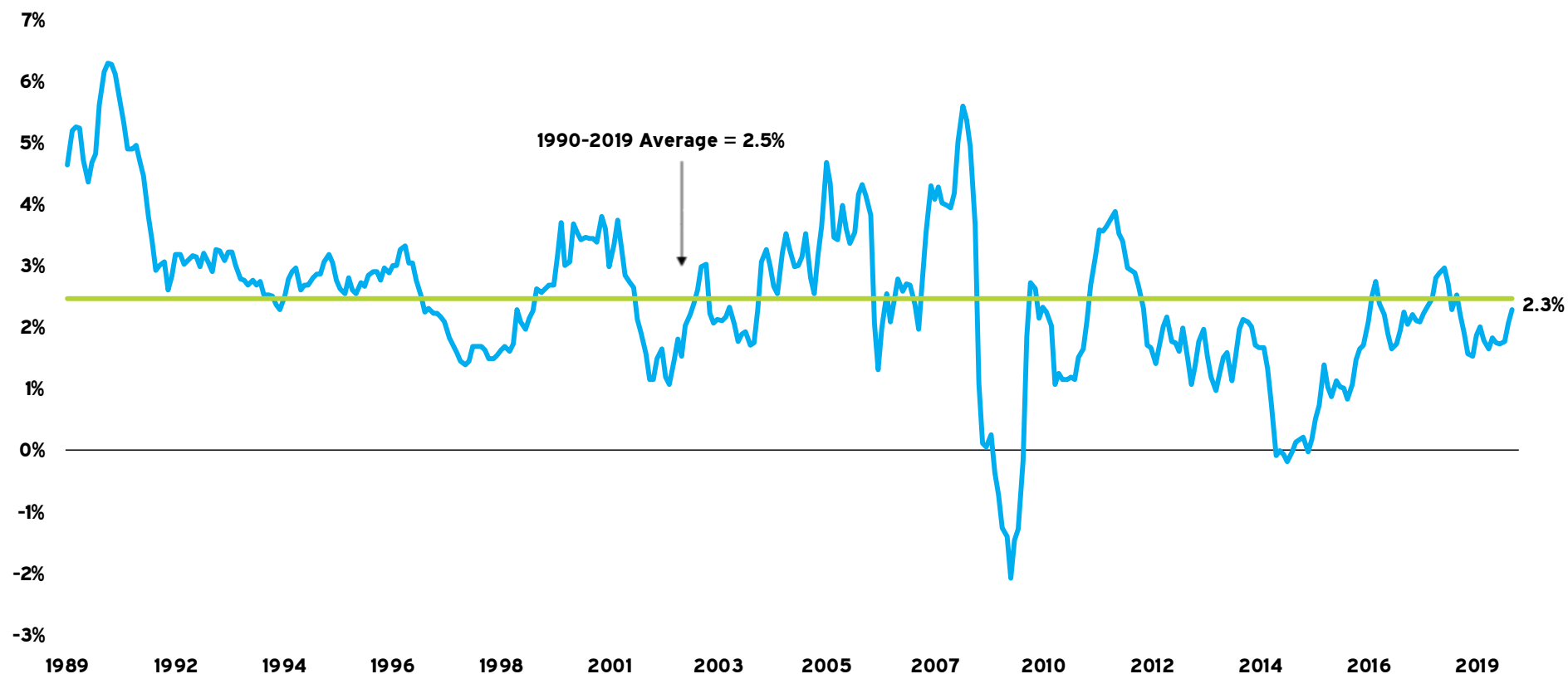
² The median high yield spread was 4.7% from 1997-2019.

US Real Gross Domestic Product (GDP) Growth¹



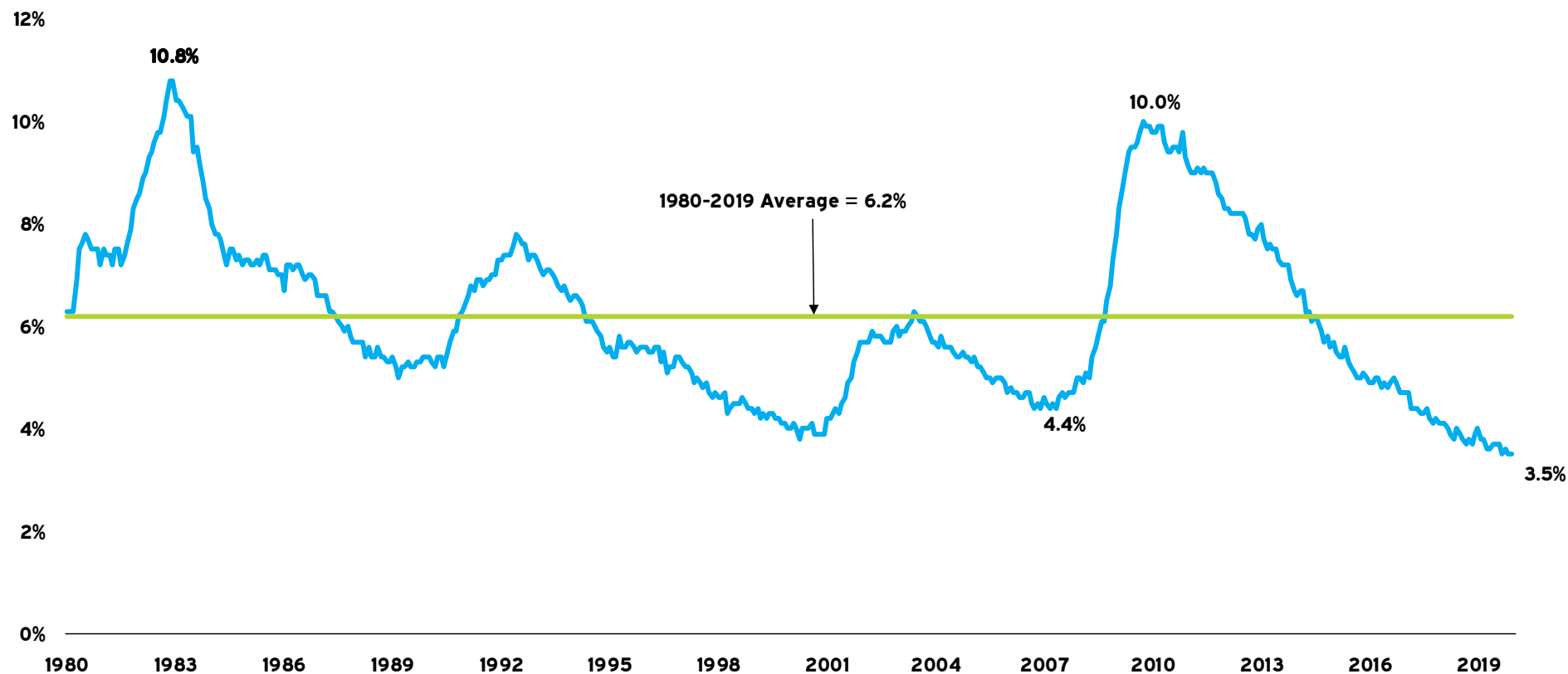
¹ Source: Bureau of Economic Analysis. Data is as of Q4 2019 and represents the first estimate.

US Inflation (CPI) Trailing Twelve Months¹



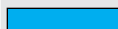



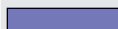





¹ Source: Bureau of Labor Statistics. Data is non-seasonally adjusted CPI, which may be volatile in the short-term. Data is as of December 31, 2019.

US Unemployment¹



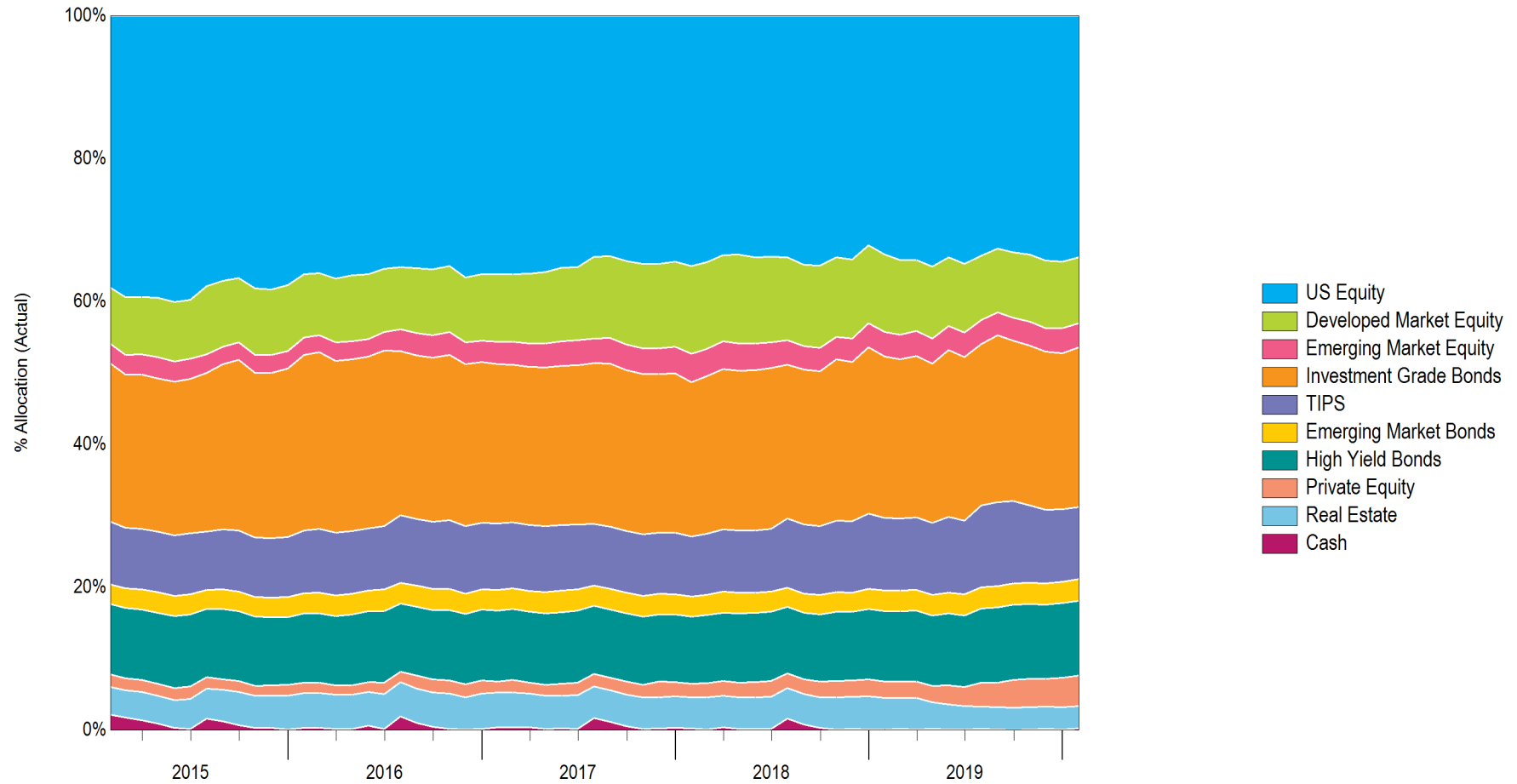
¹ Source: Bureau of Labor Statistics. Data is as of December 31, 2019.

Retirement System Interim Update

Allocation vs. Targets and Policy				
	Current Balance	Current Allocation	Policy	Policy Range
 US Equity	\$63,041,824	34%	33%	28% - 38%
 Developed Market Equity	\$17,113,339	9%	9%	5% - 13%
 Emerging Market Equity	\$6,246,554	3%	3%	1% - 5%
 Investment Grade Bonds	\$41,689,330	22%	22%	17% - 27%
 TIPS	\$18,754,431	10%	10%	7% - 13%
 Emerging Market Bonds	\$5,655,490	3%	3%	1% - 5%
 High Yield Bonds	\$19,594,862	11%	10%	7% - 13%
 Private Equity	\$7,902,911	4%	5%	3% - 7%
 Real Estate	\$5,851,132	3%	5%	2% - 8%
 Cash	\$471,237	0%	0%	0% - 5%
Total	\$186,321,111	100%	100%	

January Market Values and Returns represent preliminary data from managers.
Cash balance is preliminary.

Asset Allocation History
5 Years Ending January 31, 2020



Asset Class Performance Summary										
	Market Value (\$)	% of Portfolio	1 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Total Retirement System	186,321,111	100.0	-0.5	11.7	7.6	6.6	7.9	6.3	7.7	Jul-88
55% MSCI World & 45% Barclays Aggregate			0.5	14.3	8.5	6.5	7.3	5.3	7.1	Jul-88
Consumer Price Index			0.4	2.5	2.0	2.0	1.8	2.1	2.5	Jul-88
Domestic Equity Assets	63,041,824	33.8	-2.4	14.9	10.9	10.2	12.9	5.9	8.3	Oct-06
Russell 3000			-0.1	20.5	13.8	11.8	13.8	6.6	9.1	Oct-06
International Developed Markets Equity Assets	17,113,339	9.2	-2.1	12.4	7.9	5.3	5.0	--	2.9	Oct-06
MSCI EAFE			-2.1	12.1	7.8	5.1	5.8	3.5	3.2	Oct-06
International Emerging Markets Equity Assets	6,246,554	3.4	-4.9	6.2	8.6	5.1	--	--	5.2	Jan-15
MSCI Emerging Markets			-4.7	3.8	7.9	4.5	3.8	6.4	4.5	Jan-15
Investment Grade Bonds Assets	41,689,330	22.4	1.9	9.7	4.7	3.0	3.8	5.1	6.2	Jul-88
BBgBarc US Aggregate TR			1.9	9.6	4.6	3.0	3.8	5.1	6.2	Jul-88
High Yield Bond Assets	19,594,862	10.5	-0.1	9.7	6.1	5.7	6.9	--	6.9	Sep-03
BBgBarc US High Yield TR			0.0	9.4	5.9	6.0	7.4	7.2	7.8	Sep-03
TIPS Assets	18,754,431	10.1	2.1	9.2	3.7	2.4	3.4	--	3.9	Oct-05
BBgBarc US TIPS TR			2.1	9.2	3.7	2.4	3.4	5.6	3.9	Oct-05
Emerging Market Debt Assets	5,655,490	3.0	1.4	11.8	6.6	6.3	--	--	6.2	Jan-15
JP Morgan EMBI Global Diversified			1.5	11.9	6.7	6.4	7.0	9.0	6.4	Jan-15
Open-Ended Real Estate	5,796,523	3.1	0.0	7.3	7.9	9.7	12.3	7.2	8.1	Oct-95
NCREIF ODCE			0.0	5.3	7.1	9.0	11.4	8.2	9.0	Oct-95
Total Closed End Real Estate	54,609	0.0								
Private Equity Assets	7,902,911	4.2								
Cash	471,237	0.3								

January Market Values and Returns reflect preliminary data from the managers.

	Trailing Performance										Inception (%)	Inception Date
	Market Value (\$)	% of Portfolio	% of Sector	1 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)			
Total Retirement System	186,321,111	100.0	--	-0.5	11.7	7.6	6.6	7.9	6.3		7.7	Jul-88
55% MSCI World & 45% Barclays Aggregate				0.5	14.3	8.5	6.5	7.3	5.3		7.1	Jul-88
Consumer Price Index				0.4	2.5	2.0	2.0	1.8	2.1		2.5	Jul-88
Domestic Equity Assets	63,041,824	33.8	33.8	-2.4	14.9	10.9	10.2	12.9	5.9		8.3	Oct-06
Russell 3000				-0.1	20.5	13.8	11.8	13.8	6.6		9.1	Oct-06
RhumbLine S&P 500 Index	19,607,628	10.5	31.1	0.0	21.6	14.5	12.3	13.9	6.4		6.8	Mar-99
S&P 500				0.0	21.7	14.5	12.4	14.0	6.3		6.7	Mar-99
Fiduciary Large Cap Equity	25,187,743	13.5	40.0	-3.1	12.5	10.1	9.4	--	--		11.9	Sep-12
Russell 3000				-0.1	20.5	13.8	11.8	13.8	6.6		13.9	Sep-12
Frontier Capital Appreciation	18,246,453	9.8	28.9	-3.7	11.4	7.9	8.3	--	--		11.7	Feb-13
Russell 2500 Growth				0.1	18.7	14.3	11.2	14.5	6.7		13.1	Feb-13
International Developed Markets Equity Assets	17,113,339	9.2	9.2	-2.1	12.4	7.9	5.3	5.0	--		2.9	Oct-06
MSCI EAFE				-2.1	12.1	7.8	5.1	5.8	3.5		3.2	Oct-06
Rhumblin MSCI EAFE Index	17,113,339	9.2	100.0	-2.1	12.4	7.9	5.3	--	--		3.4	Aug-14
MSCI EAFE				-2.1	12.1	7.8	5.1	5.8	3.5		3.3	Aug-14
International Emerging Markets Equity Assets	6,246,554	3.4	3.4	-4.9	6.2	8.6	5.1	--	--		5.2	Jan-15
MSCI Emerging Markets				-4.7	3.8	7.9	4.5	3.8	6.4		4.5	Jan-15
DFA Emerging Markets	2,920,068	1.6	46.7	-6.1	0.8	5.9	3.7	--	--		3.8	Jan-15
MSCI Emerging Markets				-4.7	3.8	7.9	4.5	3.8	6.4		4.5	Jan-15
Driehaus Emerging Market Equity	3,326,486	1.8	53.3	-3.9	11.6	11.3	6.5	--	--		6.6	Jan-15
MSCI Emerging Markets				-4.7	3.8	7.9	4.5	3.8	6.4		4.5	Jan-15

	Market Value (\$)	% of Portfolio	% of Sector	1 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Investment Grade Bonds Assets	41,689,330	22.4	22.4	1.9	9.7	4.7	3.0	3.8	5.1	6.2	Jul-88
BBgBarc US Aggregate TR				1.9	9.6	4.6	3.0	3.8	5.1	6.2	Jul-88
SSgA U.S. Aggregate Bond Index	41,689,330	22.4	100.0	1.9	9.7	4.7	3.0	3.8	--	4.7	May-01
BBgBarc US Aggregate TR				1.9	9.6	4.6	3.0	3.8	5.1	4.7	May-01
High Yield Bond Assets	19,594,862	10.5	10.5	-0.1	9.7	6.1	5.7	6.9	--	6.9	Sep-03
BBgBarc US High Yield TR				0.0	9.4	5.9	6.0	7.4	7.2	7.8	Sep-03
Shenkman Capital	19,594,862	10.5	100.0	-0.1	9.7	6.1	5.7	6.9	--	6.9	Apr-06
BBgBarc US High Yield TR				0.0	9.4	5.9	6.0	7.4	7.2	7.4	Apr-06
TIPS Assets	18,754,431	10.1	10.1	2.1	9.2	3.7	2.4	3.4	--	3.9	Oct-05
BBgBarc US TIPS TR				2.1	9.2	3.7	2.4	3.4	5.6	3.9	Oct-05
SSgA TIPS Index-NL	18,754,431	10.1	100.0	2.1	9.2	3.7	2.4	3.4	--	3.9	Oct-05
BBgBarc US TIPS TR				2.1	9.2	3.7	2.4	3.4	5.6	3.9	Oct-05
Emerging Market Debt Assets	5,655,490	3.0	3.0	1.4	11.8	6.6	6.3	--	--	6.2	Jan-15
JP Morgan EMBI Global Diversified				1.5	11.9	6.7	6.4	7.0	9.0	6.4	Jan-15
Payden Emerging Market Bond	5,655,490	3.0	100.0	1.4	11.8	6.6	6.3	--	--	6.2	Jan-15
JP Morgan EMBI Global Diversified				1.5	11.9	6.7	6.4	7.0	9.0	6.4	Jan-15
Open-Ended Real Estate	5,796,523	3.1	3.1	0.0	7.3	7.9	9.7	12.3	7.2	8.1	Oct-95
NCREIF ODCE				0.0	5.3	7.1	9.0	11.4	8.2	9.0	Oct-95
Clarion Partners	5,796,523	3.1	100.0	0.0	7.3	7.9	9.7	12.3	--	7.3	Oct-02
NCREIF ODCE				0.0	5.3	7.1	9.0	11.4	8.2	8.1	Oct-02

	Market Value (\$)	% of Portfolio	% of Sector	1 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Total Closed End Real Estate	54,609	0.0	0.0								
Colony Realty Partners IV	21,529	0.0	39.4								
Rockwood Capital Real Estate Partners Fund XI, L.P.	33,080	0.0	60.6								
Private Equity Assets	7,902,911	4.2	4.2								
North American Strategic Partners 2006	623,610	0.3	7.9								
Ironsides Partnership Fund IV	1,574,679	0.8	19.9								
Ironsides Direct Investment Fund IV	3,098,461	1.7	39.2								
Ironsides Direct Investment Fund V, L.P.	2,406,161	1.3	30.4								
HarbourVest 2019 Global Fund	200,000	0.1	2.5								
Cash	471,237	0.3	0.3								

January Market Values and Returns represent preliminary data from managers.
Cash balance is preliminary.

	Calendar Year Performance									
	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)	2011 (%)	2010 (%)
Total Retirement System	17.6	-4.4	13.1	8.7	-0.2	6.3	14.0	10.9	2.4	12.3
55% MSCI World & 45% Barclays Aggregate	19.1	-4.6	13.6	5.5	0.0	5.5	13.0	10.7	0.7	10.0
Consumer Price Index	2.3	1.9	2.1	2.1	0.7	0.8	1.5	1.7	3.0	1.5
Domestic Equity Assets	27.9	-6.7	20.3	14.6	-1.6	13.1	33.1	15.3	0.0	18.8
Russell 3000	31.0	-5.2	21.1	12.7	0.5	12.6	33.6	16.4	1.0	16.9
RhumbLine S&P 500 Index	31.4	-4.4	21.8	11.9	1.4	13.6	32.2	16.0	2.1	15.0
S&P 500	31.5	-4.4	21.8	12.0	1.4	13.7	32.4	16.0	2.1	15.1
Fiduciary Large Cap Equity (net)	23.8	-3.7	19.2	13.8	-2.4	12.4	30.5	--	--	--
Russell 3000	31.0	-5.2	21.1	12.7	0.5	12.6	33.6	16.4	1.0	16.9
Frontier Capital Appreciation (net)	28.9	-13.9	19.1	20.5	-6.5	12.4	--	--	--	--
Russell 2500 Growth	32.7	-7.5	24.5	9.7	-0.2	7.1	40.6	16.1	-1.6	28.9
International Developed Markets Equity Assets	22.3	-13.5	24.9	1.4	-0.8	-8.7	21.2	15.0	-14.1	10.6
MSCI EAFE	22.0	-13.8	25.0	1.0	-0.8	-4.9	22.8	17.3	-12.1	7.8
Rhumblin MSCI EAFE Index (net)	22.3	-13.5	24.9	1.4	-0.8	--	--	--	--	--
MSCI EAFE	22.0	-13.8	25.0	1.0	-0.8	-4.9	22.8	17.3	-12.1	7.8
International Emerging Markets Equity Assets	20.7	-15.4	39.7	9.4	-12.7	--	--	--	--	--
MSCI Emerging Markets	18.4	-14.6	37.3	11.2	-14.9	-2.2	-2.6	18.2	-18.4	18.9
DFA Emerging Markets (net)	16.0	-15.2	36.6	12.4	-14.9	--	--	--	--	--
MSCI Emerging Markets	18.4	-14.6	37.3	11.2	-14.9	-2.2	-2.6	18.2	-18.4	18.9
Driehaus Emerging Market Equity (net)	25.3	-15.6	43.0	6.5	-10.6	--	--	--	--	--
MSCI Emerging Markets	18.4	-14.6	37.3	11.2	-14.9	-2.2	-2.6	18.2	-18.4	18.9

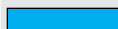



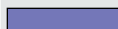





	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)	2011 (%)	2010 (%)
Investment Grade Bonds Assets	8.7	0.0	3.6	2.6	0.6	6.0	-2.0	4.3	7.8	6.6
BBgBarc US Aggregate TR	8.7	0.0	3.5	2.6	0.5	6.0	-2.0	4.2	7.8	6.5
SSgA U.S. Aggregate Bond Index	8.7	0.0	3.6	2.6	0.6	6.0	-2.0	4.3	7.8	6.6
BBgBarc US Aggregate TR	8.7	0.0	3.5	2.6	0.5	6.0	-2.0	4.2	7.8	6.5
High Yield Bond Assets	14.5	-1.3	7.1	12.7	-2.3	2.9	6.4	12.4	6.0	12.8
BBgBarc US High Yield TR	14.3	-2.1	7.5	17.1	-4.5	2.5	7.4	15.8	5.0	15.1
Shenkman Capital	14.5	-1.3	7.2	12.7	-2.3	2.9	6.4	12.4	6.0	12.8
BBgBarc US High Yield TR	14.3	-2.1	7.5	17.1	-4.5	2.5	7.4	15.8	5.0	15.1
TIPS Assets	8.4	-1.3	3.0	4.7	-1.4	3.6	-8.6	6.9	13.5	6.3
BBgBarc US TIPS TR	8.4	-1.3	3.0	4.7	-1.4	3.6	-8.6	7.0	13.6	6.3
SSgA TIPS Index-NL	8.4	-1.3	3.0	4.7	-1.4	3.6	-8.6	6.9	13.5	6.3
BBgBarc US TIPS TR	8.4	-1.3	3.0	4.7	-1.4	3.6	-8.6	7.0	13.6	6.3
Emerging Market Debt Assets	16.5	-7.0	12.0	11.5	-0.8	--	--	--	--	--
JP Morgan EMBI Global Diversified	15.0	-4.3	10.3	10.2	1.2	7.4	-5.3	17.4	7.3	12.2
Payden Emerging Market Bond (net)	16.5	-7.0	12.0	11.5	-0.8	--	--	--	--	--
JP Morgan EMBI Global Diversified	15.0	-4.3	10.3	10.2	1.2	7.4	-5.3	17.4	7.3	12.2
Open-Ended Real Estate	7.3	8.6	7.9	9.1	15.7	13.2	12.8	10.9	18.7	19.2
NCREIF ODCE	5.3	8.3	7.6	8.8	15.0	12.5	13.9	10.9	16.0	16.4
Clarion Partners	7.3	8.6	7.9	9.1	15.7	13.2	12.8	10.9	18.7	19.2
NCREIF ODCE	5.3	8.3	7.6	8.8	15.0	12.5	13.9	10.9	16.0	16.4

	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)	2011 (%)	2010 (%)
Total Closed End Real Estate										
Colony Realty Partners IV										
Rockwood Capital Real Estate Partners Fund XI, L.P. (net)										
Private Equity Assets										
North American Strategic Partners 2006 (net)										
Ironsides Partnership Fund IV (net)										
Ironsides Direct Investment Fund IV (net)										
Ironsides Direct Investment Fund V, L.P. (net)										
HarbourVest 2019 Global Fund (net)										
Cash										

Annual Investment Expense Analysis As Of January 31, 2020				
Name	Fee Schedule	Market Value	Estimated Fee Value	Estimated Fee
Equity Assets		\$86,401,718		
Domestic Equity Assets		\$63,041,824		
RhumbLine S&P 500 Index	0.07% of First 25.0 Mil, 0.05% of Next 25.0 Mil, 0.04% Thereafter	\$19,607,628	\$13,725	0.07%
Fiduciary Large Cap Equity	0.66% of Assets	\$25,187,743	\$166,239	0.66%
Frontier Capital Appreciation	0.79% of Assets	\$18,246,453	\$144,147	0.79%
International Equity Assets		\$23,359,893		
International Developed Markets Equity Assets		\$17,113,339		
Rhumblin MSCI EAFE Index	0.08% of First 25.0 Mil, 0.07% of Next 25.0 Mil, 0.05% Thereafter	\$17,113,339	\$13,691	0.08%
International Emerging Markets Equity Assets		\$6,246,554		
DFA Emerging Markets	0.52% of Assets	\$2,920,068	\$15,184	0.52%
Driehaus Emerging Market Equity	0.90% of Assets	\$3,326,486	\$29,938	0.90%
Fixed Income Assets		\$85,694,113		
Investment Grade Bonds Assets		\$41,689,330		
SSgA U.S. Aggregate Bond Index	0.04% of Assets	\$41,689,330	\$16,676	0.04%
High Yield Bond Assets		\$19,594,862		
Shenkman Capital	0.45% of Assets	\$19,594,862	\$88,177	0.45%
TIPS Assets		\$18,754,431		
SSgA TIPS Index-NL	0.04% of Assets	\$18,754,431	\$7,502	0.04%
Emerging Market Debt Assets		\$5,655,490		
Payden Emerging Market Bond	0.69% of Assets	\$5,655,490	\$39,023	0.69%

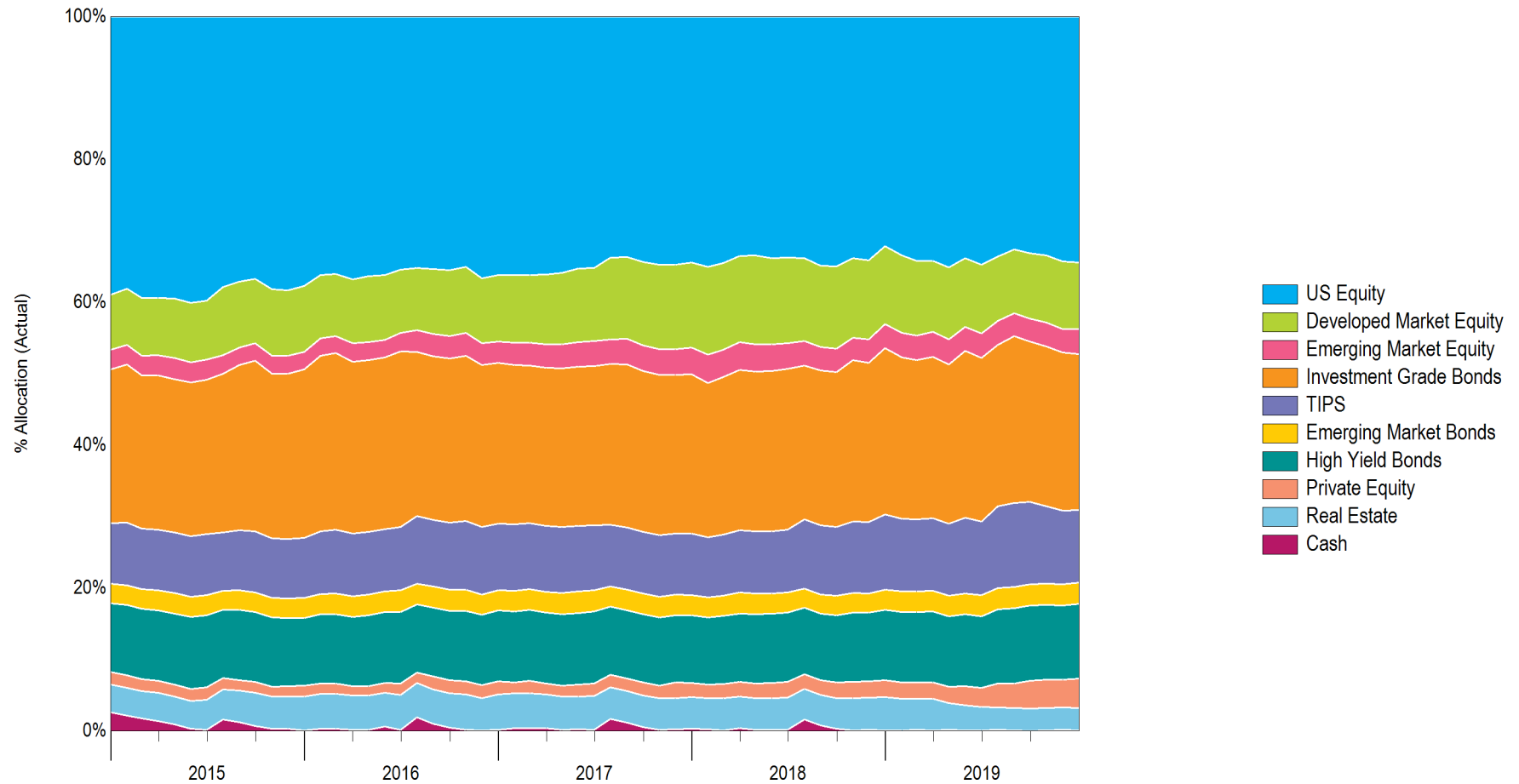
Name	Fee Schedule	Market Value	Estimated Fee Value	Estimated Fee
Real Estate Assets		\$5,851,132		
Open-Ended Real Estate		\$5,796,523		
Clarion Partners	1.10% of Assets	\$5,796,523	\$63,762	1.10%
Total Closed End Real Estate		\$54,609		
Colony Realty Partners IV	1.5% management fee based on committed equity during the investment period and invested equity thereafter	\$21,529		
Rockwood Capital Real Estate Partners Fund XI, L.P.	1.4% of committed capital during investment period; 1.4% on invested equity thereafter	\$33,080		
Private Equity Assets		\$7,902,911		
North American Strategic Partners 2006	0.8% on drawn and undrawn capital less investments sold or written off 5% carried interest, 8% preferred return	\$623,610		
Ironsides Partnership Fund IV	0% Management fee, 8% Preferred Return, 5% Carried Interest	\$1,574,679		
Ironsides Direct Investment Fund IV	0.5% Management fee, 8% Preferred Return, 15% Carried Interest	\$3,098,461		
Ironsides Direct Investment Fund V, L.P.	0.5% Management fee, 8% preferred return, 15% carried interest	\$2,406,161		
HarbourVest 2019 Global Fund	0.69% average annual management fee; 8.0% preferred return on secondary and direct investments and with corresponding carried interest of 12.5% on secondary and direct investments	\$200,000		
Cash		\$471,237		
Comerica Short Term Fund		\$471,237		
Total		\$186,321,111	\$598,064	0.32%

Retirement System Summary

Allocation vs. Targets and Policy					
		Current Balance	Current Allocation	Policy	Policy Range
 US Equity		\$64,573,826	34%	33%	28% - 38%
 Developed Market Equity		\$17,481,489	9%	9%	5% - 13%
 Emerging Market Equity		\$6,571,809	4%	3%	1% - 5%
 Investment Grade Bonds		\$40,897,935	22%	22%	17% - 27%
 TIPS		\$19,158,842	10%	10%	7% - 13%
 Emerging Market Bonds		\$5,580,081	3%	3%	1% - 5%
 High Yield Bonds		\$19,629,557	10%	10%	7% - 13%
 Private Equity		\$7,631,210	4%	5%	3% - 7%
 Real Estate		\$5,851,132	3%	5%	2% - 8%
 Cash		\$249,681	0%	0%	0% - 5%
Total		\$187,625,561	100%	100%	

Market Values are preliminary.

Asset Allocation History 5 Years Ending December 31, 2019



	Actual Asset Allocation (%)	Target Allocation (%)	Target Range (%)	PRIT Asset Allocation ¹ (%)
Total Retirement System	NA	NA	NA	NA
Equity Assets	47	45	37-53	39
Domestic Equity Assets	34	33	28-38	17
International Equity Assets	13	12	9-15	22
Fixed Income Assets	45	45	32-58	21
Domestic Investment Grade Assets	22	22	17-27	15
High Yield Bond Assets	10	10	7-13	6
TIPS	10	10	7-13	-
Emerging Market Debt	3	3	1-5	-
Portfolio Completion Strategies	NA	NA	NA	16
Real Estate Assets	3	5	2-8	9
Private Equity	4	5	3-7	12
Timber/Natural Resources	NA	NA	NA	4
Cash	< 1	<1	0-5	<1

¹ PRIT asset allocation as of December 31, 2019. TIPS and Emerging Market Debt are reflected in PRIT's Core and Value-Added Fixed Income Sleeves, respectively.

Asset Class Performance Summary										
	Market Value (\$)	% of Portfolio	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Total Retirement System (net)	187,625,561	100.0	4.4	17.5	8.2	6.6	7.8	6.2	7.7	Jul-88
55% MSCI World & 45% Barclays Aggregate			4.7	19.1	8.8	6.3	7.1	5.1	7.1	Jul-88
Consumer Price Index			0.1	2.3	2.1	1.8	1.8	2.1	2.5	Jul-88
PRIT Core Fund (net)			4.6	16.5	10.1	7.7	8.6	6.2	8.6	Jul-88
InvMetrics Public DB \$50mm-\$250mm Net Median			5.3	19.1	9.2	6.8	7.9	5.9	8.4	Jul-88
InvMetrics Public DB \$50mm-\$250mm Net Rank			92	77	84	68	59	31	69	Jul-88
Domestic Equity Assets (net)	64,573,826	34.4	8.0	27.6	12.6	10.0	12.7	5.7	8.5	Oct-06
Russell 3000			9.1	31.0	14.6	11.2	13.4	6.4	9.2	Oct-06
PRIT Domestic Equity			8.3	30.1	14.2	11.0	13.2	6.0	8.0	Oct-06
International Developed Markets Equity Assets (net)	17,481,489	9.3	8.1	22.3	9.7	5.8	4.8	--	3.1	Oct-06
MSCI EAFE			8.2	22.0	9.6	5.7	5.5	3.3	3.4	Oct-06
International Emerging Markets Equity Assets (net)	6,571,809	3.5	10.9	20.7	12.6	6.4	--	--	6.4	Jan-15
MSCI Emerging Markets			11.8	18.4	11.6	5.6	3.7	6.7	5.6	Jan-15
Investment Grade Bonds Assets (net)	40,897,935	21.8	0.2	8.7	4.0	3.1	3.8	5.0	6.1	Jul-88
BBgBarc US Aggregate TR			0.2	8.7	4.0	3.0	3.7	5.0	6.2	Jul-88
PRIT Core Fixed Income			-1.2	11.2	5.1	3.4	5.0	5.5	6.9	Jul-88
High Yield Bond Assets (net)	19,629,557	10.5	2.3	14.0	6.1	5.6	6.8	--	6.8	Sep-03
BBgBarc US High Yield TR			2.6	14.3	6.4	6.1	7.6	7.1	7.8	Sep-03
PRIT Public Value-Added Fixed Income			2.2	10.7	5.4	4.3	5.1	--	6.4	Sep-03
TIPS Assets (net)	19,158,842	10.2	0.8	8.4	3.3	2.6	3.3	--	3.8	Oct-05
BBgBarc US TIPS TR			0.8	8.4	3.3	2.6	3.4	5.5	3.8	Oct-05

	Market Value (\$)	% of Portfolio	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Emerging Market Debt Assets (net)	5,580,081	3.0	3.0	16.5	6.7	6.1	--	--	6.1	Jan-15
<i>JP Morgan EMBI Global Diversified</i>			<i>1.8</i>	<i>15.0</i>	<i>6.7</i>	<i>6.2</i>	<i>6.9</i>	<i>8.9</i>	<i>6.2</i>	<i>Jan-15</i>
Open-Ended Real Estate (net)	5,796,523	3.1	2.0	7.3	7.9	9.7	12.3	7.2	8.2	Oct-95
<i>NCREIF ODCE</i>			<i>1.5</i>	<i>5.3</i>	<i>7.1</i>	<i>9.0</i>	<i>11.4</i>	<i>8.2</i>	<i>9.0</i>	<i>Oct-95</i>
Total Closed End Real Estate (net)	54,609	0.0								
Private Equity Assets (net)	7,631,210	4.1								
Cash (net)	249,681	0.1								

Cash Balance is preliminary.

Trailing Performance											
	Market Value (\$)	% of Portfolio	% of Sector	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Total Retirement System	187,625,561	100.0	--	4.4	17.6	8.3	6.7	7.9	6.2	7.7	Jul-88
55% MSCI World & 45% Barclays Aggregate				4.7	19.1	8.8	6.3	7.1	5.1	7.1	Jul-88
Consumer Price Index				0.1	2.3	2.1	1.8	1.8	2.1	2.5	Jul-88
PRIT Core Fund (net)				4.6	16.6	10.5	8.0	9.0	6.6	8.9	Jul-88
Domestic Equity Assets	64,573,826	34.4	34.4	8.0	27.9	12.8	10.1	12.8	5.7	8.6	Oct-06
Russell 3000				9.1	31.0	14.6	11.2	13.4	6.4	9.2	Oct-06
PRIT Domestic Equity				8.3	30.2	14.3	11.1	13.3	6.2	8.2	Oct-06
RhumbLine S&P 500 Index	19,614,469	10.5	30.4	9.0	31.4	15.2	11.7	13.5	6.1	6.8	Mar-99
S&P 500				9.1	31.5	15.3	11.7	13.6	6.1	6.7	Mar-99
Fiduciary Large Cap Equity	26,005,351	13.9	40.3	5.8	23.8	12.4	9.6	--	--	12.5	Sep-12
Russell 3000				9.1	31.0	14.6	11.2	13.4	6.4	14.1	Sep-12
Frontier Capital Appreciation	18,954,006	10.1	29.4	10.1	29.9	10.4	8.7	--	--	12.4	Feb-13
Russell 2500 Growth				10.6	32.7	15.2	10.8	14.0	6.7	13.2	Feb-13
International Developed Markets Equity Assets	17,481,489	9.3	9.3	8.1	22.3	9.7	5.8	4.8	--	3.1	Oct-06
MSCI EAFE				8.2	22.0	9.6	5.7	5.5	3.3	3.4	Oct-06
Rhumblne MSCI EAFE Index	17,481,489	9.3	100.0	8.1	22.3	9.7	5.8	--	--	3.9	Aug-14
MSCI EAFE				8.2	22.0	9.6	5.7	5.5	3.3	3.7	Aug-14

Total Retirement System | As of December 31, 2019

	Market Value (\$)	% of Portfolio	% of Sector	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
International Emerging Markets Equity Assets	6,571,809	3.5	3.5	10.9	20.7	12.6	6.4	--	--	6.4	Jan-15
<i>MSCI Emerging Markets</i>				<i>11.8</i>	<i>18.4</i>	<i>11.6</i>	<i>5.6</i>	<i>3.7</i>	<i>6.7</i>	<i>5.6</i>	<i>Jan-15</i>
DFA Emerging Markets	3,108,552	1.7	47.3	10.6	16.0	10.3	5.1	--	--	5.1	Jan-15
<i>MSCI Emerging Markets</i>				<i>11.8</i>	<i>18.4</i>	<i>11.6</i>	<i>5.6</i>	<i>3.7</i>	<i>6.7</i>	<i>5.6</i>	<i>Jan-15</i>
Driehaus Emerging Market Equity	3,463,257	1.8	52.7	11.3	25.3	14.8	7.6	--	--	7.6	Jan-15
<i>MSCI Emerging Markets</i>				<i>11.8</i>	<i>18.4</i>	<i>11.6</i>	<i>5.6</i>	<i>3.7</i>	<i>6.7</i>	<i>5.6</i>	<i>Jan-15</i>
Investment Grade Bonds Assets	40,897,935	21.8	21.8	0.2	8.7	4.1	3.1	3.8	5.0	6.1	Jul-88
<i>BBgBarc US Aggregate TR</i>				<i>0.2</i>	<i>8.7</i>	<i>4.0</i>	<i>3.0</i>	<i>3.7</i>	<i>5.0</i>	<i>6.2</i>	<i>Jul-88</i>
<i>PRIT Core Fixed Income</i>				<i>-1.2</i>	<i>11.3</i>	<i>5.2</i>	<i>3.5</i>	<i>5.1</i>	<i>5.7</i>	<i>7.0</i>	<i>Jul-88</i>
SSgA U.S. Aggregate Bond Index	40,897,935	21.8	100.0	0.2	8.7	4.1	3.1	3.8	--	4.7	May-01
<i>BBgBarc US Aggregate TR</i>				<i>0.2</i>	<i>8.7</i>	<i>4.0</i>	<i>3.0</i>	<i>3.7</i>	<i>5.0</i>	<i>4.6</i>	<i>May-01</i>
High Yield Bond Assets	19,629,557	10.5	10.5	2.4	14.5	6.6	5.9	7.0	--	6.9	Sep-03
<i>BBgBarc US High Yield TR</i>				<i>2.6</i>	<i>14.3</i>	<i>6.4</i>	<i>6.1</i>	<i>7.6</i>	<i>7.1</i>	<i>7.8</i>	<i>Sep-03</i>
<i>PRIT Public Value-Added Fixed Income</i>				<i>2.3</i>	<i>11.2</i>	<i>5.9</i>	<i>4.8</i>	<i>5.5</i>	<i>--</i>	<i>6.8</i>	<i>Sep-03</i>
Shenkman Capital	19,629,557	10.5	100.0	2.4	14.5	6.6	5.9	7.0	--	6.9	Apr-06
<i>BBgBarc US High Yield TR</i>				<i>2.6</i>	<i>14.3</i>	<i>6.4</i>	<i>6.1</i>	<i>7.6</i>	<i>7.1</i>	<i>7.4</i>	<i>Apr-06</i>
TIPS Assets	19,158,842	10.2	10.2	0.8	8.4	3.3	2.6	3.3	--	3.8	Oct-05
<i>BBgBarc US TIPS TR</i>				<i>0.8</i>	<i>8.4</i>	<i>3.3</i>	<i>2.6</i>	<i>3.4</i>	<i>5.5</i>	<i>3.8</i>	<i>Oct-05</i>
SSgA TIPS Index-NL	19,158,842	10.2	100.0	0.8	8.4	3.3	2.6	3.3	--	3.8	Oct-05
<i>BBgBarc US TIPS TR</i>				<i>0.8</i>	<i>8.4</i>	<i>3.3</i>	<i>2.6</i>	<i>3.4</i>	<i>5.5</i>	<i>3.8</i>	<i>Oct-05</i>

	Market Value (\$)	% of Portfolio	% of Sector	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Emerging Market Debt Assets	5,580,081	3.0	3.0	3.0	16.5	6.7	6.1	--	--	6.1	Jan-15
<i>JP Morgan EMBI Global Diversified</i>				<i>1.8</i>	<i>15.0</i>	<i>6.7</i>	<i>6.2</i>	<i>6.9</i>	<i>8.9</i>	<i>6.2</i>	<i>Jan-15</i>
Payden Emerging Market Bond	5,580,081	3.0	100.0	3.0	16.5	6.7	6.1	--	--	6.1	Jan-15
<i>JP Morgan EMBI Global Diversified</i>				<i>1.8</i>	<i>15.0</i>	<i>6.7</i>	<i>6.2</i>	<i>6.9</i>	<i>8.9</i>	<i>6.2</i>	<i>Jan-15</i>
Open-Ended Real Estate	5,796,523	3.1	3.1	2.0	7.3	7.9	9.7	12.3	7.2	8.2	Oct-95
<i>NCREIF ODCE</i>				<i>1.5</i>	<i>5.3</i>	<i>7.1</i>	<i>9.0</i>	<i>11.4</i>	<i>8.2</i>	<i>9.0</i>	<i>Oct-95</i>
Clarion Partners	5,796,523	3.1	100.0	2.0	7.3	7.9	9.7	12.3	--	7.4	Oct-02
<i>NCREIF ODCE</i>				<i>1.5</i>	<i>5.3</i>	<i>7.1</i>	<i>9.0</i>	<i>11.4</i>	<i>8.2</i>	<i>8.1</i>	<i>Oct-02</i>
Total Closed End Real Estate	54,609	0.0	0.0								
Colony Realty Partners IV	21,529	0.0	39.4								
Rockwood Capital Real Estate Partners Fund XI, L.P.	33,080	0.0	60.6								

Colony market value is as of September 30, 2019 and adjusted for subsequent flows

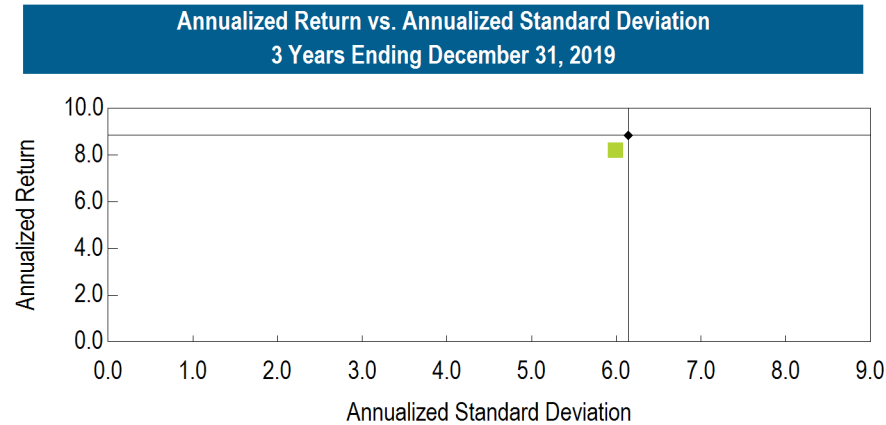
	Market Value (\$)	% of Portfolio	% of Sector	QTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	20 Yrs (%)	Inception (%)	Inception Date
Private Equity Assets	7,631,210	4.1	4.1								
North American Strategic Partners 2006	623,610	0.3	8.2								
Ironsides Partnership Fund IV	1,574,679	0.8	20.6								
Ironsides Direct Investment Fund IV	3,098,461	1.7	40.6								
Ironsides Direct Investment Fund V, L.P.	2,134,461	1.1	28.0								
HarbourVest 2019 Global Fund	200,000	0.1	2.6								
Cash	249,681	0.1	0.1								

Private Equity market values are as of September 30, 2019 and adjusted for subsequent flows

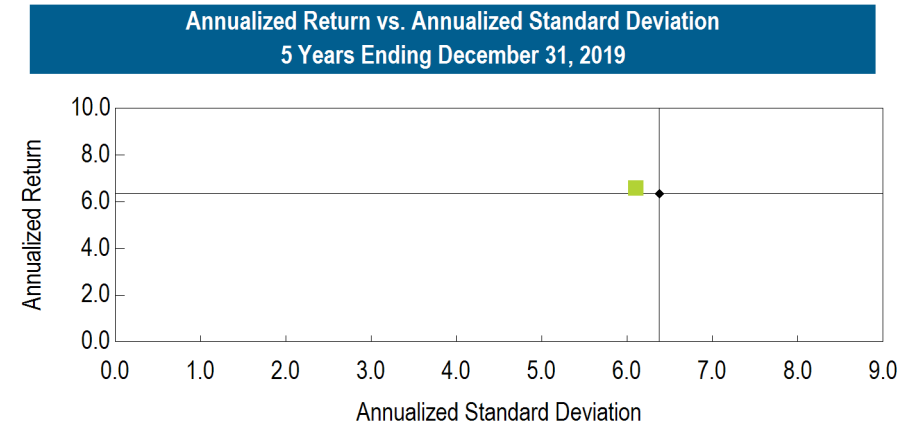
	Calendar Year Performance									
	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)	2011 (%)	2010 (%)
Total Retirement System	17.6	-4.4	13.1	8.7	-0.2	6.3	14.0	10.9	2.4	12.3
55% MSCI World & 45% Barclays Aggregate	19.1	-4.6	13.6	5.5	0.0	5.5	13.0	10.7	0.7	10.0
Consumer Price Index	2.3	1.9	2.1	2.1	0.7	0.8	1.5	1.7	3.0	1.5
PRIT Core Fund (net)	16.6	-1.8	17.7	8.0	1.1	8.1	15.2	13.9	0.1	13.6
Domestic Equity Assets	27.9	-6.7	20.3	14.6	-1.6	13.1	33.1	15.3	0.0	18.8
Russell 3000	31.0	-5.2	21.1	12.7	0.5	12.6	33.6	16.4	1.0	16.9
PRIT Domestic Equity	30.2	-5.1	20.8	12.9	0.3	11.7	33.7	16.9	1.1	16.8
RhumbLine S&P 500 Index	31.4	-4.4	21.8	11.9	1.4	13.6	32.2	16.0	2.1	15.0
S&P 500	31.5	-4.4	21.8	12.0	1.4	13.7	32.4	16.0	2.1	15.1
Fiduciary Large Cap Equity (net)	23.8	-3.7	19.2	13.8	-2.4	12.4	30.5	--	--	--
Russell 3000	31.0	-5.2	21.1	12.7	0.5	12.6	33.6	16.4	1.0	16.9
Frontier Capital Appreciation (net)	28.9	-13.9	19.1	20.5	-6.5	12.4	--	--	--	--
Russell 2500 Growth	32.7	-7.5	24.5	9.7	-0.2	7.1	40.6	16.1	-1.6	28.9
International Developed Markets Equity Assets	22.3	-13.5	24.9	1.4	-0.8	-8.7	21.2	15.0	-14.1	10.6
MSCI EAFE	22.0	-13.8	25.0	1.0	-0.8	-4.9	22.8	17.3	-12.1	7.8
Rhumblin MSCI EAFE Index (net)	22.3	-13.5	24.9	1.4	-0.8	--	--	--	--	--
MSCI EAFE	22.0	-13.8	25.0	1.0	-0.8	-4.9	22.8	17.3	-12.1	7.8

	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)	2011 (%)	2010 (%)
International Emerging Markets Equity Assets	20.7	-15.4	39.7	9.4	-12.7	--	--	--	--	--
<i>MSCI Emerging Markets</i>	<i>18.4</i>	<i>-14.6</i>	<i>37.3</i>	<i>11.2</i>	<i>-14.9</i>	<i>-2.2</i>	<i>-2.6</i>	<i>18.2</i>	<i>-18.4</i>	<i>18.9</i>
DFA Emerging Markets (net)	16.0	-15.2	36.6	12.4	-14.9	--	--	--	--	--
<i>MSCI Emerging Markets</i>	<i>18.4</i>	<i>-14.6</i>	<i>37.3</i>	<i>11.2</i>	<i>-14.9</i>	<i>-2.2</i>	<i>-2.6</i>	<i>18.2</i>	<i>-18.4</i>	<i>18.9</i>
Driehaus Emerging Market Equity (net)	25.3	-15.6	43.0	6.5	-10.6	--	--	--	--	--
<i>MSCI Emerging Markets</i>	<i>18.4</i>	<i>-14.6</i>	<i>37.3</i>	<i>11.2</i>	<i>-14.9</i>	<i>-2.2</i>	<i>-2.6</i>	<i>18.2</i>	<i>-18.4</i>	<i>18.9</i>
Investment Grade Bonds Assets	8.7	0.0	3.6	2.6	0.6	6.0	-2.0	4.3	7.8	6.6
<i>BBgBarc US Aggregate TR</i>	<i>8.7</i>	<i>0.0</i>	<i>3.5</i>	<i>2.6</i>	<i>0.5</i>	<i>6.0</i>	<i>-2.0</i>	<i>4.2</i>	<i>7.8</i>	<i>6.5</i>
<i>PRIT Core Fixed Income</i>	<i>11.3</i>	<i>-0.8</i>	<i>5.4</i>	<i>4.0</i>	<i>-2.0</i>	<i>15.2</i>	<i>-2.8</i>	<i>6.4</i>	<i>8.1</i>	<i>7.5</i>
SSgA U.S. Aggregate Bond Index	8.7	0.0	3.6	2.6	0.6	6.0	-2.0	4.3	7.8	6.6
<i>BBgBarc US Aggregate TR</i>	<i>8.7</i>	<i>0.0</i>	<i>3.5</i>	<i>2.6</i>	<i>0.5</i>	<i>6.0</i>	<i>-2.0</i>	<i>4.2</i>	<i>7.8</i>	<i>6.5</i>
High Yield Bond Assets	14.5	-1.3	7.1	12.7	-2.3	2.9	6.4	12.4	6.0	12.8
<i>BBgBarc US High Yield TR</i>	<i>14.3</i>	<i>-2.1</i>	<i>7.5</i>	<i>17.1</i>	<i>-4.5</i>	<i>2.5</i>	<i>7.4</i>	<i>15.8</i>	<i>5.0</i>	<i>15.1</i>
<i>PRIT Public Value-Added Fixed Income</i>	<i>11.2</i>	<i>-2.1</i>	<i>9.0</i>	<i>11.7</i>	<i>-4.7</i>	<i>-0.2</i>	<i>-1.5</i>	<i>14.7</i>	<i>5.3</i>	<i>13.6</i>
Shenkman Capital	14.5	-1.3	7.2	12.7	-2.3	2.9	6.4	12.4	6.0	12.8
<i>BBgBarc US High Yield TR</i>	<i>14.3</i>	<i>-2.1</i>	<i>7.5</i>	<i>17.1</i>	<i>-4.5</i>	<i>2.5</i>	<i>7.4</i>	<i>15.8</i>	<i>5.0</i>	<i>15.1</i>
TIPS Assets	8.4	-1.3	3.0	4.7	-1.4	3.6	-8.6	6.9	13.5	6.3
<i>BBgBarc US TIPS TR</i>	<i>8.4</i>	<i>-1.3</i>	<i>3.0</i>	<i>4.7</i>	<i>-1.4</i>	<i>3.6</i>	<i>-8.6</i>	<i>7.0</i>	<i>13.6</i>	<i>6.3</i>
SSgA TIPS Index-NL	8.4	-1.3	3.0	4.7	-1.4	3.6	-8.6	6.9	13.5	6.3
<i>BBgBarc US TIPS TR</i>	<i>8.4</i>	<i>-1.3</i>	<i>3.0</i>	<i>4.7</i>	<i>-1.4</i>	<i>3.6</i>	<i>-8.6</i>	<i>7.0</i>	<i>13.6</i>	<i>6.3</i>

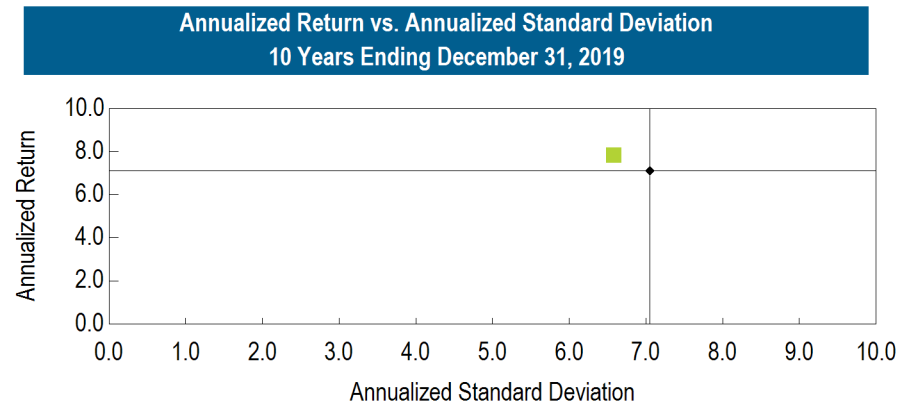
	2019 (%)	2018 (%)	2017 (%)	2016 (%)	2015 (%)	2014 (%)	2013 (%)	2012 (%)	2011 (%)	2010 (%)
Emerging Market Debt Assets	16.5	-7.0	12.0	11.5	-0.8	--	--	--	--	--
<i>JP Morgan EMBI Global Diversified</i>	<i>15.0</i>	<i>-4.3</i>	<i>10.3</i>	<i>10.2</i>	<i>1.2</i>	<i>7.4</i>	<i>-5.3</i>	<i>17.4</i>	<i>7.3</i>	<i>12.2</i>
Payden Emerging Market Bond (net)	16.5	-7.0	12.0	11.5	-0.8	--	--	--	--	--
<i>JP Morgan EMBI Global Diversified</i>	<i>15.0</i>	<i>-4.3</i>	<i>10.3</i>	<i>10.2</i>	<i>1.2</i>	<i>7.4</i>	<i>-5.3</i>	<i>17.4</i>	<i>7.3</i>	<i>12.2</i>
Open-Ended Real Estate	7.3	8.6	7.9	9.1	15.7	13.2	12.8	10.9	18.7	19.2
<i>NCREIF ODCE</i>	<i>5.3</i>	<i>8.3</i>	<i>7.6</i>	<i>8.8</i>	<i>15.0</i>	<i>12.5</i>	<i>13.9</i>	<i>10.9</i>	<i>16.0</i>	<i>16.4</i>
Clarion Partners	7.3	8.6	7.9	9.1	15.7	13.2	12.8	10.9	18.7	19.2
<i>NCREIF ODCE</i>	<i>5.3</i>	<i>8.3</i>	<i>7.6</i>	<i>8.8</i>	<i>15.0</i>	<i>12.5</i>	<i>13.9</i>	<i>10.9</i>	<i>16.0</i>	<i>16.4</i>
Total Closed End Real Estate										
Colony Realty Partners IV										
Rockwood Capital Real Estate Partners Fund XI, L.P. (net)										
Private Equity Assets										
North American Strategic Partners 2006 (net)										
Ironsides Partnership Fund IV (net)										
Ironsides Direct Investment Fund IV (net)										
Ironsides Direct Investment Fund V, L.P. (net)										
HarbourVest 2019 Global Fund (net)										
Cash										



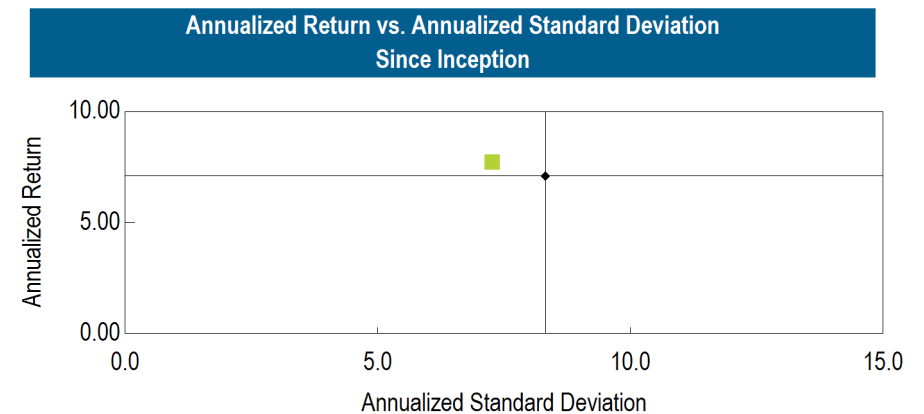
- Total Retirement System
- ◆ 55% MSCI World & 45% Barclays Aggregate



- Total Retirement System
- ◆ 55% MSCI World & 45% Barclays Aggregate

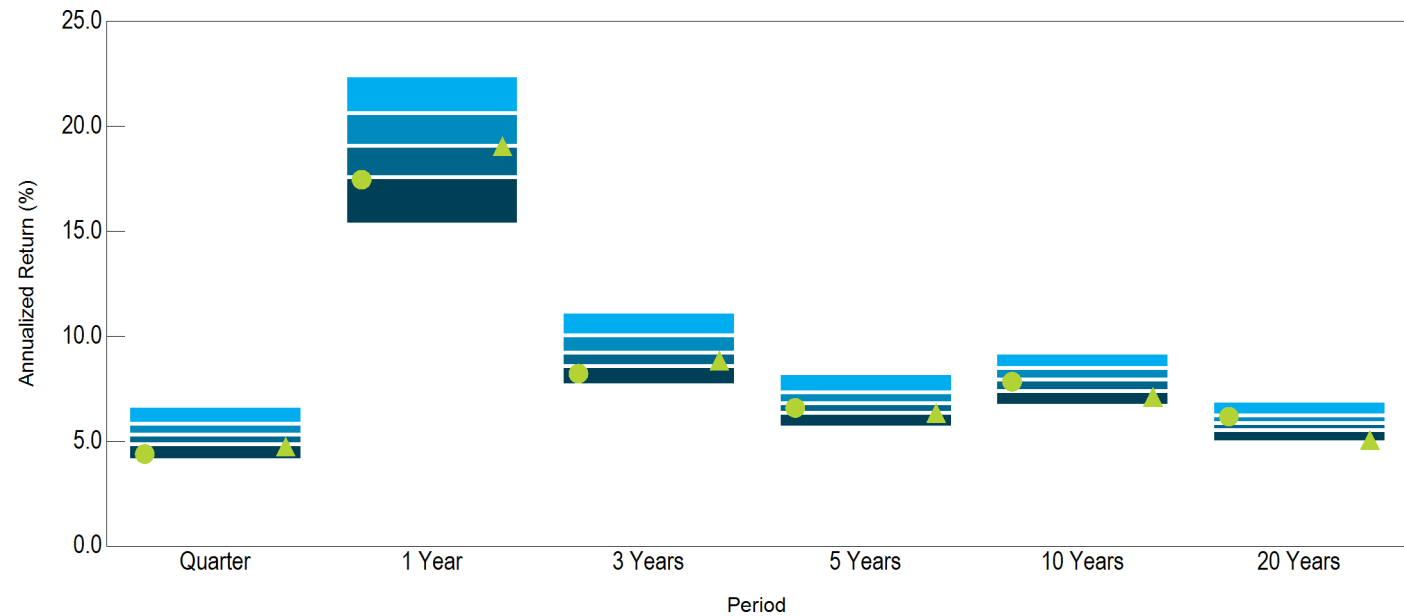


- Total Retirement System
- ◆ 55% MSCI World & 45% Barclays Aggregate



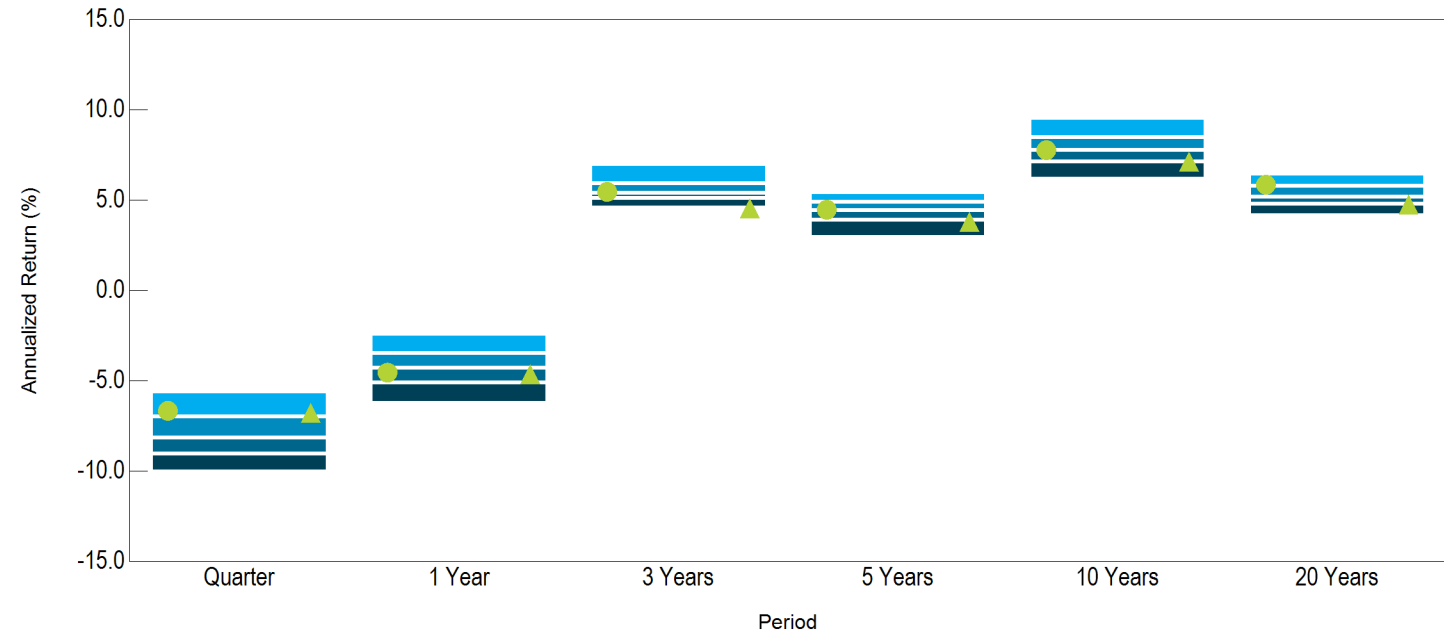
- Total Retirement System
- ◆ 55% MSCI World & 45% Barclays Aggregate

InvMetrics Public DB \$50mm-\$250mm Net Return Comparison
Ending December 31, 2019



	Return (Rank)					
	Quarter	1 Year	3 Years	5 Years	10 Years	20 Years
5th Percentile	6.7	22.4	11.2	8.2	9.2	6.9
25th Percentile	5.8	20.6	10.1	7.3	8.5	6.2
Median	5.3	19.1	9.2	6.8	7.9	5.9
75th Percentile	4.9	17.6	8.6	6.4	7.4	5.5
95th Percentile	4.1	15.3	7.7	5.7	6.7	5.0
# of Portfolios	157	157	149	137	113	44
● Total Retirement System	4.4 (92)	17.5 (77)	8.2 (84)	6.6 (68)	7.8 (59)	6.2 (31)
▲ 55% MSCI World & 45% Barclays Aggregate	4.7 (82)	19.1 (51)	8.8 (62)	6.3 (77)	7.1 (86)	5.1 (91)

InvMetrics Public DB \$50mm-\$250mm Net Return Comparison
Ending December 31, 2018



	Return (Rank)					
	Quarter	1 Year	3 Years	5 Years	10 Years	20 Years
5th Percentile	-5.6	-2.4	7.0	5.4	9.5	6.4
25th Percentile	-7.0	-3.4	5.9	4.9	8.5	5.8
Median	-8.1	-4.3	5.4	4.5	7.8	5.2
75th Percentile	-9.0	-5.1	5.1	3.9	7.2	4.8
95th Percentile	-10.0	-6.2	4.6	3.0	6.2	4.2
# of Portfolios	146	146	140	130	101	39
● Total Retirement System	-6.7 (19)	-4.5 (57)	5.5 (50)	4.5 (50)	7.8 (51)	5.9 (24)
▲ 55% MSCI World & 45% Barclays Aggregate	-6.8 (22)	-4.6 (61)	4.5 (96)	3.8 (79)	7.1 (77)	4.8 (77)

Statistics Summary						
5 Years Ending December 31, 2019						
	Anlzd Return	Anlzd Standard Deviation	Information Ratio	Beta	Sharpe Ratio	Tracking Error
Total Retirement System	6.6%	6.1%	0.2	0.9	0.9	1.1%
55% MSCI World & 45% Barclays Aggregate	6.3%	6.4%	--	1.0	0.8	0.0%
Equity Assets	8.8%	11.7%	-1.0	0.9	0.7	2.4%
Russell 3000	11.2%	12.2%	--	1.0	0.8	0.0%
Domestic Equity Assets	10.0%	12.2%	-0.7	1.0	0.7	1.7%
Russell 3000	11.2%	12.2%	--	1.0	0.8	0.0%
RhumbLine S&P 500 Index	11.7%	12.0%	-0.8	1.0	0.9	0.0%
S&P 500	11.7%	12.0%	--	1.0	0.9	0.0%
Fiduciary Large Cap Equity	9.6%	10.7%	-0.5	0.8	0.8	3.7%
Russell 3000	11.2%	12.2%	--	1.0	0.8	0.0%
Frontier Capital Appreciation	8.3%	16.4%	-0.5	1.0	0.4	5.5%
Russell 2500 Growth	10.8%	15.9%	--	1.0	0.6	0.0%
International Developed Markets Equity Assets	5.8%	12.1%	0.7	1.0	0.4	0.3%
MSCI EAFE	5.7%	12.2%	--	1.0	0.4	0.0%
Rhumblne MSCI EAFE Index	5.8%	12.1%	0.7	1.0	0.4	0.3%
MSCI EAFE	5.7%	12.2%	--	1.0	0.4	0.0%
International Emerging Markets Equity Assets	6.4%	14.1%	0.2	0.9	0.4	3.2%

	Anlzd Return	Anlzd Standard Deviation	Information Ratio	Beta	Sharpe Ratio	Tracking Error
MSCI Emerging Markets	5.6%	15.8%	--	1.0	0.3	0.0%
DFA Emerging Markets	5.1%	15.2%	-0.2	0.9	0.3	2.7%
MSCI Emerging Markets	5.6%	15.8%	--	1.0	0.3	0.0%
Driehaus Emerging Market Equity	7.6%	13.3%	0.4	0.8	0.5	4.9%
MSCI Emerging Markets	5.6%	15.8%	--	1.0	0.3	0.0%
Investment Grade Bonds Assets	3.1%	3.1%	0.5	1.0	0.7	0.0%
BBgBarc US Aggregate TR	3.0%	3.1%	--	1.0	0.7	0.0%
SSgA U.S. Aggregate Bond Index	3.1%	3.1%	0.5	1.0	0.7	0.0%
BBgBarc US Aggregate TR	3.0%	3.1%	--	1.0	0.7	0.0%
High Yield Bond Assets	5.6%	4.7%	-0.5	0.9	1.0	1.1%
BBgBarc US High Yield TR	6.1%	5.3%	--	1.0	1.0	0.0%
Shenkman Capital	5.6%	4.7%	-0.5	0.9	1.0	1.1%
BBgBarc US High Yield TR	6.1%	5.3%	--	1.0	1.0	0.0%
TIPS Assets	2.6%	3.4%	-0.7	1.0	0.4	0.0%
BBgBarc US TIPS TR	2.6%	3.4%	--	1.0	0.5	0.0%
SSgA TIPS Index-NL	2.6%	3.4%	-0.7	1.0	0.4	0.0%
BBgBarc US TIPS TR	2.6%	3.4%	--	1.0	0.5	0.0%
Emerging Market Debt Assets	6.1%	6.3%	-0.1	1.1	0.8	1.8%
JP Morgan EMBI Global Diversified	6.2%	5.3%	--	1.0	1.0	0.0%
Payden Emerging Market Bond	6.1%	6.3%	-0.1	1.1	0.8	1.8%

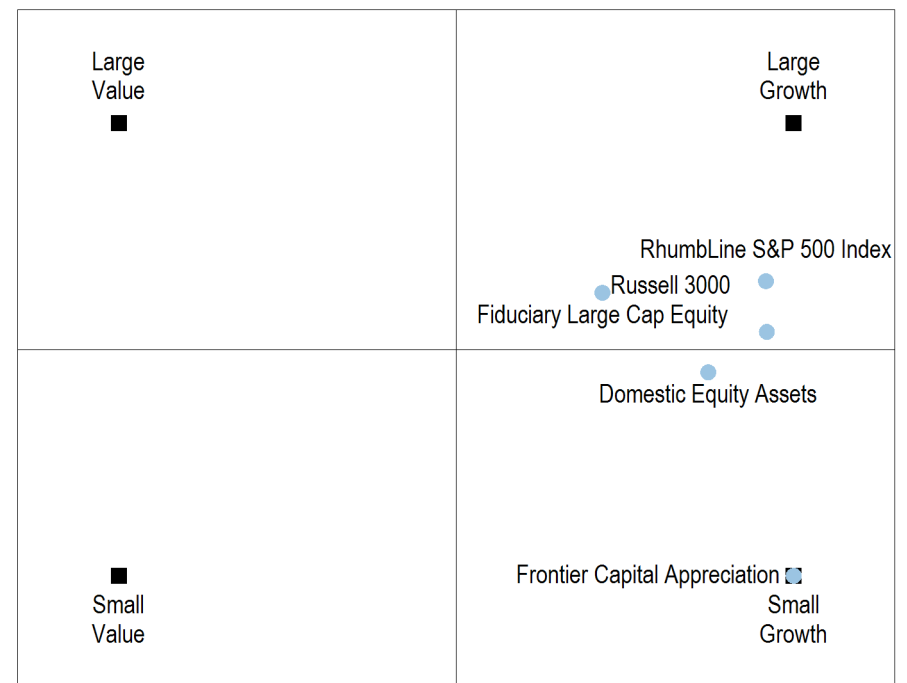
	Anlzd Return	Anlzd Standard Deviation	Information Ratio	Beta	Sharpe Ratio	Tracking Error
JP Morgan EMBI Global Diversified	6.2%	5.3%	--	1.0	1.0	0.0%
Open-Ended Real Estate	9.7%	4.2%	0.8	1.1	2.0	0.9%
NCREIF ODCE	9.0%	3.9%	--	1.0	2.0	0.0%
Clarion Partners	9.7%	4.2%	0.8	1.1	2.0	0.9%
NCREIF ODCE	9.0%	3.9%	--	1.0	2.0	0.0%
Total Closed End Real Estate	-3.0%	21.6%	-0.6	1.1	-0.2	21.2%
NCREIF ODCE	9.0%	3.9%	--	1.0	2.0	0.0%
Colony Realty Partners IV	-3.0%	21.6%	-0.6	1.1	-0.2	21.2%
NCREIF ODCE	9.0%	3.9%	--	1.0	2.0	0.0%
Comerica Short Term Fund	0.3%	0.2%	-2.4	0.0	-3.9	0.3%
91 Day T-Bills	1.1%	0.2%	--	1.0	0.0	0.0%

Retirement System Detail

Asset Allocation on December 31, 2019

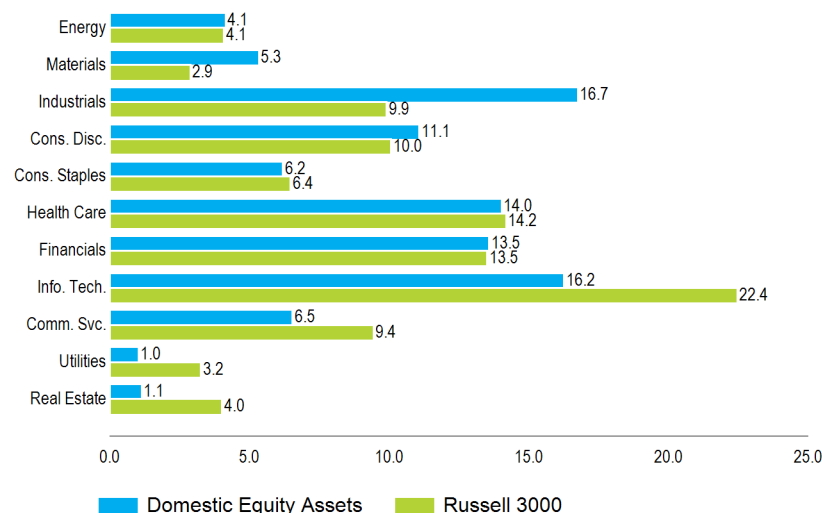
	Actual	Actual
Fiduciary Large Cap Equity	\$26,005,351	40.3%
Frontier Capital Appreciation	\$18,954,006	29.4%
RhumbLine S&P 500 Index	\$19,614,469	30.4%
Total	\$64,573,826	100.0%

Domestic Equity Assets Style Map 3 Years Ending December 31, 2019



Domestic Equity Assets Characteristics			
	Portfolio Q4-19	Index Q4-19	Portfolio Q3-19
Market Value			
Market Value (\$M)	64.6	--	60.4
Number Of Holdings	630	2992	631
Characteristics			
Weighted Avg. Market Cap. (\$B)	129.9	230.5	112.6
Median Market Cap (\$B)	18.3	1.8	17.0
P/E Ratio	20.7	22.8	18.9
Yield	1.5	1.8	1.6
EPS Growth - 5 Yrs.	9.3	13.1	9.7
Price to Book	3.5	3.6	3.2
Beta (holdings; domestic)	1.1	1.0	1.1

Sector Allocation (%) vs Russell 3000



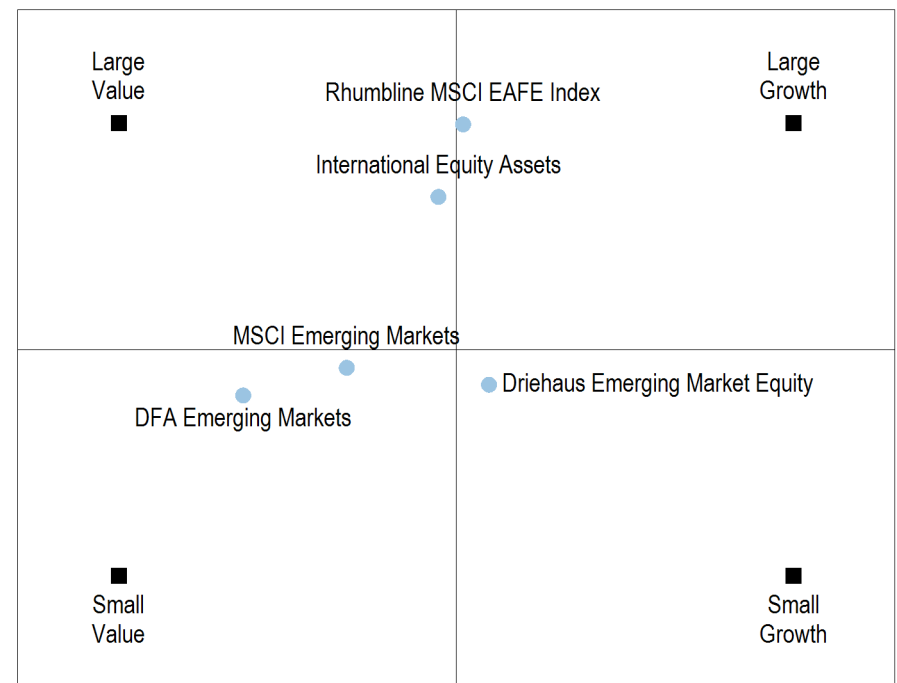
Top 10 Holdings

CASH - USD	4.2%
BERKSHIRE HATHAWAY 'B'	2.7%
UNITEDHEALTH GROUP	2.5%
JP MORGAN CHASE & CO.	2.4%
MASCO	2.0%
DOLLAR GENERAL	1.9%
HONEYWELL INTL.	1.9%
QUEST DIAGNOSTICS	1.6%
ACCENTURE CLASS A	1.5%
PEPSICO	1.5%
Total	22.1%

Asset Allocation on December 31, 2019

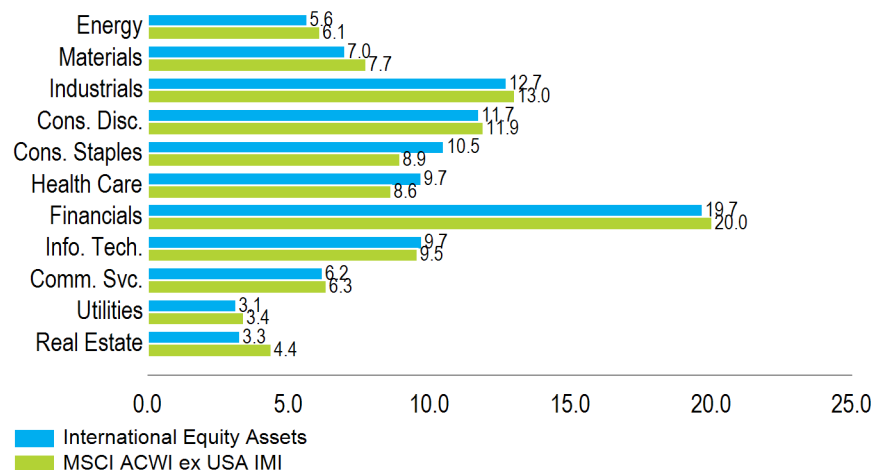
	Actual	Actual
DFA Emerging Markets	\$3,108,552	12.9%
Driehaus Emerging Market Equity	\$3,463,257	14.4%
Rhumblin MSCI EAFE Index	\$17,481,489	72.7%
Total	\$24,053,298	100.0%

International Equity Assets Style Map 3 Years Ending December 31, 2019



International Equity Characteristics			
	Portfolio Q4-19	Index Q4-19	Portfolio Q3-19
Market Value			
Market Value (\$M)	24.1	--	22.6
Number Of Holdings	5738	6587	5832
Characteristics			
Weighted Avg. Market Cap. (\$B)	69.6	64.5	62.1
Median Market Cap (\$B)	0.7	1.7	0.6
P/E Ratio	16.7	16.2	15.7
Yield	2.9	3.0	3.1
EPS Growth - 5 Yrs.	8.3	9.3	8.3
Price to Book	2.5	2.4	2.4
Beta (holdings; domestic)	1.0	1.0	1.0

Sector Allocation (%) vs MSCI ACWI ex USA IMI



Top 10 Holdings

NESTLE 'N'	1.6%
SAMSUNG ELECTRONICS	1.3%
ROCHE HOLDING	1.2%
NOVARTIS 'R'	1.0%
ALIBABA GROUP HOLDING ADR 1:8	0.9%
AIA GROUP	0.9%
TENCENT HOLDINGS	0.8%
TAIWAN SEMICON.SPN.ADR 1:5	0.8%
TOYOTA MOTOR	0.8%
HSBC HOLDINGS	0.8%
Total	10.1%

Country Allocation Report

As of 12/31/2019

Region	% of Total	% of Bench	% Diff
North America ex U.S.	0.2%	6.7%	-6.5%
United States	1.9%	0.0%	1.9%
Europe Ex U.K.	34.7%	30.3%	4.4%
United Kingdom	11.7%	11.2%	0.5%
Pacific Basin Ex Japan	12.1%	7.9%	4.2%
Japan	18.1%	17.0%	1.1%
Emerging Markets	20.8%	25.4%	-4.6%
Other	0.6%	1.5%	-1.0%
Total	100.0%	100.0%	0.0%

International Equity Country Allocation			
vs MSCI ACWI ex USA IMI			
Country	% of Total	% of Bench	% Diff
ARGENTINA	0.0%	0.1%	-0.1%
AUSTRALIA	5.0%	4.6%	0.4%
AUSTRIA	0.2%	0.2%	0.0%
BAHRAIN	0.0%	0.0%	0.0%
BANGLADESH	0.0%	0.0%	0.0%
BELGIUM	0.7%	0.8%	0.0%
BRAZIL	2.2%	2.1%	0.1%
CANADA	0.2%	6.7%	-6.5%
CHILE	0.1%	0.2%	-0.1%
CHINA	3.3%	8.3%	-5.0%
COLOMBIA	0.2%	0.1%	0.1%
CROATIA	0.0%	0.0%	0.0%
CZECH REPUBLIC	0.0%	0.0%	0.0%
DENMARK	1.3%	1.2%	0.1%
EGYPT	0.1%	0.0%	0.1%
ESTONIA	0.0%	0.0%	0.0%
FINLAND	0.7%	0.7%	0.0%
FRANCE	8.3%	6.9%	1.4%
GERMANY	6.2%	5.5%	0.7%
GREECE	0.2%	0.1%	0.1%
HONG KONG	5.8%	2.2%	3.6%
HUNGARY	0.3%	0.1%	0.2%
INDIA	3.1%	2.4%	0.7%
INDONESIA	0.6%	0.5%	0.1%

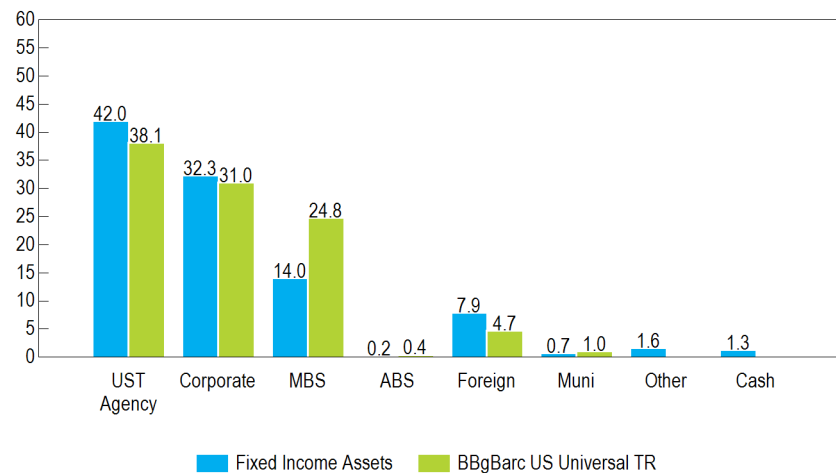
Country	% of Total	% of Bench	% Diff
IRELAND	0.4%	0.4%	0.0%
ISRAEL	0.3%	0.5%	-0.2%
ITALY	1.7%	1.7%	0.0%
JAPAN	18.1%	17.0%	1.1%
JORDAN	0.0%	0.0%	0.0%
KAZAKHSTAN	0.0%	0.0%	0.0%
KENYA	0.0%	0.0%	0.0%
KOREA	2.9%	3.2%	-0.4%
KUWAIT	0.0%	0.0%	0.0%
LEBANON	0.0%	0.0%	0.0%
LITHUANIA	0.0%	0.0%	0.0%
LUXEMBOURG	0.1%	0.0%	0.1%
MALAYSIA	0.5%	0.5%	0.0%
MAURITIUS	0.0%	0.0%	0.0%
MEXICO	0.6%	0.6%	0.0%
MOROCCO	0.0%	0.0%	0.0%
NETHERLANDS	3.5%	2.5%	0.9%
NEW ZEALAND	0.2%	0.2%	0.0%
NIGERIA	0.0%	0.0%	0.0%
NORWAY	0.5%	0.6%	-0.1%
OMAN	0.0%	0.0%	0.0%
OTHER	0.3%	0.0%	0.3%
PAKISTAN	0.0%	0.0%	0.0%
PERU	0.0%	0.1%	-0.1%
PHILIPPINES	0.3%	0.3%	0.0%
POLAND	0.2%	0.2%	0.0%
PORTUGAL	0.1%	0.1%	0.0%

Country	% of Total	% of Bench	% Diff
QATAR	0.0%	0.2%	-0.2%
ROMANIA	0.0%	0.0%	0.0%
RUSSIA	0.9%	1.0%	0.0%
SAUDI ARABIA	0.0%	0.7%	-0.7%
SERBIA	0.0%	0.0%	0.0%
SINGAPORE	1.2%	0.9%	0.3%
SLOVENIA	0.0%	0.0%	0.0%
SOUTH AFRICA	1.1%	1.3%	-0.2%
SPAIN	2.1%	1.8%	0.3%
SRI LANKA	0.0%	0.0%	0.0%
SWEDEN	1.9%	2.1%	-0.2%
SWITZERLAND	6.9%	5.8%	1.1%
TAIWAN	3.4%	3.4%	0.1%
THAILAND	0.6%	0.7%	-0.1%
TUNISIA	0.0%	0.0%	0.0%
TURKEY	0.2%	0.2%	0.0%
UNITED ARAB EMIRATES	0.1%	0.2%	-0.1%
UNITED KINGDOM	11.7%	11.2%	0.5%
UNITED STATES	1.9%	0.0%	1.9%
VIETNAM	0.0%	0.0%	0.0%
Total	100.0%	100.0%	0.0%

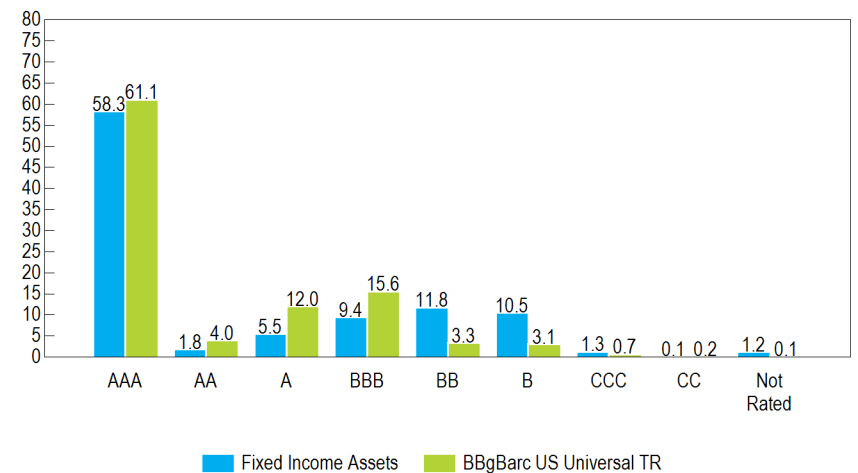
Asset Allocation on December 31, 2019		
	Actual	Actual
Payden Emerging Market Bond	\$5,580,081	6.5%
Shenkman Capital	\$19,629,557	23.0%
SSgA TIPS Index-NL	\$19,158,842	22.5%
SSgA U.S. Aggregate Bond Index	\$40,897,935	48.0%
Total	\$85,266,414	100.0%

Fixed Income Characteristics vs. BBgBarc US Universal TR			
	Portfolio Q4-19	Index Q4-19	Portfolio Q3-19
Fixed Income Characteristics			
Yield to Maturity	3.2	2.8	3.2
Average Duration	4.9	6.1	4.1
Average Quality	A	AA	A
Weighted Average Maturity	7.7	12.2	7.8

Sector Allocation



Credit Quality Allocation



Portfolio Reviews

Account Information

Account Name	RhumbLine S&P 500 Index
Account Structure	Commingled Fund
Investment Style	Passive
Inception Date	3/01/99
Account Type	US Equity
Benchmark	S&P 500
Universe	eV US Passive S&P 500 Equity Net

Portfolio Performance Summary

	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
RhumbLine S&P 500 Index	9.0	31.4	31.4	15.2	11.7	13.5	6.8	Mar-99
S&P 500	9.1	31.5	31.5	15.3	11.7	13.6	6.7	Mar-99

Top 10 Holdings

APPLE	4.5%
MICROSOFT	4.5%
AMAZON.COM	2.8%
FACEBOOK CLASS A	1.8%
BERKSHIRE HATHAWAY 'B'	1.6%
JP MORGAN CHASE & CO.	1.6%
ALPHABET A	1.5%
ALPHABET 'C'	1.5%
JOHNSON & JOHNSON	1.4%
VISA 'A'	1.2%
Total	22.5%

RhumbLine S&P 500 Index Equity Characteristics vs S&P 500

	Portfolio Q4-19	Index Q4-19	Portfolio Q3-19
Market Value			
Market Value (\$M)	19.61	--	18.54
Number Of Holdings	506	505	507
Characteristics			
Weighted Avg. Market Cap. (\$B)	269.49	272.00	230.58
Median Market Cap (\$B)	23.61	23.59	22.53
P/E Ratio	23.03	23.01	20.57
Yield	1.86	1.83	1.97
EPS Growth - 5 Yrs.	12.90	12.82	13.39
Price to Book	3.87	3.87	3.67
Beta (holdings; domestic)	1.00	1.00	0.99
Sector Distribution			
Energy	4.28	4.17	4.45
Materials	2.60	2.60	2.64
Industrials	8.93	8.99	9.16
Consumer Discretionary	9.65	10.12	9.96
Consumer Staples	7.12	7.81	7.48
Health Care	14.06	13.78	13.41
Financials	13.96	13.33	14.25
Information Technology	22.95	22.80	21.61
Communication Services	10.28	10.40	10.24
Utilities	3.28	3.16	3.52
Real Estate	2.87	2.82	3.13

Account Information

Account Name	Fiduciary Large Cap Equity
Account Structure	Mutual Fund
Investment Style	Active
Inception Date	9/01/12
Account Type	US Equity
Benchmark	Russell 3000
Universe	eV US Large Cap Equity Net

Fund Characteristics as of December 31, 2019

Versus Russell 3000

Sharpe Ratio (3 Year)	1.06
Average Market Cap (\$mm)	63,476.13
Price/Earnings	17.98
Price/Book	3.21
Price/Sales	1.92
Price/Cash Flow	14.03
Dividend Yield	1.64
Number of Equity Holdings	31
R-Squared (3 Year)	0.91
Alpha (3 Year)	0.08%

Portfolio Performance Summary

	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Fiduciary Large Cap Equity	5.8	23.8	23.8	12.4	9.6	--	12.5	Sep-12
Russell 3000	9.1	31.0	31.0	14.6	11.2	13.4	14.1	Sep-12

Top Holdings as of December 31, 2019

BERKSHIRE HATHAWAY INC B	6.32%
UNITEDHEALTH GROUP INC	5.53%
MASCO CORP	5.01%
DOLLAR GENERAL CORP	4.98%
JPMORGAN CHASE & CO	4.84%
HONEYWELL INTERNATIONAL INC	4.20%
QUEST DIAGNOSTICS INC	3.85%
CHUBB LTD	3.47%
ACCENTURE PLC CLASS A	3.42%
OMNICOM GROUP INC	3.39%

Sector Allocation as of December 31, 2019

BASIC MATERIALS	4.10%
COMMUNICATION SERVICES	5.16%
CONSUMER CYCLICAL	5.72%
CONSUMER DEFENSIVE	18.14%
ENERGY	3.01%
FINANCIAL SERVICES	20.17%
HEALTHCARE	15.67%
INDUSTRIALS	22.03%
REAL ESTATE	0.00%
TECHNOLOGY	6.01%
UTILITIES	0.00%

Frontier Capital Appreciation | As of December 31, 2019

Account Information

Account Name	Frontier Capital Appreciation
Account Structure	Commingled Fund
Investment Style	Active
Inception Date	2/01/13
Account Type	US Equity
Benchmark	Russell 2500 Growth
Universe	eV US Small-Mid Cap Growth Equity Net

Portfolio Performance Summary

	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Frontier Capital Appreciation	9.8	28.9	28.9	9.8	8.3	--	12.1	Feb-13
Russell 2500 Growth	10.6	32.7	32.7	15.2	10.8	14.0	13.2	Feb-13

Top 10 Holdings

CASH - USD	5.3%
UNITED AIRLINES HOLDINGS	2.9%
INSULET	2.1%
TUTOR PERINI	2.0%
PAN AMERICAN SILVER(NAS)	1.9%
KBR	1.8%
MONOLITHIC PWR.SYS.	1.7%
COOPER COS.	1.7%
COGENT COMMS.HOLDINGS	1.7%
DEXCOM	1.7%
Total	22.6%

Frontier Capital Appreciation Characteristics

	Portfolio Q4-19	Index Q4-19	Portfolio Q3-19
Market Value			
Market Value (\$M)	19.0	--	17.3
Number Of Holdings	140	1409	140
Characteristics			
Weighted Avg. Market Cap. (\$B)	7.0	5.9	6.3
Median Market Cap (\$B)	3.1	1.3	2.7
P/E Ratio	20.2	28.4	19.4
Yield	0.8	0.7	0.9
EPS Growth - 5 Yrs.	7.1	15.9	8.0
Price to Book	2.9	5.5	2.6
Beta (holdings; domestic)	1.4	1.2	1.3
Sector Distribution			
Energy	6.1	0.5	5.7
Materials	9.5	3.6	9.5
Industrials	22.0	17.3	22.8
Consumer Discretionary	7.3	12.9	6.9
Consumer Staples	0.6	2.2	0.5
Health Care	12.6	24.3	13.8
Financials	8.4	6.1	8.8
Information Technology	23.6	25.0	23.1
Communication Services	3.7	3.2	3.4
Utilities	0.0	0.8	0.0
Real Estate	0.8	4.2	0.9

Account Information

Account Name	Rhumblin MSCI EAFE Index
Account Structure	Commingled Fund
Investment Style	Passive
Inception Date	8/01/14
Account Type	Non-US Stock Developed
Benchmark	MSCI EAFE
Universe	eV EAFE All Cap Equity Net

Portfolio Performance Summary

	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Rhumblin MSCI EAFE Index	8.1	22.3	22.3	9.7	5.8	--	3.9	Aug-14
MSCI EAFE	8.2	22.0	22.0	9.6	5.7	5.5	3.7	Aug-14

Top 10 Holdings

NESTLE 'N'	2.2%
ROCHE HOLDING	1.5%
NOVARTIS 'R'	1.4%
TOYOTA MOTOR	1.1%
HSBC HOLDINGS	1.1%
SAP	0.9%
ASTRAZENECA	0.9%
TOTAL	0.9%
ROYAL DUTCH SHELL A(LON)	0.9%
LVMH	0.9%
Total	11.6%

Rhumblin MSCI EAFE Index Characteristics

	Portfolio Q4-19	Index Q4-19	Portfolio Q3-19
Market Value			
Market Value (\$M)	17.5	--	16.6
Number Of Holdings	924	918	939
Characteristics			
Weighted Avg. Market Cap. (\$B)	63.9	63.7	60.4
Median Market Cap (\$B)	10.8	10.8	9.9
P/E Ratio	17.2	17.2	15.9
Yield	3.2	3.2	3.3
EPS Growth - 5 Yrs.	7.0	7.1	7.0
Price to Book	2.4	2.4	2.3
Beta (holdings; domestic)	1.0	1.0	1.0
Sector Distribution			
Energy	4.8	4.9	5.1
Materials	7.0	7.1	6.9
Industrials	15.0	15.1	14.7
Consumer Discretionary	11.6	11.6	11.5
Consumer Staples	11.2	11.3	11.9
Health Care	12.1	12.2	11.5
Financials	18.4	18.6	18.4
Information Technology	6.9	7.0	6.6
Communication Services	5.2	5.2	5.3
Utilities	3.7	3.7	3.7
Real Estate	3.4	3.4	3.5

DFA Emerging Markets | As of December 31, 2019

Account Information

Account Name	DFA Emerging Markets
Account Structure	Mutual Fund
Investment Style	Active
Inception Date	1/01/15
Account Type	Non-US Stock Emerging
Benchmark	MSCI Emerging Markets
Universe	eV Emg Mkts All Cap Equity Net

Portfolio Performance Summary

	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
DFA Emerging Markets	10.6	16.0	16.0	10.3	5.1	--	5.1	Jan-15
MSCI Emerging Markets	11.8	18.4	18.4	11.6	5.6	3.7	5.6	Jan-15

Top 10 Holdings

SAMSUNG ELECTRONICS	4.7%
TENCENT HOLDINGS	2.2%
TAIWAN SEMICON.SPN.ADR 1:5	2.1%
TAIWAN SEMICON.MNFG.	1.5%
ALIBABA GROUP HOLDING ADR 1:8	1.0%
CASH - USD	1.0%
PING AN INSURANCE (GROUP) OF CHINA 'H'	1.0%
SK HYNIX	1.0%
VALE ON	0.9%
RELIANCE INDUSTRIES	0.8%
Total	16.2%

DFA Emerging Markets Characteristics

	Portfolio Q4-19	Index Q4-19	Portfolio Q3-19
Market Value			
Market Value (\$M)	3.1	--	2.8
Number Of Holdings	4787	1371	4868
Characteristics			
Weighted Avg. Market Cap. (\$B)	58.3	106.2	45.3
Median Market Cap (\$B)	0.4	5.9	0.4
P/E Ratio	13.9	15.0	12.8
Yield	2.9	2.7	3.1
EPS Growth - 5 Yrs.	11.4	13.1	11.0
Price to Book	2.3	2.6	2.2
Beta (holdings; domestic)	1.1	1.1	1.1
Sector Distribution			
Energy	6.9	7.4	7.0
Materials	10.3	7.3	10.3
Industrials	8.3	5.3	8.8
Consumer Discretionary	10.3	14.3	10.5
Consumer Staples	6.8	6.2	7.4
Health Care	3.0	2.7	2.9
Financials	18.4	24.5	18.3
Information Technology	19.8	15.6	19.1
Communication Services	7.7	11.0	7.5
Utilities	3.4	2.6	3.5
Real Estate	4.1	3.0	3.8

Account Information

Account Name	Driehaus Emerging Market Equity
Account Structure	Commingled Fund
Investment Style	Active
Inception Date	1/01/15
Account Type	Non-US Stock Emerging
Benchmark	MSCI Emerging Markets
Universe	eV Emg Mkts All Cap Equity Net

Portfolio Performance Summary

	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Driehaus Emerging Market Equity	11.3	25.3	25.3	14.8	7.6	--	7.6	Jan-15
MSCI Emerging Markets	11.8	18.4	18.4	11.6	5.6	3.7	5.6	Jan-15

Top 10 Holdings

ALIBABA GROUP HOLDING ADR 1:8	5.9%
SAMSUNG ELECTRONICS	4.7%
TENCENT HOLDINGS	4.0%
TAIWAN SEMICON.SPN.ADR 1:5	4.0%
ICICI BK.ADR 1:2	2.4%
PJSC LUKOIL SPON (LON) ADR	2.3%
HDFC BANK ADR 1:3	1.8%
AIA GROUP	1.7%
BANK CENTRAL ASIA	1.7%
KOTAK MAHINDRA BANK	1.7%
Total	30.2%

Driehaus Emerging Market Equity Characteristics

	Portfolio Q4-19	Index Q4-19	Portfolio Q3-19
Market Value			
Market Value (\$M)	3.5	--	3.1
Number Of Holdings	103	1371	100
Characteristics			
Weighted Avg. Market Cap. (\$B)	111.5	106.2	88.5
Median Market Cap (\$B)	16.5	5.9	14.9
P/E Ratio	20.4	15.0	21.0
Yield	1.7	2.7	1.9
EPS Growth - 5 Yrs.	12.7	13.1	13.1
Price to Book	3.8	2.6	3.6
Beta (holdings; domestic)	1.0	1.1	1.0
Sector Distribution			
Energy	8.9	7.4	5.6
Materials	3.5	7.3	1.9
Industrials	5.0	5.3	4.3
Consumer Discretionary	14.0	14.3	15.0
Consumer Staples	10.1	6.2	11.5
Health Care	3.5	2.7	2.3
Financials	27.7	24.5	27.5
Information Technology	15.1	15.6	13.2
Communication Services	10.0	11.0	10.7
Utilities	0.0	2.6	0.4
Real Estate	1.5	3.0	1.1

Account Information

Account Name	SSgA U.S. Aggregate Bond Index
Account Structure	Commingled Fund
Investment Style	Passive
Inception Date	5/01/01
Account Type	US Fixed Income Investment Grade
Benchmark	BBgBarc US Aggregate TR
Universe	eV US Core Fixed Inc Net

Portfolio Performance Summary

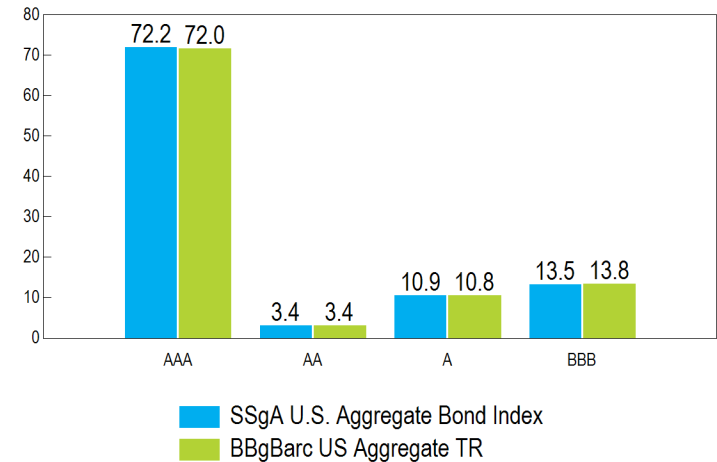
	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
SSgA U.S. Aggregate Bond Index	0.2	8.7	8.7	4.0	3.1	3.8	4.7	May-01
BBgBarc US Aggregate TR	0.2	8.7	8.7	4.0	3.0	3.7	4.6	May-01

SSgA U.S. Aggregate Bond Index Characteristics

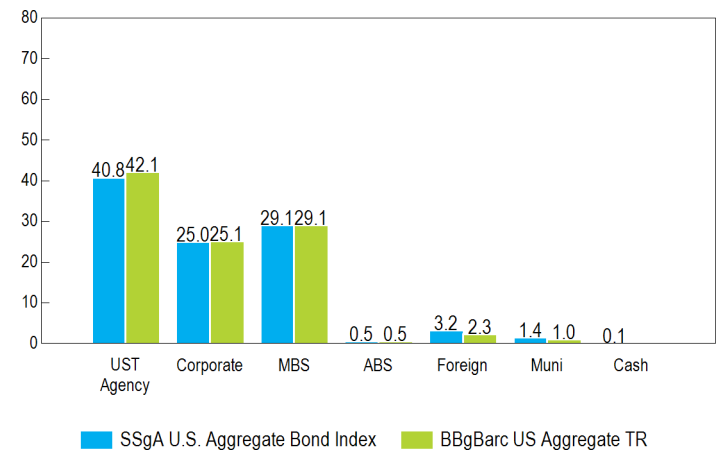
vs. BBgBarc US Aggregate TR

	Portfolio Q4-19	Index Q4-19	Portfolio Q3-19
Fixed Income Characteristics			
Yield to Maturity	2.3	2.3	2.5
Average Duration	5.9	5.9	5.8
Average Quality	AA	AA	AA
Weighted Average Maturity	7.9	8.1	7.9

Credit Quality Allocation



Sector Allocation



Shenkman Capital | As of December 31, 2019

Account Information

Account Name	Shenkman Capital
Account Structure	Commingled Fund
Investment Style	Active
Inception Date	4/01/06
Account Type	US Fixed Income High Yield
Benchmark	BBgBarc US High Yield TR
Universe	eV US High Yield Fixed Inc Net

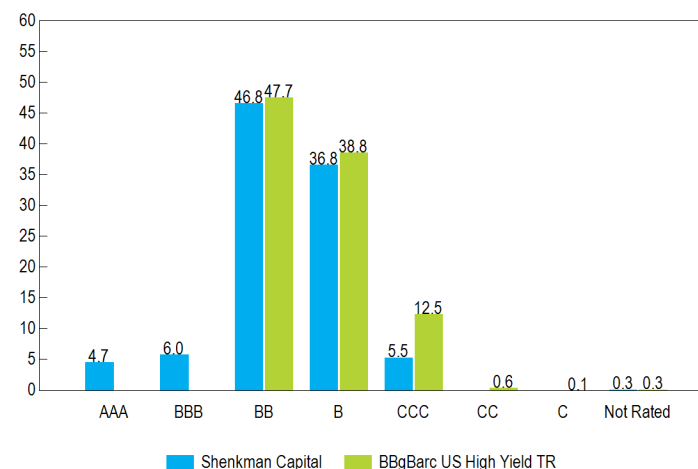
Portfolio Performance Summary

	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Shenkman Capital	2.3	14.0	14.0	6.1	5.6	6.8	6.8	Apr-06
BBgBarc US High Yield TR	2.6	14.3	14.3	6.4	6.1	7.6	7.4	Apr-06

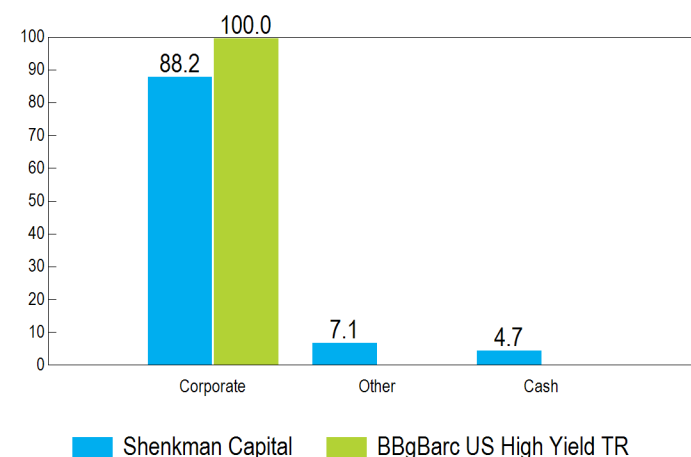
Shenkman Capital Characteristics vs. BBgBarc US High Yield TR

	Portfolio Q4-19	Index Q4-19	Portfolio Q3-19
Fixed Income Characteristics			
Yield to Maturity	5.3	7.1	5.5
Average Duration	2.3	4.6	2.9
Average Quality	BB	B	BB
Weighted Average Maturity	5.8	5.9	5.8

Credit Quality Allocation



Sector Allocation



SSgA TIPS Index-NL | As of December 31, 2019

Account Information

Account Name	SSgA TIPS Index-NL
Account Structure	Commingled Fund
Investment Style	Passive
Inception Date	10/01/05
Account Type	US Inflation Protected Fixed
Benchmark	BBgBarc US TIPS TR
Universe	eV US TIPS / Inflation Fixed Inc Net

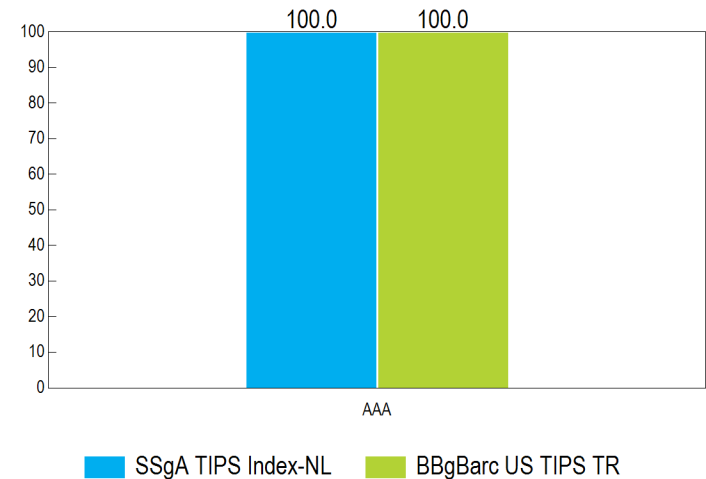
Portfolio Performance Summary

	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
SSgA TIPS Index-NL	0.8	8.4	8.4	3.3	2.6	3.3	3.8	Oct-05
BBgBarc US TIPS TR	0.8	8.4	8.4	3.3	2.6	3.4	3.8	Oct-05

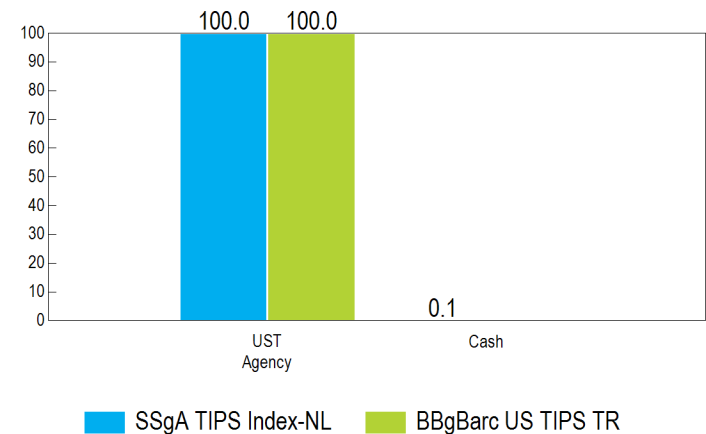
SSgA TIPS Index-NL Characteristics vs. BBgBarc US TIPS TR

	Portfolio Q4-19	Index Q4-19	Portfolio Q3-19
Fixed Income Characteristics			
Yield to Maturity	2.0	1.72	1.9
Average Duration	4.7	4.7	1.2
Average Quality	AAA	AAA	AAA
Weighted Average Maturity	8.0	8.0	8.4

Credit Quality Allocation



Sector Allocation



Account Information

Account Name	Payden Emerging Market Bond
Account Structure	Mutual Fund
Investment Style	Active
Inception Date	1/01/15
Account Type	International Emerging Market Debt
Benchmark	JP Morgan EMBI Global Diversified
Universe	

Portfolio Performance Summary

	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Payden Emerging Market Bond	3.0	16.5	16.5	6.7	6.1	--	6.1	Jan-15
JP Morgan EMBI Global Diversified	1.8	15.0	15.0	6.7	6.2	6.9	6.2	Jan-15

Fund Characteristics as of December 31, 2019

Versus JP Morgan EMBI Global Diversified

Sharpe Ratio (3 Year)	0.79
Average Duration	7.51
Average Coupon	6.48%
Average Effective Maturity	12.29
R-Squared (3 Year)	0.91
Alpha (3 Year)	-0.12%
Beta (3 Year)	1.22

Payden Emerging Market Bond Characteristics vs. JP Morgan EMBI Global Diversified

	Portfolio Q4-19	Portfolio Q3-19
Fixed Income Characteristics		
Yield to Maturity	6.1	6.3
Average Duration	7.5	7.4
Average Quality	BB	BB
Weighted Average Maturity	12.3	12.0

Fixed Income Sectors as of December 31, 2019

GOVERNMENT	70.15%
MUNICIPAL	0.00%
CORPORATE	16.66%
SECURITIZED	0.00%
CASH & EQUIVALENTS	2.96%
DERIVATIVE	10.23%

Credit Quality as of December 31, 2019

AAA	2.00%
AA	3.00%
A	5.00%
BBB	27.00%
BB	20.00%
B	31.00%
Below B	9.00%
Not Rated	3.00%

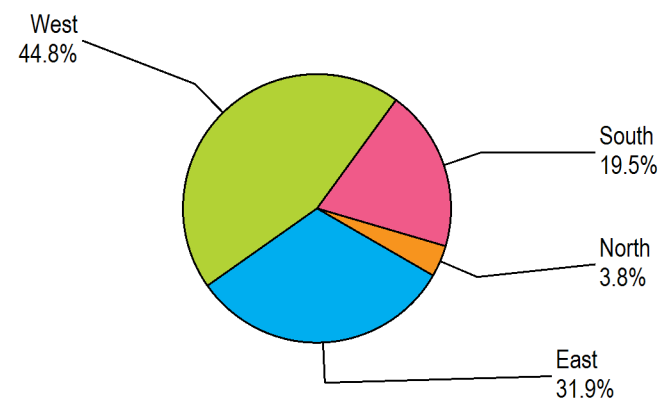
Account Information

Account Name	Clarion Partners
Account Structure	Commingled Fund
Investment Style	Active
Inception Date	10/01/02
Account Type	Real Estate
Benchmark	NCREIF ODCE
Universe	US Real Estate Equity

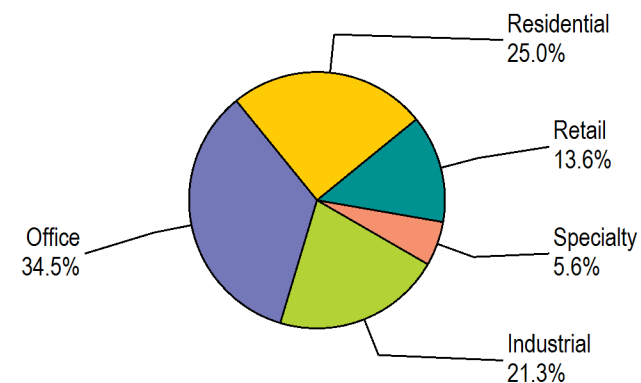
Portfolio Performance Summary

	QTD (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Inception Date
Clarion Partners	2.0	7.3	7.3	7.9	9.7	12.3	7.4	Oct-02
NCREIF ODCE	1.5	5.3	5.3	7.1	9.0	11.4	8.1	Oct-02

Geographic Diversification



Property Type Allocation



Account Information	
Account Name	Colony Realty Partners IV
Account Structure	Other
Investment Style	Active
Inception Date	1/01/13
Account Type	Real Estate
Benchmark	NCREIF ODCE
Universe	US Real Estate Equity

Colony Realty Partners IV no longer has any funds invested in properties. While there is a residual balance in the Fund, it no longer has control over any real estate.

Non-Marketable Securities Overview						
As of December 31, 2019						
Account	Vintage Year	Commitment	Cumulative Takedown	Cumulative Distributions	Value (RV)	IRR (%)
North American Strategic Partners 2006	2006	\$4,539,998	\$4,387,178	\$2,609,124	\$623,610	6.8%
Ironsides Partnership Fund IV	2015	\$2,500,000	\$1,157,107	\$0	\$1,574,679	22.5%
Ironsides Direct Investment Fund IV	2015	\$2,500,000	\$2,419,534	\$0	\$3,098,461	15.7%
Ironsides Direct Investment Fund V, L.P.	2019	\$2,000,000	\$2,018,030	\$0	\$2,134,461	--
HarbourVest 2019 Global Fund	2019	\$4,000,000	\$200,000	\$0	\$200,000	--

IRRs for investments less than 2 years old are not shown.

IRRs for all funds are as of 9/30/2019.

Annual Investment Expense Analysis As Of December 31, 2019				
Name	Fee Schedule	Market Value	Estimated Fee Value	Estimated Fee
Equity Assets		\$88,627,124		
Domestic Equity Assets		\$64,573,826		
RhumbLine S&P 500 Index	0.07% of First 25.0 Mil, 0.05% of Next 25.0 Mil, 0.04% Thereafter	\$19,614,469	\$13,730	0.07%
Fiduciary Large Cap Equity	0.66% of Assets	\$26,005,351	\$171,635	0.66%
Frontier Capital Appreciation	0.79% of Assets	\$18,954,006	\$149,737	0.79%
International Equity Assets		\$24,053,298		
International Developed Markets Equity Assets		\$17,481,489		
Rhumblin MSCI EAFE Index	0.08% of First 25.0 Mil, 0.07% of Next 25.0 Mil, 0.05% Thereafter	\$17,481,489	\$13,985	0.08%
International Emerging Markets Equity Assets		\$6,571,809		
DFA Emerging Markets	0.52% of Assets	\$3,108,552	\$16,164	0.52%
Driehaus Emerging Market Equity	0.90% of Assets	\$3,463,257	\$31,169	0.90%
Fixed Income Assets		\$85,266,414		
Investment Grade Bonds Assets		\$40,897,935		
SSgA U.S. Aggregate Bond Index	0.04% of Assets	\$40,897,935	\$16,359	0.04%
High Yield Bond Assets		\$19,629,557		
Shenkman Capital	0.45% of Assets	\$19,629,557	\$88,333	0.45%
TIPS Assets		\$19,158,842		
SSgA TIPS Index-NL	0.04% of Assets	\$19,158,842	\$7,664	0.04%
Emerging Market Debt Assets		\$5,580,081		
Payden Emerging Market Bond	0.69% of Assets	\$5,580,081	\$38,503	0.69%

Name	Fee Schedule	Market Value	Estimated Fee Value	Estimated Fee
Real Estate Assets		\$5,851,132		
Open-Ended Real Estate		\$5,796,523		
Clarion Partners	1.10% of Assets	\$5,796,523	\$63,762	1.10%
Total Closed End Real Estate		\$54,609		
Colony Realty Partners IV	1.5% management fee based on committed equity during the investment period and invested equity thereafter	\$21,529		
Rockwood Capital Real Estate Partners Fund XI, L.P.	1.4% of committed capital during investment period; 1.4% on invested equity thereafter	\$33,080		
Private Equity Assets		\$7,631,210		
North American Strategic Partners 2006	0.8% on drawn and undrawn capital less investments sold or written off 5% carried interest, 8% preferred return	\$623,610		
Ironsides Partnership Fund IV	0% Management fee, 8% Preferred Return, 5% Carried Interest	\$1,574,679		
Ironsides Direct Investment Fund IV	0.5% Management fee, 8% Preferred Return, 15% Carried Interest	\$3,098,461		
Ironsides Direct Investment Fund V, L.P.	0.5% Management fee, 8% preferred return, 15% carried interest	\$2,134,461		
HarbourVest 2019 Global Fund	0.69% average annual management fee; 8.0% preferred return on secondary and direct investments and with corresponding carried interest of 12.5% on secondary and direct investments	\$200,000		
Cash		\$249,681		
Comerica Short Term Fund		\$249,681		
Total		\$187,625,561	\$611,041	0.33%

Current Issues

Asset Allocation Review

Introduction

- This document evaluates the current asset allocation policy and presents an alternative asset allocation option for the System.
- The goal of this review is not to declare one portfolio the “right” choice or the only prudent choice, but to highlight the risk and return tradeoffs of different policy portfolios.
- The asset allocation review process highlights the natural tension between long-term goals and short-term risks, and should allow the System to make more informed decisions regarding portfolio positioning.

Asset Allocation

What is Asset Allocation?

- Asset allocation refers to the distribution of assets across a number of asset classes that exhibit different correlations with each other. Each asset class exhibits a unique combination of risk and reward. The expected and realized long-term returns vary by asset class, as does the interim volatility of those returns. Some asset classes, like equities, exhibit high degrees of volatility, but also offer high returns over time. Other asset classes, like cash, experience very little volatility, but offer limited return potential.

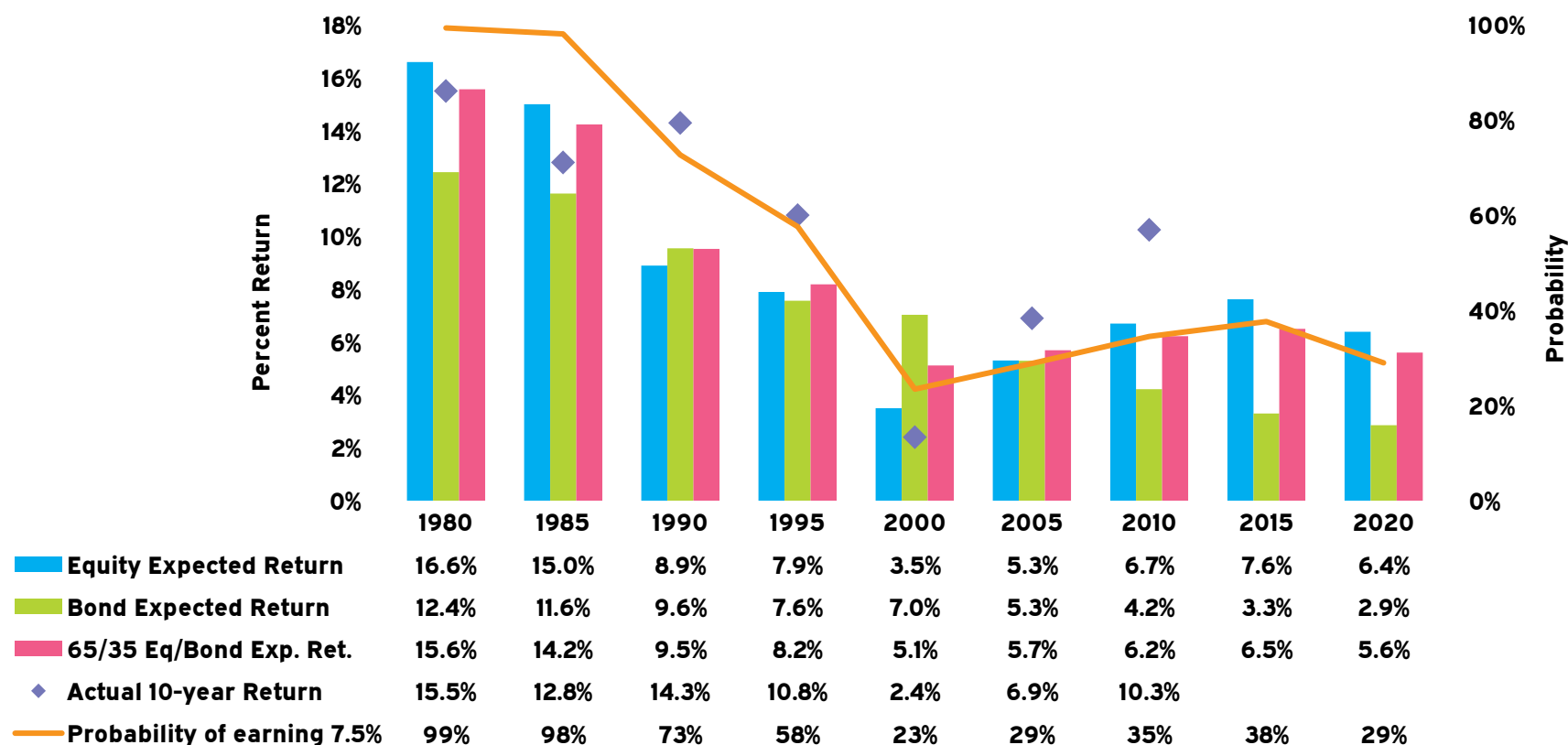
Why is Asset Allocation Important?

- The distribution of assets across various asset classes exerts a major influence on the return behavior of the aggregate pool over short and long time periods.

How does Asset Allocation affect aggregate performance?

- In addition to exhibiting unique characteristics, each asset class interacts differently with other asset classes. Because of low correlations, the likelihood that any two asset classes will move together in the same direction is limited, with the movement of one asset class often offsetting another's. Combining asset classes allows investors to control more fully the aggregate risk and return of their portfolios, and to benefit from the reduction in volatility that stems from diversification.

The Secular Decline in Investment Returns¹



- The chart above illustrates that a portfolio comprising of 65% domestic stocks and 35% investment grade bonds has produced diminishing expected returns as well as actual returns over the past 30 years.

¹ Expected return assumptions for 1) Bonds equals the yield of the ten-year Treasury plus 100 basis points, and 2) Equities equals the dividend yield plus the earnings yield of the S&P 500 index (using the inflation-adjusted trailing 10-year earnings). Probability calculation is for the subsequent ten years.

Asset Allocation and Proposed Policy¹

	Current Policy (%)	Proposed 1 (%)	Proposed 2 (%)	Proposed Target Ranges (%)
Growth/Equity	50	57	65	
US Equity	33	34	38	28-42
Developed Market Equity (non-US)	9	10	12	5-15
Emerging Market Equity	3	8	10	1-12
Private Equity	5	5	5	3-7
Credit	13	14	11	
High Yield Bonds	10	7	5	5-12
Private Debt Composite	0	4	4	0-5
Emerging Market Bonds (major)	3	3	2	1-5
Rate Sensitive	32	20	12	
Investment Grade Bonds	22	18	12	10-25
TIPS	10	2	0	0-10
Real Assets	5	9	12	
Real Estate	5	7	7	2-10
Infrastructure (Non-Core Private)	0	2	5	0-5
Expected Return (20 years)	6.5	7.2	7.8	
Standard Deviation	10.6	12.6	14.2	
Probability of Achieving 7.5% over 20 Years	32.5	45.4	52.6	

¹ Expected return and standard deviation are based upon Meketa Investment Group's 2020 Annual Asset Study. Throughout this document, returns for periods longer than one year are annualized.

Infrastructure

Asset Class Description

- The underlying foundation of basic services, facilities, and institutions upon which a community depends.
- Investable infrastructure includes the development and/or ownership of:
 - Transportation -- roads, bridges, airports
 - Environmental -- water, waste, sanitation
 - Energy -- pipelines, power generation and distribution
 - Communication -- cable, internet, phone networks
 - Social -- hospitals, schools, parks
- This is a relatively new asset class to US investors, but it has a longer history in Europe, Canada, and Australia.
- Investors can access infrastructure through public and private markets.

Pros

- Equity-like returns.
- Provides a hedge against inflation.
- Low correlation to other asset classes.

Cons

- Public to private assets may be subject to political pressures in some areas.
- Private market structures are illiquid and can use leverage.

Private Debt

Asset Class Description

- Private debt investments provide alternative financing to businesses and assets in competition with traditional capital market or bank financing.
- Investors are compensated with incremental return in exchange for lower liquidity and serving as solution providers to these businesses.
- Sources of return include interest payments, cash distributions, upfront fees, and original issuance discount.
- Broad opportunity set combines yield-oriented and opportunistic strategies across multiple collateral types (asset-based, consumer, corporate and mortgage-related).
 - Cash flowing assets provide diversification, income, and lower portfolio volatility, while opportunistic provides the opportunity for higher returns.
- Although we are currently late in the credit cycle, this cycle continues to extend.

Pros

- Opportunity for high return.
- Low correlation to other asset classes.
- Better terms than public credit.

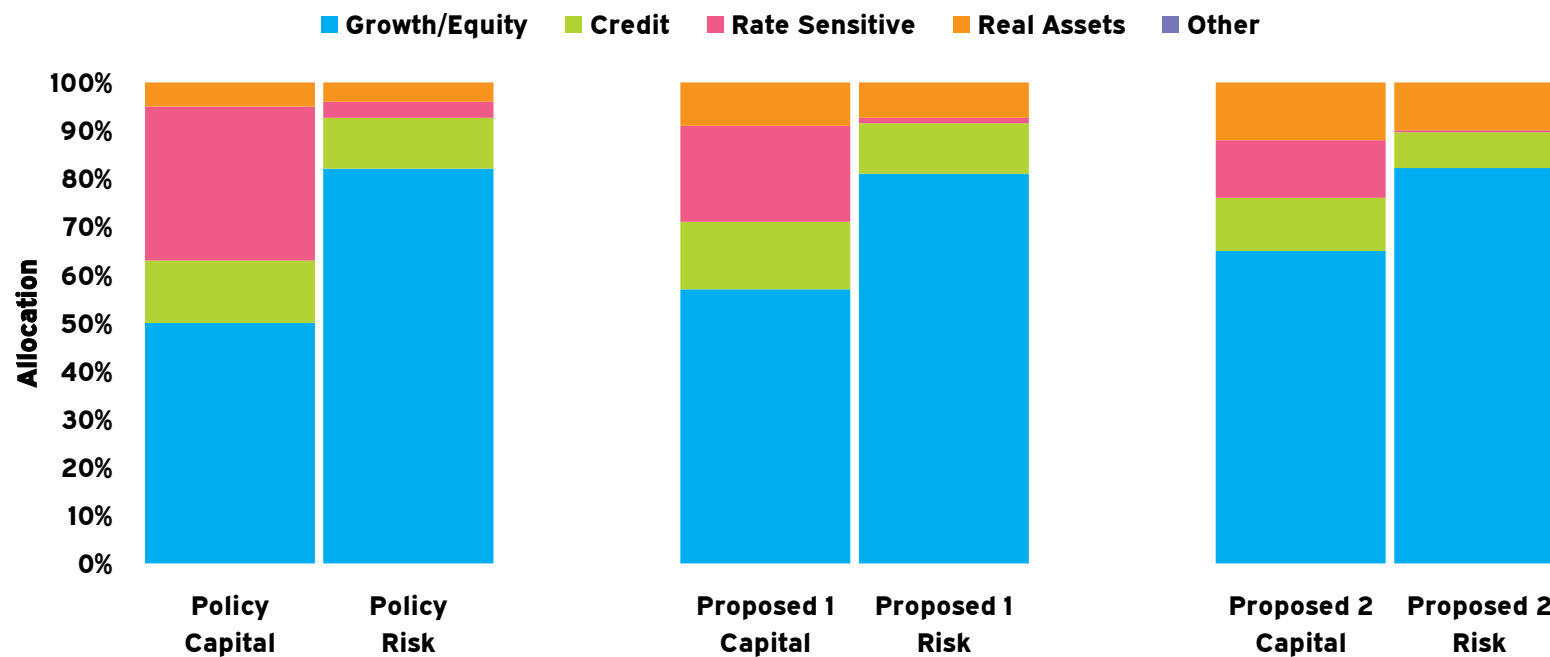
Cons

- Low liquidity.
- Higher risk than public credit counterparts.

Proposed Policy Changes

- As demonstrated in the table, we propose a two-step glidepath for the System to transition to a new policy.
 - The two-step process would allow for a gradual transition of assets to a higher risk portfolio, so that the System can better position the assets to align with the current return objectives.
- The proposed policy represents a higher return portfolio compared to the current policy exceeding the System's assumed rate of return of 7.5% and has a higher standard deviation at 14.2% versus the current policy's 10.6%.
- While the glidepath includes the two-step transition, ultimately the total allocation to equities would increase by 15%.
 - US equities would increase by 5%, foreign equities by 3%, and emerging market equity by 7%.
- The System's allocation to high grade bonds assets would decrease by 20%.
 - The decrease would be 10% from investment grade bonds and 10% from TIPS, eliminating the target to the TIPS asset class.
- The System's allocation to Credit assets would decrease by 2%.
 - While high yield bonds would decrease by 5%, and emerging market bonds down by 1%, the new allocation to private debt would be 4%.
- The System's allocation to real assets would increase by 7%. Real estate would increase by 2%, and a new allocation to infrastructure would be 5% of the Total System.

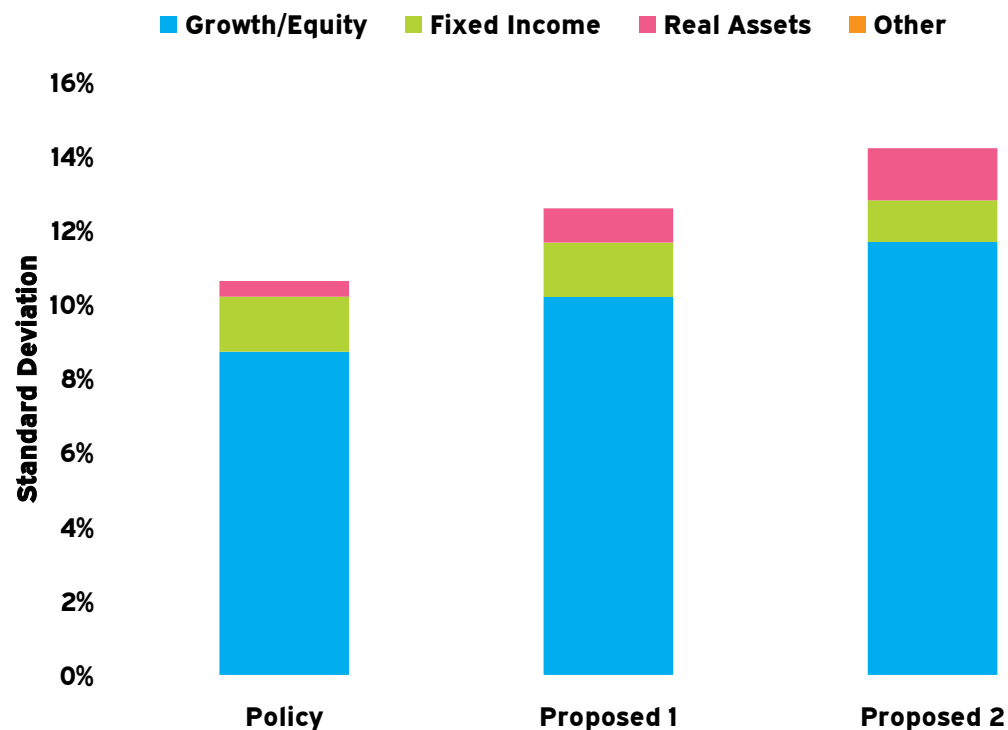
Risk Budgeting Analysis¹ (Capital Allocation vs. Risk Allocation)



- Assets with low relative volatility, such as rate sensitive fixed income, contribute less to risk than their asset weighting implies.

¹ Risk allocation is calculated by multiplying the weight of the asset class by its standard deviation and its correlation with the total portfolio and then dividing this by the standard deviation of the total portfolio.

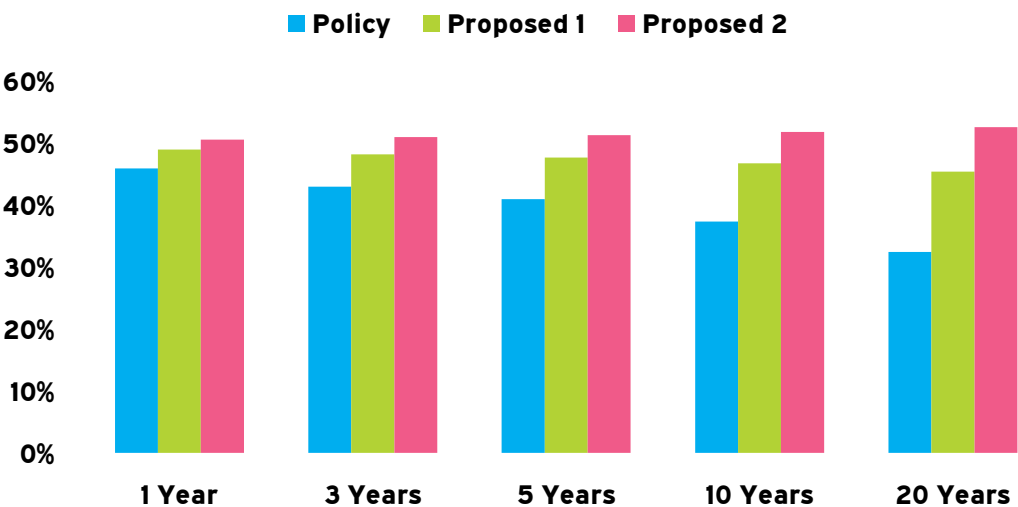
Risk Budgeting Analysis¹ (Absolute Contribution to Risk)



- In each policy option, equity risk dominates the risk profile of the portfolio.

¹ Contribution to risk is calculated by multiplying the weight of the asset class by its standard deviation and its correlation with the total portfolio.

Probability of Achieving Target Return¹



	Policy (%)	Proposed 1 (%)	Proposed 2 (%)
1 Year	45.9	49.0	50.6
3 Years	43.0	48.2	51.0
5 Years	41.0	47.7	51.3
10 Years	37.4	46.8	51.8
20 Years	32.5	45.4	52.6

- Proposed Policy 2 has the highest likelihood of producing the target return over a twenty year period.

¹ Represents the probability of achieving a 7.5% return over the specified time horizon.

Summary and Conclusions

- As returns across asset classes have continued to diminish over the past 30 years, capital markets return assumptions for 2020 continue this decreased trend.
- As a result, in order to achieve the System's return objectives, it may be necessary to in turn increase the System's expected risk.
- The System should consider the addition of private debt and infrastructure in order to diversify the portfolio while increasing return potential.
- The proposed policies would increase the System's standard deviation while increasing expected return.

Meketa Investment Group 2020 Annual Asset Study

Twenty-Year Annualized Return and Volatility Expectations for Major Asset Classes

Asset Class	Annualized Compounded Return (%)	Annualized Average Return (%)	Annualized Standard Deviation (%)
Rate Sensitive			
Cash Equivalents	2.4	2.4	1.0
Investment Grade Bonds	3.0	3.1	4.0
Long-term Government Bonds	3.2	3.9	12.0
TIPS	2.9	3.1	7.0
Credit			
High Yield Bonds	5.2	5.8	11.0
Bank Loans	5.0	5.4	9.0
Emerging Market Bonds (major; unhedged)	4.5	5.1	11.0
Emerging Market Bonds (local; unhedged)	4.8	5.8	14.0
Direct Lending - First Lien	6.2	6.8	11.0
Direct Lending - Second Lien	7.5	8.6	15.0
Mezzanine Debt	7.0	8.1	15.0
Distressed Debt	7.0	9.0	20.0
Equities			
Public US Equity	7.4	8.8	17.0
Public Developed Market Equity	7.9	9.7	19.0
Public Emerging Market Equity	9.1	12.0	24.0
Private Equity Composite	9.4	12.8	26.0
Real Assets			
REITs	7.0	10.4	26.0
Core Private Real Estate	6.3	6.9	11.0
Value Added Real Estate	8.4	10.0	18.0
Opportunistic Real Estate	9.9	12.8	24.0
High Yield Real Estate Debt	6.0	7.6	18.0
Natural Resources (Private)	8.8	11.0	21.0
Commodities	4.3	5.7	17.0
Infrastructure (Core)	6.7	7.7	14.0
Infrastructure (Non-Core)	9.1	11.5	22.0
Other			
Hedge Funds	4.9	5.1	7.0

Meketa Investment Group 2020 Annual Asset Study: Correlation Expectations

	Investment Grade Bonds	TIPS	High Yield Bonds	US Equity	Developed Market Equity	Emerging Market Equity	Private Equity	Real Estate	Natural Resources (private)	Commodities	Core Infrastructure (private)	Hedge Funds
Investment Grade Bonds	1.00											
TIPS	0.80	1.00										
High Yield Bonds	0.20	0.30	1.00									
US Equity	0.05	0.00	0.70	1.00								
Developed Market Equity	0.05	0.15	0.70	0.90	1.00							
Emerging Market Equity	0.05	0.15	0.70	0.80	0.90	1.00						
Private Equity	0.05	0.05	0.65	0.85	0.80	0.75	1.00					
Real Estate	0.20	0.10	0.50	0.50	0.45	0.40	0.45	1.00				
Natural Resources (private)	0.10	0.10	0.45	0.65	0.60	0.60	0.55	0.45	1.00			
Commodities	0.05	0.30	0.40	0.35	0.55	0.60	0.30	0.15	0.65	1.00		
Core Infrastructure (private)	0.30	0.30	0.60	0.55	0.55	0.50	0.45	0.60	0.60	0.35	1.00	
Hedge Funds	0.05	0.20	0.70	0.80	0.85	0.85	0.65	0.45	0.65	0.65	0.60	1.00

Peer Fee Review

In January, PERAC published its investment fee report for calendar year 2018

- The last version of this report, released in 2017 cover calendar year 2015, had various issues.
 - A close review of the report revealed numerous discrepancies.
 - Full accounting of performance and incentive fees appeared limited, many systems simply did not report them.
 - In some cases, systems reported no fees at all for investments that other systems reported significant fees for.
 - Some systems did not even submit fee schedules or submitted schedules with material errors.
- Meketa and other systems worked together to make PERAC aware of these shortcomings and defend the Board's approach to managing costs.

Data quality in the 2018 report appears to have improved due to a number of factors

- PERAC specifically requests incentive and performance fees be reported separately on Schedule 7.
- More cross checks appear to have been performed to validate reported expenses.

PERAC reports the System's fee at 0.38%, tied with 1 other System for the 5th cheapest fee level.

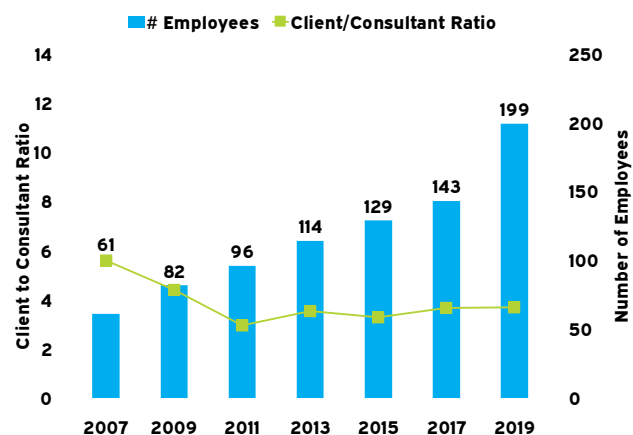
- The System's fee is substantially below the State and Teachers (0.55% each) as well as the median fee for all retirement systems (0.54%) and average fee for all systems (0.58%).
- Fee levels are tightly clustered around the State level – more than 40% of systems are within 0.01% of the State fee level (0.54%-0.56%) while almost 60% are within 0.05% (0.50%-0.60%).
- Multiple ways to help control fees.
 - Renegotiate management fees (RFPs)
 - Relationship Pricing (e.g., Constitution, Payden)
 - Lineup changes
- We continue to believe the System's approach to fees makes sense.
 - Pay for strong managers where strong management is likely to add value.
 - Always negotiate.

Appendices

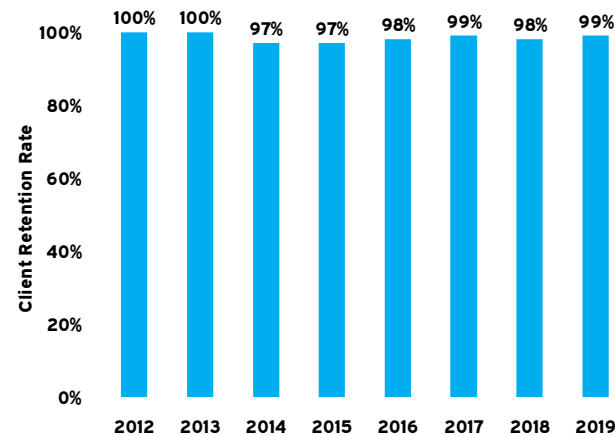
Meketa Investment Group Corporate Update

- Staff of 199, including 132 investment professionals and 40 CFA Charterholders
- 214 clients, with over 300 funds throughout the United States
- Significant investment in staff and resources
- Offices in Boston, Chicago, Miami, New York, Portland (OR), San Diego, and London
- We advise on \$1.4 trillion in client assets
 - Over \$100 billion in assets committed to alternative investments
 - Private Equity ■ Infrastructure ■ Natural Resources
 - Real Estate ■ Hedge Funds ■ Commodities

Client to Consultant Ratio¹



Client Retention Rate²



Meketa Investment Group is proud to work for over 5 million American families everyday.

¹ On March 15, 2019, 31 employees joined the firm as part of the merger of Meketa Investment Group and Pension Consulting Alliance.

² Client Retention Rate is one minus the number of clients lost divided by the number of clients at prior year-end.

Asset Classes Followed Intensively by Meketa Investment Group

Domestic Equities	International Equities	Private Equity	Real Assets	Fixed Income	Hedge Funds
<ul style="list-style-type: none"> - Passive - Enhanced Index - Large Cap - Midcap - Small Cap - Microcap - 130/30 	<ul style="list-style-type: none"> - Large Cap Developed - Small Cap Developed - Emerging Markets - Frontier Markets 	<ul style="list-style-type: none"> - Buyouts - Venture Capital - Private Debt - Special Situations - Secondaries - Fund of Funds 	<ul style="list-style-type: none"> - Public REITs - Core Real Estate - Value Added Real Estate - Opportunistic Real Estate - Infrastructure - Timber - Natural Resources - Commodities 	<ul style="list-style-type: none"> - Short-Term - Core - Core Plus - TIPS - High Yield - Bank Loans - Distressed - Global - Emerging Markets 	<ul style="list-style-type: none"> - Long/Short Equity - Event Driven - Relative Value - Fixed Income Arbitrage - Multi Strategy - Market Neutral - Global Macro - Fund of Funds - Portable Alpha

Disclaimer, Glossary, and Notes

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

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.