



NEPC, LLC

YOU DEMAND MORE. So do we.SM



MoDOT & Patrol Employees Retirement System

Investment Summary

Quarter Ending September 30, 2016

Board Report

Kevin Leonard, Partner

Will Forde, CAIA, Senior Analyst

255 State Street, Boston, MA 02109 | TEL: 617.374.1300 | FAX: 617.374.1313 | www.nepc.com

BOSTON | ATLANTA | CHARLOTTE | CHICAGO | DETROIT | LAS VEGAS | SAN FRANCISCO

Table of Contents

	<u>Tab</u>
NEPC Update	1
Market Thoughts & Education	2
Executive Summary	3
Total Fund Performance	4
Appendix	5



NEPC Update



Highlights of Third Quarter Happenings at NEPC

September 30, 2016

NEPC Insights

Recent White Papers

- “DC Governance: Slaying the Hydra” (August)
- “Nonprofit Annual Audit Survival Guide” (August)
- “Class is in Session: Lawsuits Against Higher Education Retirement Plans” (September)
- Market Chatter: “NEPC’s Summer Travel: Perspectives on China” (September)
- NEPC’s 11th Annual Defined Contribution Plan & Fee Survey

Webinar

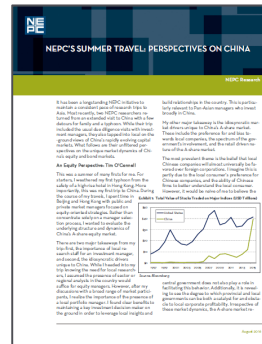
- “2016 Defined Contribution Plan & Fee Survey Webinar” (September); Panel reviewed key findings from our 11th annual NEPC 2016 Defined Contribution Plan & Fee Survey.

Video Series

- “Five Questions with Jeff Roberts on Healthcare Strategic Private Equity Investing” (July)
- “Five Questions with Richard M. Charlton” (July)
- “Discussing Pension Risk Transfers with Chris Levell and Craig Svendsen” (August)

NEPC Recognitions

We are pleased to announce that *Chief Investment Officer* published their fifth annual list of the world’s most influential investment consultants featuring NEPC’s **Tim McCusker, FSA, CFA, CAIA, CIO, Partner**, and **Scott Perry, CAIA, Partner**.



Upcoming Events

NEPC’s 22nd Annual Investment Conference will be held on May 9-10, 2017 at the InterContinental Hotel in Boston, MA.

ESG – Clearing Up The Confusion Webinar (Coming in December)

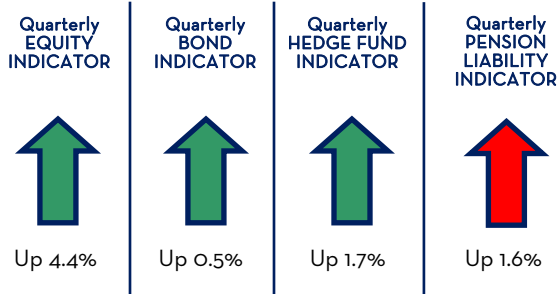
NEPC is hosting a webinar to continue the conversation around Environmental, Social and Governance integration (ESG). We aim to help clear up the confusion around what ESG represents and why it has become a growing topic of interest. NEPC will be joined by investment managers from different asset classes who will offer their insights into how they are implementing ESG into their investment portfolios.

NEPC Gives Back

- NEPC employees went “sock-less” and participated in the *Sox for Socks* drive to support the Boston Health Care for the Homeless Program, which provides socks for the homeless men and women of Boston.
- Eighteen NEPC employees volunteered to work with Habitat for Humanity Greater Boston, stepping up to help build new homes for low-income families in need of decent and affordable housing.

Market Thoughts & Education





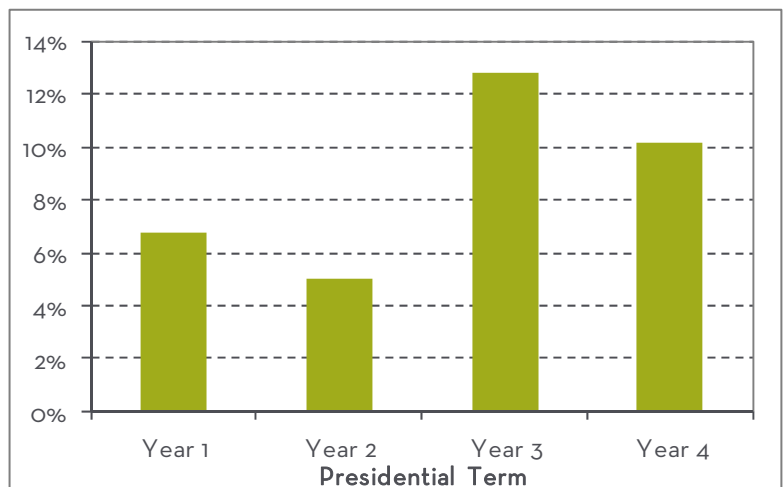
NEPC is an independent, full service investment consulting firm, providing asset allocation, traditional and alternative asset manager search, performance evaluation and investment policy services to institutional investment programs. We offer our market letters to provide insight into recent market 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.

THE YEAR SO FAR...AND YEAR(S) AHEAD

In what has been a bountiful year so far for global markets, equity and credit assets continued their climb upwards in the third quarter. Non-US equities led the way as stocks in Europe and Japan bounced back from their lows following the Brexit vote. Emerging market equities are up 16% for the year amid economic growth and recovering currencies. Meanwhile, yields rose for US Treasuries, pressured by expectations of higher inflation and in anticipation of a rate increase in December by the Federal Reserve. For investors who remained diversified, it has been a frustrating number of years and it is encouraging to see those that held the course enjoy the rewards in 2016.

For those contemplating the impact on markets from the upcoming US presidential elections, we have some facts and figures. But first, be sure to vote. Historically, the electoral outcome has had minimal impact on stocks. That said, dating back to 1896, the first two years of a presidential term have been a more difficult period for US equity investors, underperforming the final years of a four-year term by more than 5% (Exhibit 1). To be sure, this is not an investment thesis unto itself. Still, this trend's consistency should weigh on investors' minds as the S&P 500 marches towards its eighth straight year of gains.

Exhibit 1: US Equity Return in Presidential Term Years (1896-2016)



Source: Bloomberg

Looking beyond the presidential race, we turn our thoughts to key influences that we think will dominate markets in 2017 and beyond. To this end, we have outlined the following three major themes:

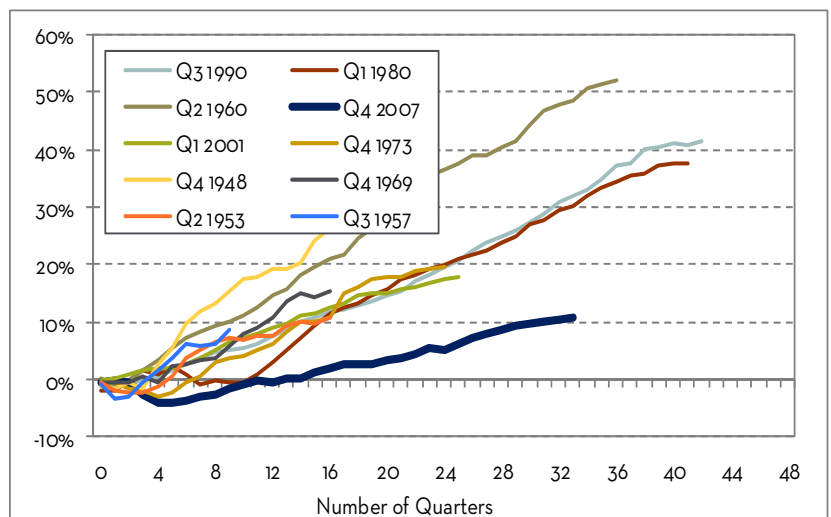
- (i) **US economic expansion:** The current growth cycle—at over seven years—is now the fourth longest expansion in the post-war period (Exhibit 2). One might assume, given the length of the expansion, the economy is due for a downturn. However, the continued strength of the US consumer and improvement in the housing sector remain a healthy tail wind. Considering these factors and the relatively muted economic growth of this cycle, there is potential for the US economy to grow at a slow and steady pace for an extended period. Such a scenario has broad implications for equity and credit assets as the absence of a downturn likely reduces the potential for volatility in corporate revenue and credit defaults.
- (ii) **Federal Reserve:** While the spotlight may be on the potential timing of the next rate hike, the pace at which the Fed raises rates over the longer term is of greater significance. To this end, we believe the Fed will raise rates at a slow and steady pace. Furthermore, the Fed has signaled its willingness to let the US economy run above capacity and allow inflation expectations to trend above its 2% target. Such an approach reinforces the potential of an ex-

tended economic expansion at home and curbs rapid appreciation of the dollar. Global economies are likely to benefit as a strong dollar tightens liquidity and raises borrowing costs for international dollar-based debtors. This dovish approach supports global economic growth and, more specifically, benefits emerging markets.

(iii) China: It is hard to overestimate the impact of China on the world economic order. For instance, its economic growth rate is equivalent to adding a new Switzerland to the global economy every year. China is expected to contribute nearly 40% of total GDP growth in 2016, according to the IMF. This is also a time of major transitions in China's economic and capital markets. The economy is shifting its focus from industry to services and consumer

consumption. Furthermore, the central government is slowly easing restrictions on capital markets and allowing the free market to hold greater sway over interest rate and currency levels. However, this transition is not without volatility as we saw earlier this year in January and August 2015 when sudden shifts in China's currency management fueled risk aversion, resulting in sharp declines in global capital markets.

Exhibit 2: Cumulative Real GDP Growth of US Economic Expansions



Source: FRED

These three themes inform our investment outlook for 2017 and beyond. We believe they provide a positive backdrop for global assets although with some clear risks. Ultimately, fundamentals and valuations will dictate returns but key cyclical and secular forces in the US and China underscore the risks and opportunities prevalent in the current investment environment. We look forward to further examining and highlighting these trends as they evolve and offering our insights to help investors meet their long-term investment objectives.

Global Equities

Domestic equities reversed course in the third quarter with the S&P 500 returning 3.9% and the Russell 2000 gaining 9.0%. Growth outpaced value across all capitalizations. Technology was the best performing sector while utilities and consumer staples lagged behind. Volatility, as measured by the VIX, dropped 15% during the quarter.

Outside the United States, developed markets had their best quarter of 2016, returning 6.4%. Investors shrugged off fears surrounding Brexit and monetary policies remained accommodative. Sector results were mixed with materials leading the pack with gains of 16% while healthcare declined 2%. In the United Kingdom, the market rebounded in local currency terms, but the pound continued to sell off and is at a 30-year low relative to the dollar.

Equity Index Returns as of 9/30/2016				
Global Equity	Quarter	1 Year	3 Yrs	5 Yrs
MSCI World	4.4%	9.1%	3.8%	9.3%
US Equity	Quarter	1 Year	3 Yrs	5 Yrs
S&P 500	3.9%	15.4%	11.2%	16.4%
Dow Jones Industrial Average	2.1%	12.4%	6.6%	10.9%
NASDAQ Composite	9.7%	15.0%	12.1%	17.1%
Russell 1000 Growth	4.6%	13.8%	11.8%	16.6%
Russell 1000 Value	3.5%	16.2%	9.7%	16.2%
Russell 2000	9.0%	15.5%	6.7%	15.8%
Russell 2000 Growth	9.2%	12.1%	6.6%	16.1%
Russell 2000 Value	8.9%	18.8%	6.8%	15.4%
International Equity	Quarter	1 Year	3 Yrs	5 Yrs
MSCI EAFE	6.4%	6.5%	0.5%	7.4%
MSCI Emerging Markets	9.0%	16.8%	-0.6%	3.0%
MSCI Europe	5.4%	2.5%	-0.6%	7.5%
MSCI UK	4.0%	1.5%	-1.8%	6.0%
MSCI Japan	8.6%	12.1%	3.3%	7.4%
MSCI Far East	8.6%	12.8%	3.4%	7.7%

Elsewhere, emerging markets rose around 9%, according to the MSCI Emerging Market Index. China—among the better performing countries—gained 13.9% in the third quarter. Political unrest in the Philippines resulted in declines of 5.3%.

Global Fixed Income

One-third of global developed sovereign debt yields were negative and two-thirds yielded below 1% in the third quarter. On the other hand, domestic high-yield fixed-income securities and hard currency emerging market debt were up 5.6% and 4%, respectively, for the three months ended September 30. So far this year, US high-yield debt and hard currency emerging market issues have returned around 15%, second only to gains of 17.1% by local currency

emerging market debt. The US Barclays Aggregate Index returned 0.5% this quarter, driven primarily by the corporate credit component of the index.

Currency Markets

Currency volatility subsided—albeit slightly—following the Brexit vote that ignited foreign exchange markets in June. The British pound continued its decline against the dollar. The DXY Index, a measure of the US dollar against a basket of developed currencies, finished the quarter marginally lower. The bid for high-yielding emerging market local debt buoyed developing economies though the currencies of some countries, including Mexico and Turkey, depreciated around 4%-5% in the quarter. The Fed will take center stage in investors’ minds towards the end of the year as markets are currently pricing in a greater than 50% chance of a rate hike in December.

Commodity Markets

On the heels of a strong first half of the year, commodities gave back a portion of their gains in the third quarter, as the Bloomberg Commodity Index retreated 3.9%. Markets were driven lower by concerns around excess supply in energy, the potential for a robust grain harvest and indications that soy prices were reverting back to the mean. Investor appetite for risk had minimal impact on precious metals as gold and silver gained. In energy, a deal that could potentially end OPEC’s “pump at will” policy buoyed oil prices.

Pension Liability

The Citigroup Pension Liability Index rose 11 basis points to 3.57% in September, its second increase this year. Still, rates are down four basis points for the quarter. Therefore, liabilities are estimated to have increased over the third quarter by 1.62%, with pension discount rates ending at 3.57% on September 30 compared to 3.61% on June 30. This brings the total increase in liabilities over the first three quarters of 2016 to about 19.1%.

Fixed Income Index Returns as of 9/30/2016				
Global Fixed Income	Quarter	1 Year	3 Yrs	5 Yrs
Citi WGBI	0.3%	9.7%	1.8%	0.8%
JPM EMBI Plus	3.1%	17.8%	8.0%	7.3%
Domestic Fixed Income	Quarter	1 Year	3 Yrs	5 Yrs
BC Aggregate Bond	0.5%	5.2%	4.0%	3.1%
BC US Agg. Treasury	-0.3%	4.1%	3.4%	2.2%
BC US Credit	1.2%	8.3%	5.4%	4.8%
BC Mortgage Backed	0.6%	3.6%	3.6%	2.6%
BC Interm. Gov't/Credit	0.2%	3.5%	2.8%	2.4%
BC 1-10 Yr TIPS	0.6%	4.8%	1.5%	1.3%
BC High Yield	5.6%	12.7%	5.3%	8.3%
S&P LSTA Lev. Loan	3.1%	5.5%	3.4%	5.2%
3 Month T-Bills	0.1%	0.3%	0.1%	0.1%
10-Year Bond Yields	Mar-16	Dec-15	Mar-15	Mar-14
US	1.6%	1.5%	2.0%	2.5%
Germany	-0.1%	-0.1%	0.6%	0.9%
UK	0.7%	0.9%	1.8%	2.4%
Japan	-0.1%	-0.2%	0.4%	0.5%

Changes in funded status were driven by asset returns rather than changes in liability. With equities gaining this quarter, many plans likely saw funded status improve. Clients with liability driven investment (LDI) strategies may not have seen much movement in funded status with long-duration credit posting gains over the quarter, partially offsetting the increase in liabilities. However, long-duration Treasuries posted negative returns in the third quarter. Therefore, the type of hedging assets in place was an important component of returns this quarter.

Given the low rate environment, clients who are considering implementing an initial LDI strategy should discuss strategies with their NEPC investment consultant.

Hedge Funds

Hedge funds were up 1.7% in the third quarter, according to the Credit Suisse Hedge Fund Composite. Strong performance in technology, healthcare and energy contributed to a rebound in equities, with the Credit Suisse Long-Short Equity Index gaining 1.9% in the third quarter.

Event-driven strategies experienced a healthy rebound with gains of 3.0%, according to the Credit Suisse Event Driven Index. Distressed opportunities in the event-driven space are driving annual performance for the strategy, returning 2.8% year to date, according to the Credit Suisse Event Driven Distressed Hedge Fund Index. Credit strategies experienced favorable performance with gains of 3.1%, according to the HFRI Relative Value (Total) Index, driven largely by convertible and fixed-income arbitrage strategies.

Global macro strategies lagged, gaining only 0.6%, according to the Credit Suisse Global Macro Index. The Credit Suisse Managed Futures Index was down 3.2% fueled by underperformance among managers following medium- and long-term trends. Although macro funds struggled in the third quarter, positive performance in emerging markets bolstered the overall strategy.

Hedge Fund Industry Performance Overview as of 9/30/2016				
Composite	Quarter	1 Year	3 Yrs	5 Yrs
DJCS Hedge Fund Composite	1.7%	0.0%	2.5%	4.3%
Relative Value	Quarter	1 Year	3 Yrs	5 Yrs
DJCS Convertible Arbitrage	3.8%	5.5%	2.1%	4.0%
DJCS Fixed Income Arbitrage	2.6%	2.4%	2.9%	4.6%
DJCS Equity Market Neutral	1.6%	-2.0%	1.2%	2.1%
DJCS Multi-Strategy	2.6%	3.7%	5.9%	7.3%
Event Driven	Quarter	1 Year	3 Yrs	5 Yrs
DJCS Event Driven	3.0%	-1.9%	0.1%	4.2%
DJCS Event Driven - Distressed	2.8%	0.9%	1.6%	5.4%
DJCS Event Driven - Risk Arbitrage	2.3%	5.9%	1.7%	2.6%
DJCS Event Driven - Multi-Strategy	3.1%	-3.0%	-0.6%	3.7%
Equity Hedge	Quarter	1 Year	3 Yrs	5 Yrs
DJCS Long-Short Equity	1.9%	-1.7%	4.0%	6.6%
DJCS Emerging Markets	4.2%	7.7%	3.5%	5.0%
DJCS Dedicated Short Bias	-12.1%	-21.9%	-8.8%	-15.4%
Tactical	Quarter	1 Year	3 Yrs	5 Yrs
DJCS Global Macro	0.6%	-0.4%	1.7%	2.3%
DJCS Managed Futures	-3.2%	-2.3%	6.8%	1.0%
Traditional Markets	Quarter	1 Year	3 Yrs	5 Yrs
BC Aggregate Bond	0.5%	5.2%	4.0%	3.1%
S&P 500	3.9%	15.4%	11.2%	16.4%

Private Markets

For the three months ended September 30, new deal and exit activity in buyouts lagged the prior quarter and year ago period, though aggregate deal value was consistent with the second quarter. Financial sponsors remain active in deploying capital but lag strategic merger and acquisition activity. Firms are exiting companies but the decline in sponsor-backed IPOs is driving down volume. Purchase prices are hovering near record highs in developed geographies, spurred by robust leverage levels; equity contributions also continue to be high.

At home, direct-lending opportunities still reside in the middle market with the lower-middle market posting outsized returns. That said, the risk-return profile of the core middle market is also appealing. In Europe, geopolitical events and reform are accelerating the pullback by banks. The manager universe in Europe has become tiered; stronger managers have better deal flow and are performing well. As pricing becomes competitive, fees have gained prominence.

In real estate, we are neutral on US core assets. While valuations stand at record highs on an absolute basis, fundamentals are robust as vacancies remain tight and new supply has largely been balanced. On a relative basis, cap rate spreads to US Treasury yields are still attractive as global economic uncertainty, partly influenced by Brexit, has driven down interest rates to record lows. We are positive on non-core real estate and continue to favor cash flow-driven managers who are attentive to duration risk at the current stage of the expansion cycle. A flight to quality will continue to favor US real estate markets, while opportunities to capitalize on distress or capital markets' inefficiencies in Europe and select emerging markets remain.

In real assets, we are positive on energy, negative on timber, and neutral on agriculture, infrastructure, and metals and mining. NEPC continues to evaluate energy-related investment opportunities. Still, balance sheet stress has subsided as oil prices have rebounded and capital markets have become more accessible. Although the global oil market remains oversupplied, signals from OPEC and Russia supporting a potential cut or limit on new production have bolstered oil prices, leading to higher asset values in the energy sector. Our highest conviction remains in private equity as these managers appear best equipped to invest and manage assets amidst a choppy recovery. We believe asset selection is critical in energy and are evaluating select opportunities in other parts of real assets.

Final Thoughts

We strongly advocate disciplined portfolio rebalancing. Reducing exposure to assets that have outperformed expectations is integral to our investment philosophy. The gains of US stocks provide just such an opportunity and we advise investors to shift exposure to developed market equities outside of the United States. Similarly, we encourage adjustments in developed market sovereign debt following recent gains and are biased towards Treasury inflation-protected securities (TIPS) over nominal government bonds. Despite their recent strong showing, we recommend investors maintain allocations to emerging markets and believe equities and local currency debt offer the most attractive total return opportunity in public markets. Finally, we remind investors of the importance of a risk balanced investment approach and believe it best serves investors' ability to weather a multitude of economic environments over the long term.

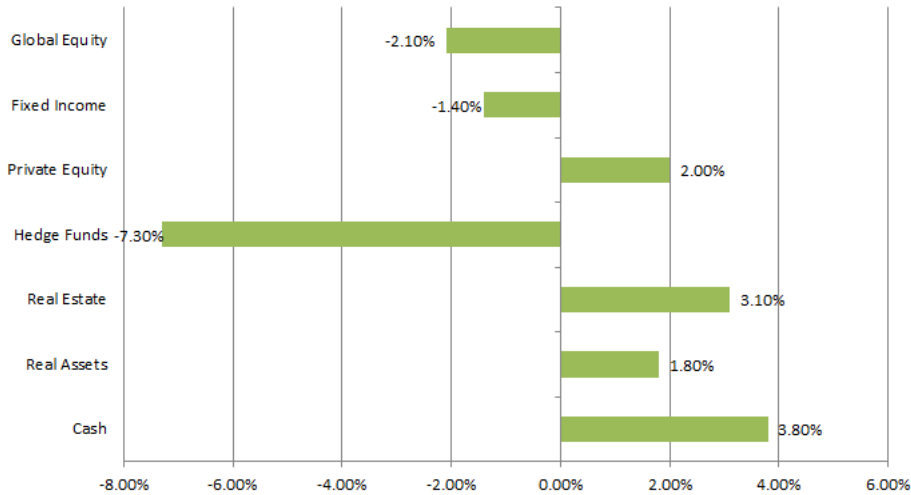
Disclaimers and Disclosures

- 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.

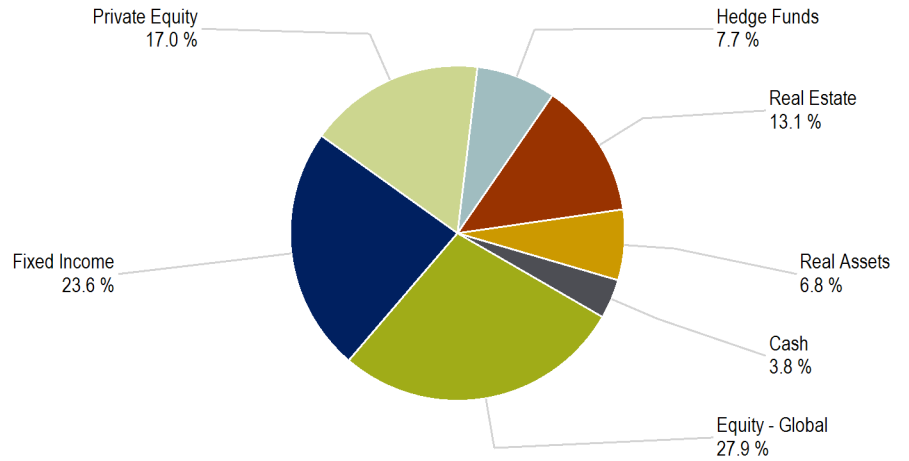
Executive Summary

Total Fund Asset Allocation vs. Current Allocation

Current Allocation vs. Policy Allocation



Current Asset Allocation

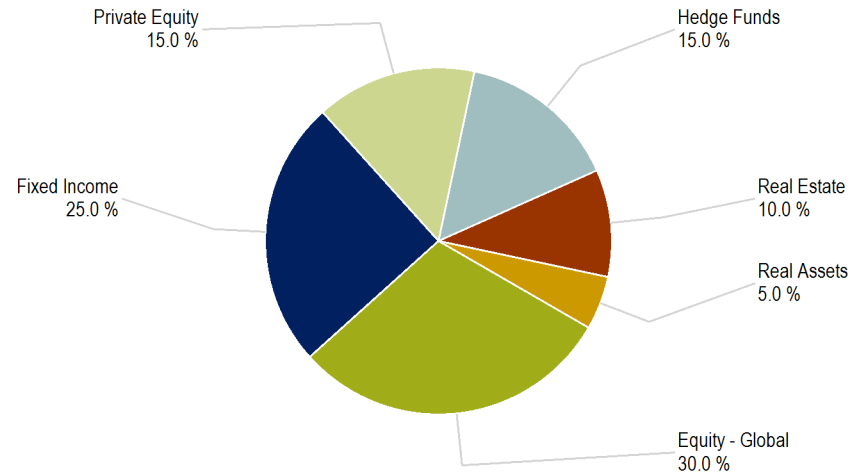


Current Asset Allocation vs. Policy Asset Allocation

	Current	Policy	Current	Current Difference*
Equity - Global	\$567,077,274	30.0%	27.9%	-2.1%
Fixed Income	\$478,977,848	25.0%	23.6%	-1.4%
Private Equity	\$344,695,205	15.0%	17.0%	2.0%
Hedge Funds	\$156,156,093	15.0%	7.7%	-7.3%
Real Estate	\$266,331,561	10.0%	13.1%	3.1%
Real Assets	\$138,974,872	5.0%	6.8%	1.8%
Cash	\$77,947,555	--	3.8%	3.8%
Total	\$2,030,160,408	100.0%	100.0%	

*Difference between Policy and Current Allocation

Policy Asset Allocation

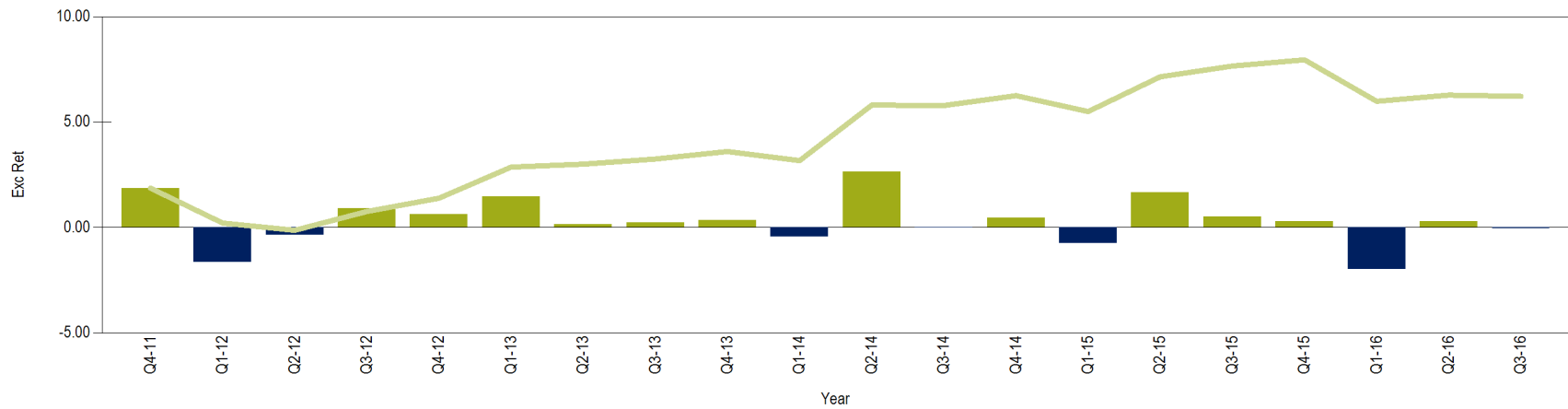


Allocations may not add to 100% due to rounding.

Total Fund Performance Summary

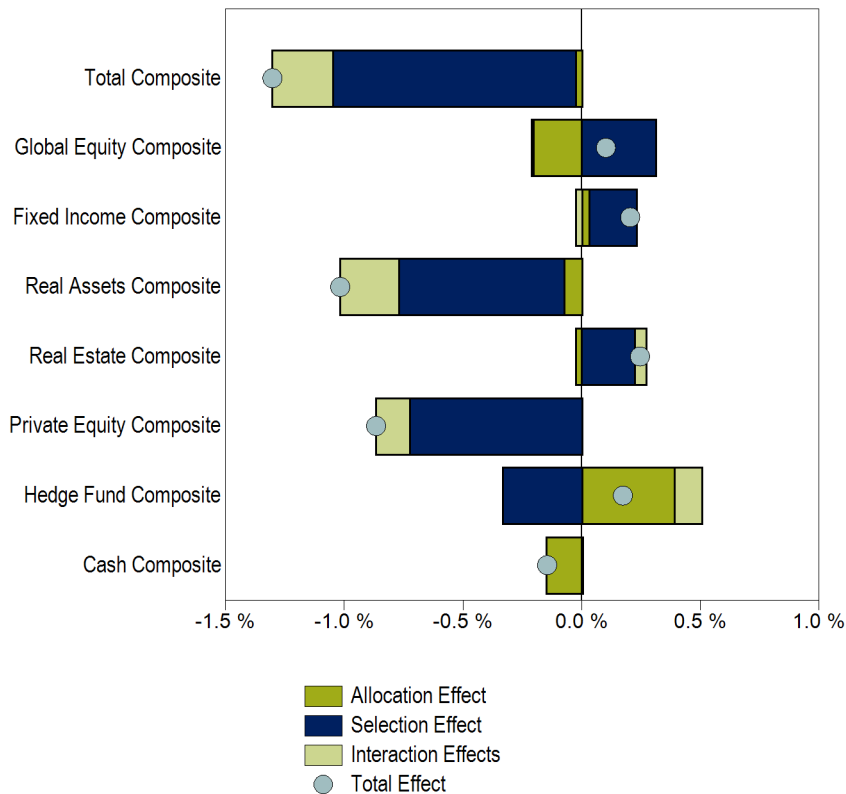
	Market Value	3 Mo	1 Yr	3 Yrs	5 Yrs	10 Yrs
Total Composite	\$2,030,160,408	2.88%	6.26%	7.80%	9.86%	5.82%
<i>Policy Index</i>		2.94%	7.78%	6.77%	8.54%	5.78%
<i>InvestorForce Public DB Net Median</i>		3.42%	9.26%	5.49%	8.74%	5.37%

Quarterly and Cumulative Excess Performance



Total Fund Attribution Analysis

Attribution Effects Relative to Policy Index
1 Year Ending September 30, 2016



Attribution Summary
1 Year Ending September 30, 2016

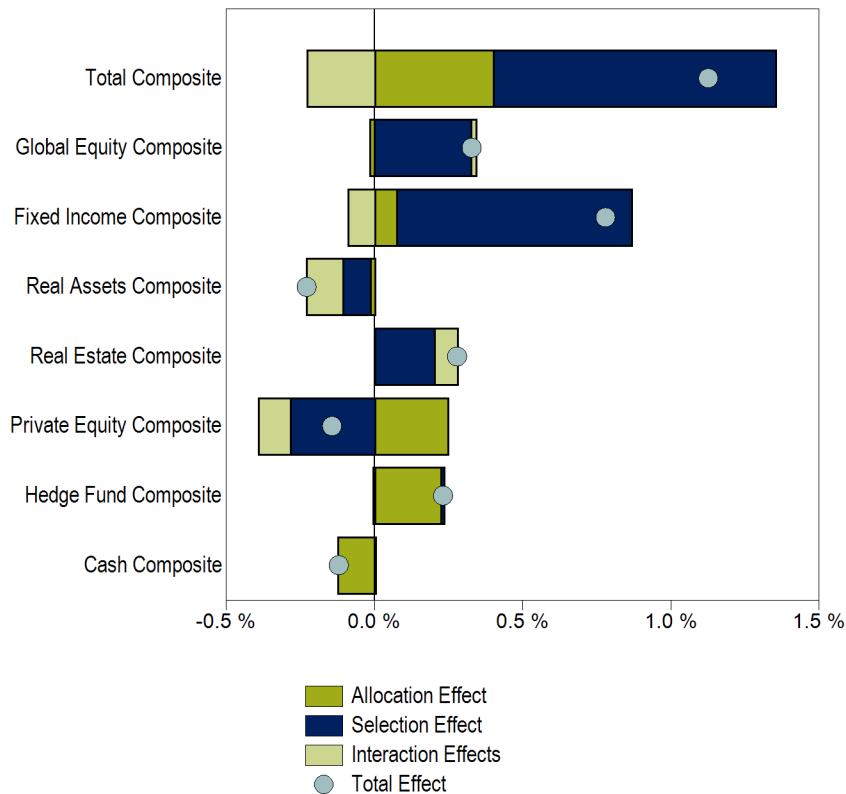
	Wtd. Actual Return	Wtd. Index Return	Excess Return	Selection Effect	Allocation Effect	Interaction Effects	Total Effects
Global Equity Composite	13.0%	12.0%	1.0%	0.3%	-0.2%	0.0%	0.1%
Fixed Income Composite	6.9%	6.1%	0.8%	0.2%	0.0%	0.0%	0.2%
Real Assets Composite	-7.7%	5.5%	-13.2%	-0.7%	-0.1%	-0.2%	-1.0%
Real Estate Composite	9.9%	--	--	0.2%	0.0%	0.0%	0.2%
Private Equity Composite	3.2%	7.1%	-3.9%	-0.7%	0.0%	-0.1%	-0.9%
Hedge Fund Composite	-1.6%	0.5%	-2.1%	-0.3%	0.4%	0.1%	0.2%
Cash Composite	0.3%	0.2%	0.0%	0.0%	-0.1%	0.0%	-0.1%
Total	6.4%	7.6%	-1.2%	-1.0%	0.0%	-0.3%	-1.3%

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
3 Years Ending September 30, 2016**



**Attribution Summary
3 Years Ending September 30, 2016**

	Wtd. Actual Return	Wtd. Index Return	Excess Return	Selection Effect	Allocation Effect	Interaction Effects	Total Effects
Global Equity Composite	6.3%	5.2%	1.1%	0.3%	0.0%	0.0%	0.3%
Fixed Income Composite	7.4%	4.3%	3.1%	0.8%	0.1%	-0.1%	0.8%
Real Assets Composite	2.9%	5.1%	-2.1%	-0.1%	0.0%	-0.1%	-0.2%
Real Estate Composite	13.0%	10.9%	2.1%	0.2%	0.0%	0.1%	0.3%
Private Equity Composite	13.3%	15.0%	-1.7%	-0.3%	0.2%	-0.1%	-0.1%
Hedge Fund Composite	2.2%	2.2%	0.0%	0.0%	0.2%	0.0%	0.2%
Cash Composite	0.2%	0.1%	0.1%	0.0%	-0.1%	0.0%	-0.1%
Total	7.9%	6.7%	1.2%	0.9%	0.4%	-0.2%	1.1%

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

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	2,030,160,408	2.88	77	4.92	94	6.26	99	7.80	1	9.86	23	5.82	26
<i>Policy Index</i>				2.94	73	6.73	39	7.78	88	6.77	7	8.54	61	5.78	27
Global Equity Composite	30.00	27.93	567,077,274	6.17	36	7.65	31	13.00	32	6.28	34	12.37	28	5.17	39
<i>MSCI ACWI</i>				5.30	49	6.60	41	11.96	41	5.17	56	10.63	66	4.34	66
Fixed Income Composite	25.00	23.59	478,977,848	1.14	76	6.80	73	6.91	69	7.39	1	7.28	13	6.50	19
<i>Barclays U.S. Universal</i>				0.96	82	6.69	73	6.11	75	4.27	33	3.62	56	5.00	48
Real Assets Composite	5.00	7.60	154,211,487	2.58	--	-2.97	--	-7.69	--	2.92	--	--	--	--	--
<i>CPI + 4% (Unadjusted)</i>				1.16	--	5.11	--	5.52	--	5.06	--	5.30	--	5.82	--
Real Estate Composite	10.00	12.37	251,094,946	2.06	--	7.95	--	11.11	--	13.47	--	13.81	--	5.67	--
<i>NFI-ODCE Eq Wtd Net Non Lag</i>				1.96	--	6.28	--	9.69	--	11.64	--	11.41	--	4.86	--
Private Equity Composite	15.00	16.98	344,695,205	1.26	--	3.41	--	3.22	--	13.30	--	12.01	--	6.87	--
<i>MO Hwy Priv. Equ. Index - Lagged</i>				3.21	--	13.61	--	7.10	--	14.98	--	15.43	--	11.03	--
Hedge Fund Composite	15.00	7.69	156,156,093	2.90	--	-1.09	--	-1.55	--	2.20	--	3.99	--	--	--
<i>HFRI Fund of Funds Composite Index</i>				2.46	--	-0.19	--	0.54	--	2.18	--	3.18	--	1.78	--
Cash Composite	0.00	3.84	77,947,555	0.07	--	0.27	--	0.28	--	0.16	--	0.11	--	0.95	--
<i>91 Day T-Bills</i>				0.07	--	0.20	--	0.23	--	0.09	--	0.08	--	0.77	--

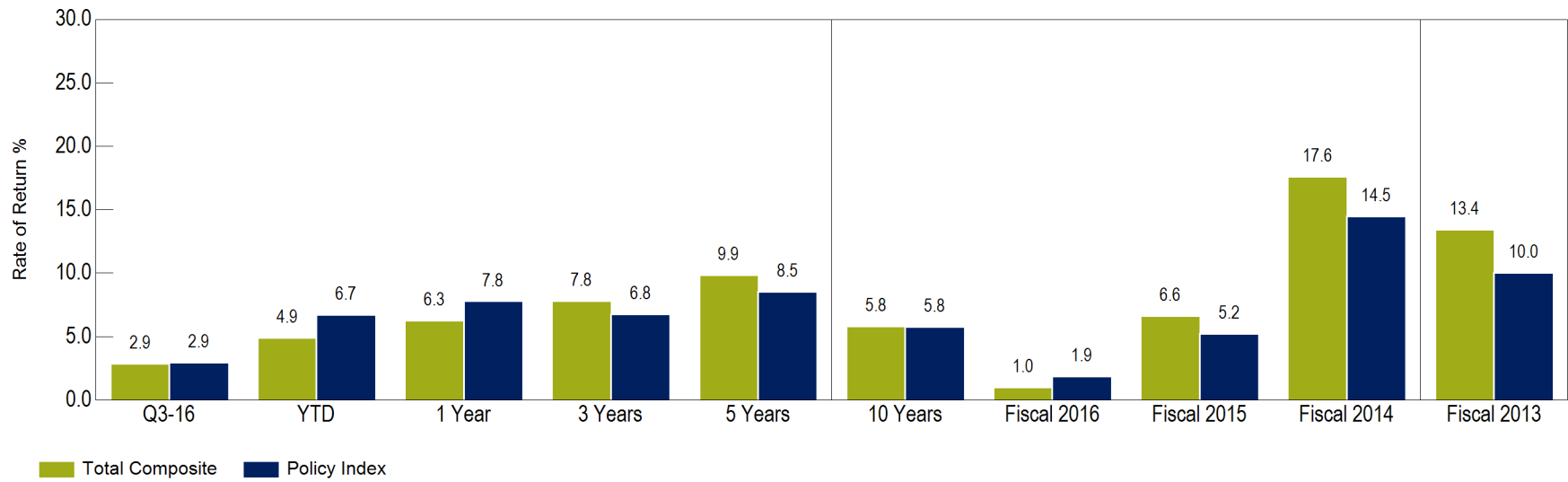
Total Composite is ranked in the IFx Public DB (peer) Net + Universe

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

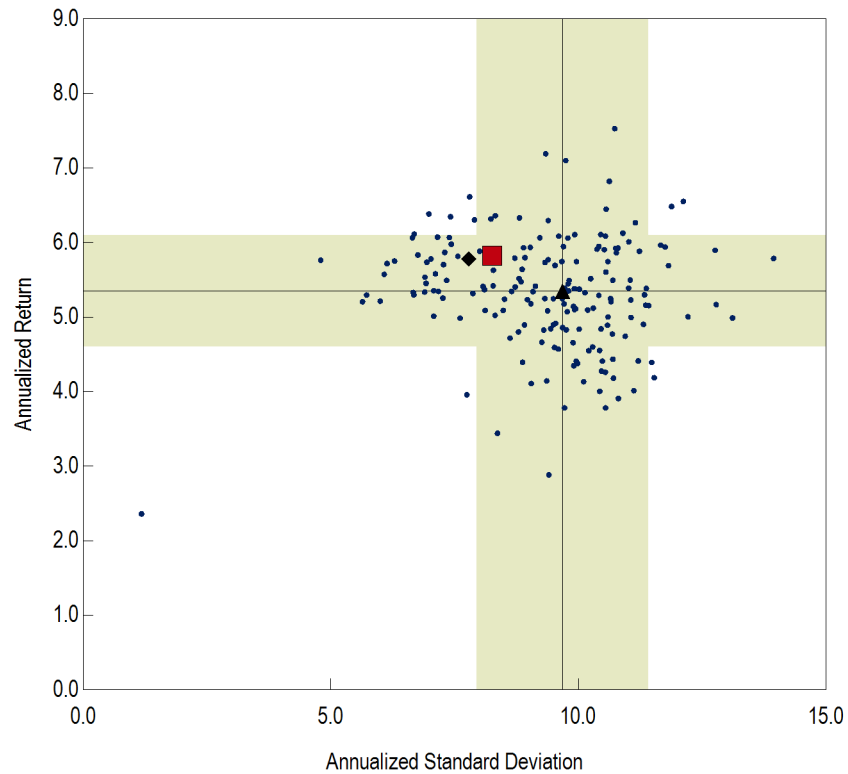
Total Fund Return Summary

Return Summary Net



Total Fund Risk/Return - 10 Years

10 Years Ending September 30, 2016



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

Statistics Summary
10 Years Ending September 30, 2016

	Anlzd Ret	Rank	Anlzd Std Dev	Rank
Total Composite	5.82%	26	8.26%	24
Policy Index	5.78%	28	7.79%	20

Statistics Summary
10 Years Ending September 30, 2016

	Sharpe Ratio	Rank
Total Composite	0.61	23
Policy Index	0.64	20

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	2,030,160,446	100.00	100.00	2.88	4.92	6.26	7.80	9.86	5.82
<i>Policy Index</i>				2.94	6.73	7.78	6.77	8.54	5.78
Global Equity Composite	567,077,274	27.93	30.00	6.17	7.65	13.00	6.28	12.37	5.17
<i>MSCI ACWI</i>				5.30	6.60	11.96	5.17	10.63	4.34
Tortoise	68,110,164	3.35		2.30	10.75	14.32	0.53	9.91	--
<i>Alerian MLP Index</i>				1.07	15.94	12.74	-4.82	4.96	9.01
Domestic Equity Composite	331,544,462	16.33	--	6.09	8.12	14.66	10.39	17.02	7.13
<i>Russell 3000</i>				4.40	8.18	14.96	10.44	16.36	7.37
Large Cap Composite	271,121,223	13.35	--	5.29	8.35	15.48	11.47	16.44	7.69
Cash/S&P Futures	271,109,200	13.35		5.89	9.42	17.78	10.07	--	--
Intech	12,023	0.00		2.43	5.71	11.16	11.25	16.15	7.44
<i>S&P 500</i>				3.85	7.84	15.43	11.16	16.37	7.24
Small/Mid Cap Composite	60,423,239	2.98	--	9.41	8.48	13.69	7.70	16.92	8.33
Kennedy Capital	23,480,952	1.16		8.05	10.35	13.62	--	--	--
Pinnacle	36,942,287	1.82		10.30	1.61	11.80	5.92	16.07	9.09
<i>Russell 2500</i>				6.56	10.80	14.43	7.77	16.30	7.94
International Equity Composite	167,422,648	8.25	--	7.68	6.16	10.29	2.39	7.87	3.02
<i>MSCI ACWI ex USA</i>				6.91	5.82	9.26	0.18	6.04	2.17
Silchester	112,322,720	5.53		6.58	5.00	8.38	3.39	9.98	7.05
Acadian Int'l Small Cap	33,731,341	1.66		7.15	5.79	14.21	--	--	--
<i>MSCI EAFE</i>				6.43	1.73	6.52	0.48	7.39	1.82
Gryphon	0	0.00		7.92	0.56	6.60	--	--	--
<i>MSCI EAFE Growth</i>				4.96	2.63	9.47	2.39	8.73	3.14
Acadian Emerging Markets	0	0.00		10.04	15.74	15.87	-1.09	3.74	3.86
GMO EM	20,954,754	1.03		5.67	11.87	11.84	1.30	--	--
<i>MSCI Emerging Markets</i>				9.03	16.02	16.78	-0.56	3.03	3.94
Transition Account	413,833	0.02							

MPERS

Total Fund Performance Detail

	Market Value (\$)	% of Portfolio	Policy %	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Fixed Income Composite	478,977,848	23.59	25.00	1.14	6.80	6.91	7.39	7.28	6.50
<i>Barclays U.S. Universal</i>				0.96	6.69	6.11	4.27	3.62	5.00
Core Fixed Income Composite	154,407,393	7.61	10.00	-2.07	2.47	2.97	4.32	4.31	4.02
Aberdeen	21,607,257	1.06		2.47	3.19	4.84	5.03	6.51	5.31
<i>Barclays Aggregate</i>				0.46	5.80	5.19	4.03	3.08	4.79
Internal Fixed - Core	88,411,267	4.35		-4.72	0.80	1.23	4.17	--	--
<i>Barclays Govt/Credit</i>				0.40	6.66	5.86	4.22	3.24	4.86
Octagon Senior Debt	26,076,369	1.28		1.76	4.65	4.52	--	--	--
<i>Barclays Aggregate</i>				0.46	5.80	5.19	4.03	3.08	4.79
Principal CMBS Fixed	18,312,500	0.90		2.22	5.32	5.06	3.87	--	--
<i>Barclays CMBS ERISA Eligible</i>				0.59	6.55	5.23	3.95	4.83	5.50
Long Duration Composite	120,214,104	5.92	5.00	0.87	11.22	10.97	9.59	6.67	--
Internal Fixed - Long Duration	120,214,104	5.92		0.86	11.21	10.96	9.58	6.71	--
<i>Barclays LT Govt/Credit</i>				1.24	15.74	14.66	10.08	6.32	7.84
Opportunistic Debt Composite	178,535,169	8.79	5.00	4.80	8.70	8.60	11.72	14.76	--
ABRY ASF	136,779	0.01		4.56	5.20	7.42	24.14	23.07	--
Anchorage Capital II	366,452	0.02		-0.96	-2.57	-4.27	12.51	14.84	--
Anchorage Capital III	5,867,870	0.29		0.91	-0.66	0.94	11.93	--	--
Anchorage Illiquid Opps	2,378,865	0.12		8.78	11.24	--	--	--	--
Audax Mezzanine II	304,069	0.01		-12.66	-14.17	-9.36	6.48	7.22	6.76
CVI Credit Value	9,025,311	0.44		4.56	12.16	13.98	18.54	24.47	--
CVI Credit Value Fund III	7,537,186	0.37		4.43	11.70	12.20	--	--	--
CVI Global Value	4,616,239	0.23		-1.41	2.15	1.76	6.60	11.84	--
GOLUB Capital	27,059,967	1.33		2.28	8.01	8.64	6.66	6.69	--
GSO Capital Opp II	5,242,777	0.26		3.24	-5.14	-8.35	8.56	--	--
GSO Credit Alpha Fund	16,992,376	0.84		5.74	10.77	-0.67	--	--	--
GSO Capital Opp	945,254	0.05		-4.12	-5.07	0.59	6.26	15.54	--
GSO Energy Select Opps	982,842	0.05		15.79	25.80	--	--	--	--
Internal Fixed - Nonrated	2,167,468	0.11		0.96	7.49	8.41	--	--	--
M&G III	6,443,028	0.32		-0.90	-7.26	-7.81	-80.11	--	--
Northern Shipping II	14,508,847	0.71		2.34	6.84	8.05	--	--	--
Northern Shipping III	6,773,487	0.33		-0.54	--	--	--	--	--
Och-Ziff II	4,573,734	0.23		8.94	7.99	3.85	9.76	--	--
OCP Asia	13,853,170	0.68		2.80	11.15	13.99	13.95	--	--
Octagon Opportunistic	32,847,403	1.62		11.59	15.21	11.24	--	--	--

MPERS

Total Fund Performance Detail

	Market Value (\$)	% of Portfolio	Policy %	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Riverstone Credit Partners	10,231,738	0.50		6.77	12.14	16.04	--	--	--
<i>Barclays High Yield</i>				5.55	15.11	12.73	5.28	8.34	7.71
Siguler Guff Sec Opps	5,351,738	0.26		--	--	--	--	--	--
<i>Barclays High Yield</i>				5.55	15.11	12.73	5.28	8.34	7.71
GSO COF III	328,569	0.02		--	--	--	--	--	--
<i>Barclays High Yield</i>				5.55	15.11	12.73	5.28	8.34	7.71
Inflation Protection Securities Composite	25,821,182	1.27	5.00	0.60	6.41	5.47	2.44	2.15	--
Internal US TIPS	25,821,182	1.27		0.59	6.40	5.46	2.43	2.15	--
<i>Barclays US TIPS</i>				0.97	7.27	6.58	2.40	1.92	4.48
Real Assets Composite	154,211,487	7.60	5.00	2.58	-2.97	-7.69	2.92	--	--
<i>CPI + 4% (Unadjusted)</i>				1.16	5.11	5.52	5.06	5.30	5.82
American Infrastructure I MLP	17,408,557	0.86		2.96	1.31	5.00	-0.63	-0.69	--
American Infrastructure II MLP	8,226,058	0.41		-2.12	2.64	2.14	--	--	--
Apollo Aviation III	3,612,445	0.18		-0.46	-5.96	-10.88	--	--	--
Blue Road	3,287,280	0.16		2.58	12.65	--	--	--	--
EIF - US Power III	9,212,153	0.45		-0.07	2.84	3.32	13.68	10.18	--
EMG Fund IV	11,949,335	0.59		-0.68	-1.20	-21.76	--	--	--
Energy & Mineral Group III	14,159,305	0.70		-0.42	-11.82	-12.33	--	--	--
Energy & Mineral Group II	12,144,587	0.60		5.64	-5.52	-11.81	19.86	--	--
Midstream & Resources I	7,931,279	0.39		7.63	-17.05	-31.75	-1.54	13.63	--
NGP IX	2,999,089	0.15		22.67	-12.55	-27.46	-2.81	-0.07	--
NGP X	6,944,893	0.34		13.78	3.35	-5.96	-0.20	--	--
NGP XI	3,061,890	0.15		10.49	4.74	-7.25	--	--	--
Orion Mine Finance Fund I	11,135,776	0.55		7.91	9.19	10.00	--	--	--
Ridgewood Energy	7,361,545	0.36		0.27	-2.26	-1.98	--	--	--
Ridgewood III	303,000	0.01		-34.75	-61.30	-67.54	--	--	--
Sciens Marine Investments	2,261,103	0.11		-2.36	-54.57	-60.76	--	--	--
<i>CPI + 4% (Unadjusted)</i>				1.16	5.11	5.52	5.06	5.30	5.82
RMK - Timberland	4,802,029	0.24		-0.62	-2.91	-2.97	-0.74	7.26	1.65
MP Timber	27,154,456	1.34		-0.05	--	--	--	--	--
<i>NCREIF Timberland 1 Qtr Lag</i>				1.09	2.70	3.49	7.77	6.72	6.40
Newquest Fund	256,707	0.01		--	--	--	--	--	--
<i>CPI + 4% (Seasonally Adjusted)</i>				1.44	4.26	5.41	5.03	5.26	5.80

MPERS

Total Fund Performance Detail

	Market Value (\$)	% of Portfolio	Policy %	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Real Estate Composite	251,094,946	12.37	10.00	2.06	7.95	11.11	13.47	13.81	5.67
<i>NFI-ODCE Eq Wtd Net Non Lag</i>				1.96	6.28	9.69	11.64	11.41	4.86
Core Real Estate Composite	160,576,658	7.91	--	2.43	8.52	12.93	14.85	15.52	5.48
<i>NCREIF Property Index</i>				1.77	6.13	9.22	11.30	11.18	7.22
CBRE Capital Partners	690,267	0.03		-1.25	4.96	12.59	9.62	11.15	--
Clarion Lion	66,546,350	3.28		1.86	6.78	10.13	11.77	11.31	3.90
Principal CMBS	20,516,164	1.01		3.56	13.25	12.10	15.32	21.67	--
Principal Enhanced Property	49,229,549	2.42		2.90	9.61	18.81	17.36	16.72	3.96
<i>NCREIF Property Index</i>				1.77	6.13	9.22	11.30	11.18	7.22
Principal US Property	23,594,328	1.16		2.04	6.29	9.25	11.94	11.99	4.96
<i>NCREIF ODCE</i>				2.07	6.52	10.07	12.45	12.39	6.02
Non-Core Real Estate Composite	74,508,775	3.67	--	1.53	7.45	7.36	11.86	10.44	3.91
AEW Partners V	169,540	0.01		10.66	42.93	104.49	60.68	43.54	14.23
Apollo European III	1,838,901	0.09		-0.05	5.38	-2.91	3.95	2.93	--
Apollo Real Estate	6,748,508	0.33		4.47	14.20	13.37	17.07	15.80	1.35
Centersquare III	13,726,482	0.68		0.60	--	--	--	--	--
<i>NCREIF Property Index</i>				1.77	6.13	9.22	11.30	11.18	7.22
Clarion Lion Mexico Fund	2,268,908	0.11		-0.99	-24.77	-26.37	-12.62	-9.91	--
Colony Capital VIII	1,774,702	0.09		-1.13	-9.86	-26.58	0.28	-3.30	--
M&G II	7,834,039	0.39		-0.66	-6.36	-6.80	3.35	--	--
Och-Ziff	3,125,262	0.15		8.14	48.68	56.66	28.16	33.14	26.07
Och-Ziff RE III	2,960,983	0.15		2.52	5.17	5.79	--	--	--
Torchlight Debt Opp II	8,778,977	0.43		0.42	9.65	12.90	--	--	--
Torchlight Debt Opp III	3,356,318	0.17		0.28	1.44	1.64	--	--	--
Torchlight Debt Opps V	3,020,008	0.15		3.26	1.10	-0.49	--	--	--
Tristan EISPO	4,833,551	0.24		3.25	9.87	18.22	12.85	9.74	--
Tristan EPI SO 3	8,601,135	0.42		1.38	3.68	0.09	--	--	--
Tristan EPI SO 4	2,099,463	0.10		1.17	2.35	--	--	--	--
Urdang Value Added Fund II	784,978	0.04		-6.99	-4.83	-3.74	2.95	8.83	--
<i>NCREIF Property Index</i>				1.77	6.13	9.22	11.30	11.18	7.22
Och Ziff RE Credit FD LP	2,587,020	0.13		--	--	--	--	--	--
<i>NCREIF Property Index</i>				1.77	6.13	9.22	11.30	11.18	7.22

MPERS

Total Fund Performance Detail

	Market Value (\$)	% of Portfolio	Policy %	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
REITS Composite	16,009,513	0.79	--	0.67	5.99	8.90	6.09	9.49	--
CBRE Investors	16,009,513	0.79		0.66	5.98	8.89	6.09	9.49	--
<i>FTSE EPRA/NAREIT Developed</i>				1.25	10.23	14.85	7.71	12.29	3.41
Private Equity Composite	344,695,205	16.98	15.00	1.26	3.41	3.22	13.30	12.01	6.87
<i>MO Hwy Priv. Equ. Index - Lagged</i>				3.21	13.61	7.10	14.98	15.43	11.03
Abry Partners VI	3,469,479	0.17		8.31	34.15	43.52	34.72	30.14	--
Abry Partners VII	4,950,379	0.24		1.03	4.95	4.51	15.04	12.14	--
Capital Partners II	8,477,354	0.42		4.18	5.78	10.54	--	--	--
Grove Street - MP Ventures	125,474,739	6.18		0.81	2.61	1.70	10.91	11.35	5.17
Grove Street - MP Ventures II	168,476,138	8.30		0.78	2.17	2.19	15.34	10.93	--
KPS IV	704,617	0.03		39.58	44.58	49.70	17.74	--	--
Opengate Capital Partners	1,820,371	0.09		-9.98	--	--	--	--	--
Ospraie	1,979,602	0.10		-1.80	33.45	19.39	16.65	9.79	--
Shore Capital Partners GP I LP	1,820,716	0.09		17.59	19.46	14.20	--	--	--
Shoreline China Valu III	7,852,951	0.39		-1.73	2.16	11.59	--	--	--
Turnbridge Capital Partners I	3,052,841	0.15		0.00	-6.15	-10.07	--	--	--
Vectis H & L II	12,249,377	0.60		13.22	22.64	24.77	19.41	13.73	--
Pfungsten Fund V	1,007,895	0.05							
Aisling	3,358,745	0.17		-6.38	--	--	--	--	--
<i>MO Hwy Priv. Equ. Index - Lagged</i>				3.21	13.61	7.10	14.98	15.43	11.03
Long Ridge II	1	0.00		--	--	--	--	--	--
<i>MO Hwy Priv. Equ. Index - Lagged</i>				3.21	13.61	7.10	14.98	15.43	11.03

MPERS

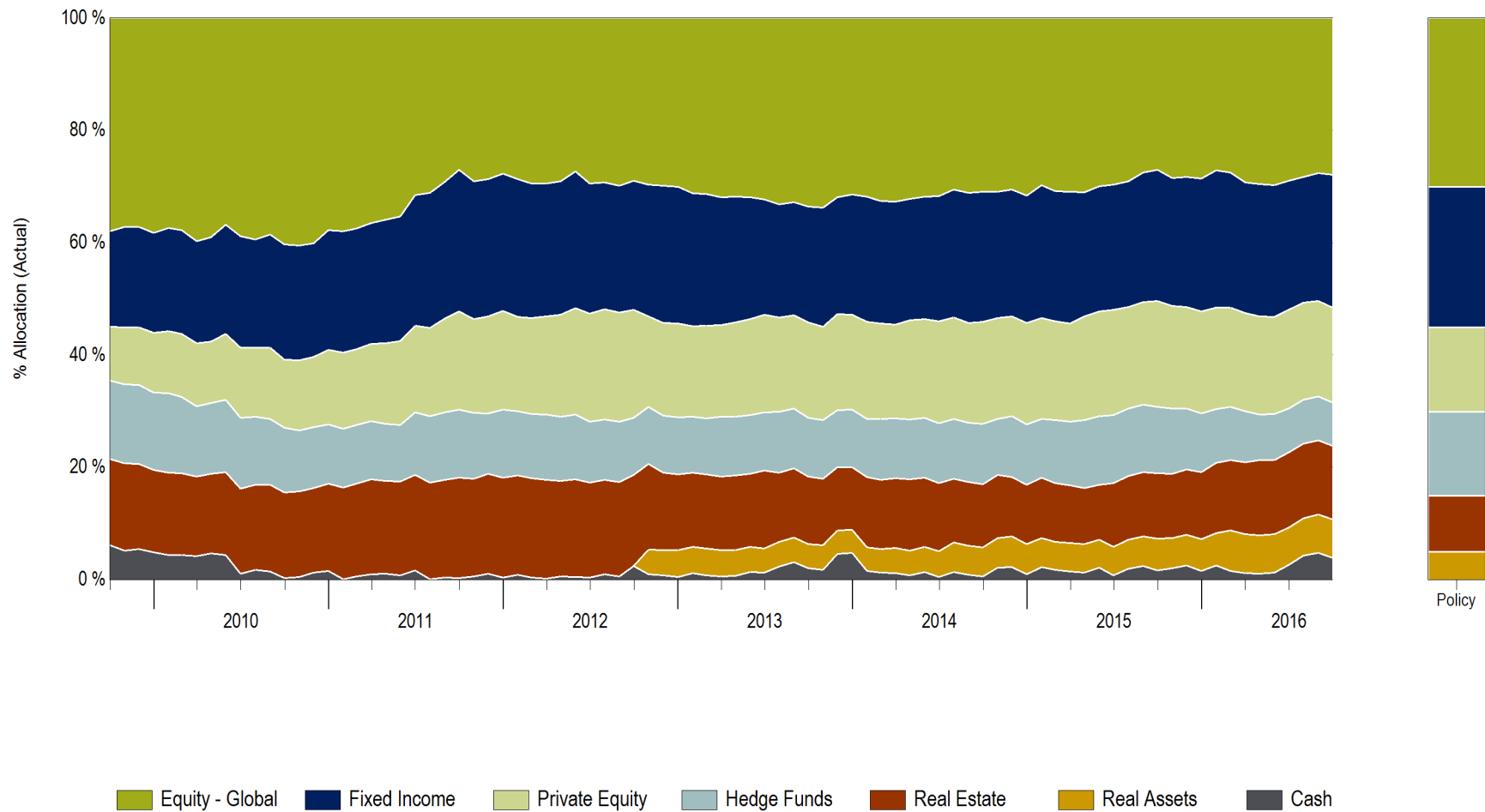
Total Composite

	Market Value (\$)	% of Portfolio	Policy %	3 Mo (%)	YTD (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)
Hedge Fund Composite	156,156,093	7.69	15.00	2.90	-1.09	-1.55	2.20	3.99	--
<i>HFRI Fund of Funds Composite Index</i>				2.46	-0.19	0.54	2.18	3.18	1.78
Alyeska Fund	14,627,676	0.72		2.71	-5.97	-5.93	--	--	--
BlueTrend	9,812,457	0.48		-7.19	-7.10	-9.30	2.98	--	--
Brevan Howard	3,630,516	0.18		-1.95	-3.00	-5.13	-1.43	0.15	--
Bridgewater Pure Alpha	15,935,563	0.78		1.79	-10.19	-9.49	-0.43	0.77	8.94
Cevian	12,681,821	0.62		13.15	11.43	18.03	4.44	--	--
Indus Pacific Opp. Fund	11,829,256	0.58		3.45	2.53	3.56	--	--	--
Koppenburg Commodity Fund	9,917,248	0.49		-2.55	4.39	-0.72	--	--	--
Luxor Capital	2,463,708	0.12		-3.37	-20.45	-23.72	-12.52	-5.87	--
Metacapital	11,307,662	0.56		3.50	5.25	3.81	6.82	--	--
Millenium USA LP	18,095,131	0.89		3.07	3.87	4.85	--	--	--
Pentwater	10,027,388	0.49		12.27	7.24	12.36	--	--	--
PFM	12,125,365	0.60		5.30	-5.16	-5.17	4.26	6.36	--
RK Capital Management LLP	10,607,513	0.52		-1.49	-0.95	1.93	--	--	--
Shepard International	483,347	0.02		-0.80	-5.78	-2.20	-3.99	-5.04	--
Taconic Capital	797,704	0.04		3.06	8.03	9.62	3.46	7.39	--
ValueAct	11,813,738	0.58		6.43	-2.63	-4.03	5.46	--	--
Cash Composite	77,947,555	3.84	0.00	0.07	0.27	0.28	0.16	0.11	0.95
<i>91 Day T-Bills</i>				0.07	0.20	0.23	0.09	0.08	0.77

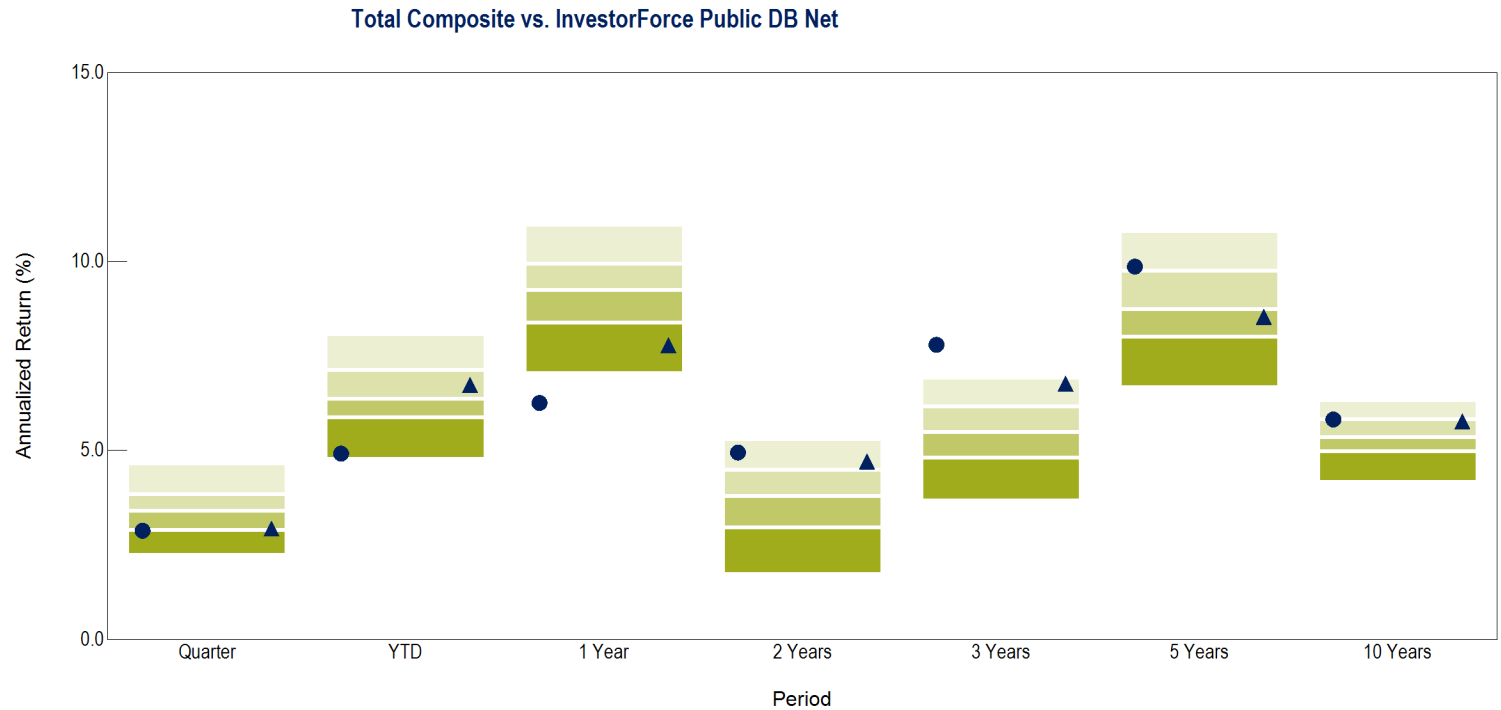
Appendix

Total Fund Asset Allocation History

Asset Allocation History



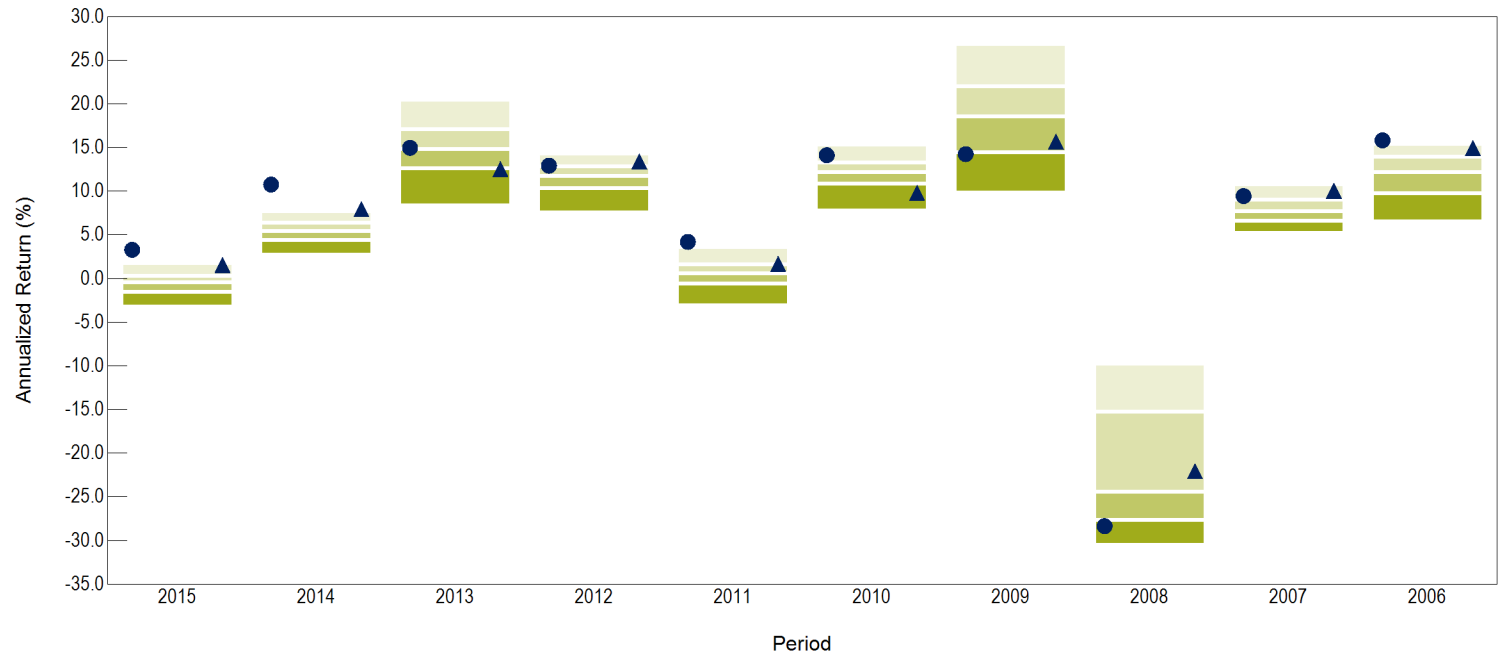
Total Fund Return Summary vs. Peer Universe



	Return (Rank)													
5th Percentile	4.7	8.1	11.0	5.3	6.9	10.8	6.3							
25th Percentile	3.9	7.1	10.0	4.5	6.2	9.8	5.8							
Median	3.4	6.4	9.3	3.8	5.5	8.7	5.4							
75th Percentile	2.9	5.9	8.4	3.0	4.8	8.0	5.0							
95th Percentile	2.3	4.8	7.0	1.7	3.7	6.7	4.2							
# of Portfolios	229	227	225	219	201	179	144							
● Total Composite	2.9	(77)	4.9	(94)	6.3	(99)	4.9	(13)	7.8	(1)	9.9	(23)	5.8	(26)
▲ Policy Index	2.9	(73)	6.7	(39)	7.8	(88)	4.7	(19)	6.8	(7)	8.5	(61)	5.8	(27)

Total Fund Return Summary vs. Peer Universe

Total Composite vs. InvestorForce Public DB Net



	Return (Rank)														
	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006					
5th Percentile	1.7	7.7	20.4	14.3	3.6	15.3	26.8	-9.8	10.7	15.4					
25th Percentile	0.4	6.4	17.2	12.9	1.6	13.4	22.0	-15.2	9.1	14.0					
Median	-0.4	5.5	14.9	11.8	0.6	12.2	18.6	-24.4	7.8	12.3					
75th Percentile	-1.5	4.4	12.7	10.4	-0.5	10.9	14.5	-27.6	6.7	9.8					
95th Percentile	-3.2	2.7	8.4	7.6	-3.1	7.9	9.9	-30.5	5.2	6.6					
# of Portfolios	262	210	191	159	137	131	128	125	122	115					
● Total Composite	3.3 (1)	10.8 (1)	15.0 (49)	12.9 (24)	4.2 (3)	14.1 (14)	14.2 (77)	-28.4 (83)	9.4 (20)	15.8 (3)					
▲ Policy Index	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)	14.9 (7)					

Glossary of Investment Terminology—Risk Statistics

Alpha - Measures the relationship between the fund performance and the performance of another fund or benchmark index and equals the excess return while the other fund or benchmark index is zero.

Alpha Jensen - The average return on a portfolio over and above that predicted by the capital asset pricing model (CAPM), given the portfolio's beta and the average market return. Also known as the abnormal return or the risk adjusted excess return.

Annualized Excess Return over Benchmark - Annualized fund return minus the annualized benchmark return for the calculated return.

Annualized Return - A statistical technique whereby returns covering periods greater than one year are converted to cover a 12 month time span.

Beta - Measures the volatility or systematic risk and is equal to the change in the fund's performance in relation to the change in the assigned index's performance.

Information Ratio - A measure of the risk adjusted return of a financial security, asset, or portfolio.

Formula:

(Annualized Return of Portfolio - Annualized Return of Benchmark)/Annualized Standard Deviation(Period Portfolio Return - Period Benchmark Return). To annualize standard deviation, multiply the deviation by the square root of the number of periods per year where monthly returns per year equals 12 and quarterly returns is four periods per year.

R-Squared – Represents the percentage of a fund's movements that can be explained by movements in an index. R-Squared values range from 0 to 100. An R-Squared of 100 denotes that all movements of a fund are completely explained by movements in the index.

Sharpe Ratio - A measure of the excess return or risk premium per unit of risk in an investment asset or trading strategy.

Sortino Ratio - A method to differentiate between good and bad volatility in the Sharpe Ratio. The differentiation of up and down volatility allows the calculation to provide a risk adjusted measure of a security or fund's performance without upward price change penalties.

Formula:

*Calculation Average (X-Y)/Downside Deviation (X-Y) * 2
Where X=Return Series X Y = Return Series Y which is the risk free return (91 day T-bills)*

Standard Deviation - The standard deviation is a statistical term that describes the distribution of results. It is a commonly used measure of volatility of returns of a portfolio, asset class, or security. The higher the standard deviation the more volatile the returns are.

Formula:

(Annualized Return of Portfolio - Annualized Return of Risk Free) / 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:

*Tracking Error = 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:

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

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

UpsideCapture = TotalReturn(FundReturns)/TotalReturns(BMReturn) when Period Benchmark Return is > = 0

DownsideCapture = TotalReturn(FundReturns)/TotalReturns(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

Glossary of Investment Terminology

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

- **Past performance is no guarantee of future results.**
- **NEPC relies on the plan's custodian bank for portfolio pricing, calculation of accruals, and transaction information. Information on market indices and security characteristics is received from other sources external to NEPC. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.**
- **This report is provided as a management aid for the client's internal use only. Performance contained in this report does not constitute a recommendation by NEPC.**
- **This report may contain confidential or proprietary information and may not be copied or redistributed to any party not legally entitled to receive it.**