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MoDOT & Patrol Employees Retirement System

Investment Summary
Quarter Ending June 30, 2017
Board Report

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NEPC Update



Highlights of Second Quarter Happenings at NEPC

June 30, 2017

NEPC Insights

- 2017 First Quarter Market Thoughts (April 2017)
- The French Election – A Sigh of Relief (May 2017)
- An Insight into a Goals-Based Asset Allocation Framework (May 2017)
- The Essential Guide to Third-Party Valuations for Hedge Fund Investors (May 2017)
- Market Chatter: What’s Next for Puerto Rico Bondholders? (June 2017)
- Are US Equities Falling out of Favor? (June 2017)

Webinar Replays

- NEPC’s 7th Annual Investment Manager Webinar (May 2017)

To download NEPC’s recent insights and webinar replays, visit: www.NEPC.com/insights

Conference Recap

- NEPC hosted its 22nd Annual Investment Conference in Boston in May. This year’s agenda focused on the uncertainty and challenges facing investors today. Over 200 NEPC clients attended the panel discussions, keynote presentations and breakout sessions. Thank you to everyone who took time out of their schedules to make this conference our biggest and, according to our attendees, our best one yet! Check out some pictures from the event here: <http://info.nepc.com/nepc-22nd-annual-investment-conference>



Recent Updates

- Healthcare Financial Management Association (HFMA) has awarded NEPC’s Healthcare practice with the “Peer Reviewed by HFMA ®” designation.*



NEPC Gives Back

- NEPC’s Stacey Flier, CFA, Private Wealth Senior Consultant, hosted an educational day to discuss the importance of education and preparing for future careers to a group of 7th grade girls that attend St. Andrew Nativity School, a college-prep middle school in Portland, OR, that provides education for low-income, primarily minority, students of all religious backgrounds.
- NEPC participated in the J.P. Morgan Corporate Challenge Series, a world-wide series of 3.5-mile running events open to groups from organizations within the business and public sectors in Boston. The Corporate Challenge is set up to be the world’s greenest road race, and this year the race made a donation to the Boston Children’s Hospital Trust.



*HFMA staff and volunteers determined that this business solution has met specific criteria developed under the HFMA Peer Review Process. HFMA does not endorse or guarantee the use of this business solution.

Market Thoughts & Education



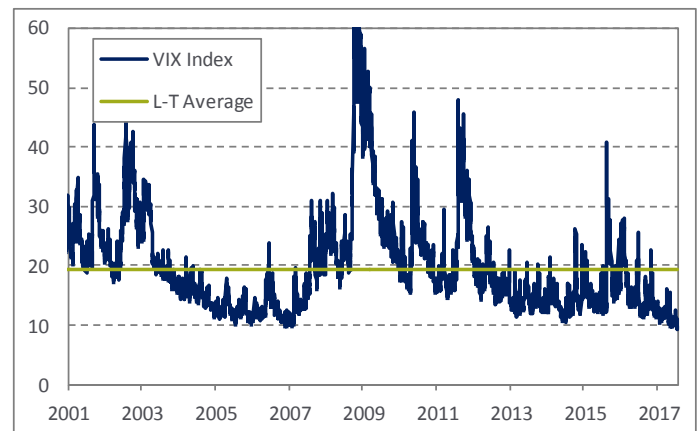
NEPC is an independent, full-service investment consulting firm, providing asset allocation, traditional and alternative asset manager search, performance evaluation and investment policy services to institutional investment programs and private clients. We offer our Market Thoughts to provide insight into recent market conditions, and to assist your interpretation of investment results. We encourage your comments and feedback, as well as any inquiries you may have about our firm or our consulting services.

LOW VOLATILITY DEMYSTIFIED: THE NEXT CHAPTER FOR INVESTORS

Introduction

Equities continued their march forward in the second quarter, undeterred by bickering in the White House, political upheaval across the pond, and unrest in the Middle East. Even the prospect of the Federal Reserve reigning in its crisis-era fueled balance sheet failed to dampen investors' appetite for risk assets. Emerging markets and non-US developed equities returned over 6% for the three months ended June 30, and are up 18% and 14%, respectively, so far this year. At home, the S&P 500 Index moved 3% higher in the second quarter, returning more than 9% for the year. Other risk assets were also in the black: domestic high-yield bonds rallied with credit spreads falling below long-term averages; emerging-market local debt recorded gains of over 10% this year.

Exhibit 1: VIX Index



Source: Bloomberg

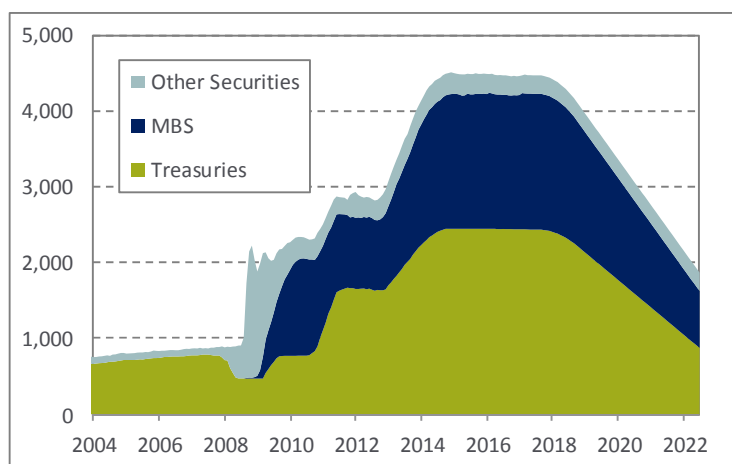
Expanding valuations have been the driver of recent returns in US equities and, with corporate profit margins scaling new heights, we maintain our recommendation for investors to trim gains from domestic stocks should markets continue to rally. We remain constructive on international equities and encourage an overweight to non-US developed stocks as corporate earnings recover in Europe. Emerging market equities are still appealing, notwithstanding their strong run over the past 12 months; we believe fundamentals support an overweight position relative to global index weights.

Within fixed-income markets, we advocate an allocation to Treasury Inflation-Protected Securities, or TIPS, favoring them over core bonds. We suggest reducing exposure to high-yield bonds, given the extent of spread tightening over the last 16 months. Our views underscore our philosophy of reducing exposure to assets that have outperformed expectations.

As risk assets climb new peaks, investors are also emboldened by the markedly low readings of volatility. In the US, the VIX, a prominent bellwether of market volatility, has dipped to new lows (Exhibit 1). Outside of US equities, the markets for other assets—ranging from European stocks and Treasuries, to currencies—are also experiencing historically low levels of volatility. It is a baffling equilibrium for many, including us, who are skeptical of the markets' tranquil outlook.

However, low market volatility may be somewhat explained by the extended US economic cycle, the so-far smooth transition of China's manufacturing economy to a service-oriented one, and the rise of an anti-establishment rookie politician in France who was voted to power by a disenchanting electorate. These events—part of NEPC's key themes for 2017—have provided a market-friendly backdrop for global equities and other risk assets. Adding to the market's complacency is the

Exhibit 2: Projected Federal Reserve Balance Sheet (\$ Billions)



Source: Bloomberg

market expects the central bank to begin shrinking its balance sheet in the fourth quarter. Based on the Fed’s outline, its holdings would decline to about \$2 trillion over five years (Exhibit 2) but the Fed still holds the option to deviate from its plan to reduce its balance sheet. Nevertheless, it is clear that the vast and unprecedented amounts of global liquidity, which have been a constant since the financial crisis, are on the decline. The withdrawal of this excess from markets, no matter how gradual, does not reconcile with the persistence of today’s subdued market variability and will likely give rise to volatility in the coming years.

Finding investment strategies and approaches to asymmetrically exploit this rising market volatility will be exceedingly challenging. To this end, we emphasize a basic and sound investment concept: arm yourself with a diversified and risk-balanced portfolio to weather the inevitable return of volatility.

Global Equity Markets

Global equities recorded another quarter of gains amid a solid corporate earnings season and generally positive economic data. Similar to the first quarter, growth stocks outperformed value and large-cap stocks bested small-cap equities.

The S&P 500 Index returned 3.1% despite some mixed economic data and political uncertainty around the ability of the White House to push through its policies. Healthcare stocks rallied as the Senate proposed a new industry-friendly plan to reform the nation’s healthcare system.

Non-US developed markets posted gains of 6.1%, according to the MSCI EAFE Index. France and Switzerland led the pack with gains of around 9.0%, while Australia lagged with losses of 1.9%. The euro’s appreciation versus the US dollar remained a tailwind for US dollar-centric investors.

Emerging market equities led the fray with gains of 6.3%, according to the MSCI EM Index. China, Korea and Taiwan were the biggest winners with returns of

Fed, which has been sticking to its measured pace of well-telegraphed rate hikes; this gradual pace of tightening monetary policy is another of our key market themes.

To be sure, periods of subdued volatility have gone hand-in-hand with the Fed’s extraordinary quantitative easing programs that were undertaken in the aftermath of the financial crisis. The current low volatility is reminiscent of the levels seen at the height of the Fed’s accommodative policies. That said, it is puzzling that market volatility has fallen even further following the Fed outlining its plan to reduce its \$4.2 trillion balance sheet holdings of Treasuries and mortgage-backed securities amassed since the crisis. While the Fed is yet to announce a start date, the

Global Equity Market Returns as of 06/30/2017				
Global Equity	Quarter	1 Year	3 Yrs	5 Yrs
MSCI ACWI	4.3%	18.8%	4.8%	10.5%
US Equity	Quarter	1 Year	3 Yrs	5 Yrs
S&P 500	3.1%	17.9%	9.6%	14.6%
Russell 1000 Growth	4.7%	20.4%	11.1%	15.3%
Russell 1000 Value	1.3%	15.5%	7.4%	13.9%
Russell 2000	2.5%	24.6%	7.4%	13.7%
Russell 2000 Growth	4.4%	24.4%	7.6%	14.0%
Russell 2000 Value	0.7%	24.9%	7.0%	13.4%
International Equity	Quarter	1 Year	3 Yrs	5 Yrs
MSCI EAFE	6.1%	20.3%	1.1%	8.7%
MSCI EAFE Hedged USD	2.7%	22.1%	7.0%	12.5%
MSCI EAFE Small Cap	8.1%	23.2%	5.6%	12.9%
MSCI Europe	7.4%	21.1%	-0.2%	8.8%
MSCI Japan	5.2%	19.2%	5.5%	9.6%
MSCI Emerging Markets	6.3%	23.7%	1.1%	4.0%
MSCI Emerging Markets Small Cap	2.6%	17.0%	0.8%	5.1%
Alternative	Quarter	1 Year	3 Yrs	5 Yrs
HFRI Equity Hedge	2.1%	12.3%	3.0%	6.3%
HFRI Emerging Markets	3.3%	14.5%	2.6%	5.1%
HFRI ED: Activist	2.6%	16.5%	6.4%	11.4%
HFRI ED: Merger Arbitrage	2.1%	6.6%	3.2%	3.6%
HFRI Short Bias	-1.0%	-11.9%	-2.3%	-8.2%

10.7%, 10% and 9.2%, respectively; Russia fell behind, losing 9.8%. Within sectors, information technology gained 15.5% and consumer discretionary returned 8.4%; energy lost 4.8% while utilities declined by 1.6%.

In private equity, fundraising remained robust at \$121 billion. While only 12% of buyout deals totaled \$1 billion or more, they accounted for 71% of aggregate value.

Equity strategies within hedge funds posted another strong quarter, gaining 2.1%, according to the HFRI Equity Hedge Index. Emerging markets led performance, returning 3.3%, according to the HFRI Emerging Markets Index. Healthcare and technology sectors contributed significantly to the overall index. Activist strategies finished the quarter at 2.6%, assisted by large-scale mergers and acquisitions activity in the auto and food industries. The HFRI ED: Special Situations Index was up 2.6% as managers looked for opportunities with less systematic risk.

Global Fixed-Income Markets

Fixed income gained 1.4% in the second quarter, according to the Barclays Aggregate Index, bringing the index's year-to-date performance to 2.3%. High-yield debt outperformed bank loans, returning nearly 5% so far this year compared to 2% for bank loans.

Emerging markets debt in hard currency gained 2.4% in the second quarter; local currency-denominated securities outperformed, up 3.6%, fueled by a boost to emerging market currencies (which returned 1.9% in the quarter), bringing total returns for the JP GBI-EM Index to over 10% in 2017. We remain positive on emerging market debt, especially local-currency denominated issues. We favor leveraged loans to high-yield bonds from a relative value standpoint.

In private debt, fundraising totaled \$16 billion. In private lending, the US core-middle market offers attractive risk-adjusted returns, given the stage of the credit cycle. With European banks still exiting leveraged loans due to regulatory pressures, the manager universe in Europe has become tiered with stronger managers enjoying superior deal flow and performance.

Within hedge funds, relative-value strategies posted moderate gains as rates increased and US yields were little changed. Credit spreads are tight, and while markets remain on a benign trajectory, there are some pockets of opportunity in structured securities. The HFRI Relative Value Index was up 0.5% for the quarter while the HFRI Distressed/Restructuring Index eked out a modest 0.9% as default rates remain stable.

Real Assets

Commodities continued to retreat, declining 3% in the second quarter, according to the Bloomberg Commodity Index. Natural gas fell 9.4% as increased production and cooler than seasonal weather reduced demand for power. Precious metals decreased by 3.2% amid tepid desire for safe haven assets. Industrial metals, down 1.2%, were affected by concerns of slowing demand in China. In agriculture, weather in the Northern US plains supported Kansas City and Chicago wheat, while conditions in Brazil hindered sugar and coffee. Lean hogs led performance in livestock, which gained 11.2%.

Global Fixed Income Market Returns as of 06/30/2017				
Global Fixed Income	Quarter	1 Year	3 Yrs	5 Yrs
BC Global Aggregate	2.6%	-2.2%	-0.4%	0.8%
BC Global Aggregate (USD Hedged)	1.0%	-0.4%	3.3%	3.3%
JPM EMBI Plus	2.4%	3.7%	4.8%	5.0%
JPM GBI-EM Global Diversified	3.6%	6.4%	-2.8%	-0.7%
Domestic Fixed Income	Quarter	1 Year	3 Yrs	5 Yrs
BC Aggregate Bond	1.4%	-0.3%	2.5%	2.2%
BC Municipal Bond	2.0%	-0.5%	3.3%	3.3%
BC TIPS	-0.4%	-0.6%	0.6%	0.3%
BC US Treasury	1.2%	-2.3%	2.0%	1.3%
BC US Long Treasury	4.0%	-7.2%	5.6%	2.8%
BC MBS	0.9%	-0.1%	2.2%	2.0%
BC US Credit	2.4%	1.8%	3.4%	3.7%
BC US Long Credit	4.7%	3.0%	5.3%	5.3%
BC High Yield	2.2%	12.7%	4.5%	6.9%
BC Muni High Yield	2.0%	1.2%	5.6%	5.2%
S&P LSTA Lev. Loan	0.8%	7.4%	3.4%	4.6%
BC T-Bills	0.2%	0.5%	0.3%	0.2%
Alternative	Quarter	1 Year	3 Yrs	5 Yrs
HFRI Credit Index	1.0%	10.0%	3.1%	5.8%
HFRI ED: Credit Arbitrage	1.0%	11.7%	3.1%	5.3%
HFRI ED: Distressed/Restructuring	0.9%	15.2%	0.8%	5.8%
HFRI Relative Value	0.5%	7.7%	3.1%	5.4%

Energy fell 9.7%. North American shale production offset the effects of OPEC's extension of production cuts, fueling declines of 9.0% and 9.3%, respectively, in WTI crude and Brent crude. Within energy, our highest-conviction strategies remain in private equity as these managers appear best equipped to invest and manage assets amid what we believe will be a choppy recovery. We still believe asset selection is critical in energy; in the public markets, we favor Master Limited Partnerships, or MLPs, which have exhibited resilient cash flows.

We are constructive on mining over the mid-to-longer-term and are actively seeking infrastructure opportunities; however, the impact of federal legislation remains uncertain. We remain positive on energy, negative on timber, and neutral on agriculture, infrastructure and metals and mining.

In real estate, US core property markets have normalized, but fundamentals remain healthy. Future value appreciation will likely come from income growth as opposed to cap-rate compression, which remains at historical lows. Rising interest rates will place upward pressure on cap rates but we expect growth, although at a slower pace, as capital flows chase income-yielding core assets in the United States. Relative value opportunities remain within non-core US real estate. We favor niche, cash flow-driven strategies, and managers that are attentive to duration risk given the current stage of the expansion cycle. Elsewhere, capital markets constraints and pockets of distress in Europe and emerging markets may be appealing.

Final Thoughts

Typically, volatility is a gauge measuring market risk. The present levels are outside the range of what many would consider normal. While investor complacency and comfort may characterize US markets today, the future is less obvious. It is exceedingly difficult to anticipate changes in market volatility and history shows that low volatility is a phenomenon that can last for many years. With this in mind, we believe commitment to a fundamental outlook is the best course. To this end, we recommend trimming gains in US equities as markets continue to rally; in fixed income, we suggest reducing exposure to high-yield bonds as credit spreads have fallen below long-term averages. Outside the US, we encourage investors to embrace the opportunities available in international stocks and maintain an overweight position in developed and emerging equities. Amidst the calm of global markets, we remind investors that duration exposure remains a critical building block in the asset allocation process and provides exposure to a safe haven in times of market stress. To this end, we prefer US TIPS over core bonds. Additionally, this period of historically low market volatility is an opportune time to emphasize that a risk-balanced approach is the foundation of our investment philosophy and an appropriately diversified portfolio is best equipped to weather increases in market volatility.

Disclaimers and Disclosures

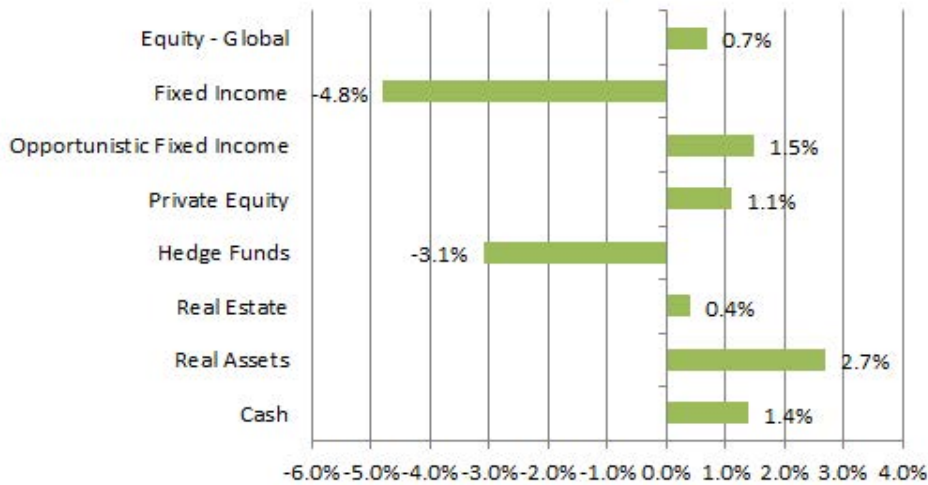
- Past performance is no guarantee of future results.
- The information in this report has been obtained from sources NEPC believes to be reliable. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.
- The opinions presented herein represent the good faith views of NEPC as of the date of this report and are subject to change at any time.
- This report contains summary information regarding the investment management approaches described herein but is not a complete description of the investment objectives, portfolio management and research that supports these approaches. This analysis does not constitute a recommendation to implement any of the aforementioned approaches.

Real Asset Returns as of 06/30/2017				
	Quarter	1 Year	3 Yrs	5 Yrs
Bloomberg Commodity	-3.0%	-6.5%	-14.8%	-9.2%
GSCI Commodity	-4.1%	-0.4%	-17.3%	-9.1%
Gold Spot	-0.6%	-6.1%	-2.2%	-4.9%
WTI Crude Oil Spot	-9.0%	-4.7%	-24.1%	-11.5%
BBG Commodity - Agriculture	-0.4%	-13.0%	-10.3%	-8.6%
BBG Commodity - Energy	-9.7%	-14.8%	-31.8%	-17.4%
BBG Commodity - Industrial Metals	-1.2%	17.5%	-5.7%	-4.7%
BBG Commodity - Precious Metals	-3.2%	-8.4%	-4.2%	-6.9%
S&P Global Natural Resource Equities	-1.1%	14.7%	-5.3%	0.0%
NAREIT Composite Index	2.4%	1.5%	8.8%	9.8%
NAREIT Global REIT Ex US	0.6%	-5.8%	1.2%	-
Alerian MLP	-6.4%	0.4%	-11.2%	1.8%

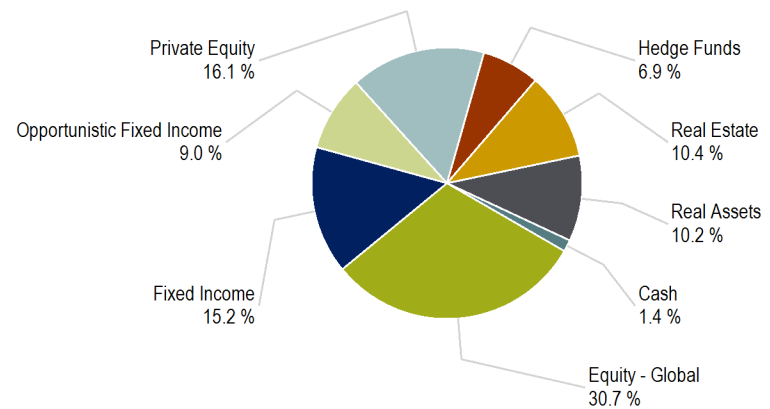
Executive Summary

Total Fund Asset Allocation vs. Current Allocation

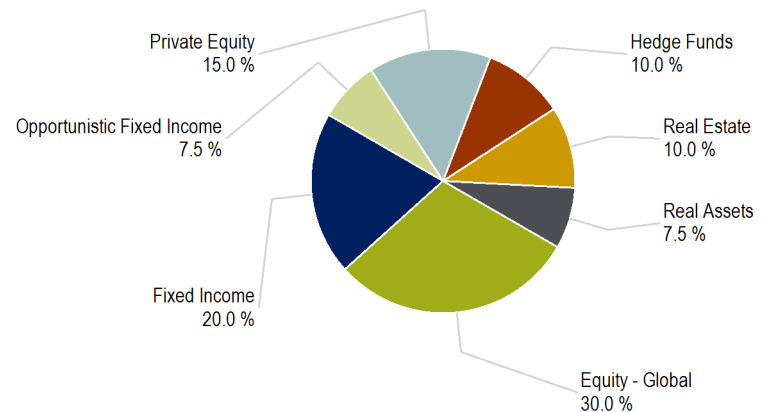
Current Allocation vs. Policy Allocation



Current Asset Allocation



Policy Asset Allocation



Current Asset Allocation vs. Policy Asset Allocation

	Current	Policy	Current	Current Difference*
Equity - Global	\$664,326,249	30.0%	30.7%	0.7%
Fixed Income	\$328,314,319	20.0%	15.2%	-4.8%
Opportunistic Fixed Income	\$195,426,266	7.5%	9.0%	1.5%
Private Equity	\$348,961,860	15.0%	16.1%	1.1%
Hedge Funds	\$149,231,207	10.0%	6.9%	-3.1%
Real Estate	\$225,733,199	10.0%	10.4%	0.4%
Real Assets	\$221,757,657	7.5%	10.2%	2.7%
Cash	\$29,976,141	--	1.4%	1.4%
Total	\$2,163,726,898	100.0%	100.0%	

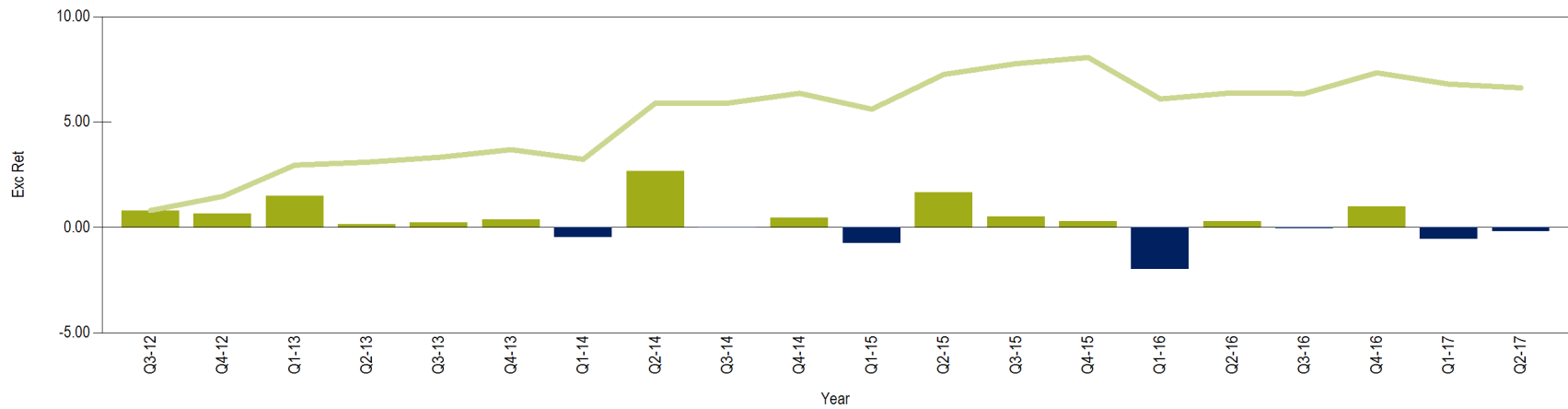
*Difference between Policy and Current Allocation

Allocations may not add to 100% due to rounding.

Total Fund Performance Summary

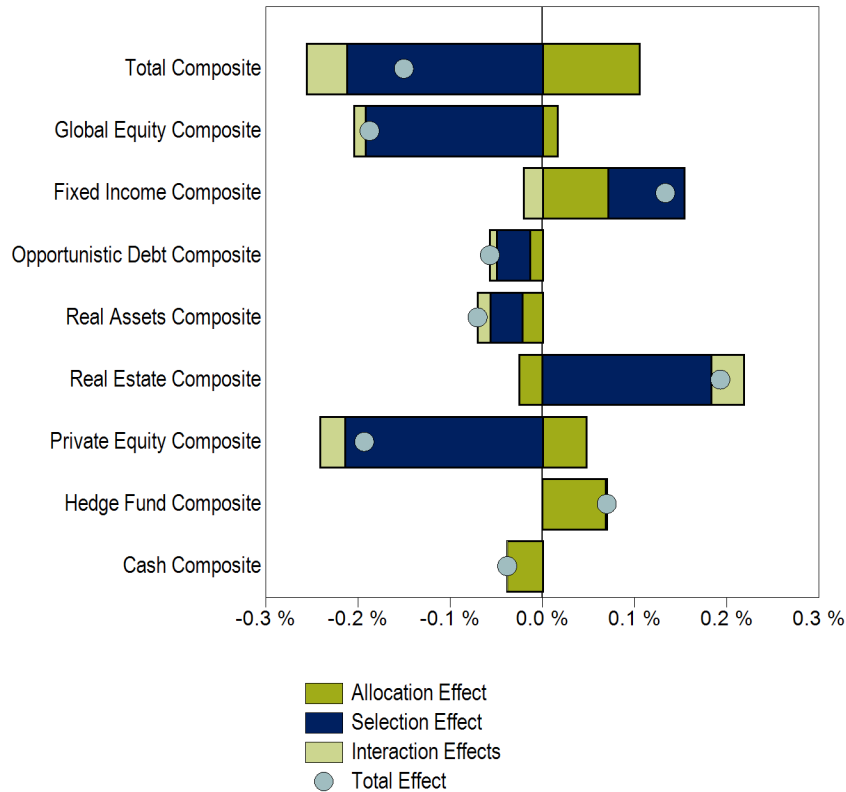
	Market Value	3 Mo	YTD	1 Yr	3 Yrs	5 Yrs	10 Yrs
Total Composite	\$2,163,726,898	2.97%	6.25%	11.23%	6.20%	9.82%	5.19%
<i>Policy Index</i>		3.14%	6.99%	10.95%	5.94%	8.41%	5.29%
<i>InvestorForce Public DB Net Median</i>		2.77%	7.27%	11.88%	4.85%	8.19%	5.03%

Quarterly and Cumulative Excess Performance



Total Fund Attribution Analysis

Attribution Effects Relative to Policy Index
3 Months Ending June 30, 2017



Attribution Summary
3 Months Ending June 30, 2017

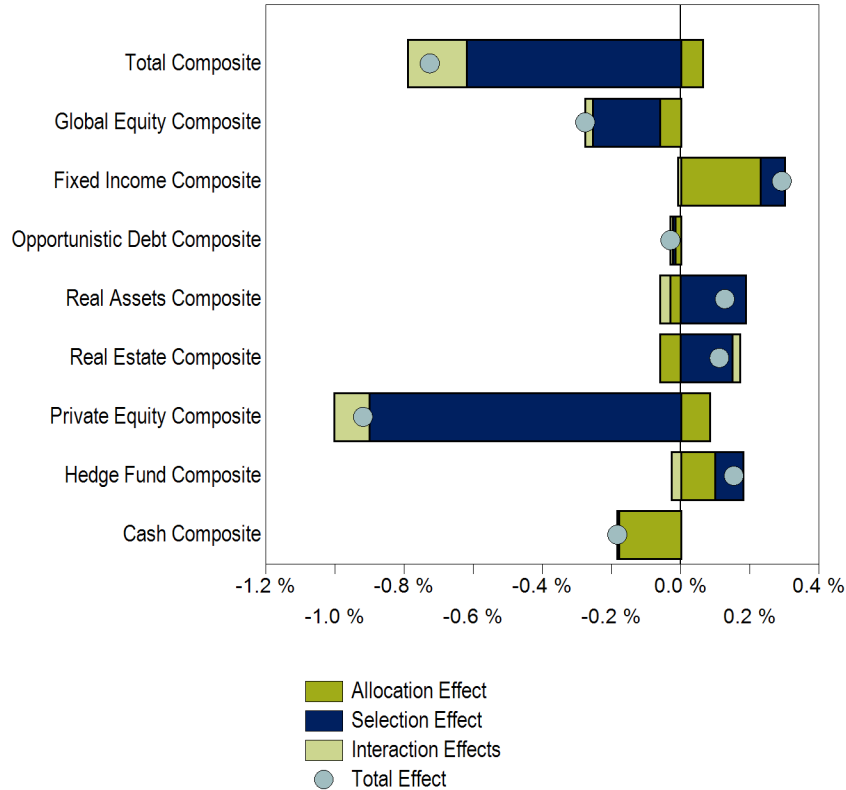
	Wtd. Actual Return	Wtd. Index Return	Excess Return	Selection Effect	Allocation Effect	Interaction Effects	Total Effects
Global Equity Composite	3.6%	4.3%	-0.6%	-0.2%	0.0%	0.0%	-0.2%
Fixed Income Composite	2.1%	1.7%	0.4%	0.1%	0.1%	0.0%	0.1%
Opportunistic Debt Composite	1.7%	2.2%	-0.5%	0.0%	0.0%	0.0%	-0.1%
Real Assets Composite	1.0%	1.5%	-0.5%	0.0%	0.0%	0.0%	-0.1%
Real Estate Composite	3.3%	1.5%	1.8%	0.2%	0.0%	0.0%	0.2%
Private Equity Composite	5.4%	6.8%	-1.5%	-0.2%	0.0%	0.0%	-0.2%
Hedge Fund Composite	0.7%	0.7%	0.0%	0.0%	0.1%	0.0%	0.1%
Cash Composite	0.2%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	3.0%	3.1%	-0.2%	-0.2%	0.1%	0.0%	-0.2%

Note: Plan attribution calculations are returns based and the results shown reflect the composites shown. As a result, the total returns shown may vary from the calculated return shown on the performance summary.
 The target return shown for each composite is a custom index, based on aggregated policy indices. This policy index asset weights the underlying policy indices of each option in the plan and the respective benchmark return.
 The allocation, selection, and interaction effects are calculated using the custom index described above along with the policy or target weight of each composite.
 May not add due to rounding

Allocation Effect - The return attributable to the asset allocation of the portfolio
 Selection Effect - The return attributable to the managers' security selection
 Interaction Effect - The return attributable to the interaction between the Allocation and Selection Effects

Total Fund Attribution Analysis

**Attribution Effects Relative to Policy Index
YTD Ending June 30, 2017**



**Attribution Summary
YTD Ending June 30, 2017**

	Wtd. Actual Return	Wtd. Index Return	Excess Return	Selection Effect	Allocation Effect	Interaction Effects	Total Effects
Global Equity Composite	10.8%	11.5%	-0.7%	-0.2%	-0.1%	0.0%	-0.3%
Fixed Income Composite	2.9%	2.7%	0.3%	0.1%	0.2%	0.0%	0.3%
Opportunistic Debt Composite	4.8%	4.9%	-0.2%	0.0%	0.0%	0.0%	0.0%
Real Assets Composite	5.5%	3.5%	2.1%	0.2%	0.0%	0.0%	0.1%
Real Estate Composite	4.6%	3.2%	1.5%	0.1%	-0.1%	0.0%	0.1%
Private Equity Composite	5.7%	11.7%	-6.1%	-0.9%	0.1%	-0.1%	-0.9%
Hedge Fund Composite	3.8%	3.1%	0.7%	0.1%	0.1%	0.0%	0.2%
Cash Composite	0.3%	0.4%	-0.1%	0.0%	-0.2%	0.0%	-0.2%
Total	6.2%	7.0%	-0.8%	-0.6%	0.1%	-0.2%	-0.7%

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May not add due to rounding

Allocation Effect - The return attributable to the asset allocation of the portfolio
 Selection Effect - The return attributable to the managers' security selection
 Interaction Effect - The return attributable to the interaction between the Allocation and Selection Effects

MPERS

Total Composite

	Policy %	% of Portfolio	Market Value (\$)	3 Mo (%)	Rank	YTD (%)	Rank	1 Yr (%)	Rank	3 Yrs (%)	Rank	5 Yrs (%)	Rank	10 Yrs (%)	Rank
Total Composite	100.00	100.00	2,163,726,898	2.97	36	6.25	84	11.23	64	6.20	5	9.82	6	5.19	43
<i>Policy Index</i>				3.14	26	6.99	58	10.95	66	5.94	8	8.41	46	5.29	37
Global Equity Composite	30.00	30.70	664,326,249			10.81	58	20.89	38	5.72	36	12.35	27	4.51	40
<i>MSCI ACWI</i>						11.48	51	18.78	52	4.82	48	10.54	60	3.71	67
Fixed Income Composite	20.00	15.17	328,314,319			2.93	82	3.69	59	5.75	3	6.26	16	6.12	24
<i>Fixed Income Custom Benchmark</i>						2.66	86	0.94	77	2.77	39	2.74	64	4.73	54
Opportunistic Debt Composite	7.50	9.03	195,426,266			4.78	32	--	--	--	--	--	--	--	--
<i>BBgBarc US High Yield TR</i>						4.93	24	12.70	27	4.48	28	6.89	25	7.67	14
Real Assets Composite	7.50	10.25	221,757,657			5.52	--	13.40	--	2.40	--	--	--	--	--
<i>CPI + 4% (Unadjusted)</i>						3.46	--	5.69	--	4.95	--	5.36	--	5.69	--
Real Estate Composite	10.00	10.43	225,733,199			4.62	--	6.74	--	9.93	--	13.00	--	4.89	--
<i>NFI-ODCE Eq Wtd Net Non Lag</i>						3.15	--	7.23	--	10.67	--	10.83	--	4.16	--
Private Equity Composite	15.00	16.13	348,961,860			5.68	--	9.92	--	9.67	--	12.82	--	6.23	--
<i>MO Hwy Priv. Equ. Index - Lagged</i>						11.74	--	20.64	--	13.65	--	16.67	--	11.04	--
Hedge Fund Composite	10.00	6.90	149,231,207			3.84	--	10.18	--	2.02	--	4.73	--	3.70	--
<i>HFRI Fund of Funds Composite Index</i>						3.14	--	6.41	--	1.53	--	3.86	--	0.86	--
Cash Composite	0.00	1.39	29,976,141			0.27	--	0.39	--	0.18	--	0.16	--	0.59	--
<i>91 Day T-Bills</i>						0.36	--	0.54	--	0.24	--	0.16	--	0.44	--

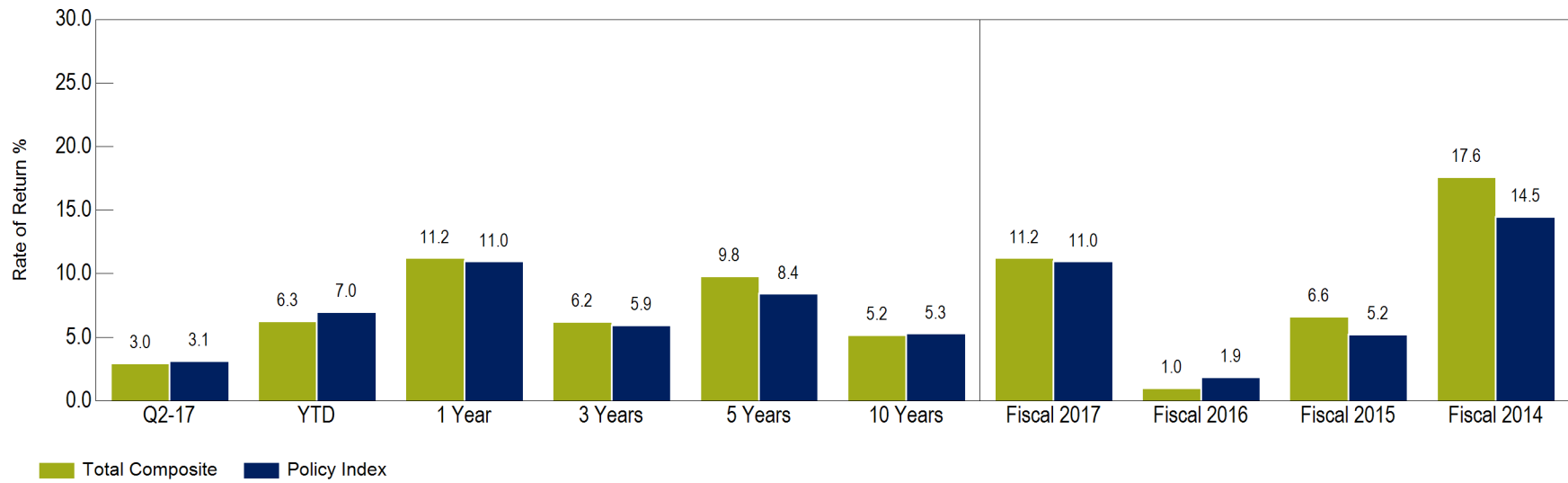
Total Composite is ranked in the IFx Public DB (peer) Net + Universe

Global Equity Composite is ranked in the eA Global All Cap Equity Net Universe

Fixed Income Composite is ranked in the eA All Global Fixed Inc Net Universe

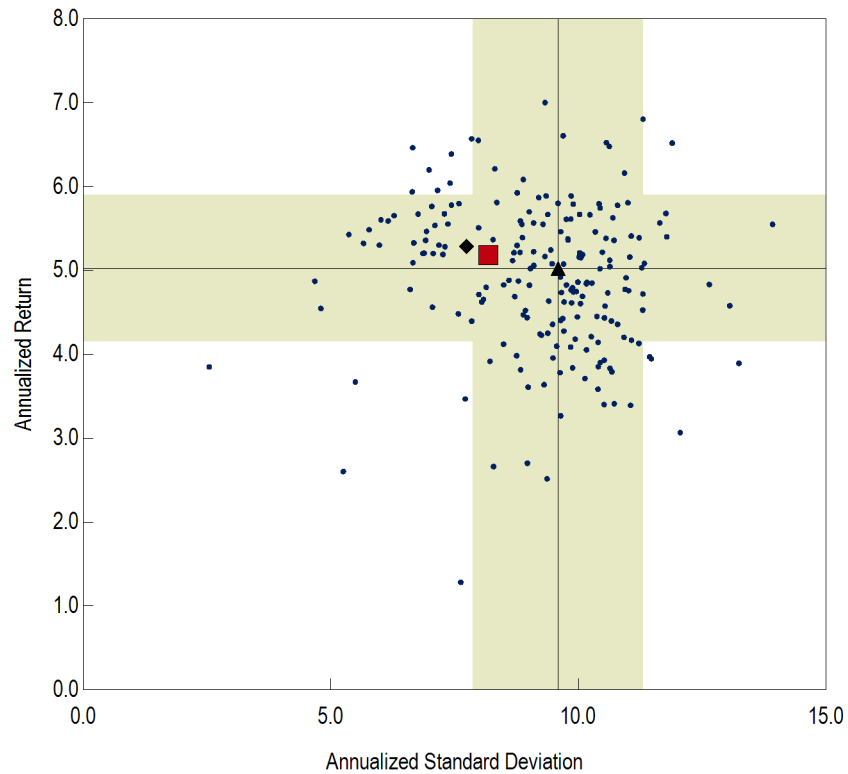
Total Fund Return Summary

Return Summary Net



Total Fund Risk/Return - 10 Years

10 Years Ending June 30, 2017



- Total Composite
- ◆ Policy Index
- ▲ Universe Median
- 68% Confidence Interval
- InvestorForce Public DB Net

Statistics Summary
10 Years Ending June 30, 2017

	Anlzd Ret	Rank	Anlzd Std Dev	Rank
Total Composite	5.19%	43	8.18%	25
Policy Index	5.29%	37	7.74%	20

Statistics Summary
10 Years Ending June 30, 2017

	Sharpe Ratio	Rank
Total Composite	0.58	25
Policy Index	0.63	22

Total Fund Performance

MPERS

Total Fund Performance Detail

	Market Value (\$)	% of Portfolio	Policy %	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Total Composite	2,163,726,898	100.00	100.00	2.97	6.25	11.23	6.20	9.82	5.19
<i>Policy Index</i>				3.14	6.99	10.95	5.94	8.41	5.29
Global Equity Composite	664,326,249	30.70	30.00	3.64	10.81	20.89	5.72	12.35	4.51
<i>MSCI ACWI</i>				4.27	11.48	18.78	4.82	10.54	3.71
Tortoise	69,870,002	3.23		-5.63	-0.80	4.36	-8.88	7.15	--
<i>Alerian MLP Index</i>				-6.35	-2.66	0.40	-11.23	1.77	5.74
Domestic Equity Composite	374,311,988	17.30	--	3.98	10.78	22.28	9.77	15.27	7.04
<i>Russell 3000</i>				3.02	8.93	18.51	9.10	14.58	7.26
Large Cap Composite	317,067,717	14.65	--	3.95	10.68	20.43	10.24	14.63	7.89
Cash/S&P Futures	317,067,717	14.65		3.95	10.68	21.12	9.37	13.73	--
S&P 500				3.09	9.34	17.90	9.61	14.63	7.18
Small/Mid Cap Composite	57,244,271	2.65	--	4.24	11.39	30.72	9.54	16.05	7.90
Kennedy Capital	28,316,979	1.31		4.45	5.27	29.16	--	--	--
Pinnacle	28,927,292	1.34		3.78	15.32	31.32	7.42	15.32	8.03
<i>Russell 2500</i>				2.13	5.97	19.84	6.93	14.04	7.42
International Equity Composite	220,144,259	10.17	--	6.35	15.34	24.37	4.18	9.80	2.16
<i>MSCI ACWI ex USA</i>				5.78	14.10	20.45	0.80	7.22	1.13
Silchester	131,171,604	6.06		5.91	14.07	24.46	4.78	12.92	6.78
Acadian Int'l Small Cap	38,759,841	1.79		8.49	18.29	23.12	6.47	--	--
<i>MSCI EAFE</i>				6.12	13.81	20.27	1.15	8.69	1.03
GMO EM	23,131,393	1.07		5.92	18.70	16.65	3.01	--	--
<i>MSCI Emerging Markets</i>				6.27	18.43	23.75	1.07	3.96	1.92
MPERS-Acadian Non-US Microcap	26,671,849	1.23		5.99	--	--	--	--	--
<i>MSCI EAFE Small Cap</i>				8.10	16.72	23.18	5.60	12.94	3.41
Transition Account	409,572	0.02							

MPERS - Acadian Non-US Microcap was funded on 03/20/2017.

MPERS

Total Fund Performance Detail

	Market Value (\$)	% of Portfolio	Policy %	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Fixed Income Composite	328,314,319	15.17	20.00	2.09	2.93	3.69	5.75	6.26	6.12
<i>Fixed Income Custom Benchmark</i>				1.69	2.66	0.94	2.77	2.74	4.73
Core Fixed Income Composite	161,417,642	7.46	10.00	1.46	1.72	-0.67	3.17	3.38	3.89
Aberdeen	18,036,351	0.83		4.04	6.45	10.57	5.98	6.35	5.84
<i>BBgBarc US Aggregate TR</i>				1.45	2.27	-0.31	2.48	2.21	4.48
Internal Fixed - Core	100,866,401	4.66		1.13	0.52	-5.21	2.07	2.30	--
<i>BBgBarc US Govt/Credit TR</i>				1.69	2.66	-0.41	2.62	2.29	4.57
Octagon Senior Debt	26,933,784	1.24		0.59	2.05	4.91	--	--	--
<i>BBgBarc US Aggregate TR</i>				1.45	2.27	-0.31	2.48	2.21	4.48
Principal CMBS Fixed	15,581,106	0.72		2.09	2.88	4.68	3.78	--	--
<i>BBgBarc US CMBS ERISA Eligible TR</i>				1.31	2.19	-0.32	2.57	3.12	5.24
Long Duration Composite	131,072,597	6.06	5.00	3.56	5.09	-2.17	5.80	4.59	--
Internal Fixed - Long Duration	131,072,597	6.06		3.56	5.09	-2.17	5.80	4.59	--
<i>BBgBarc US Govt/Credit Long TR</i>				4.39	6.03	-1.07	5.28	4.26	7.58
Inflation Protection Securities Composite	35,824,080	1.66	5.00	0.10	1.44	0.34	1.08	0.70	--
Internal US TIPS	35,824,080	1.66		0.10	1.44	0.34	1.08	0.70	--
<i>BBgBarc US TIPS TR</i>				-0.40	0.85	-0.63	0.63	0.27	4.27
Opportunistic Debt Composite	195,426,266	9.03	7.50	1.69	4.78	--	--	--	--
<i>BBgBarc US High Yield TR</i>				2.17	4.93	12.70	4.48	6.89	7.67
ABRY ASF	153,822	0.01		-1.72	8.55	17.59	14.72	23.17	--
Anchorage Capital II	36,545	0.00		0.00	-3.40	-11.85	4.13	9.92	--
Anchorage Capital III	4,564,653	0.21		0.00	4.10	1.47	7.42	9.77	--
Anchorage Illiquid Opps V	9,396,901	0.43		0.00	2.44	15.26	--	--	--
Audax Mezzanine II	250,109	0.01		-6.51	-11.46	-17.83	-0.29	3.94	6.36
CVI Credit Value	5,455,956	0.25		2.60	5.93	14.54	14.01	22.17	--
CVI Credit Value Fund III	11,515,802	0.53		4.13	6.23	15.83	--	--	--
CVI Global Value	3,693,341	0.17		-0.92	2.16	1.45	4.91	10.23	8.17
GOLUB Capital	27,059,967	1.25		1.43	2.95	9.29	7.62	6.86	--
GSO Credit Alpha Fund	17,536,933	0.81		-3.08	1.79	15.71	--	--	--
GSO Energy Select Opps	2,902,451	0.13		0.55	3.88	29.46	--	--	--
GSO I	466,588	0.02		2.66	-14.59	-19.03	-0.96	8.76	--
GSO II	6,260,407	0.29		3.50	5.72	15.00	9.35	14.30	--
GSO III	3,424,087	0.16		2.29	3.02	--	--	--	--
Internal Fixed - Nonrated	2,040,676	0.09		1.91	3.78	3.87	--	--	--

Fixed Income Custom Benchmark was BBgBarc US Universal TR preceding 01/01/2017. As of 01/01/2017 the benchmark is BBgBarc US Agg Govt/Credit.

MPERS

Total Fund Performance Detail

	Market Value (\$)	% of Portfolio	Policy %	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
M&G III	5,443,976	0.25		5.84	8.51	4.04	-3.78	--	--
Northern Shipping II	9,611,750	0.44		2.71	2.99	3.24	7.45	--	--
Northern Shipping III	5,490,761	0.25		1.21	-1.45	2.68	--	--	--
Och-Ziff Struct Products II	3,243,819	0.15		1.33	4.34	40.64	13.95	--	--
OCP Asia	16,683,176	0.77		3.77	8.39	16.61	15.49	--	--
Octagon Opportunistic	37,282,740	1.72		1.55	6.58	25.96	--	--	--
Owl Rock	6,474,919	0.30		2.97	6.66	--	--	--	--
Riverstone Credit Partners	12,702,332	0.59		2.60	8.01	18.75	--	--	--
Siguler Guff Sec Opps	3,734,555	0.17		4.75	2.65	--	--	--	--
<i>BBgBarc US High Yield TR</i>				2.17	4.93	12.70	4.48	6.89	7.67
Real Assets Composite	221,757,657	10.25	7.50	1.01	5.52	13.40	2.40	--	--
<i>CPI + 4% (Unadjusted)</i>				1.46	3.46	5.69	4.95	5.36	5.69
American Infrastructure I MLP	18,125,406	0.84		1.02	8.00	13.03	7.90	4.00	--
American Infrastructure II MLP	8,743,238	0.40		1.33	-6.39	-10.75	0.84	--	--
Apollo Aviation III	9,244,416	0.43		2.36	23.54	20.15	--	--	--
Blue Road	5,135,365	0.24		1.05	0.27	-6.49	--	--	--
EIF - US Power III	7,169,947	0.33		1.13	0.79	11.06	15.65	11.53	-9.54
EMG I	7,746,084	0.36		-1.99	0.31	14.76	-10.45	5.28	--
EMG II	12,768,812	0.59		0.26	7.92	16.00	8.79	--	--
EMG III	19,372,374	0.90		3.17	15.16	2.31	-0.12	--	--
EMG IV	13,093,612	0.61		-0.85	16.08	30.77	--	--	--
Grey Rock Energy Fund II	6,288,168	0.29		-0.70	-2.29	--	--	--	--
NGP IX	613,096	0.03		-8.45	-3.69	12.24	-12.03	-1.60	--
NGP X	5,716,752	0.26		0.80	0.70	30.80	3.06	3.61	--
NGP XI	7,488,203	0.35		11.00	10.98	45.79	--	--	--
Orion II	6,046,370	0.28		--	--	--	--	--	--
Orion Mine Finance Fund I	15,353,583	0.71		2.27	22.24	46.51	--	--	--
Ridgewood Energy	8,850,695	0.41		-1.80	-0.50	11.24	-5.34	--	--
Ridgewood III	1,012,003	0.05		-4.19	-7.02	-25.32	--	--	--
Sciens Marine Investments	3,002,063	0.14		42.05	32.70	29.64	-29.17	--	--
<i>CPI + 4% (Unadjusted)</i>				1.46	3.46	5.69	4.95	5.36	5.69

MPERS

Total Fund Performance Detail

	Market Value (\$)	% of Portfolio	Policy %	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Timber Composite	65,987,470	3.05	--	-0.95	-3.83	5.14	-3.30	--	--
RMK - Timberland	1,133,673	0.05		4.92	-32.89	-17.41	-11.58	2.35	-0.51
MP Timber	26,352,160	1.22		-1.33	-0.79	7.01	--	--	--
MPATC	19,288,985	0.89		--	--	--	--	--	--
MPCTT	10,539,200	0.49		0.00	--	--	--	--	--
MPMCB	8,648,452	0.40		--	--	--	--	--	--
MPERS - MP Battlefield	25,000	0.00		--	--	--	--	--	--
<i>NCREIF Timberland 1 Qtr Lag</i>				0.76	1.95	3.75	5.71	7.17	5.73
Real Estate Composite	225,733,199	10.43	10.00	3.34	4.62	6.74	9.93	13.00	4.89
<i>NFI-ODCE Eq Wtd Net Non Lag</i>				1.51	3.15	7.23	10.67	10.83	4.16
Core Real Estate Composite	137,848,325	6.37	--	3.42	5.00	8.68	12.10	14.72	4.86
<i>NCREIF Property Index</i>				1.75	3.33	6.98	10.16	10.49	6.42
Clarion Partners Lion Prop Fd	43,115,797	1.99		5.36	5.36	8.65	11.58	11.06	3.23
Principal CMBS	18,864,977	0.87		2.84	3.60	8.83	9.61	20.81	--
Principal Enhanced Property	50,644,798	2.34		2.65	6.54	9.63	15.34	15.29	3.37
<i>NCREIF Property Index</i>				1.75	3.33	6.98	10.16	10.49	6.42
Principal U.S. Property Fund	25,137,499	1.16		2.06	3.94	8.71	11.31	11.58	4.54
<i>NCREIF ODCE</i>				1.70	3.50	7.87	11.34	11.78	5.25
Non-Core Real Estate Composite	72,429,802	3.35	--	2.97	4.05	4.72	7.43	10.21	2.69
AEW Partners V	95,471	0.00		0.63	5.86	22.73	56.78	41.07	13.31
Apollo European III	1,658,050	0.08		6.39	4.08	-2.12	-5.61	2.21	--
Apollo Real Estate	6,303,922	0.29		1.40	3.68	6.19	14.23	12.19	0.28
Centersquare III	13,081,557	0.60		0.79	2.86	3.07	--	--	--
Clarion Part Lion Mexico Fund	1,512,911	0.07		-0.88	-24.68	-27.84	-20.81	-14.59	-8.33
Colony Capital VIII	841,424	0.04		4.02	-10.15	-6.32	-10.78	0.80	--
M&G II	7,349,825	0.34		6.34	10.05	6.32	-0.90	--	--
Och Ziff RE Credit FD LP	2,802,307	0.13		7.01	11.11	--	--	--	--
Och-Ziff	2,419,732	0.11		3.50	8.09	19.97	26.92	32.89	20.71
Och-Ziff RE III	4,097,956	0.19		6.29	11.00	15.79	-13.38	--	--
Torchlight Debt Opp II	8,629,959	0.40		1.84	-3.21	-1.28	6.83	--	--
Torchlight Debt Opp III	2,832,221	0.13		0.05	3.10	8.96	36.06	--	--
Torchlight Debt Opps V	5,620,945	0.26		4.03	7.00	17.94	--	--	--

MPERS

Total Fund Performance Detail

	Market Value (\$)	% of Portfolio	Policy %	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Tristan EPISO	4,138,029	0.19		-7.76	-7.90	-6.79	5.79	6.42	--
Tristan EPISO 3	6,191,491	0.29		9.02	18.37	12.04	-3.40	--	--
Tristan EPISO 4	4,149,826	0.19		6.53	7.97	2.46	--	--	--
Urdang Value Added Fund II	704,176	0.03		1.66	3.51	-4.26	2.10	6.99	2.39
<i>NCREIF Property Index</i>				1.75	3.33	6.98	10.16	10.49	6.42
REITS Composite	15,455,072	0.71	--	4.33	3.36	-3.19	0.13	5.34	--
CBRE Investors	15,455,072	0.71		4.33	3.36	-3.20	0.13	5.33	--
<i>FTSE EPRA/NAREIT Developed</i>				2.71	4.84	0.21	3.67	7.50	1.98
Private Equity Composite	348,961,860	16.13	15.00	5.38	5.68	9.92	9.67	12.82	6.23
<i>MO Hwy Priv. Equ. Index - Lagged</i>				6.84	11.74	20.64	13.65	16.67	11.04
Abry Partners VI	325,201	0.02		2.50	-3.01	22.65	32.14	30.93	--
Abry Partners VII	3,145,083	0.15		18.90	27.19	30.88	21.44	16.61	--
Capital Partners II	8,817,497	0.41		5.11	13.35	19.28	11.64	--	--
DC Capital Partners	666,062	0.03		-11.50	-15.53	--	--	--	--
Grove Street - MP Ventures	103,628,670	4.79		-2.87	-2.98	-0.80	4.43	9.59	5.70
Grove Street - MP Ventures II	185,539,070	8.57		10.80	10.73	15.77	12.93	14.27	--
KPS IV	818,329	0.04		-3.44	--	--	--	--	--
Longford II	1,305,339	0.06		-8.16	-13.24	--	--	--	--
Newquest Fund	152,525	0.01		-20.69	-38.40	--	--	--	--
Opengate Capital Partners	2,822,751	0.13		1.52	-3.65	-9.29	--	--	--
Ospraie	168,203	0.01		14.51	14.51	6.62	9.84	11.39	--
Pfingsten Fund V	1,796,695	0.08		-3.41	-7.88	-7.57	--	--	--
Shore Capital Partners GP I LP	4,461,019	0.21		2.18	6.74	23.95	--	--	--
Shoreline China Valu III	7,932,774	0.37		3.36	6.27	8.98	--	--	--
Turnbridge Capital Partners I	4,072,553	0.19		-5.14	-5.14	-8.63	--	--	--
Vectis H & L II	10,814,093	0.50		16.73	16.73	33.22	21.44	17.85	--
Aisling	5,898,470	0.27		-1.50	-3.49	4.25	--	--	--
Arrowroot Capital III	4,000,156	0.18		0.00	--	--	--	--	--
Long Ridge II	2,597,370	0.12		-4.43	-9.24	--	--	--	--

MPERS

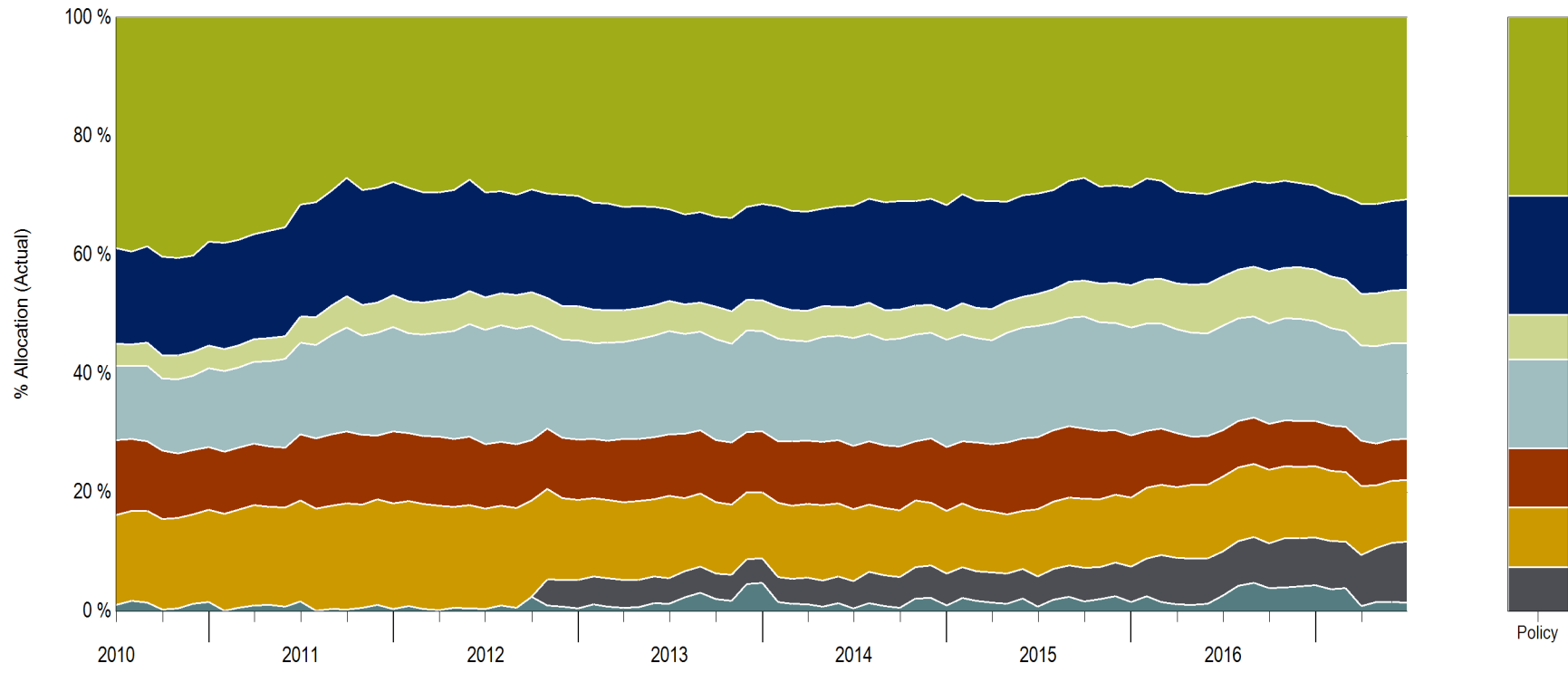
Total Fund Performance Detail

	Market Value (\$)	% of Portfolio	Policy %	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Hedge Fund Composite	149,231,207	6.90	10.00	0.74	3.84	10.18	2.02	4.73	3.70
<i>HFRI Fund of Funds Composite Index</i>				0.74	3.14	6.41	1.53	3.86	0.86
Alyeska Fund	15,219,650	0.70		1.79	1.07	6.86	--	--	--
BlueTrend	8,788,638	0.41		-4.88	-6.54	-16.88	-2.97	-2.55	--
Bridgewater Pure Alpha	17,770,549	0.82		-4.57	-2.36	13.51	0.32	3.77	9.69
Cevian	14,855,126	0.69		2.98	10.90	32.54	5.40	11.48	--
Indus Pacific Opp. Fund	13,305,347	0.61		7.26	14.19	16.36	9.99	--	--
Koppenburg Commodity Fund	10,499,997	0.49		-4.78	-0.99	3.17	--	--	--
Luxor Capital	2,092,752	0.10		9.92	15.15	2.68	-12.68	-4.47	--
Metacapital	11,400,001	0.53		-0.39	0.72	4.35	2.50	--	--
Millenium USA LP	18,940,981	0.88		2.00	3.88	7.89	--	--	--
Pentwater	11,518,711	0.53		5.64	12.49	28.97	--	--	--
PFM	601,696	0.03		0.00	1.64	4.51	1.54	7.06	--
RK Tessera	11,362,292	0.53		-0.02	2.36	5.52	3.28	--	--
Shepherd International Fund	422,279	0.02		0.47	-0.21	-1.59	-3.23	-5.33	-3.89
Taconic Capital	2,868	0.00		0.00	-8.81	-4.35	-1.23	4.10	--
ValueAct	12,450,320	0.58		2.24	8.45	22.56	4.87	13.21	--
<i>HFRI Fund of Funds Composite Index</i>				0.74	3.14	6.41	1.53	3.86	0.86
Cash Composite	29,976,141	1.39	0.00	0.21	0.27	0.39	0.18	0.16	0.59
<i>91 Day T-Bills</i>				0.22	0.36	0.54	0.24	0.16	0.44

Appendix

Total Fund Asset Allocation History

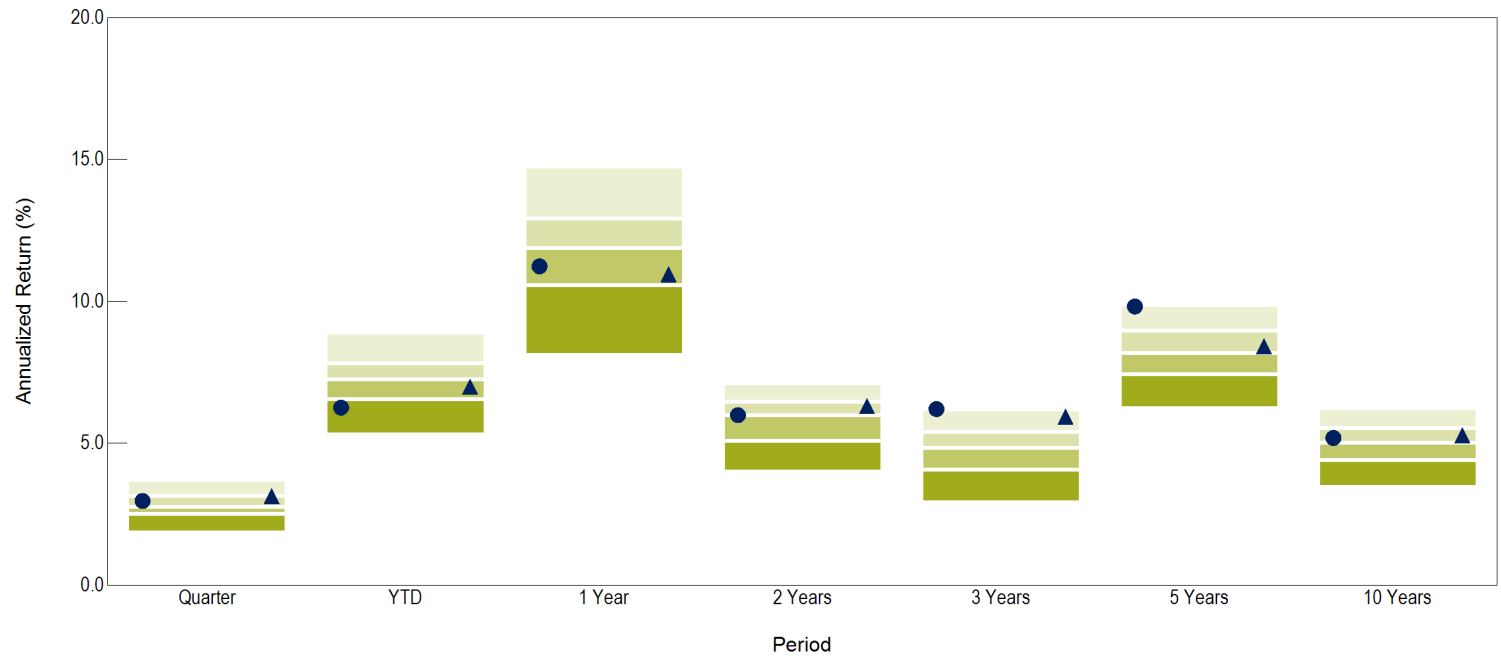
Asset Allocation History



- Equity - Global
- Opportunistic Fixed Income
- Hedge Funds
- Real Assets
- Cash
- Fixed Income
- Private Equity
- Real Estate

Total Fund Return Summary vs. Peer Universe

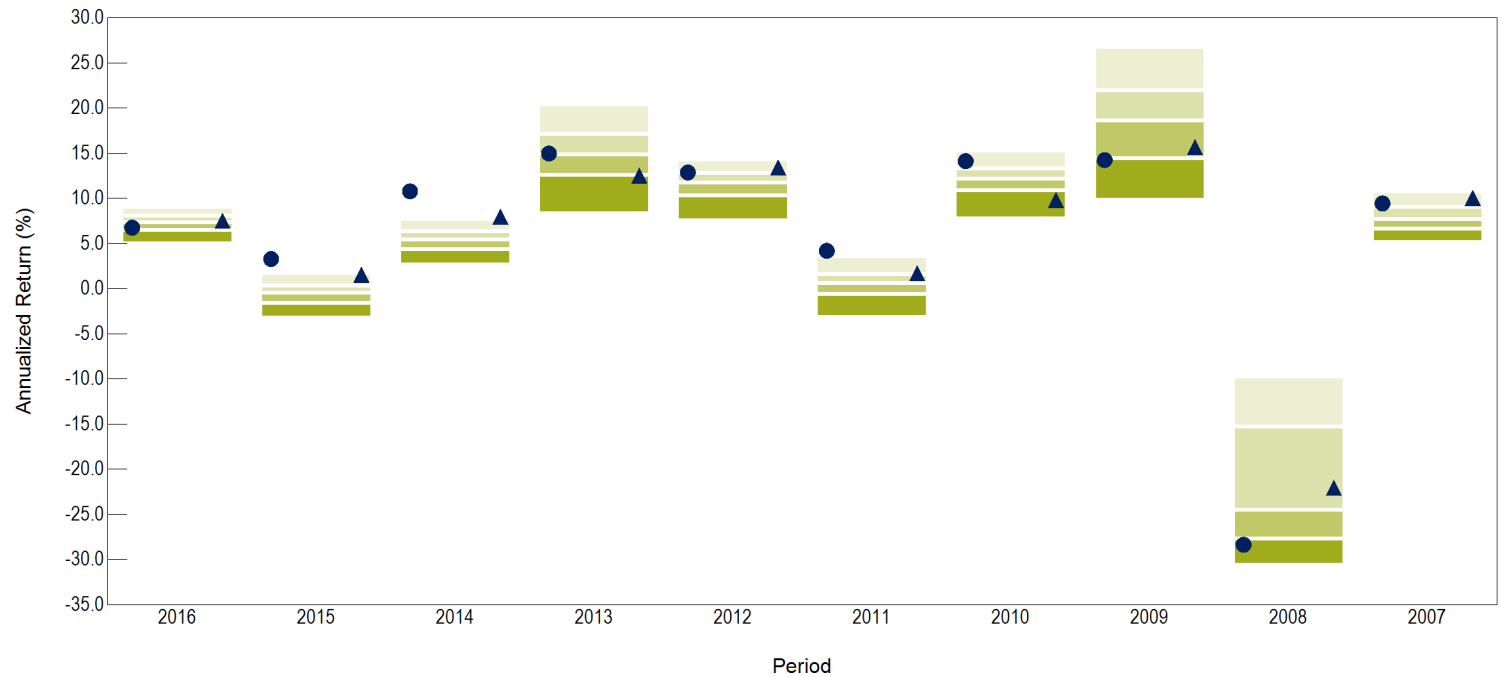
Total Composite vs. InvestorForce Public DB Net



	Return (Rank)													
5th Percentile	3.7	8.9	14.7	7.1	6.2	9.9	6.2							
25th Percentile	3.2	7.8	12.9	6.5	5.4	9.0	5.5							
Median	2.8	7.3	11.9	6.0	4.9	8.2	5.0							
75th Percentile	2.5	6.6	10.6	5.1	4.1	7.4	4.4							
95th Percentile	1.9	5.3	8.1	4.0	2.9	6.2	3.5							
# of Portfolios	283	283	282	278	269	245	199							
● Total Composite	3.0	(36)	6.3	(84)	11.2	(64)	6.0	(51)	6.2	(5)	9.8	(6)	5.2	(43)
▲ Policy Index	3.1	(26)	7.0	(58)	11.0	(66)	6.3	(31)	5.9	(8)	8.4	(46)	5.3	(37)

Total Fund Return Summary vs. Peer Universe

Total Composite vs. InvestorForce Public DB Net



	Return (Rank)									
5th Percentile	9.0	1.7	7.7	20.4	14.3	3.6	15.3	26.8	-9.8	10.7
25th Percentile	8.1	0.4	6.4	17.2	12.9	1.6	13.4	22.0	-15.2	9.1
Median	7.4	-0.4	5.5	14.9	11.8	0.6	12.2	18.6	-24.4	7.8
75th Percentile	6.6	-1.5	4.4	12.7	10.4	-0.5	10.9	14.5	-27.6	6.7
95th Percentile	5.0	-3.2	2.7	8.4	7.6	-3.1	7.9	9.9	-30.5	5.2
# of Portfolios	269	262	210	191	159	137	131	128	125	122
● Total Composite	6.8 (70)	3.3 (1)	10.8 (1)	15.0 (49)	12.9 (26)	4.2 (3)	14.1 (14)	14.2 (77)	-28.4 (83)	9.4 (20)
▲ Policy Index	7.5 (47)	1.5 (7)	8.0 (4)	12.5 (76)	13.4 (15)	1.7 (24)	9.8 (88)	15.7 (68)	-22.1 (38)	10.0 (12)

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:
 $(\text{Annualized Return of Portfolio} - \text{Annualized Return of Benchmark}) / \text{Annualized Standard Deviation}(\text{Period Portfolio Return} - \text{Period Benchmark Return})$. 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.

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:
 $\text{Calculation Average } (X-Y) / \text{Downside Deviation } (X-Y) * 2$
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:
 $(\text{Annualized Return of Portfolio} - \text{Annualized Return of Risk Free}) / \text{Annualized Standard Deviation (Portfolio Returns)}$

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:
 $\text{Tracking Error} = \text{Standard Deviation } (X-Y) * \sqrt{(\# \text{ of periods per year})}$
Where X = periods portfolio return and Y = the period's benchmark 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:
 $(\text{Portfolio Average Return} - \text{Average Return of Risk-Free Rate}) / \text{Portfolio Beta}$

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.

$\text{UpsideCapture} = \text{TotalReturn}(\text{FundReturns}) / \text{TotalReturns}(\text{BMReturn})$ when Period Benchmark Return is $> = 0$

$\text{DownsideCapture} = \text{TotalReturn}(\text{FundReturns}) / \text{TotalReturns}(\text{BMReturn})$ when Benchmark < 0

Data Source: InvestorForce

Glossary of Investment Terminology

Of Portfolios/Observations¹ – The total number of data points that make up a specified universe

Allocation Index³ - The allocation index measures the value added (or subtracted) to each portfolio by active management. It is calculated monthly: The portfolio asset allocation to each category from the prior month-end is multiplied by a specified market index.

Asset Allocation Effect² - Measures an investment manager's ability to effectively allocate their portfolio's assets to various sectors. The allocation effect determines whether the overweighting or underweighting of sectors relative to a benchmark contributes positively or negatively to the overall portfolio return. Positive allocation occurs when the portfolio is over weighted in a sector that outperforms the benchmark and underweighted in a sector that underperforms the benchmark. Negative allocation occurs when the portfolio is over weighted in a sector that underperforms the benchmark and under weighted in a sector that outperforms the benchmark.

Agency Bonds (Agencies)³ - The full faith and credit of the United States government is normally not pledged to payment of principal and interest on the majority of government agencies issuing these bonds, with maturities of up to ten years. Their yields, therefore, are normally higher than government and their marketability is good, thereby qualifying them as a low risk-high liquidity type of investment. They are eligible as security for advances to the member banks by the Federal Reserve, which attests to their standing.

Asset Backed Securities (ABS)³ - Bonds which are similar to mortgage-backed securities but are collateralized by assets other than mortgages; commonly backed by credit card receivables, auto loans, or other types of consumer financing.

Attribution³ - Attribution is an analytical technique that allows us to evaluate the performance of the portfolio relative to the benchmark. A proper attribution tells us where value was added or subtracted as a result of the manager's decisions.

Average Effective Maturity⁴ - For a single bond, it is a measure of maturity that takes into account the possibility that a bond might be called back to the issuer.

For a portfolio of bonds, average effective maturity is the weighted average of the maturities of the underlying bonds. The measure is computed by weighing each bond's maturity by its market value with respect to the portfolio and the likelihood of any of the bonds being called. In a pool of mortgages, this would also account for the likelihood of prepayments on the mortgages.

Batting Average¹ - A measurement representing an investment manager's ability to meet or beat an index.

Formula: Divide the number of days (or months, quarters, etc.) in which the manager beats or matches the index by the total number of days (or months, quarters, etc.) in the period of question and multiply that factor by 100.

Brinson Fachler (BF) Attribution¹ - The BF methodology is a highly accepted industry standard for calculating the allocation, selection, and interaction effects within a portfolio that collectively explains a portfolio's underlying performance. The main advantage of the BF methodology is that rather than using the overall return of the benchmark, it goes a level deeper than BHB and measures whether the benchmark sector, country, etc. outperformed/or underperformed the overall benchmark.

Brinson Hood Beebower (BHB) Attribution¹ - The BHB methodology shows that excess return must be equal to the sum of all other factors (i.e., allocation effect, selection effect, interaction effect, etc.). The advantage to using the BHB methodology is that it is a highly accepted industry standard for calculating the allocation, selection, and interaction effects within a portfolio that collectively explains a portfolio's underlying performance.

Corporate Bond (Corp)⁴ - A debt security issued by a corporation and sold to investors. The backing for the bond is usually the payment ability of the company, which is typically money to be earned from future operations. In some cases, the company's physical assets may be used as collateral for bonds.

Correlation¹ - A range of statistical relationships between two or more random variables or observed data values. A correlation is a single number that describes the degree of relationship between variables.

Data Source: ¹InvestorForce, ²Interaction Effect Performance Attribution, ³NEPC, LLC, ⁴Investopedia, ⁵Hedgeco.net

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Coupon⁴ – The interest rate stated on a bond when it is issued. The coupon is typically paid semiannually. This is also referred to as the "coupon rate" or "coupon percent rate."

Currency Effect¹ - Is the effect that changes in currency exchange rates over time affect excess performance.

Derivative Instrument³ - A financial obligation that derives its precise value from the value of one or more other instruments (or assets) at the same point of time. For example, the relationship between the value of an S&P 500 futures contract (the derivative instrument in this case) is determined by the value of the S&P 500 Index and the value of a U.S. Treasury bill that matures at the expiration of the futures contract.

Downside Deviation¹ - Equals the standard deviation of negative return or the measure of downside risk focusing on the standard deviation of negative returns.

Formula:

Annualized Standard Deviation (Fund Return - Average Fund Return) where average fund return is greater than individual fund returns, monthly or quarterly.

Duration³ - Duration is a measure of interest rate risk. The greater the duration of a bond, or a portfolio of bonds, the greater its price volatility will be in response to a change in interest rates. A bond's duration is inversely related to interest rates and directly related to time to maturity.

Equity/Debt/Cash Ratio¹ – The percentage of an investment or portfolio that is in Equity, Debt, and/or Cash (i.e. A 7/89/4 ratio represents an investment that is made up of 7% Equity, 89% Debt, and 4% Cash).

Foreign Bond³ - A bond that is issued in a domestic market by a foreign entity, in the domestic market's currency. A foreign bond is most often issued by a foreign firm to raise capital in a domestic market that would be most interested in purchasing the firm's debt. For foreign firms doing a large amount of business in the domestic market, issuing foreign bonds is a common practice.

Hard Hurdle⁵ – is a hurdle rate that once beaten allows a fund manager to charge a performance fee on only the funds above the specified hurdle rate.

High-Water Mark⁴ - The highest peak in value that an investment fund/account has reached. This term is often used in the context of fund manager compensation, which is performance based. Some performance-based fees only get paid when fund performance exceeds the high-water mark. The high-water mark ensures that the manager does not get paid large sums for poor performance.

Hurdle Rate⁴ - The minimum rate of return on an investment required, in order for a manager to collect incentive fees from the investor, which is usually tied to a benchmark.

Interaction Effects² - The interaction effect measures the combined impact of an investment manager's selection and allocation decisions within a sector. For example, if an investment manager had superior selection and over weighted that particular sector, the interaction effect is positive. If an investment manager had superior selection, but underweighted that sector, the interaction effect is negative. In this case, the investment manager did not take advantage of the superior selection by allocating more assets to that sector. Since many investment managers consider the interaction effect to be part of the selection or the allocation, it is often combined with the either effect.

Median³ - The value (rate of return, market sensitivity, etc.) that exceeds one-half of the values in the population and that is exceeded by one-half of the values. The median has a percentile rank of 50.

Modified Duration³ - The percentage change in the price of a fixed income security that results from a change in yield.

Mortgage Backed Securities (MBS)³ - Bonds which are a general obligation of the issuing institution but are also collateralized by a pool of mortgages.

Municipal Bond (Muni)⁴ - A debt security issued by a state, municipality or county to finance its capital expenditures.

Net Investment Change¹ – Is the change in an investment after accounting for all Net Cash Flows.

Performance Fee⁴ - A payment made to a fund manager for generating positive returns. The performance fee is generally calculated as a percentage of investment profits, often both realized and unrealized.

Data Source: ¹InvestorForce, ²Interaction Effect Performance Attribution, ³NEPC, LLC, ⁴Investopedia, ⁵Hedgeco.net

Glossary of Investment Terminology

Policy Index³ - A custom benchmark designed to indicate the returns that a passive investor would earn by consistently following the asset allocation targets set forth in this investment policy statement.

Price to Book (P/B)⁴ - A ratio used to compare a stock's market value to its book value. It is calculated by dividing the current closing price of the stock by the latest quarter's book value per share, also known as the "price-equity ratio".

Price to Earnings (P/E)³ - The weighted equity P/E is based on current price and trailing 12 months earnings per share (EPS).

Price to Sales (P/S)⁴ - A ratio for valuing a stock relative to its own past performance, other companies, or the market itself. Price to sales is calculated by dividing a stock's current price by its revenue per share for the trailing 12 months.

Return on Equity (ROE)⁴ - The amount of net income returned as a percentage of shareholders equity. Return on equity measures a corporation's profitability by revealing how much profit a company generates with the money shareholders have invested.

Selection (or Manager) Effect² - Measures the investment manager's ability to select securities within a given sector relative to a benchmark. The over or underperformance of the portfolio is weighted by the benchmark weight, therefore, selection is not affected by the manager's allocation to the sector. The weight of the sector in the portfolio determines the size of the effect—the larger the sector, the larger the effect is, positive or negative.

Soft Hurdle rate⁵ – is a hurdle rate that once beaten allows a fund manager to charge a performance fee based on the entire annualized return.

Tiered Fee¹ – A fee structure that is paid to fund managers based on the size of the investment (i.e. 1.00% fee on the first \$10M invested, 0.90% on the next \$10M, and 0.80% on the remaining balance).

Total Effects² - The active management (total) effect is the sum of the selection, allocation, and interaction effects. It is also the difference between the total portfolio return and the total benchmark return. You can use the active management effect to determine the amount the investment manager has added to a portfolio's return.

Total Return¹ - The actual rate of return of an investment over a specified time period. Total return includes interest, capital gains, dividends, and distributions realized over a defined time period.

Universe³ - The list of all assets eligible for inclusion in a portfolio.

Upside Deviation¹ – Standard Deviation of Positive Returns

Weighted Avg. Market Cap.⁴ - A stock market index weighted by the market capitalization of each stock in the index. In such a weighting scheme, larger companies account for a greater portion of the index. Most indexes are constructed in this manner, with the best example being the S&P 500.

Yield (%)³ - The current yield of a security is the current indicated annual dividend rate divided by current price.

Yield to Maturity³ -The discount rate that equates the present value of cash flows, both principal and interest, to market price.

Data Source: ¹InvestorForce, ²Interaction Effect Performance Attribution, ³NEPC, LLC, ⁴Investopedia, ⁵Hedgeco.net

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