AGENDA

NOTICE OF A PUBLIC MEETING OF THE
ARIZONA STATE RETIREMENT SYSTEM (ASRS)
INVESTMENT COMMITTEE

3300 North Central Avenue
14th Floor Conference Room
Phoenix, Arizona 85012

Monday, December 1, 2014
2:30 p.m.

Pursuant to A.R.S. § 38-431.02, notice is hereby given to the members of the Arizona State Retirement System (ASRS) Investment Committee (IC) and to the general public that the ASRS Investment Committee will hold a public meeting December 1, 2014 beginning at 2:30 p.m., in the 14th Floor Conference Room of the Arizona State Retirement System office, 3300 North Central Avenue, Phoenix, Arizona. Trustees of the Committee may attend either in person or by telephone conference call.

This is a regularly scheduled meeting of the Investment Committee; however, due to possible attendance by other ASRS Board Trustees, this meeting may technically become a meeting of the Board or one of its Committees. Actions taken will be consistent with Investment Committee governance procedures. Actions requiring Board authority will be presented to the full Board for final decision.

The Chair may take public comment during any agenda item. If any member of the public wishes to speak to a particular agenda item, they should complete a Request to Speak form indicating the item and provide it to the Committee Administrator.

This meeting will be teleconferenced to the ASRS office in Tucson, 7660 E. Broadway Blvd., Suite 108, Tucson, AZ 85710. The conference call to Tucson will be disconnected after 15 minutes if there are no attendees in the Tucson audience.

The Agenda for the meeting is as follows:

1. Call to Order; Roll Call (estimated time 4 min. to 2:34 p.m.)............................... Mr. Tom Connelly
   Chair, Investment Committee

2. Approval of Minutes of the October 20, 2014 Investment Committee Meeting (Action item; estimated time 1 min. to 2:35 p.m.) .... Mr. Tom Connelly

3. Presentation, Discussion, and Appropriate Action Regarding ASRS Investment Program Updates (Informational and discussion item; estimated time 20 min. to 2:55 p.m.) ....
   .... Mr. Paul Matson
   Director, ASRS
   .... Mr. Gary Dokes
   Chief Investment Officer, ASRS
   .... Mr. Dave Underwood
   Assistant Chief Investment Officer, ASRS
   .... Mr. Karl Polen
   Head of Private Markets Investing, ASRS
   .... Mr. Eric Glass
   Portfolio Manager of Private Markets, ASRS
   .... Mr. Kien Trinh
   Assistant Vice President, Risk Services, State Street Investment Analytics

   a. ASRS Fund Positioning
   b. IMD Investment House Views
   c. Asset Class Committee (ACC) Activities
   d. Tactical Portfolio Positioning
   e. IMD Projects, Research, and Initiatives
   f. Investment Risk Reports and Securities Lending Risk Metrics

4. Presentation, Discussion, and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight of the ASRS Investment Program – Includes Total Fund and Investment Performance Report Q3-14 (Informational and discussion item; estimated time 20 min. to 3:15 p.m.) .... Mr. Allan Martin
   Partner, NEPC
   .... Mr. Dan LeBeau
   Consultant, NEPC

5. Presentation, Discussion, Update and Appropriate Action with Respect to the Asset Allocation Study (Informational and discussion item; estimated time 90 min. to 4:45 p.m.) ....
   .... Mr. Paul Matson
   .... Mr. Gary Dokes
   .... Mr. Allan Martin
   .... Mr. Chris Levell
   Partner, NEPC

6. Presentation, Discussion, and Appropriate Action Regarding the IC Meeting 2015 Schedule (Action item; estimated time 10 min. to 4:55 p.m.) .... Mr. Tom Connelly
   .... Mr. Gary Dokes

7. Presentation, Discussion, and Appropriate Action Regarding ASRS Inflation-Linked Asset Class (Informational and discussion item; estimated time 20 min. to 5:15 p.m.) .... Mr. Gary Dokes
   .... Mr. Karl Polen
   .... Mr. Eric Glass

8. Requests for Future Agenda Items (Informational and discussion item; estimated time 5 min. to 5:20 p.m.)............ Mr. Tom Connelly
.... Mr. Gary Dokes

9. Call to the Public............ Mr. Tom Connelly

Those wishing to address the ASRS Committee are required to complete a Request to Speak form before the meeting indicating their desire to speak. Request to Speak forms are available at the sign-in desk and should be given to the Committee Administrator. Trustees of the Committee are prohibited by A.R.S. § 38-431.01(G) from discussing or taking legal action on matters raised during an open call to the public unless the matters are properly noticed for discussion and legal action. As a result of public comment, the Committee Chair may direct staff to study and/or reschedule the matter for discussion and decision at a later date.

10. The next ASRS Investment Committee Meeting is tentatively scheduled for Monday, February 23, 2015 at 2:30 p.m., at 3300 N. Central Avenue, 14th Floor Conference room, Phoenix, Arizona.

11. Adjournment of the ASRS Investment Committee Meeting

A copy of the agenda background material provided to Committee Trustees (with the exception of material relating to possible executive sessions) is available for public inspection at the ASRS offices located at 3300 North Central Avenue, 14th Floor, Phoenix, Arizona, and 7660 East Broadway Boulevard, Suite 108, Tucson, Arizona. The agenda is subject to revision up to 24 hours prior to meeting. These materials are also available on the ASRS website (https://www.azasrs.gov/web/BoardCommittees.do) approximately 48 hours prior to the meeting.

Persons(s) with disabilities may request a reasonable accommodation such as a sign language interpreter or alternate formats of this document by contacting Tracy Darmer, ADA Coordinator at (602) 240-5378 in Phoenix, at (520) 239-3100, ext. 5378 in Tucson or 1-800-621-3778, ext. 5378 outside metro Phoenix or Tucson. Requests should be made as early as possible to allow time to arrange the accommodations.

Dated November 17, 2014

ARIZONA STATE RETIREMENT SYSTEM

Gloria Trujillo Committee Administrator	Gary Dokes Chief Investment Officer

Agenda Item #2

ARIZONA STATE RETIREMENT SYSTEM

3300 NORTH CENTRAL AVENUE • PO BOX 33910 • PHOENIX, AZ 85067-3910 • PHONE (602) 240-2000
7660 EAST BROADWAY BOULEVARD • SUITE 108 • TUCSON, AZ 85710-3776 • PHONE (520) 239-3100
TOLL FREE OUTSIDE METRO PHOENIX AND TUCSON 1 (800) 621-3778
EMAIL ADDRESS: ASKMAC@AZASRS.GOV • WEB ADDRESS: WWW. AZASRS.GOV

Paul Matson
Director

MINUTES OF THE PUBLIC MEETING OF THE
ARIZONA STATE RETIREMENT SYSTEM
INVESTMENT COMMITTEE

HELD ON

Monday, October 20, 2014

2:30 p.m.

The Arizona State Retirement System (ASRS) Investment Committee (IC) met at 3300 N. Central Avenue, 14th Floor, Phoenix, AZ 85012. Prof. Dennis Hoffman, Vice-chair of the IC, called the meeting to order at 2:35 p.m.

1. Call to Order; Roll Call; Opening Remarks

Present: Mr. Tom Connelly, Chair (via teleconference)
Prof. Dennis Hoffman, Vice-chair
Mr. Marc Boatwright (via teleconference)

A quorum was present for the purpose of conducting business.

Mr. Connelly turned the meeting over to Prof. Dennis Hoffman, stating he would possibly not be available for the entire meeting.

Also in attendance was Board Trustee Dr. Richard Jacob.

2. Approval of Minutes of the August 18, 2014 Investment Committee Meeting

Motion: Mr. Tom Connelly moved to approve the minutes of the August 18, 2014 Public Meeting. Mr. Marc Boatwright seconded the motion.

By a vote of 3 in favor, 0 opposed, 0 abstentions, 0 excused, the motion was approved.

3. Presentation, Discussion, and Appropriate Action Regarding ASRS Investment Program Updates

Mr. Gary Dokes, ASRS Chief Investment Officer (CIO), provided a brief overview of the ASRS investment program, noting the under and over weights of the Total Fund positioning. He further noted the details of ongoing commitments in private markets, and ongoing and upcoming meetings within the Investment Management Division (IMD) to focus on key matters relating to public markets, the revision of the ASRS Cash Management Program, as well as the Asset Allocation Study.

Mr. Kien Trinh, State Street Investment Analytics, presented the State Street Risk Report. He discussed the Monthly Reallocation Summary and provided a detailed breakdown of the risk exposure versus the benchmark. Mr. Kien confirmed the market changes were consistent with the ASRS House View and noted the steady market environment was the key factor in the production of a steady risk profile since the beginning of the year.

4. Presentation, Discussion, and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight of the ASRS Investment Program

Mr. Allan Martin, NEPC Partner, provided the Committee with a brief overview of the fund performance, advising the IC there were no major changes to report. Mr. Martin stated IMD's tactical positioning is consistent with IMD House Views.

5. Presentation, Discussion, Update and Appropriate Action with Respect to the Asset Allocation Study

Mr. Paul Matson provided the Committee with an update of the Asset Allocation Study, advising the Board IMD is working in conjunction with NEPC to review asset class expected rates of return and correlations projections on a both a longer-term (30-year) and shorter-term (3-year) basis. Additional details relating to the Strategic Asset Allocation Policy (SAAP) Study and discussion with the IC is expected to occur at the December 1, 2014 IC meeting.

6. Presentation, Discussion, and Appropriate Action Regarding the ASRS Global Tactical Asset Allocation (GTAA) Program Review

Mr. Dokes provided an overview and history of the GTAA program. He explained the program details and discussed its goals and objectives. Mr. Dokes stated that the GTAA program policy target/range is 10% +/-5%.

Mr. Dokes, then introduced Mr. Paul Podosky, Bridgewater Portfolio Strategist, who discussed Bridgewater Pure Alpha strategies, portfolio positioning and answered questions regarding Bridgewater's perspectives on the markets.

7. Presentation, Discussion, and Appropriate Action Regarding the Supplemental Retirement Savings Plan (SRSP)

Mr. Pat Klein, Assistant Director of External Affairs, provided the Committee with the annual review of the SRSP. Highlights of Mr. Klein's discussion included:

- Plan Type & Structure – 401(a)
- Participant Eligibility
- Number of Participants – Employers & Employees
- Contribution Rates and Restrictions
- Funding Status

Mr. Klein stated that the SRSP is a supplemental plan to the ASRS Defined Benefit Plan and is offered to non-state employees.

8. Presentation, Discussion, and Appropriate Action Regarding the Supplemental Salary Deferral Plan (SSDP)

Mr. Klein provided the Committee with the annual review of the SSDP. Highlights of Mr. Klein's discussion included:

- Plan Type & Structure – 457 and 403(b)
- Participant Eligibility
- Number of Participants – Employers & Employees
- Contribution Rates and Allowable Elections
- Funding Status

Mr. Klein stated that the SSDP is a supplemental plan to the ASRS Defined Benefit Plan and is offered to non-state employees; however, unlike the SRSP 401(a), there are fewer restrictions in terms of participation, amount contributed, or how often contribution amounts may change.

9. Presentation, Discussion, Update and Appropriate Action with Respect to New Investment Strategies and Industry Investment Trends

No specific topics were raised by the IC, Director or CIO.

10. Requests for Future Agenda Items

Mr. Connelly suggested the following as possible topics for a future investment roundtable:

- A discussion of demographics and its effect on future expected investment returns in both the equity and fixed income market.
- A discussion longevity insurance and availability of products and investment strategies offered by insurance companies and other parties which may help manage pension longevity risk.

In addition, Mr. Marc Boatwright said he was interested in a discussion of the Hedge Fund industry with specific focus on the investment structure of hedge funds, fee levels, alignment of interests, and hedge fund investment theses.

11. Call to the Public

No members of the public requested to speak.

12. Adjournment

The meeting adjourned at 4:52 p.m.

Respectfully submitted,

ARIZONA STATE RETIREMENT SYSTEM

Gloria Trujillo Date	Gary Dokes Date
Investment Committee Administrator	Chief Investment Officer

Agenda Item #3

ARIZONA STATE RETIREMENT SYSTEM

3300 NORTH CENTRAL AVENUE • PO BOX 33910 • PHOENIX, AZ 85067-3910 • PHONE (602) 240-2000
7660 EAST BROADWAY BOULEVARD • SUITE 108 • TUCSON, AZ 85710-3776 • PHONE (520) 239-3100
TOLL FREE OUTSIDE METRO PHOENIX AND TUCSON 1 (800) 621-3778
EMAIL ADDRESS: ASKMAC@AZASRS.GOV • WEB ADDRESS: WWW. AZASRS.GOV

Paul Matson
Director

MEMORANDUM

TO: The Arizona State Retirement System (ASRS) Investment Committee (IC)

FROM: Mr. Paul Matson, Director
Mr. Gary Dokes, Chief Investment Officer (CIO)
Mr. Dave Underwood, Assistant Chief Investment Officer
Mr. Al Alaimo, Fixed Income Portfolio Manager
Mr. Karl Polen, Head of Private Markets Investing
Mr. Eric Glass, Portfolio Manager of Private Markets

DATE: November 18, 2014

RE: **Agenda Item #3:** Presentation, Discussion, and Appropriate Action Regarding ASRS Investment Program Updates

Purpose
To present and discuss information regarding ASRS investment program updates and Investment Risk Reports.

Recommendation
Informational only; no action required.

Background
The CIO and IMD Portfolio Managers will present and facilitate a discussion of the ASRS Investment Program.

The topics listed below are intended to comprehensively cover how ASRS investments are managed, what and why recent strategic/tactical investment decisions have been made and share other information regarding the investment activities of the ASRS.

a. ASRS Fund Positioning
b. IMD Investment House Views
c. Asset Class Committee (ACC) Activities
d. Tactical Portfolio Positioning
e. IMD Projects, Research, and Initiatives
f. Investment Risk Reports and Securities Lending Risk Metrics

Additionally, on a quarterly basis; the Director includes in the Board Packet the two primary Investment Risk reports IMD uses to help monitor and manage macro-level Total Fund investment risk. These reports along with other portfolio risk and positioning reports provide the CIO with valuable information needed to manage the ASRS Total Fund.

The Director and CIO will discuss the Total Fund, State Street truView Risk Report as well as IMD's Securities Lending Risk Metrics.

Attachments:

From ASRS
- Investment Program Updates Report

From State Street
- truView Risk Report – as of September 30, 2014

From ASRS
- Securities Lending Risk Metrics – as of October 31, 2014

Arizona State Retirement System

Investment Committee

Investment Program Updates

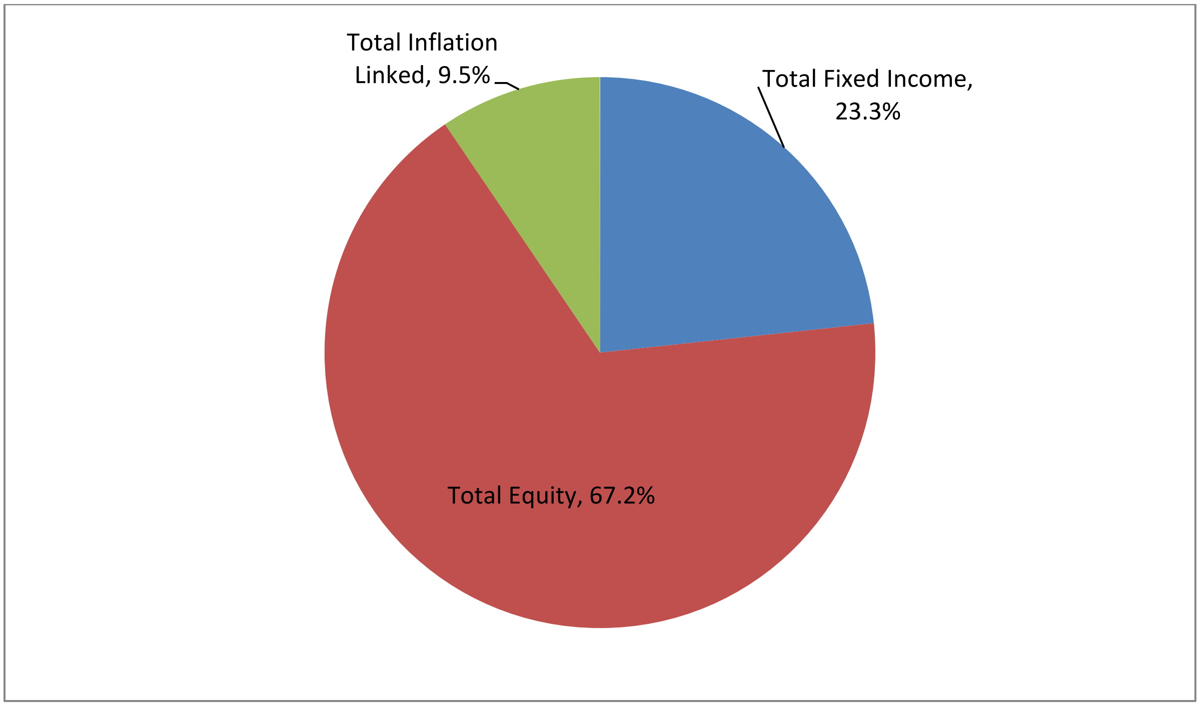
December 1, 2014

Presented by:
Gary R. Dokes, Chief Investment Officer, ASRS
David Underwood, Assistant Chief Investment Officer, ASRS
Karl Polen, Head of Private Markets Investing, ASRS
Al Alaimo, Fixed Income Portfolio Manager, ASRS
Eric Glass, Portfolio Manager of Private Markets, ASRS

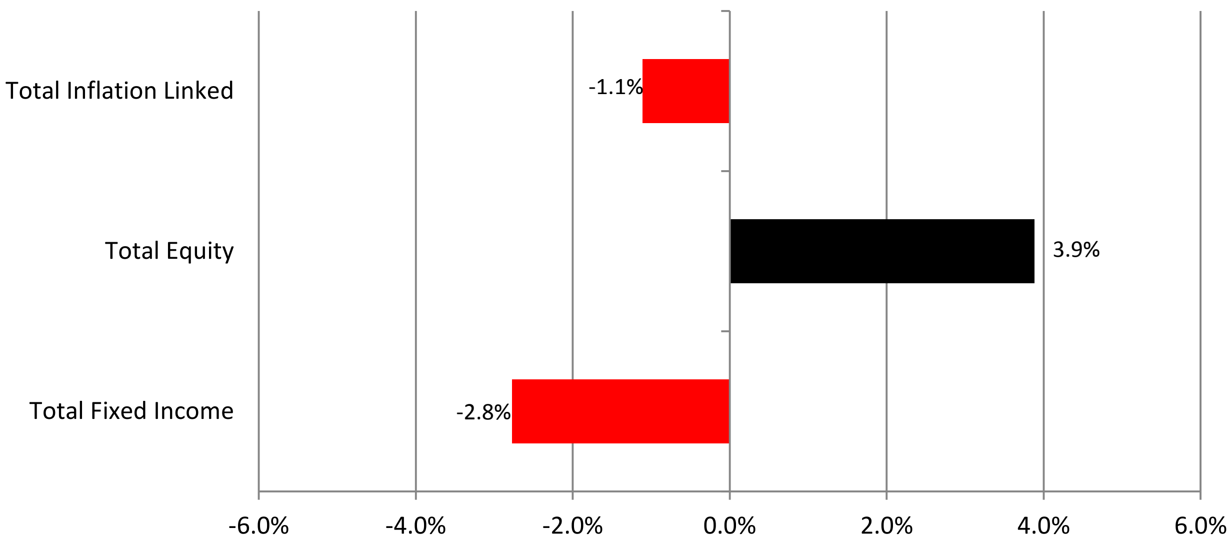
CONTENTS

TOTAL FUND POSITIONING – 10/31/14

ACTUAL PORTFOLIO



ACTUAL PORTFOLIO (ASSUMED GTAA ALLOCATION VS. ADJUSTED SAA POLICY *)



**Real Estate and Private Equity actual weight is equal to policy weight during the implementation of the asset class.*

**Over/Underweights include both GTAA positions as well as IMD tactical considerations.*

Note: Opportunistic & Private Debt, Opportunistic Private Equity, Farmland & Timber, Real Estate and Private Equity market values are reported on a quarter-lag and adjusted to include the current quarter's cash flows. Within the Assumed GTAA Allocation vs. Adjusted SAA Policy chart, Real Estate was prorated to domestic equity, international equity and fixed income. Private Equity was prorated to domestic equity.

Pension (Plan, System, HBS Assets)		ASRS Market Value Report				As of:		Friday, October 31, 2014	
Account Manager	Account Manager Style	Fixed Income		Equity		Inflation Linked		Total	Pct of Fund
		Active	Enh/Passive	Active	Enh/Passive	Active	Enh/Passive		
State Street B&T: Boston	Master Cash & Pension Acct.		139,949,815					139,949,815	0.41%
	Cash Total							$139,949,815	0.41%
GTAA Managers (2)	Active GTAA	1,203,488,536						1,203,488,536	3.54%
Blackrock: San Francisco	Passive (Intermediate Gov Credit)		24,068,300					24,068,300	0.07%
ASRS: Phoenix	Enhanced Passive F2		1,857,004,177					1,857,004,177	5.46%
Blackrock: San Francisco	Passive (US Debt Index)		436,393,709					436,393,709	1.28%
	Core Fixed Income Total							$3,520,954,721	10.35%
								Core Fixed Income Policy	13.00%
Columbia: Minneapolis	Active	800,233,171						800,233,171	2.35%
JP Morgan: Indianapolis	Active	479,531,046						479,531,046	1.41%
	High Yield Fixed Income Total							$1,279,777,971	3.76%
								High Yield Fixed Income Policy	5.00%
	US Fixed Income Total							$4,800,732,693	14.11%
								US Fixed Income Policy Range: 8% - 28%	18.00%
PIMCO (local): Newport Beach	Active	342,695,180						342,695,180	1.01%
Ashmore (blended): London	Active	408,658,763						408,658,763	1.20%
	EM Debt Total							$751,353,943	2.21%
								EM Debt Policy	4.00%
	Opportunistic Debt							$1,044,838,387	3.07%
								Opportunistic Debt Policy Range: 0% - 10%	0.00%
	Private Debt Total							$1,188,130,250	3.49%
								Private Debt Policy	3.00%
	Fixed Income Total							$7,925,005,087	23.29%
								Total Fixed Income Policy Range: 15% - 35%	25.00%
Intech: FL	Active (Growth)			479,878,854				479,878,854	1.41%
LSV: Chicago	Active (Value)			815,752,195				815,752,195	2.40%
GTAA Managers (2)	Active GTAA			1,182,442,770				1,182,442,770	3.48%
ASRS: Phoenix	Passive E2				5,060,275,797			5,060,275,797	14.87%
ASRS: Phoenix	Enhanced Passive E7				792,681,069			792,681,069	2.33%
ASRS: Phoenix	Enhanced Passive E8				522,429,531			522,429,531	1.54%
ASRS: Phoenix	Risk Factor Portfolio				530,039,708			530,039,708	1.56%
	Large Cap Equity Total							$9,383,523,136	27.58%
								Large Cap Policy	23.00%
Wellington: Boston	Active (Core)			414,839,641				414,839,641	1.22%
CRM: New York	Active (Value)			99,536,956				99,536,956	0.29%
ASRS: Phoenix	Passive E3 (Growth)				503,880,810			503,880,810	1.48%
ASRS: Phoenix	Passive E4 (Value)				518,787,403			518,787,403	1.52%
	Mid Cap Equity Total							$1,537,044,810	4.52%
								Mid Cap Policy	5.00%
TimesSquare: New York	Active SMID (Growth)			455,402,792				455,402,792	1.34%
DFA: Santa Monica	Active (Value)			387,795,183				387,795,183	1.14%
Champlain:Vermont	Active (Core)			94,242,950				94,242,950	0.28%
ASRS: Phoenix	Passive E6				483,432,942			483,432,942	1.42%
	Small Cap Equity Total							$1,420,873,868	4.18%
								Small Cap Policy	5.00%
	U.S. Equity Total							$12,341,441,814	36.27%
								US Equity Policy Range: 26% - 38%	33.00%
Brandes: San Diego	Active (Value)			555,792,068				555,792,068	1.63%
GTAA Managers (2)	Active GTAA			970,852,483				970,852,483	2.85%
American Century	Active (EAFE)			504,254,064				504,254,064	1.48%
Trinity Street	Active (EAFE)			319,197,235				319,197,235	0.94%
Thompson Siegel Walmsley	Active (EAFE)			149,461,786				149,461,786	0.44%
Blackrock: San Francisco	Passive (EAFE)				2,242,053,905			2,242,053,905	6.59%
	Large Cap Developed Non-US Equity Total							$4,743,881,098	13.94%
								Large Cap Developed Policy	14.00%
AQR: Greenwich	Active (EAFE SC)			168,872,394				168,872,394	0.50%
DFA: Santa Monica	Active (EAFE SC)			203,557,202				203,557,202	0.60%
Franklin Templeton: San Mateo	Active (EAFE SC)			381,936,483				381,936,483	1.12%
Blackrock: San Francisco	Passive (EAFE SC)				429,068,181			429,068,181	1.26%
	Small Cap Developed Non-US Equity Total							$1,183,437,141	3.48%
								Small Cap Developed Policy	3.00%
William Blair: Chicago	Active (EM)			471,729,230				471,729,230	1.39%
Eaton Vance: Boston	Active (EM)			503,691,983				503,691,983	1.48%
LSV: Chicago	Active (EM)			305,336,528				305,336,528	0.90%
Blackrock: San Francisco	Passive (EM)				676,449,623			676,449,623	1.99%
	Emerging Markets Equity Total							$1,957,207,364	5.75%
								Emerging Markets Policy	6.00%
	Non-US Equity Total							$7,884,525,603	23.17%
								Non-US Equity Policy Range: 16% - 28%	23.00%
	Private Equity Total							$2,263,046,571	6.65%
								Private Equity Policy Range: 5% - 9%	7.00%
	Opportunistic Equity							$378,826,455	1.11%
								Opportunistic Equity Policy Range: 0% - 3%	0.00%
	Equity Total							$22,867,840,443	67.21%
								Total Equity Policy Range: 53% - 73%	63.00%
Gresham: New York						760,895,604		760,895,604	2.24%
GTAA Managers (2)	Active GTAA					298,223,444		298,223,444	0.88%
	Commodities Total							$1,059,119,048	3.11%
								Commodities Policy Range: 1% - 7%	4.00%
GTAA Manager (1)	Active GTAA					43,035,958		43,035,958	0.13%
	Real Estate Total							$2,027,414,647	5.96%
								Real Estate Policy Range: 6% - 10%	8.00%
	Infrastructure Total							$0	0.00%
								Infrastructure Policy Range: 0% - 3%	0.00%
	Farmland & Timber Total					146,009,309		$146,009,309	0.43%
								Farmland & Timber Policy Range: 0% - 3%	0.00%
	Opportunistic Inflation Linked Total							$0	0.00%
								Opportunistic I/L Policy Range: 0% - 3%	0.00%
	Inflation Linked Total							$3,232,543,004	9.50%
								Inflation Linked Policy Range: 7%-15%	12.00%
	TOTAL Amounts	$4,422,750,700	$3,502,254,387	$11,108,718,262	$11,759,122,182	$3,378,552,313	$0	$34,025,388,534	Total Fund
	TOTAL Percent	13.00%	10.29%	32.65%	34.56%	9.93%	0.00%		

Asset Class	Actual Portfolio	SAA Policy: Target (Range)	Rebalancing Assumed Port	Rebalancing Adj Policy	Assumed - Adjusted % diff	Assumed - Adjusted $ diff	Policy Band check Actual - Adj	Passive Min	Passive Actual
Cash	0.41%								
Core	10.35%	13%						50%	69%
High Yield	3.76%	5%							
US Fixed Income	14.11%	18% (8-28%)	14.03%	18.57% (9-29%)	-4.54%	-$1,546,416,474	OK		
EM Debt	2.21%	4%		4.00%					
Opportunistic Debt	3.07%	0% (0-10%)	3.07%	0% (0-10%)	3.07%	$1,044,838,387	OK		
Private Debt	3.49%	3%		3.00%					
Total Fixed Income	**23.29%**	**25% (15-35%)**	**22.80%**	**25.57% (16-36%)**	**-2.77%**	**-$943,871,092**	**OK**		
Large Cap	27.58%	23%							
Mid Cap	4.52%	5%							
Small Cap	4.18%	5%							
US Equity	**36.27%**	**33% (26-38%)**	**37.47%**	**34.23% (27-39%)**	**3.24%**	**$1,103,363,706**	**OK**	**50%**	**66%**
Developed Large Cap	13.94%	14%							
Developed Small Cap	3.48%	3%							
Emerging Markets	5.75%	6%							
Non-US Equity	**23.17%**	**23% (16-28%)**	**23.04%**	**23.51% (17-29%)**	**-0.47%**	**-$161,309,553**	**OK**	**30%**	**49%**
Private Equity	6.65%	7% (5-9%)	6.65%	6.65% (5-9%)	0.00%	$0	OK		
Opportunistic Equity	1.11%	0% (0-3%)	1.11%	0% (0-3%)	1.11%	$378,826,455	OK		
Total Equity	**67.21%**	**63% (53-70%)**	**68.27%**	**64.39% (54-71%)**	**3.88%**	**$1,320,880,608**	**OK**		
Commodities	3.11%	4% (1-7%)	2.67%	4.08% (1-7%)	-1.41%	-$479,982,867	OK		
Real Estate	5.96%	8% (6-10%)	5.83%	5.96% (4-8%)	-0.13%	-$43,035,958	OK		
Infrastructure	0.00%	0% (0-3%)	0.00%	0% (0-3%)	0.00%	$0	OK		
Farmland & Timber	0.43%	0% (0-3%)	0.43%	0% (0-3%)	0.43%	$146,009,309	OK		
Opportunistic I/L	0.00%	0% (0-3%)	0.00%	0% (0-3%)	0.00%	$0	OK		
Total Inflation Linked	**9.50%**	**12% (8-16%)**	**8.93%**	**10.04% (6-14%)**	**-1.11%**	**-$377,009,516**	**OK**		
Total	**100.00%**	**100%**	**100.00%**	**100.00%**	**0.00%**	**$0**		**30%**	**42%**
								Internally Managed Portfolios:	
Total GTAA								**$9,738,491,730**	**29%**
Bridgewater	$3,104,443,768	9.1%					**Opportunistic definitions:**		
Windham	$593,599,424	1.7%					1) Tactical in nature: Function of market dislocation AND		
Total	**$3,698,043,191**	**10.9%**					2a) Outside SAA benchmark, OR		
Policy	**10% ±5%**	**OK**					2b) Within SAA benchmark but absolute return oriented		

(Notable changes from the previous month are highlighted in RED)

DECEMBER 2014

U.S. EQUITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **POSITIVE**
   - Economic data suggests stable, sub-trend growth into 2015.
   - U.S. unemployment, persistently high until recently is displaying sustained improvement although income growth has not despite some anecdotal evidence of isolated upward pressure on wages.
   - At risk longer term due to stimulus measures, inflation remains generally subdued.
   - Liquidity remains ample; Federal Reserve policy remains accommodative without its asset purchases program.
   - Overall U.S. corporate profits are still growing, but with decelerating momentum; revenues have begun trending up modestly although high profit margins are no longer expanding.

2. Valuations: **NEUTRAL**
   1. Mixed macro data and concerns about Ebola couldn't restrain U.S. equity market coming out of October. As 3Q2014 earnings reports started solidly, all major indices, led by small-caps, saw major gains.
   - Though marginally rich, they remain near historic averages: S&P 500, 14.7x-16.2x, S&P MID, 1635x-18.8x; S&P SC600, 16.3x-20.0x.
   - Historic P/Es imply advances of 5-10% for mid and small caps; 9-12% for S&P 500.
   - Still rising earnings and low yields on 10-Yr Treasury notes combine for equity risk premiums that are favorably above the 4.0% long-range average for large caps, but market advances have trimmed those of mid- and small-caps to near 3.0%.

3. Sentiment: **NEUTRAL**
   - Short-term caution has moved up a notch following the sustained advance of equity markets throughout 2013 and ¾ of 2014 without a significant pullback.
   - Lessened near-term equity market volatility (i.e., VIX Index) still reflects growing acceptance of risk-oriented assets.
   - Assets are continuing to flow toward equities, and decidedly to U.S. equities classes.

Commentary:

Throughout 1Q2014, Staff systematically pared back the allocation of U.S. stocks to address capital calls in the Plan's private equity and real estate asset classes. Proportionally more was withdrawn from the smallcap and midcap sub-classes. Strong price advances in 2013 outpaced earnings growth in those categories to the extent that their short-run risk premiums became less compelling than the larger-cap counterparts. Until October, this was also reflected in the waning performance of smallcap stocks *relative* to largecap and midcap counterparts. Following October's gains Smallcaps rose about 2.1% YTD; largecaps and midcaps rose 9.2% and 5.7%, respectively.

Valuations of domestic equities are full, but generally don't exceed long-term average valuations by much. Business conditions are constructive if not vibrant. Moreover, the equity markets have been resilient in spite of unsettling political events and have rebounded on shallow dips over 2014 in anticipation of a sustainably higher long-term trend. There are reasons:

A strong USD is often a counterpart for weak USD commodity prices; this seems to be the case now. Whether driven by cyclical forces or secular factors, prices of commodities overall, are suppressed most visibly the energy-related. These soft prices confirm a low inflation setting, which, together with responsible monetary policy is helping to firm-up the USD despite a tepid economic setting. Robust investment flows into equities from outside the U.S., substantiated by anecdotal evidence, are more than counterbalancing whatever headwinds the USD makes for corporations.

The recent Federal Reserve Board senior loan officers' survey suggests supportive commercial and industrial credit conditions for capital spending, profit margins, employment and ultimately, GDP growth. The takeaway is that both the business and the equity cycles will be longer than most expect.

Demographics factor in as well. The collective experience of most institutional investors today barely extends more than 15 years, certainly not to 30. They have not experienced a non-inflationary investment environment in which policy embraces gradually higher interest rates. Thus the prospect of the Federal Reserve moving to some policy other than "rates at zero bound" is disquieting. Historically, those concerns have been misplaced.

The "NEUTRAL" opinions on Sentiment and Valuations are unchanged as is the "POSITIVE" opinion on Fundamentals.

CURRENT PORTFOLIO POSTURE: *Overweight vs. SAA target*

NON – U.S. EQUITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **NEUTRAL**
   - Eurozone GDP growth remains subpar and that of the lesser-developed economies also remains off pace. Mid-year comparative strength has faltered.
   - Relatively inexpensive and available money supports a shift toward risk assets.
   - Monetary and economic policies are focused on controlling economic growth and fiscal stability.

2. Valuations: **POSITIVE**
   - Reasonable global valuations relative to U.S.; price-to-book values of 1.5x - 1.7x; P/Es of 13.5x – 16.5x on trend earnings.
   - Dividend yields are incrementally more favorable -ranging from 1.5x to 1.6x that of the S&P500.

3. Sentiment: **POSITIVE**
   - Money flows continue toward both U.S. and developed markets non-U.S. equities; excepting the emerging economies markets, investors are less guarded and remain constructive on global risks.
   - Major non-U.S. markets performance has trailed the U.S. although selected regions are keeping pace.

Commentary:

The global equity indexes, with the exception of Europe, rallied in October on strong macro and earnings data. The European region was hurt by an economic slowdown and lack of further monetary stimulus. For the month, the MSCI World index was up 1.14%, MSCI EAFE was down 0.29%, and MSCI EM was up 1.42% (in local currency with net dividends reinvested). The strong second-half rally masked a weak start to the month from disappointing European and US manufacturing data, protest in Hong Kong, and weaker outlooks on world economic growth by both the International Monetary Fund and the European Central Bank. The markets firmed on a strong US employment report, a dovish policy inference from the FOMC minutes, and a positive start to the earnings season pared some of the losses. Encouraging statements by the president of the St. Louis Federal Reserve Bank and better than expected results from ECB stress tests by banks helped extend the markets' turnaround.

Global growth is languishing in the low 3% range and is destined for some time to grow slowly. Of the big economies, the US and UK look most solid. Japan is suffering from adverse demographics, the euro area from poor past policy. China is slowing and might be weaker than it looks. Lower oil prices will subdue inflation for now. USD strength and weaker-than-forecast Chinese demand threaten commodity exporters. The US is the ray of hope among the advanced countries, followed by the UK; both are moving towards higher interest rates in mid-2015.

With little growth, no inflation and scant job creation, the Eurozone is subject to political risk. Although the most acute part of the crisis has passed, European Central Bank chair Mario Draghi is trying valiantly to move the ECB towards true Quantitative Easing. The likely size will probably undershoot the amount needed to reach the ECB's target of a 2% annual inflation rate, but it would be positive psychologically and make it easier to enact any needed follow-on QE programs.

Japan's aggressive QQE has driven down its bond yields and supported the Japanese stock markets, driven further by the directive that Japanese pension funds are to increase allocations to equities. However, rising inflation and investor concern about where the monetization may ultimately lead seem certain to boost yields over time. The increasing share of BOJ holdings in the stock of JGBs, however, will clearly constrain how far this can go. It would seem that the BOJ will cap the 10-year JGB at around 2% to keep debt funding costs down.

There are risks for emerging markets, that as the Fed hikes rates in 2015, the flows into emerging markets of recent years will try to exit and find a narrow doorway, causing more emerging-market volatility than might currently be forecast. Those countries with the greatest internal and external imbalances and those seeing an erosion of central-bank credibility are at greatest risk. Some Latin American countries look to be among the most exposed from a terms-of-trade perspective. Brazil's economy has stalled amid high inflation and looks vulnerable to shocks. Mexico, having embraced structural reform and with strong links to the US economy, looks far more insulated. South Africa faces labor problems, consumer debt shortages and budgetary and credit-rating problems. While India has slowed and inflation expectations are still high, it looks to have turned the corner and the central bank is gaining, not losing, credibility.

For the capital markets, the diverging growth prospects of the US, on one hand, and the Eurozone and Japan, on the other, add up to one thing: dollar strength. Add to that, that the Fed will be tightening rates while the BOJ and ECB will be on a balance-sheet expansion tack, then the scope for considerable and extended USD strength is magnified. With the Fed likely to raise rates more slowly than in previous cycles, stock values and bond yields will move according to the USD. US risk assets are likely to continue attracting investment in lieu of non-U.S. markets.

The paradox is that available liquidity is supportive for re-rating equity risk premiums. Equity risk premiums on international stocks of over 5% exceed those of the U.S. by about 100 basis points. Both imply ample compensation for investment, more so for the former. Falling yields among high-yield bonds and other compressions of credit spreads are further magnifying the relative advantage available in current equity risk premiums.

Emerging markets (EM) overall, are enigmatic, but of late are trading more favorably. Having undergone two years of price correction, valuations for the most part remain attractive as compared to those of the developed economies. But an inherent "value trap" persists, as economic fundamentals continue to shift about for the larger countries, weaken for those with large external debt balances, yet are surprisingly solid for many others. Up until recently, capital was withdrawn indiscriminately from EM equity markets, despite select opportunities at the specific company level. As discussed above, risks of capital flight from EM lingers. Therefore, Staff intends to maintain the modest underallocation versus SAA policy target while these countervailing forces play out.

Staff has kept U.S. and overall Non-U.S. equities allocations more neutral to SAA policy since late 4Q2013. It had wanted to see sustainably stronger global economic growth relative to that of the U.S. before increasing the relative proportion of Non-U.S. equities. As those preconditions have yet to materialize, it will continue the current allocations.

CURRENT PORTFOLIO POSTURE: Underweight vs. SAA target

FIXED INCOME

Primary Markets Metrics & Indicators:

1. Fundamentals: **NEUTRAL**
    - Over the past few years, fundamentals in the fixed income markets have been dominated by an extremely accommodative monetary policy by the Federal Reserve. This has included massive, unprecedented bond buying programs of both treasury bonds and agency MBS securities known as "quantitative easing" that began in 2009 during the credit crisis and continues to this day. While the Fed has now ended its monthly purchases, it will continue to reinvest the principal payments it receives from its massive portfolio of treasury bonds and agency MBS securities with additional purchases; as a consequence, the bond buying program is not over. While these policies have kept interest rates artificially low, the complete cessation of bond buying activities along with an improving U.S. economic outlook could lead to higher interest rates over an intermediate to long-term time frame.
    - Despite the potential for higher rates, long-term interest rates have fallen in 2014 in response to a combination of factors including some disappointing economic data, concerns about global growth, some geopolitical uncertainty (ex. Ukraine), subdued inflation expectations, falling rates in other developed countries, and possible short covering by investors positioned for rising rates.

2. Valuations: **NEGATIVE**
    - The core fixed income market is relatively unattractive due to low overall yields as Treasury rates remain at low levels, investment-grade credit spreads are relatively tight and spreads on agency MBS are somewhat compressed due to aggressive buying by the Fed. Ultimately, we believe the Fed will end its aggressive bond buying, and Treasury rates will rise over the intermediate-term from artificially low levels in the current market. That being said, core fixed income remains a safe haven in times of market turbulence and tends to perform well when risky assets such as equities sell off.
    - With a benign outlook for corporate defaults and an overall demand in the market for yield, the valuation of high yield bonds has substantially compressed since mid-2012. As a result, the market has lost much of its return potential relative to prior years and will likely achieve low to mid-single-digit returns this year. Recently, the high yield market has become more attractive as both spreads and yields have increased due to technical selling pressure and a sharp drop in oil prices which hurt the outlook for bonds in the energy sector. In late October, we reallocated $300 million of funds from core fixed income to high yield to take advantage of the improved valuations in high yield; this reallocation reduced our underweight by approximately 90 bps.
    - While emerging market debt denominated in local currencies offers attractive yields, it comes with the added risk that emerging market currencies depreciate in value relative to the U.S. dollar resulting in poor returns as happened both in 2013 and in the third quarter of this year. Of most concern is the potential for a sustained period of US dollar appreciation as has occurred periodically in the past (such as the 1990's) that could adversely affect the returns of EM local currency debt going forward.
    - Private debt offers the most attractive opportunity in the fixed income markets with double-digit yields readily available for investors willing to accept illiquidity.
    - Select areas of opportunistic debt such as distressed debt (both corporate and structured credit) and excess mortgage-servicing rights ("MSRs") also offer opportunities to potentially achieve double-digit returns.
3. Sentiment: **NEUTRAL**
    - Following a multi-decade period of declining interest rates, IMD has modest concerns that investors sentiment is shifting away from fixed income. That being said, going forward, IMD believes demand will continue for income producing assets particularly those which offer a yield premium.

Commentary:

IMD remains underweight in its overall fixed income target due to the relatively low yields offered in the public fixed income markets as well as the risk of potentially higher treasury rates. ASRS is currently underweight in its SAAP target for core fixed income, high yield and emerging market debt. While core fixed income offers important defensive characteristics to potentially balance out the overall risks of the total fund portfolio, low levels of U.S. Treasuries and generally tight spreads in the investment-grade bond markets make it generally unattractive.

Furthermore, IMD remains concerned about the potential for higher Treasury rates and the impact on returns for core fixed income, should the Fed completely end its quantitative easing programs. In high yield, which historically is less sensitive to higher interest rates, spreads have compressed to levels which make potential returns much less compelling than in prior years. In emerging market debt, we are concerned about the currency risk embedded in the local currency bond markets of this asset class.

IMD sees the most attractive opportunities in fixed income in select credit markets -- particularly private debt and opportunistic debt -- where compelling yield and total return opportunities exist. Opportunistic debt includes a number of mandates such as distressed debt and structured asset-backed securities that are likely to provide very attractive returns.

CURRENT PORTFOLIO POSTURE: UNDERWEIGHT vs. SAA target

REAL ESTATE

Primary Market Metrics & Indicators:

1. Fundamentals: **POSITIVE**
   - Improved levels of demand and easing credit conditions, combined with broad improvement in the economy, are supportive of continued expansion of commercial lending and building. Better levels of occupancy while there is a lack of construction has resulted in rising rents.
   - Our review of property market fundamentals leads to emphasize apartments, industrial properties, medical office buildings, senior housing self-storage, and student housing in our current investing efforts for demographic and macro policy reasons.
   - There are relatively few foreclosures on high quality property, but there continues to be pressures on refinancing of legacy leverage structures and we participate in those transactions through several of our manager relationships.
   - Single family housing continues to exhibit tight supply and moderate demand driven by healing household balance sheets, improved employment conditions, and continued affordability. This should lead to reacceleration of new construction and continued moderate price increases. Recovery in construction and NOI has been led by apartments to date.
2. Valuations: **NEUTRAL**
   - On a total market basis, valuations have recovered from recession lows but are still about 5% below prior peak. However, coastal markets have rebounded more strongly than interior markets.
   - High quality coastal market properties are trading at historic low cap rates; however these cap rates still reflect approximately a normal spread to treasury. The financing market for assets of this quality has recovered and supports these valuations by providing fixed rate financing that mitigates the risk of later cap rate expansion. International investors looking for safe assets have contributed to demand in the coastal markets.
   - Recent increases in treasury rates do not appear to have affected commercial real estate valuations. Many observers believe that ~100bps of rate increase was already discounted into cap rates.
   - At the end of October, REITs are trading at a 6% premium to NAV with an average dividend yield of 3.7%. This reflects a 130bps spread to the 10 year treasury, which is a bit higher than the historical average of 108bps.
3. Sentiment: **POSITIVE**
   - U.S. focused real estate fund raising rose 13% to $76 billion per year. U.S. focused dry powder has trended down to approximately $80 billion.
   - Global commercial real estate transaction volume peaked at around $700 billion in 2007, but dropped to about a third of that during the global financial crisis. Current volume of approximately $550 billion is double the recession trough, but still well below the peak.
   - Debt availability has improved considerably since the depth of the recession, but is still tight by historic standards for all but the most desirable properties. Construction financing remains a considerable challenge, even for well justified projects.

Commentary:

IMD continues to implement its separate account real estate strategic manager program. ASRS 2014 real estate pacing plan called for $500 million in new commitments; including $350M allocated to niche and tactical opportunities. The 2015 pacing plan will be presented to the Private Market Committee in December.

CURRENT PORTFOLIO POSTURE: Underweight vs. SAA target (in program funding/build-out phase)

PRIVATE EQUITY

Primary Market Metrics & Indicators:

1. Fundamentals: **POSITIVE**
   - The U.S. economy continues to show steady improvement.
     - ◊ The energy sector is dynamic with massive new investment in "tight oil" and related infrastructure and services, with supply improvements also resulting in improved energy efficiency particularly of benefit to manufacturers.
     - ◊ Healthcare is being reshaped to implement the requirements of "Obamacare"
     - ◊ The U.S. continues to be a global leader in technology innovation.
   - Europe continues to struggle in recovering from the financial crisis with the ECB looking to increase its stimulus efforts. Its problems are exacerbated by a unified currency without unified fiscal policy and it is expected to experience a very slow recovery.
   - Emerging markets have slowed while the largest emerging markets are transitioning to focus on domestic consumption.

1. Valuations: **NEUTRAL**
   - Purchase price multiples in 2013 (through Q3) were 8.4x, roughly flat from 2012 levels and below 2007 peak valuations. Over the course of 2013, large deal multiples rose from 10x to 11x while small deals fell from 4.0x to 2.5x.
   - The leveraged loan and high yield debt markets were active in 2013 reaching multi-year highs for net issuance, albeit principally for refinancing. Single B high yield spreads have widened to ~415bps.
   - Total leverage in 2013 (through Q3) ticked up to 5.3x from 5.1x in 2012, although still down ~0.8x turn from the 2007 peak.

2. Sentiment: **NEUTRAL**
   - Globally, year-to-date $334B (688 funds) have closed through Q3 2014 compared to $348B (802 funds) at this time a year ago. Dry powder of nearly $1.2T globally has remained flat.
   - The global number of buyout deals fell from 816 in Q2 to 803 in Q3 2014 while the aggregate value of deals ticked up slightly from $80B to $84B.
   - Exits were steady in Q3 2014 at 403 while the aggregate value of $105B dropped from the Q2 2014 level of $133B.
   - The IPO market in Q2 2014 remained strong ($20B) but was down from Q2 2014 levels.

Commentary:

Areas of emphasis are U.S middle market buyout with focus on managers with strong operational capability. Vertical strategies in energy, healthcare and technology are under consideration. IMD will reduce emphasis on large buyout strategies though larger managers with specialized deal flow remain of interest. IMD will continue to monitor Europe for a favorable reentry point. IMD's pacing plan called for $550M in commitments for 2014. The 2015 pacing plan will be presented to the Private Markets Committee in November.

CURRENT PORTFOLIO POSTURE: slightly Underweight vs. SAA target (in program funding/build-out phase)

COMMODITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **NEGATIVE**
   - The Fed ended its tapering program in November but reiterated that inflation continues to run below the FOMC's long-term objective. As Europe has begun to deal with its economic weakness with stimulus, the US dollar has strengthened on a relative basis.
   - Most commodity sectors appear well supplied, particularly for the current global growth environment.
   - Corn and wheat stockpiles have recently hit multi-year highs while world food prices continue to slide. Energy markets reflect the continued growth in US production as WTI and Brent prices have fallen by more than $20 from their June highs. Metals have weakened as precious metals have suffered from US dollar strength while industrial metals still exhibit weak demand.
2. Valuations: **NEUTRAL**
   - The index rose to nearly 280 in April 2014 but has steadily sold off to its current level of 235.
   - YTD: coffee, cattle, & hogs have been the leaders; gas oil and silver are the biggest laggards.
   - The index on a year-to-date basis is down 7.7% as all of the index sub-groups have posted negative returns.
3. Sentiment: **NEGATIVE** (from Neutral)
   - The moderate growth and weak inflation environment in the U.S. year-to-date has tempered investor enthusiasm for commodities and resulted in outflows from commodities.
   - Exogenous geopolitical shocks have not resulted in price spikes; weather has been favorable.
   - Looking across the individual commodities, most remain well supplied, which has been reflected in prices as inflationary fears have abated.

Commentary:

IMD has maintained a tactical underweight relative to the SAAP during 2013 and into 2014 after recognizing the potential effects of Fed tapering and Chinese transition. IMD recognizes that Fed's actions will be data dependent but the QE program has ended.

The North American shale play has resulted in increased US energy production and represents a long-term phenomenon. China's growth rate is also moderating and the era of infrastructure build-out which fueled a portion of the demand for commodities (particularly industrial metals) is abating. Precious metals may also be challenged as the US has moved to the front of the global recovery and other countries' stimulus should result in US dollar strength at the margin. While grains are currently well supplied, the unpredictability of weather inhibits long-term forecasting.

IMD will closely monitor the growth and inflation dynamics globally with improving economic conditions and inflationary pressures serving as a catalyst which may initiate a neutral position.

CURRENT PORTFOLIO POSTURE: Underweight vs. SAA target

OPPORTUNISTIC INVESTMENTS

IMD continues to monitor and assess co-investment flow from real estate, private equity and debt managers for select opportunistic investments with favorable capital market dynamics. Opportunistic investments are tactical in nature AND are outside ASRS SAAP benchmarks or absolute return oriented.

CURRENT PORTFOLIO POSTURE: Approx. 4.1% of ASRS TOTAL MARKET VALUE

GLOSSARY

Commentary: Provides verbiage on 1) the current asset class market environment and possible changes to this environment and 2) ASRS asset class portfolio positioning relative to ASRS SAA policy, its rationale for positioning and anticipated changes which may occur in such positioning.

Current Portfolio Posture: Indicates ASRS asset class position relative to its asset allocation policy weight. "Overweight" indicates an asset class weight is greater than its policy target, "Neutral" indicates an equal weight and "Underweight" indicates a lesser weight than its policy target.

Investment House Views: Synthesizes IMD's current and forward-looking investment perspectives and tactical positioning in asset classes and investment strategies in which the ASRS invests.

Primary Market Metrics and Indicators: Broadly-defined metrics (Fundamentals, Valuations, and Sentiments) applied universally to ASRS asset classes and used collectively to evaluate existing market conditions. Indicators ("Positive," "Neutral" and "Negative") reflect IMD's existing views of these metrics and, in addition to other factors, generally determine the basis for the existing (and possible future changes) to ASRS aggregate portfolio position relative to or within ASRS SAA policy targets.

2014 ASSET CLASS COMMITEE AND IC MEETINGS								
2014		Asset Class Committees				Board Committee		Grand Totals
		Private Market Committee (PRIVMC)		Public Market Committee (PUBMC)		Investment Committee (IC)		
Quarter	Month	Dates	Total	Dates	Total	Dates	Total	
	January	1/15 1/31	2	1/31	1	1/31	1	
1st	February	2/21	1			2/20 2/24	2	9
	March	3/24	1	3/27	1			
	April	04/22	1	04/17	1	04/21	1	
2nd	May	05/12 05/27 05/28	3					9
	June	06/19 06/26	2			06/23	1	
	July	07/01 07/14 07/21	3					
3rd	August	08/08 08/20	2			08/18	1	7
	September	09/23	1					
	October	10/17 10/23	2			10/20	1	
4th	November			11/13	1			4
	December							
Totals			18		4		7	29

PUBLIC MARKETS COMMITTEE (PUBMC)

11/13/14:

- **Public Market Program**

  - The Investment Management Division discussed their perspectives on the market.

  - Mr. Underwood characterized the current equity market as net positive, with larger capitalization segments relatively stronger than smaller-capitalization counterparts. Staff remains constructive toward equities but recognized that in the short-run, valuations appear full, but not grossly overextended.

  - Mr. Alaimo provided an update on the performance of the various public market fixed income asset classes and managers within those asset classes. The Committee discussed ASRS blended emerging market debt mandate and the currency risks of emerging market corporate debt. Mr. Alaimo provided an overview of the F2 portfolio whose excess return has favorably contributed to the fixed income asset class.

  - Mr. Polen reported on his attendance at the International Farming Partners annual meeting and current information about the agriculture market. He noted the following major trends in the industry: a) a glut of grains impacting Midwest farming, b) drought in California is having major impact and c) Florida farms affected by a citrus disease.

PRIVATE MARKETS COMMITTEE (PRIVMC)

10/17/14:

- **Real Estate Investments**

  - The Committee approved a $100 million commitment in a separately managed account focused on value add office buildings as part of the niche-tactical real estate program. Final legal negotiations are pending.

  - The Committee approved granting Pierce Education Properties a variance permitting investment in a property located near Georgia Tech.

- **Real Estate Program**

  - The Committee approved up to $200 million investment in a special situations real estate credit fund. Final legal negotiations are pending,

- **Private Equity Program**

- The Committee authorized detailed diligence on a firm investing in platforms of real estate asset managers.

- The Committee confirmed the following future meeting dates: November 19, December 18, 2014 and January 23, 2015

10/23/14:

- **Ad-Hoc Meeting**

  - The Committee approved a C$12.5 million co-investment solely in the Holding Company PIK notes and Delayed Draw Notes of GFL Environmental and not in its equity.

TACTICAL PORTFOLIO POSITIONING

Asset class tactical positioning is a function of Investment House Views and an assessment of relative value between ASRS asset classes and their positioning to ASRS Strategic Asset Allocation Policy (SAAP).

Following an increase in spreads in the high yield market that primarily began in September and was exacerbated by market volatility in mid-October, we reallocated $300 million from core fixed income to high yield in late October with an additional $150 million each allocated to our two high yield managers, Columbia and JP Morgan. The incremental funding to high yield reduced our underweight in this asset class by approximately 90 bps to 3.8% vs. a 5.0% SAAP target while increasing our underweight in core fixed income to 10.3% vs. a 13.0% SAAP target.

In Infrastructure (0% SAAP target with a 0-3% range), the fund in which the ASRS is committed called ASRS commitment of $300M, which will represent 0.9% of the total fund. The IFM fund is open-end and invests globally in developed markets' transportation, energy, communication, and utilities infrastructure projects.

The more notable SAA policy underweights reside in high yield, EM debt relative and commodities. The CIO will discuss these tactical portfolios repositioning in more detail at the IC meeting.

Note: tactical portfolio positioning is captured in the ASRS Asset Allocation report; the performance results of tactical positioning (vs. policy targets) are reflected in the ASRS Quarterly Total Fund Performance Attribution Analysis.

IMD (INVESTMENT MANAGEMENT DIVISION)
ACTIVITIES, PROJECTS AND RESEARCH INITIATIVES

- Research and discussions continue regarding ASRS Asset Allocation Policy Study. As part of this process, ASRS/NEPC developed capital market assumptions for both a short-to-intermediate (3, 5-7yrs) and long-term (30 years) and various "strawman" asset allocation mixes. NEPC and IMD will discuss these at the December IC meeting; a subsequent meeting(s) with the IC will occur and, upon their recommendation, it is expected to be presented to the full Board for approval in Q1-15.

- The redesigned ASRS securities lending program was implemented on October 1st after final contract negotiations with State Street. The program includes two parts: 'agency lending' via State Street to create a conservative strategic lending program and 'opportunistic lending' to profit from relatively large or one-off individual lending transactions, the latter of which will be evaluated and approved on a case-by-case basis by the Director and CIO.

- ASRS enhanced cash management program is in the process of being implemented. The goals of the program are to provide required Fund liquidity, mitigate cash drag, minimize transaction costs and optimize manager portfolios rebalancing. The CIO and Asst. Equity Portfolio Manager are scheduled to make a presentation at the next IC meeting.

- At an ad-hoc Nov 21 PRVMC meeting, the Committee will be discussing the merits of and possibly investment in a separately managed account in European direct lending. Providing capital in primarily first lien senior secured loans to middle market companies has attractive risk/returns attributes and is viewed as a complement to other existing ASRS private debt mandates.

- IMD will hold an investment seminar on bankruptcy. Newton Glassman, founder of Catalyst Capital, will lead the discussion. Catalyst Capital is a Toronto based private equity firm which specializes in investing in companies experiencing distress. ASRS is an investor in Catalyst funds III and IV. Mr. Glassman is experienced in distressed and bankruptcy deals across North America and Europe.

- As a standard course of business, IMD meets with both incumbent and potential investment managers to discuss macro-economies and capital markets as well as providing a means to review new initiatives, relationships and new strategy offerings. Since the last IC meeting, IMD has met via conference call or in-person with a total of <u>76 investment managers</u>: Private markets (RE, PE, Debt) – 47 and Public markets (Equity and Debt) – 29.

- IMD internally manages 7 public equities and fixed income portfolios which had an aggregate market value of over $9.7 billion or 29% of Total Fund. For the 1-year ending October August 31, 4 of 7 met or exceeded their benchmarks, and 7 of 7 portfolios met or exceeded their benchmarks on an inception-to-date basis.

STATE STREET GLOBAL SERVICES

STATE STREET INVESTMENT ANALYTICS

Executive Presentation

To: Arizona State Retirement System

truView Risk Report September 30, 2014

Produced by State Street Investment Analytics, Risk Services

Monthly Reallocation Summary*

Month Ending September 30, 2014

Portfolio Reductions

- TOTAL US EQUITY
  - $16.5M – E2 Large Cap)
  - $6M – E7 (US Large Cap)
  - $2.9M – E8 (US Large Cap)
  - $2.2M –E3 (US Mid Cap)
  - $2.2M –E4 (US Mid Cap)
  - $0.5M – E6 (US Small Cap)
- TOTAL FIXED INCOME
  - $ 70M – F2 (Core)
- **TOTAL REDUCTIONS****
  - **$100.3M**

Portfolio Additions

- TOTAL MASTER CASH
  - $100.3M – MASTER CASH
- **TOTAL ADDITIONS****
  - **$100.3M**

***Based on State Street accounting records for public markets and therefore exclude private market drawdowns.**
****Reductions and additions do not include plan distributions.**

Monthly Reallocation Summary*

Month Ending October 31, 2014

Portfolio Reductions

- TOTAL FIXED INCOME
  - $ 285M – BGI US DEBT FUND (Core)
  - $ 15M – F2 (Core)

- **TOTAL REDUCTIONS****
  - **$300M**

Portfolio Additions

- TOTAL FIXED INCOME
  - $ 150M – COLUMBIA MANAGEMENT (High Yield)
  - $ 150M – JP MORGAN (High Yield)

- **TOTAL ADDITIONS****
  - **$300M**

***Based on State Street accounting records for public markets and therefore exclude private market drawdowns.**
****Reductions and additions do not include plan distributions.**

Monthly Risk Summary

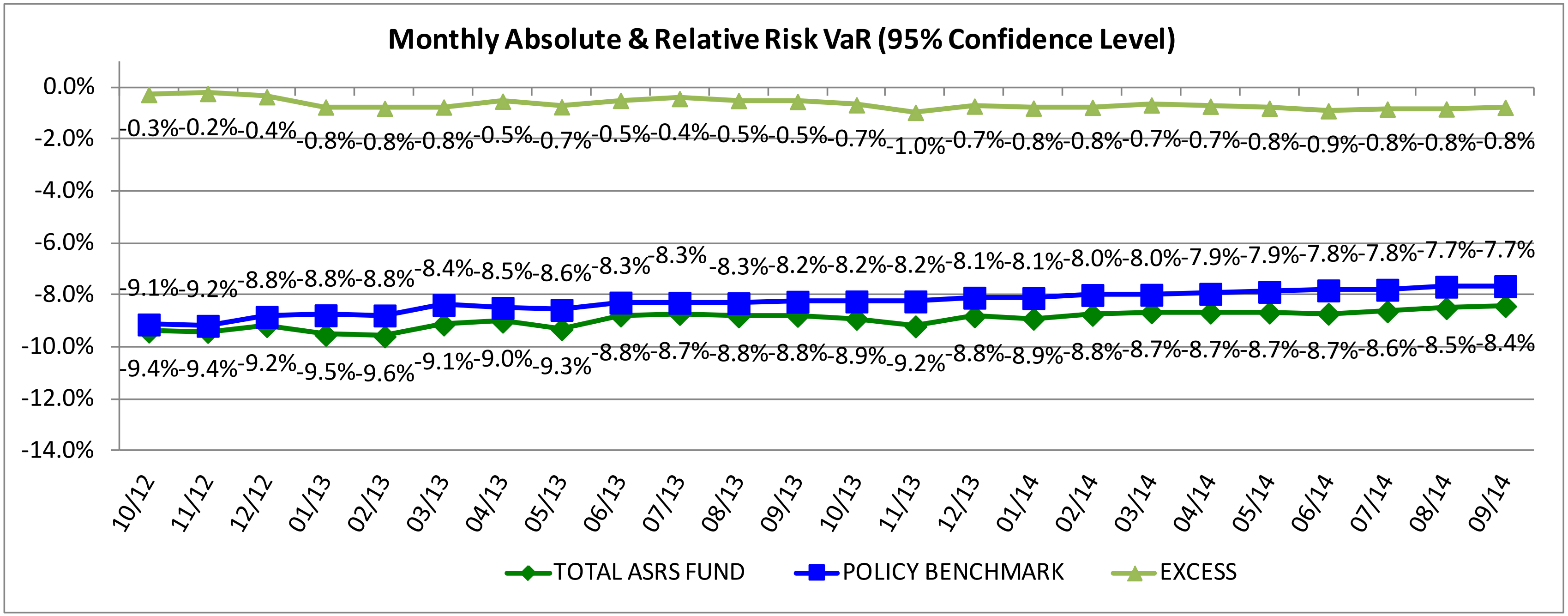
Month Ending September 30, 2014

Month-end Risk Profile

- For another month, Historical Risk (95% VaR) for all asset classes remain relatively constant from prior months with minimal changes. Total Plan risk decreased 8bps and the Policy Benchmark had a corresponding decrease of 2bps. A steady market environment has helped produce a stable risk profile since the beginning of this year.

- Excess risk over the Policy Benchmark remains unchanged at -0.8%.

.



ARIZONA STATE RETIREMENT SYSTEM

TOTAL PLAN EXPOSURE OVERVIEW

As of September 30, 2014

Sector (Public US Equity Only)		$ Value	% Value	**Blended US BM	Difference
CONSUMER NON-CYCLICAL	$	2,367,266,559	21.9%	22.4%	(0.6%)
FINANCIAL	$	1,673,580,249	15.5%	16.7%	(1.2%)
TECHNOLOGY	$	1,276,403,777	11.8%	13.6%	(1.8%)
INDUSTRIAL	$	1,228,021,515	11.3%	10.3%	1.0%
CONSUMER CYCLICAL	$	1,041,862,369	9.6%	9.2%	0.4%
ENERGY	$	936,514,027	8.6%	9.7%	(1.0%)
COMMUNICATIONS	$	916,538,835	8.5%	11.9%	(3.5%)
FUNDS	$	513,331,177	4.7%	0.0%	4.7%
BASIC MATERIALS	$	379,897,099	3.5%	3.2%	0.3%
UTILITIES	$	352,606,246	3.3%	3.0%	0.3%
CASH	$	106,137,529	1.0%	0.0%	1.0%
GOVERNMENT	$	28,118,853	0.3%	0.0%	0.3%
INDEX	$	8,498,992	0.1%	0.0%	0.1%
DIVERSIFIED	$	2,105,988	0.0%	0.0%	(0.0%)
GRAND TOTAL	**$**	**10,830,883,215**	**100.0%**	**100.0%**	**0.0%**

Country Category (Total Plan)		$ Value	% Value	*Blended TOTAL BM	Difference
NORTH AMERICA	$	25,809,467,457	76.4%	66.7%	9.7%
EUROPE DEVELOPED	$	3,699,604,559	11.0%	14.3%	(3.4%)
ASIA DEVELOPED	$	1,868,836,713	5.5%	9.1%	(3.6%)
ASIA EM	$	1,230,659,635	3.6%	4.4%	(0.8%)
LATIN AMERICA	$	637,640,926	1.9%	3.1%	(1.2%)
AFRICA	$	270,898,193	0.8%	0.9%	(0.1%)
EUROPE EM	$	124,942,644	0.4%	0.9%	(0.6%)
MIDDLE EAST	$	123,021,596	0.4%	0.5%	(0.1%)
GRAND TOTAL	**$**	**33,765,071,722**	**100.0%**	**100.0%**	**0.0%**

Market Cap^ (Public Equities Only)		$ Value	% Value	*Blended TOTAL BM	Difference
1) 0 - 100M	$	3,569,020	0.0%	0.0%	0.0%
2) 100M - 500M	$	541,010,778	2.8%	1.5%	1.2%
3) 500M - 1B	$	517,552,523	2.6%	3.7%	(1.1%)
4) 1B - 5B	$	3,237,819,758	16.5%	22.7%	(6.2%)
5) 5B - 10B	$	2,138,914,910	10.9%	10.1%	0.8%
6) 10B - 50B	$	5,724,283,430	29.2%	27.7%	1.5%
7) >50B	$	7,442,946,846	38.0%	34.2%	3.7%
GRAND TOTAL	**$**	**19,606,097,265**	**100.0%**	**100.0%**	**100.0%**

^Excludes cash and non-traded securities

	Top 20 Issuer (Total Plan)		$ Value	% Value	Market Cap	Sector	Industry Group
1	CASH***	$	1,590,688,876	4.7%		CASH	Cash
2	SPDR S&P 500 ETF TRUST	$	1,329,727,384	3.9%	7) 50B+	FUNDS	EQUITY FUND
3	US TREASURY N/B	$	954,814,651	2.8%		GOVERNMENT	SOVEREIGN
4	TREASURY BILL	$	722,938,394	2.1%		GOVERNMENT	SOVEREIGN
5	FANNIE MAE	$	720,345,864	2.1%		MORTGAGE SECURITIES	FNMA COLLATERAL
6	APPLE INC	$	227,965,514	0.7%	7) 50B+	TECHNOLOGY	COMPUTERS
7	MICROSOFT CORP	$	177,372,108	0.5%	7) 50B+	TECHNOLOGY	SOFTWARE
8	FREDDIE MAC	$	173,037,074	0.5%		MORTGAGE SECURITIES	FGLMC COLLATERAL
9	EXXON MOBIL CORP	$	172,641,566	0.5%	7) 50B+	ENERGY	OIL&GAS
10	JOHNSON & JOHNSON	$	138,174,109	0.4%	7) 50B+	CONSUMER NON-CYCLICAL	PHARMACEUTICALS
11	VANGUARD TOTAL STOCK MARKET ET	$	131,901,344	0.4%	6) 10B - 50B	FUNDS	EQUITY FUND
12	ISHARES MSCI USA MOMENTUM FACT(	$	130,777,920	0.4%	2) 100M - 500I	FUNDS	EQUITY FUND
13	ISHARES MSCI USA QUALITY FACTOR I	$	130,158,217	0.4%	3) 500M - 1B	FUNDS	EQUITY FUND
14	ISHARES MSCI USA VALUE FACTOR ET	$	128,878,360	0.4%	2) 100M - 500I	FUNDS	EQUITY FUND
15	ISHARES MSCI USA SIZE FACTOR ETF	$	123,516,680	0.4%	2) 100M - 500I	FUNDS	EQUITY FUND
16	CHEVRON CORP	$	115,352,013	0.3%	7) 50B+	ENERGY	OIL&GAS
17	ISHARES MSCI EMERGING MARKETS E	$	108,459,423	0.3%	6) 10B - 50B	FUNDS	EQUITY FUND
18	VANGUARD FTSE DEVELOPED MARKE	$	107,539,849	0.3%	6) 10B - 50B	FUNDS	EQUITY FUND
19	PFIZER INC	$	103,528,562	0.3%	7) 50B+	CONSUMER NON-CYCLICAL	PHARMACEUTICALS
20	PROCTER & GAMBLE CO/THE	$	99,770,683	0.3%	7) 50B+	CONSUMER NON-CYCLICAL	COSMETICS/PERSONAL CARE

*__Blended TOTAL BM__: 26% SP500, 5% SP400, 5% SP600, 5% R2000, 14% MSCI EAFE, 6% MSCI EM, 3% MSCI Sml Cap, 17% BC US AGG, 5% BC US HY, 6% FTSE NAREIT GLOBAL, 4% DJ-UBS COMMODITY, 4% JPM EMBI.

**__Blended US BM__: 72% SP500, 14% SP400, 14% SP600.

***__Cash__ does not represent an IMD tactical view; __Cash__ includes the ASRS Master Cash balance, manager- level portfolio cash & equivalents and cash collateralizing sundry portfolio-level futures contracts.

ARIZONA STATE RETIREMENT SYSTEM

INTERNATIONAL EQUITY EXPOSURE OVERVIEW

As of September 30, 2014

Sector (Public Intl Equity Only)		$ Value	% Value	*Blended NON-US BM	Difference
FINANCIAL	$	1,744,151,650	24.9%	25.3%	(0.4%)
CONSUMER NON-CYCLICAL	$	1,285,679,397	18.4%	19.0%	(0.6%)
INDUSTRIAL	$	901,554,306	12.9%	11.8%	1.1%
CONSUMER CYCLICAL	$	875,012,538	12.5%	11.6%	0.9%
COMMUNICATIONS	$	607,025,242	8.7%	8.6%	0.0%
ENERGY	$	420,463,182	6.0%	7.0%	(1.0%)
BASIC MATERIALS	$	410,280,551	5.9%	7.3%	(1.4%)
TECHNOLOGY	$	334,459,085	4.8%	4.9%	(0.1%)
UTILITIES	$	219,524,607	3.1%	3.5%	(0.3%)
CASH	$	96,368,239	1.4%	0.0%	1.4%
DIVERSIFIED	$	66,776,204	1.0%	1.0%	(0.1%)
INDEX	$	31,898,409	0.5%	0.0%	0.4%
FX	$	(17,990)	(0.0%)	0.0%	(0.0%)
GRAND TOTAL	**$**	**6,993,175,419**	**100.0%**	**100.0%**	**0.0%**

Country Category (Public Intl Equity Only)		$ Value	% Value	*Blended NON-US BM	Difference
EUROPE DEVELOPED	$	3,271,372,624	46.8%	47.6%	(0.8%)
ASIA DEVELOPED	$	1,814,368,127	25.9%	30.9%	(4.9%)
ASIA EM	$	1,039,945,590	14.9%	13.1%	1.7%
LATIN AMERICA	$	375,243,172	5.4%	4.8%	0.5%
AFRICA	$	182,071,304	2.6%	2.0%	0.6%
NORTH AMERICA	$	142,801,636	2.0%	0.1%	1.9%
MIDDLE EAST	$	97,935,675	1.4%	0.8%	0.6%
EUROPE EM	$	69,437,291	1.0%	0.6%	0.4%
GRAND TOTAL	**$**	**6,993,175,419**	**100.0%**	**100.0%**	**0.0%**

	Top 20 Industry Groups (Public Intl Only		$ Value	% Value	*Blended NON-US BM	Difference
1	BANKS	$	924,778,093	13.2%	13.8%	(0.6%)
2	PHARMACEUTICALS	$	417,199,382	6.0%	6.7%	(0.7%)
3	TELECOMMUNICATIONS	$	391,462,402	5.6%	5.9%	(0.3%)
4	OIL&GAS	$	372,355,747	5.3%	6.2%	(0.9%)
5	INSURANCE	$	361,484,358	5.2%	4.5%	0.7%
6	FOOD	$	305,768,747	4.4%	4.2%	0.2%
7	RETAIL	$	257,030,585	3.7%	3.1%	0.6%
8	AUTO MANUFACTURERS	$	231,211,176	3.3%	3.1%	0.2%
9	COMMERCIAL SERVICES	$	185,350,888	2.7%	1.8%	0.8%
10	CHEMICALS	$	175,910,245	2.5%	3.2%	(0.7%)
11	DIVERSIFIED FINAN SERV	$	174,206,621	2.5%	2.7%	(0.2%)
12	SEMICONDUCTORS	$	163,302,159	2.3%	2.7%	(0.3%)
13	ELECTRIC	$	152,982,777	2.2%	2.3%	(0.1%)
14	REAL ESTATE	$	150,481,179	2.2%	2.1%	0.0%
15	MINING	$	136,508,080	2.0%	2.5%	(0.6%)
16	ENGINEERING&CONSTRUCTI(	$	133,852,923	1.9%	1.7%	0.2%
17	BUILDING MATERIALS	$	133,775,629	1.9%	1.3%	0.6%
18	BEVERAGES	$	120,198,981	1.7%	2.1%	(0.3%)
19	ELECTRONICS	$	113,799,144	1.6%	1.7%	(0.0%)
20	MACHINERY-DIVERSIFIED	$	113,266,214	1.6%	1.1%	0.6%

Market Cap** (Public Intl Equities Only)		$ Value	% Value	*Blended NON-US BM	Difference
1) 0 - 100M	$	2,720,339	0.0%	0.0%	0.0%
2) 100M - 500M	$	119,238,465	1.7%	0.9%	0.9%
3) 500M - 1B	$	237,946,999	3.5%	2.1%	1.4%
4) 1B - 5B	$	1,308,403,153	19.2%	15.7%	3.5%
5) 5B - 10B	$	896,834,338	13.1%	12.1%	1.0%
6) 10B - 50B	$	2,499,645,593	36.6%	36.4%	0.2%
7) >50B	$	1,760,849,310	25.8%	32.9%	(7.1%)
GRAND TOTAL	**$**	**6,825,638,198**	**100.0%**	**100.0%**	**100.0%**

**Excludes cash and non-traded securities

***Blended NON-US BM**: 61% MSCI EAFE, 26% MSCI EM, 13% MSCI Sml Cap.

ARIZONA STATE RETIREMENT SYSTEM

TOTAL FIXED INCOME EXPOSURE OVERVIEW

As of September 30, 2014

Sector (Public Fixed Income Only)	$ Value	% Value	*Blended FI BM	Difference
GOVERNMENT	$ 1,499,772,303	34.8%	40.3%	(5.5%)
MORTGAGE SECURITIES	$ 858,511,732	19.9%	20.0%	(0.1%)
FINANCIAL	$ 397,052,654	9.2%	8.9%	0.3%
COMMUNICATIONS	$ 319,042,683	7.4%	5.4%	2.0%
CONSUMER NON-CYCLICAL	$ 280,745,771	6.5%	5.3%	1.2%
ENERGY	$ 240,396,448	5.6%	6.6%	(1.0%)
CONSUMER CYCLICAL	$ 167,621,945	3.9%	3.5%	0.4%
INDUSTRIAL	$ 147,621,604	3.4%	3.1%	0.3%
UTILITIES	$ 94,771,884	2.2%	2.2%	0.0%
TECHNOLOGY	$ 74,065,088	1.7%	1.4%	0.3%
CASH	$ 70,654,648	1.6%	0.0%	1.6%
BASIC MATERIALS	$ 68,175,789	1.6%	2.4%	(0.8%)
BANK LOANS	$ 45,190,339	1.0%	0.0%	1.0%
INDEX	$ 26,856,614	0.6%	0.4%	0.2%
ASSET BACKED SECURITIES	$ 9,001,596	0.2%	0.3%	(0.1%)
DIVERSIFIED	$ 8,648,498	0.2%	0.2%	0.0%
FUNDS	$ 4,196,260	0.1%	0.0%	0.1%
SWAP	$ (29,798)	(0.0%)	0.0%	(0.0%)
FX	$ (4,058,490)	(0.1%)	0.0%	(0.1%)
GRAND TOTAL	**$ 4,308,237,569**	**100.0%**	**100.0%**	**0.0%**

	Top 20 Industry Groups (Public Fixed Income Only)	$ Value	% Value	*Blended FI BM	Difference
1	SOVEREIGN	$ 1,423,485,490	33.0%	38.5%	(5.4%)
2	FNMA COLLATERAL	$ 592,902,150	13.8%	8.5%	5.2%
3	OIL&GAS	$ 180,120,103	4.2%	4.9%	(0.7%)
4	TELECOMMUNICATIONS	$ 179,169,999	4.2%	3.1%	1.0%
5	BANKS	$ 152,237,761	3.5%	5.0%	(1.5%)
6	FGLMC COLLATERAL	$ 121,684,300	2.8%	5.0%	(2.2%)
7	DIVERSIFIED FINAN SERV	$ 120,092,146	2.8%	2.3%	0.5%
8	MEDIA	$ 113,318,109	2.6%	2.0%	0.7%
9	ELECTRIC	$ 93,805,342	2.2%	2.0%	0.1%
10	COMMERCIAL MBS	$ 76,033,984	1.8%	1.3%	0.4%
11	CASH	$ 70,654,648	1.6%	0.0%	1.6%
12	HEALTHCARE-SERVICES	$ 66,340,875	1.5%	1.2%	0.4%
13	RETAIL	$ 59,377,695	1.4%	1.3%	0.1%
14	COMMERCIAL SERVICES	$ 46,428,722	1.1%	0.8%	0.2%
15	PHARMACEUTICALS	$ 46,428,615	1.1%	0.9%	0.2%
16	PIPELINES	$ 46,098,701	1.1%	1.2%	(0.1%)
17	BANK LOANS	$ 45,190,339	1.0%	0.0%	1.0%
18	SOFTWARE	$ 45,137,504	1.0%	0.6%	0.4%
19	MUNICIPAL	$ 44,856,836	1.0%	0.6%	0.4%
20	GNMA2 COLLATERAL	$ 41,824,015	1.0%	3.8%	(2.8%)

Credit Rating Group** (Public Fixed Income Only)	$ Value	% Value	*Blended FI BM	Difference
01) AAA	$ 1,936,872,650	45.0%	47.1%	(2.2%)
02) AA	$ 153,636,434	3.6%	3.7%	(0.1%)
03) A	$ 499,881,695	11.6%	9.4%	2.2%
04) BBB	$ 585,818,904	13.6%	14.7%	(1.1%)
05) BB	$ 474,437,409	11.0%	11.9%	(0.9%)
06) B	$ 430,307,799	10.0%	9.2%	0.8%
07) CCC	$ 137,263,321	3.2%	3.1%	0.1%
08) CC	$ -	0.0%	0.0%	(0.0%)
09) C	$ -	0.0%	0.0%	(0.0%)
10) D	$ -	0.0%	0.0%	0.0%
11) Not Rated	$ 90,019,358	2.1%	0.7%	1.4%
GRAND TOTAL	**$ 4,308,237,569**	**100.0%**	**100.0%**	**0.0%**

Maturity Bucket (Public Fixed Income Only)	$ Value	% Value	*Blended FI BM	Difference
0-1Y	$ 154,418,472	3.7%	1.2%	2.5%
1Y-3Y	$ 645,499,590	15.5%	18.3%	(2.8%)
3Y-5Y	$ 678,712,170	16.3%	16.7%	(0.3%)
5Y-10Y	$ 1,511,903,377	36.4%	30.3%	6.1%
10Y-15Y	$ 192,852,407	4.6%	5.6%	(0.9%)
15Y+	$ 1,096,423,545	26.4%	28.0%	(1.6%)
GRAND TOTAL	**$ 4,279,809,561**	**100.0%**	**100.0%**	**100.0%**

***Blended TOTAL BM**: 66% BC US AGG, 19% BC US HY, 15% JPM EMBI.

ARIZONA STATE RETIREMENT SYSTEM

As of September 30, 2014

TOTAL PLAN RISK OVERVIEW

Strategy	$ Value	% Value	Historical VaR 95%	HVaR Contri 95%	HVaR Contri % to Total	Parametric VaR 95%	PVaR Contri 95%	PVaR Contri % to Total	Exp Tail Loss 95%	Exp Tail Loss Contri 95%	Exp Tail Loss Contri % to Total	Max Loss	Std Dev	Downside Risk (8%)	Downside Risk Contri (8%)	Downside Risk Contri (8%) to Total
MONTHLY RISK																
MASTER CASH	$ 365,370,874	1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	(0.6%)	(0.0%)	0.0%
TOTAL FIXED INCOME	$ 4,308,237,569	13%	(2.6%)	(0.1%)	1.2%	(2.2%)	(0.1%)	1.7%	(3.8%)	(0.2%)	1.5%	(6.0%)	1.3%	(1.4%)	(0.1%)	1.9%
US EQUITY	$ 10,830,883,215	32%	(9.8%)	(3.2%)	38.0%	(8.9%)	(2.8%)	36.4%	(16.1%)	(5.1%)	37.3%	(30.6%)	6.2%	(4.5%)	(1.4%)	36.4%
INTERNATIONAL EQUITY	$ 6,993,175,419	21%	(10.8%)	(2.0%)	23.5%	(10.2%)	(2.0%)	26.4%	(16.7%)	(3.4%)	24.7%	(37.2%)	6.9%	(4.9%)	(1.0%)	25.5%
REAL ESTATE	$ 1,785,062,021	5%	(13.0%)	(0.7%)	8.4%	(11.6%)	(0.6%)	7.6%	(20.7%)	(1.0%)	7.6%	(39.1%)	7.6%	(5.8%)	(0.3%)	7.5%
FARMLAND & TIMBER	$ 116,218,612	0%	(9.6%)	(0.0%)	0.4%	(8.4%)	(0.0%)	0.4%	(15.5%)	(0.1%)	0.4%	(29.8%)	5.6%	(4.5%)	(0.0%)	0.4%
PRIVATE EQUITY	$ 2,183,121,273	6%	(12.7%)	(0.8%)	9.7%	(11.1%)	(0.7%)	8.9%	(19.5%)	(1.2%)	9.1%	(36.1%)	7.3%	(5.6%)	(0.4%)	9.0%
PRIVATE DEBT	$ 1,241,879,438	4%	(7.5%)	(0.2%)	2.9%	(6.6%)	(0.2%)	3.0%	(12.6%)	(0.4%)	3.2%	(25.1%)	4.4%	(3.5%)	(0.1%)	3.1%
OPPORTUNISTIC EQUITY	$ 338,837,763	1%	(11.9%)	(0.1%)	1.4%	(10.3%)	(0.1%)	1.3%	(18.3%)	(0.2%)	1.3%	(34.3%)	6.8%	(5.2%)	(0.1%)	1.3%
OPPORTUNISTIC DEBT	$ 1,052,998,542	3%	(6.1%)	(0.2%)	2.1%	(5.8%)	(0.2%)	2.2%	(11.4%)	(0.3%)	2.5%	(23.4%)	4.0%	(3.2%)	(0.1%)	2.4%
GLOBAL INFLATION LINKEI	$ 769,188,044	2%	(7.9%)	(0.1%)	1.7%	(7.8%)	(0.1%)	1.6%	(12.6%)	(0.2%)	1.7%	(26.2%)	4.9%	(3.9%)	(0.1%)	1.7%
GTAA	$ 3,780,098,951	11%	(8.2%)	(0.9%)	10.6%	(7.3%)	(0.8%)	10.5%	(13.0%)	(1.4%)	10.6%	(26.7%)	4.8%	(3.8%)	(0.4%)	10.8%
GRAND TOTAL	**$ 33,765,071,722**	**100%**	**(8.4%)**	**(8.4%)**	**100.0%**	**(7.7%)**	**(7.7%)**	**100.0%**	**(13.6%)**	**(13.6%)**	**100.0%**	**(28.2%)**	**5.2%**	**(3.9%)**	**(3.9%)**	**100.0%**
INTERIM POLICY BENCHMARK			***(7.7%)***			***(7.1%)***			***(12.2%)***			***(25.7%)***	**6.2%**	***(3.6%)***		
ANNUALIZED RISK																
MASTER CASH	$ 365,370,874	1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.0%	(2.2%)	(0.0%)	0.0%
TOTAL FIXED INCOME	$ 4,308,237,569	13%	(9.1%)	(0.4%)	1.2%	(7.7%)	(0.5%)	1.7%	(13.2%)	(0.7%)	1.5%	N/A	4.6%	(4.9%)	(0.3%)	1.9%
US EQUITY	$ 10,830,883,215	32%	(34.0%)	(11.1%)	38.0%	(30.8%)	(9.7%)	36.4%	(55.7%)	(17.6%)	37.3%	N/A	21.5%	(15.6%)	(5.0%)	36.4%
INTERNATIONAL EQUITY	$ 6,993,175,419	21%	(37.5%)	(6.9%)	23.5%	(35.4%)	(7.0%)	26.4%	(57.8%)	(11.6%)	24.7%	N/A	24.0%	(17.1%)	(3.5%)	25.5%
REAL ESTATE	$ 1,785,062,021	5%	(45.0%)	(2.4%)	8.4%	(40.2%)	(2.0%)	7.6%	(71.6%)	(3.6%)	7.6%	N/A	26.2%	(19.9%)	(1.0%)	7.5%
FARMLAND & TIMBER	$ 116,218,612	0%	(33.3%)	(0.1%)	0.4%	(29.2%)	(0.1%)	0.4%	(53.7%)	(0.2%)	0.4%	N/A	19.5%	(15.4%)	(0.1%)	0.4%
PRIVATE EQUITY	$ 2,183,121,273	6%	(44.1%)	(2.8%)	9.7%	(38.6%)	(2.4%)	8.9%	(67.5%)	(4.3%)	9.1%	N/A	25.3%	(19.3%)	(1.2%)	9.0%
PRIVATE DEBT	$ 1,241,879,438	4%	(26.0%)	(0.8%)	2.9%	(22.8%)	(0.8%)	3.0%	(43.5%)	(1.5%)	3.2%	N/A	15.3%	(12.1%)	(0.4%)	3.1%
OPPORTUNISTIC EQUITY	$ 338,837,763	1%	(41.2%)	(0.4%)	1.4%	(35.6%)	(0.3%)	1.3%	(63.4%)	(0.6%)	1.3%	N/A	23.4%	(18.1%)	(0.2%)	1.3%
OPPORTUNISTIC DEBT	$ 1,052,998,542	3%	(21.3%)	(0.6%)	2.1%	(20.1%)	(0.6%)	2.2%	(39.4%)	(1.2%)	2.5%	N/A	13.9%	(11.2%)	(0.3%)	2.4%
GLOBAL INFLATION LINKEI	$ 769,188,044	2%	(27.4%)	(0.5%)	1.7%	(27.0%)	(0.4%)	1.6%	(43.5%)	(0.8%)	1.7%	N/A	16.9%	(13.7%)	(0.2%)	1.7%
GTAA	$ 3,780,098,951	11%	(28.3%)	(3.1%)	10.6%	(25.3%)	(2.8%)	10.5%	(45.1%)	(5.0%)	10.6%	N/A	16.6%	(13.3%)	(1.5%)	10.8%
GRAND TOTAL	**$ 33,765,071,722**	**100%**	**(29.2%)**	**(29.2%)**	**100.0%**	**(26.7%)**	**(26.7%)**	**100.0%**	**(47.1%)**	**(47.1%)**	**100.0%**	**N/A**	**18.1%**	**(13.7%)**	**(13.7%)**	**100.0%**
INTERIM POLICY BENCHMARK			***(26.5%)***			***(24.5%)***			***(42.3%)***			**N/A**	***21.4%***	***(12.4%)***		

Strategy	$ Value	% Value	Beta SP500	Corr SP500	Beta MSCI EAFE	Corr MSCI EAFE	Duration	Convexity	Notional Exposure	Gross Exposure	Gross Leverage
MASTER CASH	$ 365,370,874	1%	0.00		0.00				$ 365,370,874	$ 365,370,874	100.0%
TOTAL FIXED INCOME	$ 4,308,237,569	13%	0.09	0.36	0.09	0.47	4.91	0.061	$ 4,073,506,945	$ 4,906,132,547	113.9%
US EQUITY	$ 10,830,883,215	32%	1.08	0.99	0.84	0.91	0.12	0.000	$ 10,949,883,381	$ 10,830,883,215	100.0%
INTERNATIONAL EQUITY	$ 6,993,175,419	21%	1.11	0.90	1.03	0.98	(0.07)	(0.000)	$ 6,993,651,853	$ 7,021,107,339	100.4%
REAL ESTATE	$ 1,785,062,021	5%	1.23	0.91	1.03	0.91			$ 1,785,062,021	$ 1,785,062,021	100.0%
FARMLAND & TIMBER	$ 116,218,612	0%	1.00	1.00	0.77	0.91			$ 116,218,612	$ 116,218,612	100.0%
PRIVATE EQUITY	$ 2,183,121,273	6%	1.24	0.96	0.95	0.86			$ 2,183,121,273	$ 2,183,121,273	100.0%
PRIVATE DEBT	$ 1,241,879,438	4%	0.73	0.93	0.59	0.88	0.43	0.002	$ 1,242,977,592	$ 1,242,088,058	100.0%
OPPORTUNISTIC EQUITY	$ 338,837,763	1%	1.18	0.98	0.90	0.88			$ 338,837,763	$ 338,837,763	100.0%
OPPORTUNISTIC DEBT	$ 1,052,998,542	3%	0.68	0.95	0.54	0.89			$ 1,052,998,542	$ 1,052,998,542	100.0%
GLOBAL INFLATION LINKEI	$ 769,188,044	2%	0.29	0.67	0.26	0.70	0.29	0.001	$ 1,538,568,416	$ 769,188,044	100.0%
GTAA	$ 3,780,098,951	11%	0.43	0.97	0.35	0.95	4.45	(0.436)	$ 7,362,751,125	$ 7,342,442,185	194.2%
GRAND TOTAL	**$ 33,765,071,722**	**100%**	**0.80**	**0.98**	**0.66**	**0.95**	**4.19**	**0.011**	**$ 38,002,948,398**	**$ 37,953,450,474**	**112.4%**

ARIZONA STATE RETIREMENT SYSTEM
As of September 30, 2014

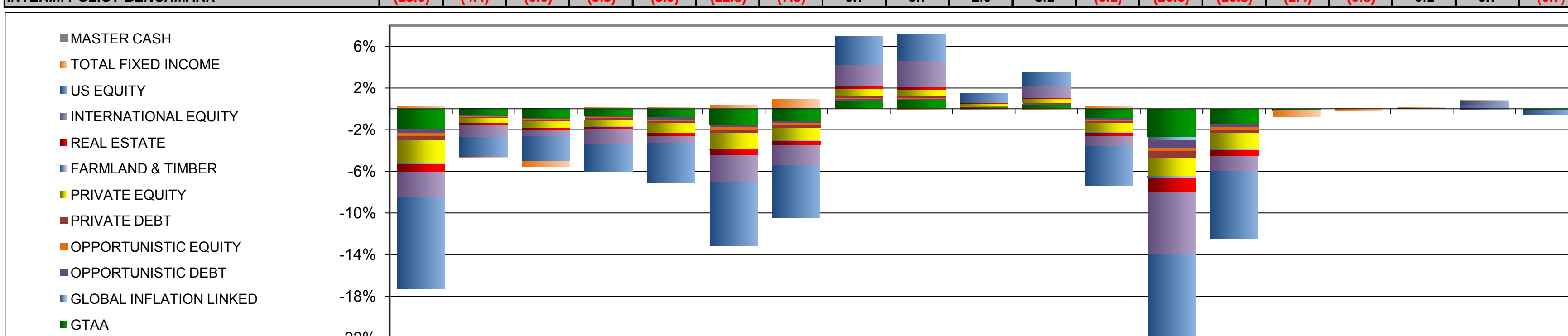
TOTAL PLAN STRESS TESTS

Stress Test Stand Alone

Strategy	$ Value	% Value	Black Monday - 5 Day	Gulf War - 5 Day	Bond Crash: Feb 94 - May 94	Asian Crisis 97-98 - 5 day	Russian Crisis - 5 Day	Nasdaq Correction: July 98 - Aug 98	Russian Debt Crisis Aug-Oct	IR Steepening: Sept 98 - Nov 98	Emerging Markets Rally: Jan 99 - May 99	Fed Tightening: April - June 99	Nasdaq Rally: Nov 99 - Jan 00	9/11 Attack - 5 Day	09-10-2008	S&P 500 -20%	IR Parallel Shift +100bps	Spread Up 100bps	Inflation +1%	Gold Shock -20%	Oil Shock -20%
			Historical Scenarios													Predictive Scenarios					
MASTER CASH	$ 365,370,874	1.1%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL FIXED INCOME	$ 4,308,237,569	12.8%	1.1	(0.7)	(4.2)	1.0	0.7	2.6	7.2	(0.6)	(1.7)	(0.8)	(1.3)	1.7	(4.7)	(0.1)	(4.9)	(0.3)	0.3	0.0	(0.0)
US EQUITY	$ 10,830,883,215	32.1%	(27.5)	(6.1)	(7.7)	(8.3)	(12.2)	(19.1)	(15.6)	8.6	7.9	2.8	4.2	(11.7)	(26.7)	(20.2)	0.0	0.0	0.0	1.4	(1.4)
INTERNATIONAL EQUITY	$ 6,993,175,419	20.7%	(11.8)	(5.8)	(2.7)	(6.7)	(2.8)	(12.6)	(9.2)	10.0	12.0	(0.3)	5.7	(4.8)	(28.6)	(7.2)	0.0	0.0	(0.0)	1.3	(0.1)
REAL ESTATE	$ 1,785,062,021	5.3%	(14.3)	(3.1)	(4.1)	(4.3)	(6.3)	(10.1)	(8.1)	4.5	4.1	1.5	2.2	(6.1)	(28.0)	(10.5)	0.0	0.0	0.0	0.0	0.0
FARMLAND & TIMBER	$ 116,218,612	0.3%	(27.2)	(6.0)	(7.8)	(8.2)	(12.0)	(19.1)	(15.4)	8.6	7.8	2.8	4.1	(11.6)	(27.0)	(20.0)	0.0	0.0	0.0	0.0	0.0
PRIVATE EQUITY	$ 2,183,121,273	6.5%	(34.0)	(7.5)	(9.7)	(10.3)	(15.1)	(24.0)	(19.3)	10.8	9.8	3.5	5.2	(14.5)	(26.9)	(25.0)	0.0	0.0	0.0	0.0	(0.0)
PRIVATE DEBT	$ 1,241,879,438	3.7%	(11.2)	(2.5)	(3.2)	(3.4)	(5.0)	(7.9)	(6.3)	3.6	3.2	1.2	1.7	(4.8)	(20.5)	(8.3)	(0.0)	(0.0)	0.0	0.0	0.0
OPPORTUNISTIC EQUITY	$ 338,837,763	1.0%	(32.3)	(7.1)	(9.2)	(9.8)	(14.3)	(22.7)	(18.3)	10.2	9.3	3.3	4.9	(13.8)	(27.1)	(23.7)	0.0	0.0	0.0	0.0	0.0
OPPORTUNISTIC DEBT	$ 1,052,998,542	3.1%	(13.0)	(2.9)	(3.7)	(3.9)	(5.8)	(9.2)	(7.4)	4.1	3.7	1.3	2.0	(5.6)	(22.3)	(9.6)	0.0	0.0	0.0	0.0	0.0
GLOBAL INFLATION LINKEI	$ 769,188,044	2.3%	(0.0)	0.0	0.0	(0.0)	(0.0)	(0.0)	0.0	(0.0)	0.0	0.0	0.0	(0.0)	(16.4)	0.0	(0.0)	0.0	0.0	(4.1)	(3.4)
GTAA	$ 3,780,098,951	11.2%	(17.3)	(5.5)	(8.0)	(6.5)	(7.7)	(13.7)	(10.6)	7.2	7.6	1.1	3.4	(7.8)	(24.2)	(13.3)	(1.7)	0.0	0.1	0.5	(1.2)
GRAND TOTAL	**$ 33,765,071,722**	**100.0%**	**(17.2)**	**(4.8)**	**(5.7)**	**(5.9)**	**(7.1)**	**(12.9)**	**(9.6)**	**6.9**	**6.9**	**1.3**	**3.4**	**(7.2)**	**(23.2)**	**(12.6)**	**(0.8)**	**(0.3)**	**0.1**	**0.7**	**(0.7)**
INTERIM POLICY BENCHMARK			**(15.0)**	**(4.4)**	**(6.0)**	**(5.5)**	**(5.9)**	**(11.8)**	**(7.5)**	**6.7**	**6.7**	**1.0**	**3.1**	**(6.1)**	**(20.6)**	**(10.8)**	**(1.4)**	**(0.8)**	**0.1**	**0.7**	**(0.7)**

Stress Test Contribution

Strategy	$ Value	% Value	Black Monday - 5 Day	Gulf War - 5 Day	Bond Crash: Feb 94 - May 94	Asian Crisis 97-98 - 5 day	Russian Crisis - 5 Day	Nasdaq Correction: July 98 - Aug 98	Russian Debt Crisis Aug-Oct	IR Steepening: Sept 98 - Nov 98	Emerging Markets Rally: Jan 99 - May 99	Fed Tightening: April - June 99	Nasdaq Rally: Nov 99 - Jan 00	9/11 Attack - 5 Day	09-10-2008	S&P 500 -20%	IR Parallel Shift +100bps	Spread Up 100bps	Inflation +1%	Gold Shock -20%	Oil Shock -20%
MASTER CASH	$ 365,370,874	1.1%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL FIXED INCOME	$ 4,308,237,569	12.8%	0.1	(0.1)	(0.5)	0.1	0.1	0.3	0.9	(0.1)	(0.2)	(0.1)	(0.2)	0.2	(0.6)	(0.0)	(0.6)	(0.3)	0.0	0.0	(0.0)
US EQUITY	$ 10,830,883,215	32.1%	(8.8)	(1.9)	(2.5)	(2.7)	(3.9)	(6.1)	(5.0)	2.8	2.5	0.9	1.3	(3.8)	(8.6)	(6.5)	0.0	0.0	0.0	0.4	(0.4)
INTERNATIONAL EQUITY	$ 6,993,175,419	20.7%	(2.4)	(1.2)	(0.6)	(1.4)	(0.6)	(2.6)	(1.9)	2.1	2.5	(0.1)	1.2	(1.0)	(5.9)	(1.5)	0.0	0.0	(0.0)	0.3	(0.0)
REAL ESTATE	$ 1,785,062,021	5.3%	(0.8)	(0.2)	(0.2)	(0.2)	(0.3)	(0.5)	(0.4)	0.2	0.2	0.1	0.1	(0.3)	(1.5)	(0.6)	0.0	0.0	0.0	0.0	0.0
FARMLAND & TIMBER	$ 116,218,612	0.3%	(0.1)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	0.0	0.0	0.0	0.0	(0.0)	(0.1)	(0.1)	0.0	0.0	0.0	0.0	0.0
PRIVATE EQUITY	$ 2,183,121,273	6.5%	(2.2)	(0.5)	(0.6)	(0.7)	(1.0)	(1.6)	(1.2)	0.7	0.6	0.2	0.3	(0.9)	(1.7)	(1.6)	0.0	0.0	0.0	0.0	(0.0)
PRIVATE DEBT	$ 1,241,879,438	3.7%	(0.4)	(0.1)	(0.1)	(0.1)	(0.2)	(0.3)	(0.2)	0.1	0.1	0.0	0.1	(0.2)	(0.8)	(0.3)	(0.0)	(0.0)	0.0	0.0	0.0
OPPORTUNISTIC EQUITY	$ 338,837,763	1.0%	(0.3)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	0.1	0.1	0.0	0.0	(0.1)	(0.3)	(0.2)	0.0	0.0	0.0	0.0	0.0
OPPORTUNISTIC DEBT	$ 1,052,998,542	3.1%	(0.4)	(0.1)	(0.1)	(0.1)	(0.2)	(0.3)	(0.2)	0.1	0.1	0.0	0.1	(0.2)	(0.7)	(0.3)	0.0	0.0	0.0	0.0	0.0
GLOBAL INFLATION LINKEI	$ 769,188,044	2.3%	(0.0)	0.0	0.0	(0.0)	(0.0)	(0.0)	0.0	(0.0)	0.0	0.0	0.0	(0.0)	(0.4)	0.0	(0.0)	0.0	0.0	(0.1)	(0.1)
GTAA	$ 3,780,098,951	11.2%	(1.9)	(0.6)	(0.9)	(0.7)	(0.9)	(1.5)	(1.2)	0.8	0.8	0.1	0.4	(0.9)	(2.7)	(1.5)	(0.2)	0.0	0.0	0.1	(0.1)
GRAND TOTAL	**$ 33,765,071,722**	**100.0%**	**(17.2)**	**(4.8)**	**(5.7)**	**(5.9)**	**(7.1)**	**(12.9)**	**(9.6)**	**6.9**	**6.9**	**1.3**	**3.4**	**(7.2)**	**(23.2)**	**(12.6)**	**(0.8)**	**(0.3)**	**0.1**	**0.7**	**(0.7)**
INTERIM POLICY BENCHMARK			**(15.0)**	**(4.4)**	**(6.0)**	**(5.5)**	**(5.9)**	**(11.8)**	**(7.5)**	**6.7**	**6.7**	**1.0**	**3.1**	**(6.1)**	**(20.6)**	**(10.8)**	**(1.4)**	**(0.8)**	**0.1**	**0.7**	**(0.7)**



GLOSSARY	DEFINITION	INTERPRETATION
Historical VaR 95%	A risk metric that is derived from a full revaluation historical simulation of the risk factors impacting a portfolio, making no assumption of the tail distribution, and reporting the largest loss likely to be suffered over a holding period (1Month for ASRS) 5 times out of 100, or 1 month out of 20	Value at Risk is a number, measured in price units or as percentage of portfolio value, which tells you that in a defined large percentage of cases (usually 95% or 99%) your portfolio is likely to not lose more than that amount of money. Or said the other way around, in a defined small percentage of cases (5% or 1%) your loss is expected to be greater than that number.
HVaR Contri 95%	This is the decomposition of the VaR, making it an additive measure, showing positive values where risk is decreased and correlations are negative.	
HVaR Contri % to Total	This is the VaR contribution displayed in percent.	
Parametric VaR 95%	A risk metric that is derived from a full revaluation historical simulation of the risk factors impacting a portfolio, making a Normal distribution assumption of the tail distribution, and reporting the largest loss likely to be suffered over a holding period (1Month for ASRS) 5 times out of 100, or 1 month out of 20.	Value at Risk is a number, measured in price units or as percentage of portfolio value, which tells you that in a defined large percentage of cases (usually 95% or 99%) your portfolio is likely to not lose more than that amount of money. Or said the other way around, in a defined small percentage of cases (5% or 1%) your loss is expected to be greater than that number.
PVaR Contri 95%	This is the decomposition of the VaR, making it an additive measure, showing positive values where risk is decreased and correlations are negative.	
PVaR Contri % to Total	This is the VaR contribution displayed in percent.	
Exp Tail Loss 95%	Also known as Conditional VaR or ETL, it is derived by taking a weighted average between the VaR and losses exceeding the VaR. If VaR is reported at 95.0%, then ETL will average the losses between 95.1% to 99.9%. It is a risk measure that assesses the risk beyond VaR and into the tail end of the distribution of loss.	A measure that produces better incentives for traders than VaR is expected shortfall. This is also sometimes referred to as Conditional VaR, or tail loss. Where VaR asks the question 'how bad can things get?', expected shortfall asks 'if things do get bad, what is our expected loss?
Exp Tail Loss Contri 95%	This is the decomposition of the ETL making it an additive measure, showing positive values where risk is decreased and correlations are negative.	
Exp Tail Loss Contri % to Total	This is the ETL contribution displayed in percent.	
Max Loss	The maximum projected loss.	
Downside Risk (8.7%)	A risk metric that distinguishes between "good" and "bad" returns by assigning risk only to those returns below a return specified by an investor. Downside risk is considered a more effective risk measure than standard deviation (volatility) for two important reasons: 1) it is investor specific, and 2) it identifies return distributions that have higher probabilities for negative ("left tail") market events. Downside risk is also referred to as downside deviation or target semi-deviation.	A 5 % downside risk with an 8.7% MAR means that the conditional average underperformance (below 8.7% annual) is 5%, adjusted for a positive skew (greater than the MAR). Effectively, downside risk amplifies a big loss (by squaring the distance of that loss to the target) and smoothes out the risk measure by taking into account the gains setting them up to be equal to the target MAR.
Downside Risk Contri (8.7%)	This is the decomposition of the downside risk, making it an additive measure, showing positive values where risk is decreased and correlations are negative.	
Downside Risk Contri (8.7%) to Total	This is the downside risk contribution displayed in percent.	

Securities Lending Risk Metrics

	2 – Year Swap Spread (bps)	S&P/ISDA U.S. Financials Select 10 Index	5-Year Financial OAS (bps)	TED Spread (bps)	CBOE VIX Index (vol)	Windham Systemic Risk	Windham Turbulance
10/31/2014	21	59	112	23	14	Low	Moderate
9/30/2014	25	67	107	22	16	Low	Low
8/31/2014	22	53	99	21	12	Low	Low
7/31/2014	20	59	95	22	17	Low	Low
6/30/2014	13	53	96	21	12	Low	Low
5/31/2014	14	54	99	20	11	Low	Low
4/30/2014	12	56	99	20	13	Low	Low
3/31/2014	13	61	103	20	14	Low	Low
2/28/2014	13	60	104	19	14	Low	Low
1/31/2014	13	71	111	22	18	Low	Low
12/31/2013	11	60	109	18	14	Low	Low
11/30/2013	9	68	118	18	14	Low	Low
10/31/2013	12	79	125	21	14	Low	Moderate
9/30/2013	14	90	139	24	17	Low	Moderate
8/31/2013	16	89	142	24	17	Low	High
7/31/2013	17	91	142	23	13	Low	High
6/30/2013	16	106	158	24	17	Low	High
5/31/2013	16	84	134	25	16	Low	Moderate
4/30/2013	14	91	137	23	14	Low	Moderate
3/31/2013	18	101	142	21	13	Low	Low
2/28/2013	15	99	141	18	16	Low	Low
1/31/2013	17	101	146	23	14	Low	Low
12/31/2012	14	116	155	27	18	Low	Low
11/30/2012	12	126	163	23	16	Low	Moderate
10/31/2012	10	130	158	21	19	Low	Moderate
9/30/2012	13	142	179	27	16	Low	Moderate
8/31/2012	18	164	206	35	17	Low	High
7/31/2012	20	179	223	35	19	Low	High
6/30/2012	25	191	253	38	17	Low	Moderate
5/31/2012	35	221	272	40	24	Low	Moderate
4/30/2012	29	179	239	37	17	Low	Moderate
3/31/2012	25	158	227	40	16	Low	Moderate
2/29/2012	26	171	245	41	18	Low	Moderate
1/31/2012	30	186	278	49	19	High	Moderate
12/31/2011	48	248	337	57	23	High	Moderate
11/30/2011	42	263	349	53	28	High	Moderate
10/31/2011	33	219	281	44	30	High	Moderate
9/30/2011	33	268	332	35	43	High	Moderate

LEGEND

	RISK FACTORS	Green	Yellow	Red
1	2 – Year Swap Spread	< 40 bps	40 - 60 bps	> 60 bps
2	S&P/ISDA US Financial Select 10	< 100 bps	100 - 200 bps	> 200 bps
3	5-Year Financial OAS	< 125 bps	125 - 200 bps	> 200 bps
4	TED Spread	< 50 bps	50 - 100 bps	> 100 bps
5	CBOE VIX Index	< 25 Vol	25 - 35 Vol	> 35 Vol
6	Windham Systemic Risk	Low	n/a	High
7	Windham Turbulence	Low	Moderate	High

2 – Year Swap Spread	The spread paid by the fixed-rate payer of an interest rate swap over the rate of the 2-year Treasury. The reported 2-year swap spread from Bloomberg is a composite price - calculated average of best bid/ask pricing.
S&P/ISDA US Financial Select 10	The S&P/ISDA US Financial Select 10 tracks major domestic financial 5-year CDS rates. The Index uses and average weighting methodology of the current liquid, "on the run" active contract.
5-Year Financial OAS	The Barclay's U.S. Aggregate Financial Average Option Adjusted Spread; the option adjusted investment grade financial corporate bond spread over 5-year Treasury bonds.
TED Spread	The TED Spread is calculated as the difference between three-month LIBOR expressed in USD and the corresponding yield on 3-month Treasury Bills, expressed in basis points.
CBOE VIX Index	The Chicago Board Options Exchange VIX Index measures the weighted average implied volatility of the S&P 500 using call and put prices over the front two months with a wide range of strike prices.
Windham Systemic Risk	Windham Capital's proprietary measure of the extent to which markets are unified or tightly coupled, called the absorption ratio. When markets are tightly coupled, they are more fragile and negative shocks propagate more quickly and broadly than when markets are loosely linked. Windham reports Systemic Risk as High or Low; there is no Moderate designation for
Windham Turbulence	Windham Capital's proprietary measure of the statistical unusualness of a set of returns given their historical pattern of behavior; including extreme price moves, decoupling of correlated assets and convergence of uncorrelated assets. Windham reports Turbulence as High, Moderate, or Low.

Agenda Item #4

NEPC, LLC

To: The Arizona State Retirement System (ASRS) Investment Committee (IC)

From: Mr. Allan Martin, Partner, Consultant, NEPC

Mr. Dan LeBeau, Consultant, NEPC

Date: November 20, 2014

Subject: **Agenda Item #4**: Presentation, Discussion and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight of the ASRS Investment Program – Includes Total Fund and Investment Performance Report Q3-14

Purpose

To present and discuss information regarding the independent reporting, monitoring and oversight of the ASRS Investment Program.

In addition to the Total Fund Report, NEPC and IMD Staff will provide a detailed review of the quarterly ASRS Investment Performance Report (IPR).

Recommendation

Informational only; no action required.

Notice

Regarding this agenda item, pursuant to A.R.S. § 38-431.03(A)(2) and A.R.S. § 38-718(P) notice is hereby given to Trustees of the ASRS Investment Committee and the general public that the ASRS Investment Committee may vote to go into executive session, in the event specific manager data is discussed that is deemed confidential/non-public information.

Background

NEPC is responsible for providing an independent reporting, monitoring and oversight function from the Investment Program information which is presented by the CIO and IMD.

As a result, NEPC has developed reports for both the IC and Board designed to 1) provide the appropriate level of investment information for the purposes of independent oversight (ASRS SAAP compliance, Asset Class Committee minutes review, investment selection due diligence packet compliance, etc.); 2) provide ASRS investment program performance relative to its goals/objectives (presented quarterly); and 3) communicate NEPC's perspectives on the market environment, investment outlook or other initiatives or topics they believe are important to convey to the IC and Board.

More specific to the IC, NEPC will provide the IC with an ASRS Investment Performance Report (IPR) on a quarterly basis, which will provide investment manager-level detail information for discussion by NEPC and IMD staff. In addition, IMD will provide one or more staff reports related to ASRS private investments or other asset class/managers. These reports will be marked as confidential/non-public and, prior to a discussion of individual manager performance, the IC will move to executive session.

As of September 30, 2014 the Total Fund's market value was approximately $34.1 billion.

For the one-year period ending September 30, 2014, the Total Fund returned 10.8% (net of fees), outperforming the Interim SAA Policy by 1.2%. For the three-year period, the Total Fund produced a return of 14.2% per annum, outperforming the Interim SAA Policy by 0.5%. Over the past ten years, the Total Fund has returned 7.4% per annum, and since inception, the portfolio's performance is 9.9%.

Attachments:

- NEPC's Independent Reporting, Monitoring and Oversight reports
- ASRS Investment Performance Report (IPR) for period ending September 30, 2014. (Confidential/Non-Public) – distributed at the meeting

Arizona State Retirement System

Independent ASRS Investment Program Oversight for the Period Ending September 30, 2014

December 1, 2014

Allan Martin, Partner, NEPC
Dan LeBeau, Consultant, NEPC

NEPC, LLC

Contents

ASRS Investment Objectives/Performance

Note: All of the data shown on the following pages is as of September 30, 2014 and reflects the deduction of investment manager fees, unless otherwise noted.

ASRS Investment Objectives

Macro

- Objective #1: Achieve a twenty-year rolling annual total fund net rate of return equal to or greater than the actuarial assumed interest rate.
- Objective #2: Achieve one- and three-year rolling annual total fund net rates of return equal to or greater than the return of the ASRS Strategic Asset Allocation Policy (SAAP) Benchmark.
- Objective #3: Achieve one- and three-year rolling annual net rates of return for ASRS strategic asset classes that are equal to or greater than their respective strategic asset class benchmarks.
- Objective #4: Ensure sufficient monies are available to meet pension benefits, health insurance, member refunds, administrative payments, and other cash flow requirements.

Micro

Source: ASRS Strategic Plan, March 2013

Total Fund Performance

- Objective #1: Achieve a twenty-year rolling annual total fund net rate of return equal to or greater than the actuarial assumed interest rate.

	20 Year Annualized Return
Total Fund	8.7%
Constant 8%	8.0%
Excess Return	0.7%

Goal Met: Yes

Total Fund Performance

- Objective #2: Achieve one- and three-year rolling annual total fund net rates of return equal to or greater than the return of the ASRS Strategic Asset Allocation Policy (SAAP) Benchmark.

	Quarter	**1 Year**	**3 Years**	5 Years	10 Years	Since Inception (6/30/75)
Total Fund	-1.3%	**10.8%**	**14.2%**	11.1%	7.4%	9.9%
Interim SAA Policy[1]	-1.9%	**9.6%**	**13.7%**	10.5%	7.0%	9.7%
Excess Return	0.6%	**1.2%**	**0.5%**	0.6%	0.4%	0.2%

1 Year Goal Met: Yes
3 Year Goal Met: Yes

[1]Composition of SAA Policy can be found in the appendix.

Total Fund Attribution Analysis

Total Plan	1 Year	3 Years	5 Years
Allocation Effect[1]	0.69%	0.64%	0.34%
Manager Selection Effect[2]	0.08%	0.09%	0.07%
Interaction Effect[3]	0.45%	-0.14%	0.34%
Residual[4]	-0.04%	-0.07%	-0.11%
Excess Return	**1.18%**	**0.52%**	**0.64%**

The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:

1. Allocation Effect: Measures the impact of the decision to over/under weight assets classes relative to Interim SAAP weights**.** (Return Asset Class Index – Total Interim Policy Index Return) × (Weight Asset Class Portfolio − Weight Asset Class Interim Policy Index)

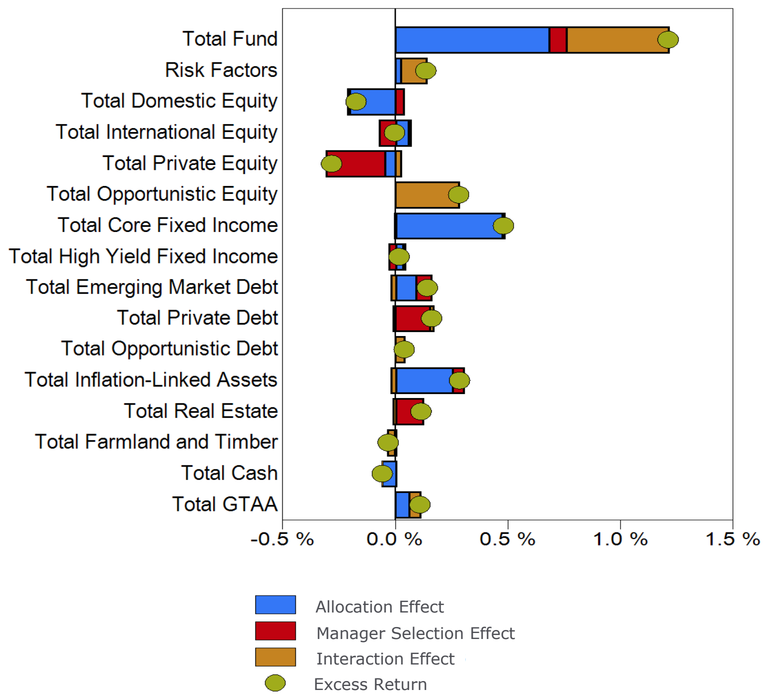
2. Manager Selection Effect: Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark. [Weight Asset Class Benchmark × (Return Portfolio Asset Class − Return Asset Class in Interim Policy Index)]

3. Interaction Effect: Measures the impact of over/under weighting decisions and over/under performance. (Return Asset Class Portfolio (Weight Asset Class Portfolio − Weight Asset Class Policy Index))−(Return Asset Class Index (Weight Asset Class Portfolio − Weight Asset Class Index))

4. Residual: Contribution to excess return not captured in Allocation Effect, Manager Selection Effect and Interaction Effect.

Total Fund Attribution Detail

Attribution Effects
1 Year Ending September 30, 2014



1 Year Excess Return: +1.18%

- Allocation Effect: +0.69%
  - Public Markets Fixed Income tactical underweight (+0.61%)
  - Commodities tactical underweight (+0.25%)
  - Domestic Equity tactical underweight (-0.20%)
- Manager Selection Effect: +0.08%
  - Private Debt outperformed due to various managers (+0.16%)
  - Real Estate outperformed due to various managers (+0.12%)
  - Private Equity underperformed due to various managers (-0.26%)
- Interaction Effect: +0.45%
  - Opportunistic Equity outperformed due to various managers (+0.28%)
  - Equity Risk Factor Portfolio outperformed due to various exposures (+0.11%)
- Residual: -0.04%

The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:

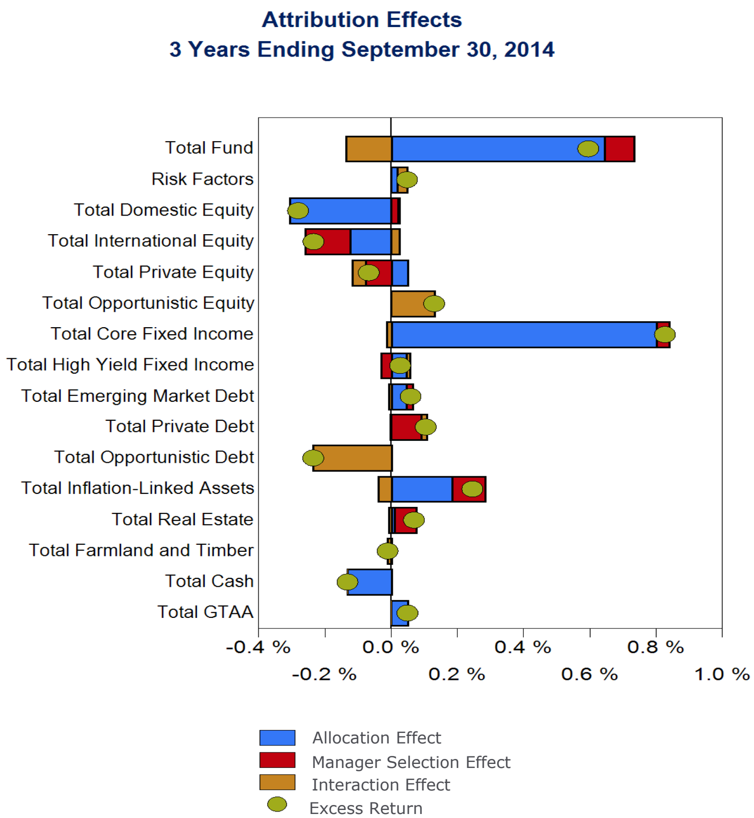
Allocation Effect: Measures the impact of the decision to over/under weight assets classes relative to Interim SAAP benchmark weights**.** (Return Asset Class Index – Total Interim Policy Index Return) × (Weight Asset Class Portfolio − Weight Asset Class Interim Policy Index)

Manager Selection Effect: Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark. [Weight Asset Class Benchmark × (Return Portfolio Asset Class − Return Asset Class in Interim Policy Index)]

Interaction Effect: Measures the impact of over/under weighting decisions and over/under performance. (Return Asset Class Portfolio (Weight Asset Class Portfolio − Weight Asset Class Policy Index))−(Return Asset Class Index (Weight Asset Class Portfolio − Weight Asset Class Index))

Residual: Contribution to excess return not captured in Allocation Effect, Manager Selection Effect and Interaction Effect.

Total Fund Attribution Detail



3 Year Excess Return: +0.52%

- Allocation Effect: +0.64%
  - Public Markets Fixed Income tactical underweight (+0.90%)
  - Commodities tactical underweight (+0.18%)
  - Domestic Equity tactical underweight (-0.31%)
- Manager Selection Effect: +0.09%
  - Commodities outperformed due to Gresham (+0.10%)
  - Private Debt outperformed due to various managers (+0.09%)
  - International Equity underperformed due to various managers (-0.13%)
- Interaction Effect: -0.14%
  - Opportunistic Equity outperformed due to various managers (+0.13%)
  - Opportunistic Debt underperformed due to various managers (-0.24%)
- Residual: -0.07%

The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:

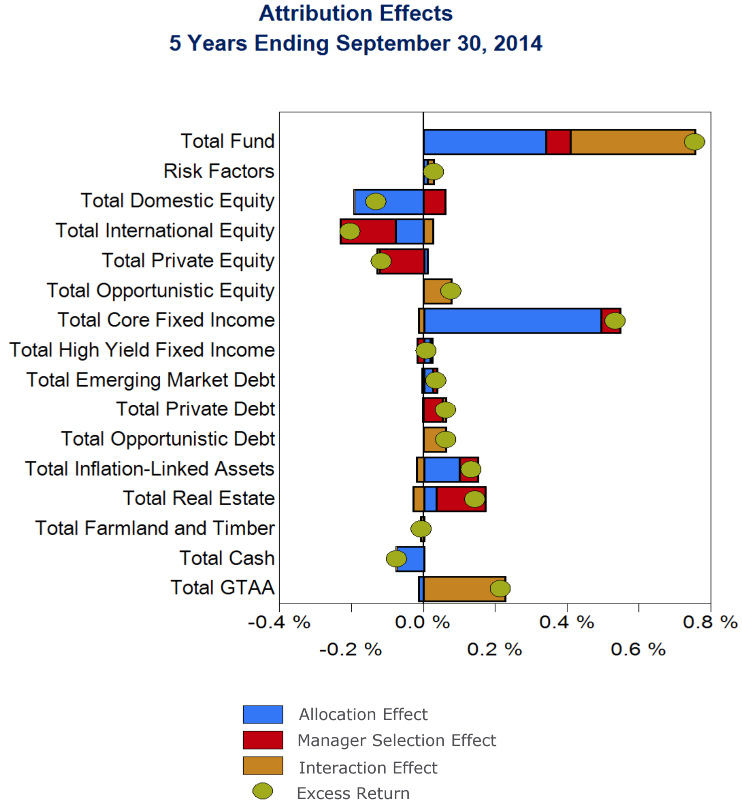
Allocation Effect: Measures the impact of the decision to over/under weight assets classes relative to Interim SAAP benchmark weights**.** (Return Asset Class Index – Total Interim Policy Index Return) × (Weight Asset Class Portfolio − Weight Asset Class Interim Policy Index)

Manager Selection Effect: Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark. [Weight Asset Class Benchmark × (Return Portfolio Asset Class − Return Asset Class in Interim Policy Index)]

Interaction Effect: Measures the impact of over/under weighting decisions and over/under performance. (Return Asset Class Portfolio (Weight Asset Class Portfolio − Weight Asset Class Policy Index))−(Return Asset Class Index (Weight Asset Class Portfolio − Weight Asset Class Index))

Residual: Contribution to excess return not captured in Allocation Effect, Manager Selection Effect and Interaction Effect.

Total Fund Attribution Detail



5 Year Excess Return: +0.64%

- Allocation Effect: +0.34%
  - Public Markets Fixed Income tactical underweight (+0.55%)
  - Domestic Equity tactical underweight (-0.19%)
- Manager Selection Effect: +0.07%
  - Real Estate outperformed due to various managers (+0.13%)
  - Domestic Equity outperformed due to various managers (+0.06%)
  - International Equity underperformed due to various managers (-0.15%)
- Interaction Effect: +0.34%
  - GTAA outperformed due to Bridgewater (+0.23%)
  - Opportunistic Equity outperformed due to various managers (+0.08%)
- Residual: -0.11%

The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:

Allocation Effect: Measures the impact of the decision to over/under weight assets classes relative to Interim SAAP benchmark weights**.** (Return Asset Class Index – Total Interim Policy Index Return) × (Weight Asset Class Portfolio − Weight Asset Class Interim Policy Index)

Manager Selection Effect: Measures the impact of over/under performance of asset classes in the portfolio relative to the asset class benchmarks in the Interim SAAP benchmark. [Weight Asset Class Benchmark × (Return Portfolio Asset Class − Return Asset Class in Interim Policy Index)]

Interaction Effect: Measures the impact of over/under weighting decisions and over/under performance. (Return Asset Class Portfolio (Weight Asset Class Portfolio − Weight Asset Class Policy Index))−(Return Asset Class Index (Weight Asset Class Portfolio − Weight Asset Class Index))

Residual: Contribution to excess return not captured in Allocation Effect, Manager Selection Effect and Interaction Effect.

Asset Class Performance vs. Benchmark – Public Markets

- Objective #3: Achieve one- and three-year rolling annual net rates of return for ASRS strategic asset classes that are equal to or greater than their respective strategic asset class benchmarks.

	1 Year Return	3 Year Return
ASRS Total Domestic and Int'l Equity[1]	11.6%	19.0%
ASRS Custom Total Equity Benchmark	11.3%	19.1%
Excess Return	0.3%	-0.1%
ASRS Domestic Equity	16.7%	23.0%
ASRS Custom Domestic Equity Benchmark	16.4%	22.9%
Excess Return	0.3%	0.1%
ASRS International Equity	3.9%	11.9%
ASRS Custom Int'l Equity Benchmark	4.2%	12.4%
Excess Return	-0.3%	-0.5%
ASRS Public Markets Fixed Income	3.9%	3.0%
ASRS Custom Fixed Income Benchmark	3.7%	2.8%
Excess Return	0.2%	0.2%
ASRS Inflation-Linked	-5.5%	-3.2%
ASRS Custom Inflation-Linked Benchmark	-6.6%	-5.3%
Excess Return	1.1%	2.1%
ASRS GTAA	10.6%	14.1%
ASRS Custom GTAA Benchmark	10.2%	14.1%
Excess Return	0.4%	0.0%

[1]Performance of ASRS Total Domestic and Int'l Equity includes the performance of the ASRS Domestic Equity and ASRS International Equity asset classes and the Equity Risk Factor Portfolio with an inception date of 6/1/2013.

Note: Composition of ASRS Custom Asset Class Benchmarks can be found in the appendix.

Goal Met: Partially

Asset Class Performance vs. Benchmark – Private Markets[1]

- Objective #3: Achieve one- and three-year rolling annual net rates of return for ASRS strategic asset classes that are equal to or greater than their respective strategic asset class benchmarks.

	1 Year Return	3 Year Return	IRR Since Inception	Inception Date
ASRS Private Equity	19.5%	15.0%	13.4%	Oct-07
Russell 2000	23.6%	14.6%	15.7%	
Excess Return	-4.1%	0.4%	-2.3%	
ASRS Opportunistic Equity[2]	47.4%	28.9%	39.1%	Apr-11
ASRS Private Debt	14.6%	--	15.6%	Jul-12
S&P/LSTA Levered Loan Index + 250 bps	8.1%	--	8.2%	
Excess Return	6.5%	--	7.4%	
ASRS Opportunistic Debt[2]	11.6%	9.4%	12.3%	Jan-08
ASRS Real Estate	13.8%	12.4%	6.1%	Oct-05
NFI - ODCE Index	11.7%	11.4%	5.5%	
Excess Return	2.1%	1.0%	0.6%	
ASRS Farmland and Timber	-46.3%	--	1.5%	Jul-13
CPI ex-Food and Energy + 350 bps	5.5%	--	4.2%	
Excess Return	-51.8%	--	-2.7%	

[1]Performance of private markets portfolios and corresponding benchmarks is reported on a one quarter lag. Performance shown as of June 30, 2014.

[2]Net absolute rate of return expectations range from 10-14% per annum.

Note: Time-weighted performance of private markets portfolios shown for the one- and three-year periods to reconcile Total Fund performance as it is reported on a time-weighted basis. Due to the drawdown nature of private markets portfolios in which the investment managers call capital over time, dollar-weighted performance, or internal rate of return (IRR) is a more appropriate measure of the performance of ASRS private markets portfolios.

Goal Met: Partially

Cash Management

- Objective #4: Ensure sufficient monies are available to meet pension benefits, health insurance, member refunds, administrative payments, and other cash flow requirements.

Month	Cash In	Cash Out	Balance as of 1st Business Day
Oct-13	$404,897,845	($190,046,089)	$200,202,122
Nov-13	$213,012,636	($190,661,495)	$126,730,318
Dec-13	$560,544,992	($190,590,864)	$317,630,570
Jan-14	$386,764,591	($190,949,369)	$352,809,530
Feb-14	$210,787,413	($191,680,149)	$189,010,112
Mar-14	$679,587,225	($192,454,469)	$486,243,101
Apr-14	$455,478,123	($192,789,720)	$246,095,874
May-14	$328,489,975	($193,063,809)	$162,815,927
Jun-14	$143,781,061	($193,481,152)	$90,885,762
Jul-14	$249,555,269	($196,223,085)	$101,745,713
Aug-14	$196,994,381	($198,736,874)	$141,827,348
Sep-14	$365,370,874	($199,232,408)	$165,530,449

All Pension Obligations, Capital Calls and Other Requirements Met with Available Cash

Goal Met: Yes

Note:

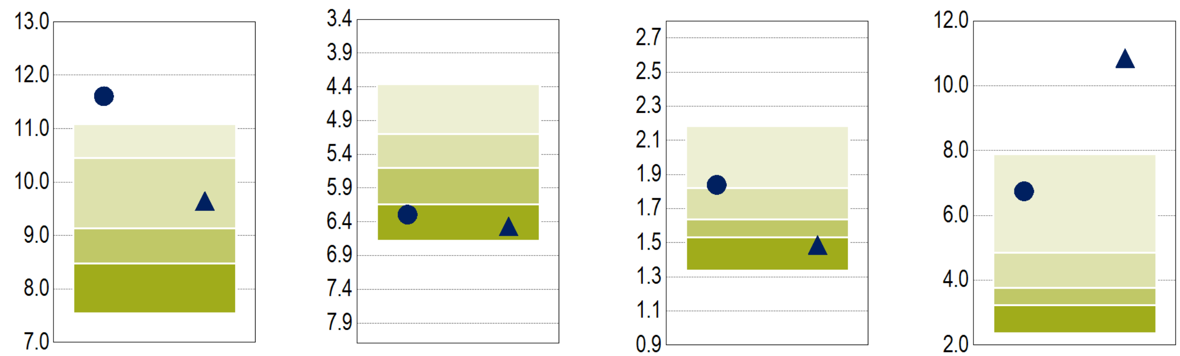
Cash In - The balance as of the business day prior to the monthly pension run payment, comprised of month-to-date contributions and excess cash held to fund manager(s) or as a tactical allocation.

Cash Out - The monthly pension run payment.

Total Fund Risk Statistics vs. Peer Universe

Total Fund vs. IFx Public DB > $1B Gross(USD)(peer)

1 Year



	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
● Total Fund				
Value	11.6	6.3	1.8	6.7
%tile	1	80	23	10
▲ Interim SAA Policy				
Value	9.6	6.5	1.5	10.9
%tile	41	88	79	2
Universe				
5th %tile	11.1	4.4	2.2	7.9
25th %tile	10.5	5.1	1.8	4.9
Median	9.1	5.6	1.6	3.8
75th %tile	8.5	6.1	1.5	3.3
95th %tile	7.5	6.7	1.3	2.4

Note: The information contained herein is for comparison purposes only and is not a Total Fund benchmark. Peer universe comparisons are subject to several limitations, including: peer groups are not comprehensive; several funds are included in multiple peer groups; peer groups are constructed using gross of fee returns; and survivorship bias in that poorly performing funds may no longer report results.

Universes are constructed using gross of fee returns; therefore, ASRS rank is based on gross of fee returns.

Rankings are from highest (1) to lowest (100) in the InvestorForce Public Funds > $1 Billion Universe.

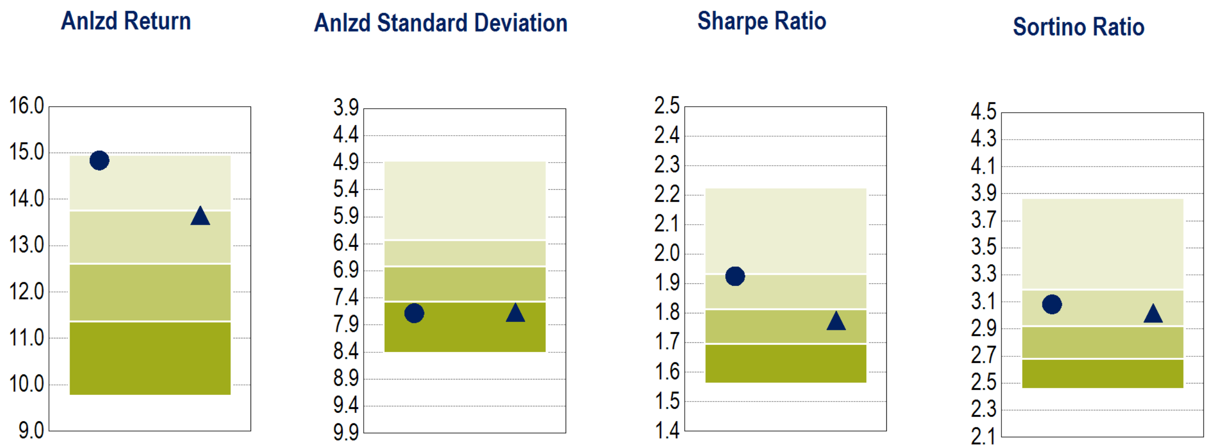
The InvestorForce Public Funds > $1 Billion Universe contains 57 observations for the period ending September 30, 2014, with total assets of $530.4 billion.

Composition of Interim SAA Policy can be found in the appendix.

Total Fund Risk Statistics vs. Peer Universe

Total Fund vs. IFx Public DB > $1B Gross(USD)(peer)

3 Year



	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
● Total Fund				
Value	14.8	7.7	1.9	3.1
%tile	8	81	28	35
▲ Interim SAA Policy				
Value	13.7	7.7	1.8	3.0
%tile	28	80	57	38
Universe				
5th %tile	15.0	4.9	2.2	3.9
25th %tile	13.8	6.3	1.9	3.2
Median	12.6	6.8	1.8	2.9
75th %tile	11.4	7.5	1.7	2.7
95th %tile	9.8	8.4	1.6	2.5

Note: The information contained herein is for comparison purposes only and is not a Total Fund benchmark. Peer universe comparisons are subject to several limitations, including: peer groups are not comprehensive; several funds are included in multiple peer groups; peer groups are constructed using gross of fee returns; and survivorship bias in that poorly performing funds may no longer report results.

Universes are constructed using gross of fee returns; therefore, ASRS rank is based on gross of fee returns.

Rankings are from highest (1) to lowest (100) in the InvestorForce Public Funds > $1 Billion Universe.

The InvestorForce Public Funds > $1 Billion Universe contains 57 observations for the period ending September 30, 2014, with total assets of $530.4 billion.

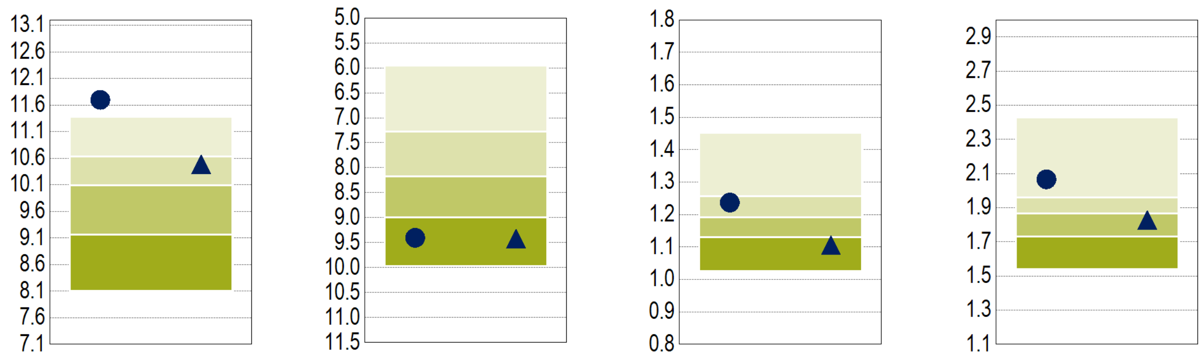
Composition of Interim SAA Policy can be found in the appendix.

Total Fund Risk Statistics vs. Peer Universe

Total Fund vs. IFx Public DB > $1B Gross(USD)(peer)

5 Year

Anlzd Return | Anlzd Standard Deviation | Sharpe Ratio | Sortino Ratio



	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
● Total Fund				
Value	11.7	9.4	1.2	2.1
%tile	2	86	32	18
▲ Interim SAA Policy				
Value	10.5	9.4	1.1	1.8
%tile	31	87	84	58
Universe				
5th %tile	11.4	6.0	1.5	2.4
25th %tile	10.6	7.3	1.3	2.0
Median	10.1	8.2	1.2	1.9
75th %tile	9.2	9.0	1.1	1.7
95th %tile	8.1	10.0	1.0	1.5

Note: The information contained herein is for comparison purposes only and is not a Total Fund benchmark. Peer universe comparisons are subject to several limitations, including: peer groups are not comprehensive; several funds are included in multiple peer groups; peer groups are constructed using gross of fee returns; and survivorship bias in that poorly performing funds may no longer report results.

Universes are constructed using gross of fee returns; therefore, ASRS rank is based on gross of fee returns.

Rankings are from highest (1) to lowest (100) in the InvestorForce Public Funds > $1 Billion Universe.

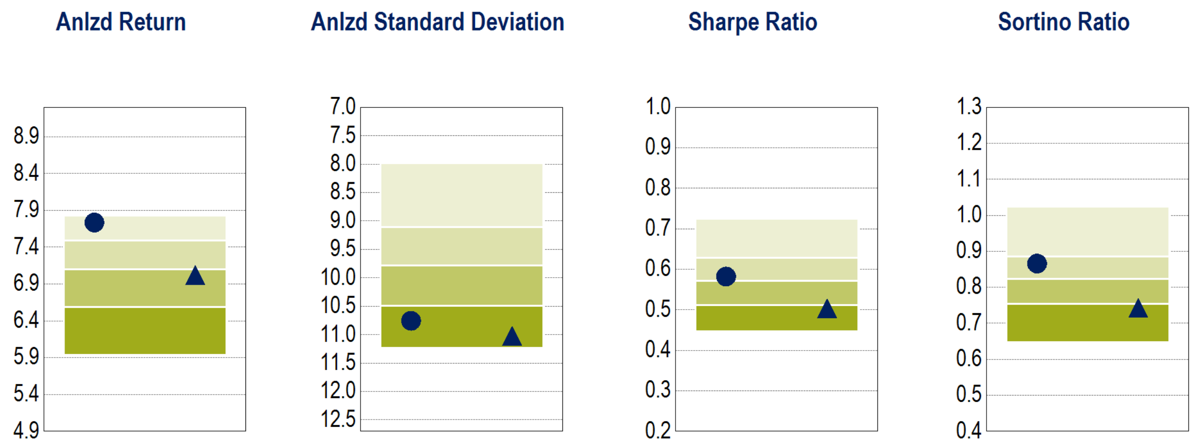
The InvestorForce Public Funds > $1 Billion Universe contains 57 observations for the period ending September 30, 2014, with total assets of $530.4 billion.

Composition of Interim SAA Policy can be found in the appendix.

Total Fund Risk Statistics vs. Peer Universe

Total Fund vs. IFx Public DB > $1B Gross(USD)(peer)

10 Year



	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
● Total Fund				
Value	7.7	10.8	0.6	0.9
%tile	10	85	46	35
▲ Interim SAA Policy				
Value	7.0	11.0	0.5	0.7
%tile	57	89	83	77
Universe				
5th %tile	7.8	8.0	0.7	1.0
25th %tile	7.5	9.1	0.6	0.9
Median	7.1	9.8	0.6	0.8
75th %tile	6.6	10.5	0.5	0.8
95th %tile	5.9	11.2	0.4	0.6

Note: The information contained herein is for comparison purposes only and is not a Total Fund benchmark. Peer universe comparisons are subject to several limitations, including: peer groups are not comprehensive; several funds are included in multiple peer groups; peer groups are constructed using gross of fee returns; and survivorship bias in that poorly performing funds may no longer report results.

Universes are constructed using gross of fee returns; therefore, ASRS rank is based on gross of fee returns.

Rankings are from highest (1) to lowest (100) in the InvestorForce Public Funds > $1 Billion Universe.

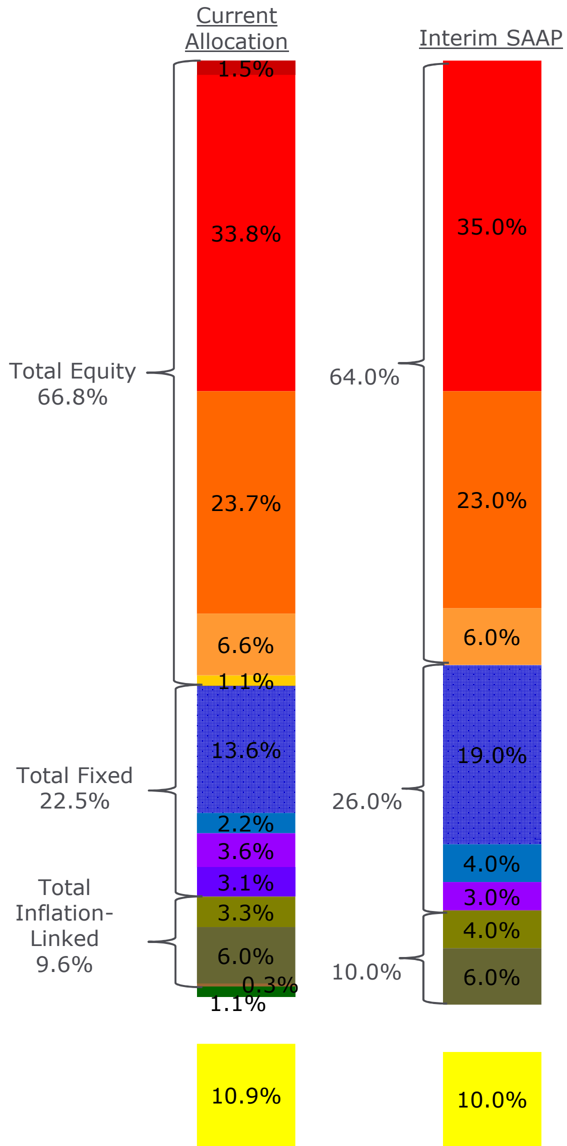
The InvestorForce Public Funds > $1 Billion Universe contains 57 observations for the period ending September 30, 2014, with total assets of $530.4 billion.

Composition of Interim SAA Policy can be found in the appendix.

Independent Oversight/Compliance

Note: All of the data shown on the following pages is as of September 30, 2014 and reflects the deduction of investment manager fees, unless otherwise noted.

SAA Policy Compliance



	Current Mkt Value	Current Allocation	Interim SAAP	Difference	Policy Range	Within Range
Total Domestic and International Equity[1]	$20,107,558,419	59.0%	58.0%	1.0%		
Domestic Equity[3]	$11,503,593,068	33.8%	35.0%	-1.2%	26% - 38%	Yes
U.S. Large Cap[2]	*$8,666,173,427*	*25.4%*	*25.0%*	*0.4%*		
U.S. Mid Cap	*$1,485,956,040*	*4.4%*	*5.0%*	*-0.6%*		
U.S. Small Cap	*$1,351,463,600*	*4.0%*	*5.0%*	*-1.0%*		
International Equity[3]	$8,086,764,651	23.7%	23.0%	0.7%	16% - 28%	Yes
Developed Large Cap[2]	*$4,932,651,025*	*14.5%*	*14.0%*	*0.5%*		
Developed Small Cap	*$1,201,570,116*	*3.5%*	*3.0%*	*0.5%*		
Emerging Markets	*$1,952,543,510*	*5.7%*	*6.0%*	*-0.3%*		
Private Equity[4]	$2,249,040,843	6.6%	6.0%	0.6%	5% - 9%	Yes
Opportunistic Equity[4,6]	$378,636,388	1.1%	0.0%	1.1%	0% - 3%	Yes
Total Equity	$22,735,235,649	66.8%	64.0%	2.8%	53% - 70%	Yes
U.S. Fixed Income[3]	$4,628,342,436	13.6%	19.0%	-5.4%	8% - 28%	Yes
Core[2]	*$3,665,661,126*	*10.8%*	*14.0%*	*-3.2%*		
High Yield	*$962,681,310*	*2.8%*	*5.0%*	*-2.2%*		
Emerging Market Debt	$735,153,288	2.2%	4.0%	-1.8%		
Private Debt[4]	$1,241,477,856	3.6%	3.0%	0.6%		
Opportunistic Debt[4,6]	$1,062,075,523	3.1%	0.0%	3.1%	0% - 10%	Yes
Total Fixed Income	$7,667,049,102	22.5%	26.0%	-3.5%	15% - 35%	Yes
Commodities[2]	$1,108,360,052	3.3%	4.0%	-0.7%	1% - 7%	Yes
Real Estate[2,4]	$2,056,715,973	6.0%	6.0%	0.0%	6% - 10%	Yes
Infrastructure	$0	0.0%	0.0%	0.0%	0% - 3%	Yes
Farmland and Timber[4]	$116,218,653	0.3%	0.0%	0.3%	0% - 3%	Yes
Opportunistic Inflation-Linked[6]	$0	0.0%	0.0%	0.0%	0% - 3%	Yes
Total Inflation-Linked	$3,281,294,679	9.6%	10.0%	-0.4%	8% - 16%	Yes
Cash[5]	$374,540,574	1.1%	0.0%	1.1%		
Total	$34,058,120,005	100.0%	100.0%	0.0%		
Global Tactical Asset Allocation (GTAA)[2]	$3,729,097,756	10.9%	10.0%	0.9%	5% - 15%	Yes

[1] Total Domestic and International Equity includes Equity Risk Factor Portfolio with assets of $517.2 million.

[2] GTAA allocation distributed into U.S. Large Cap Equity, Int'l Developed Large Cap Equity, Core Fixed Income, Commodities and Real Estate.

[3] Domestic Equity, International Equity and U.S. Fixed Income market values include residual values remaining in terminated manager accounts.

[4] Values shown for private markets portfolios include cash flows that occurred during 3Q 2014.

[5] Cash includes money for the upcoming monthly pension distribution. Value shown also includes assets in liquidating GTAA account.

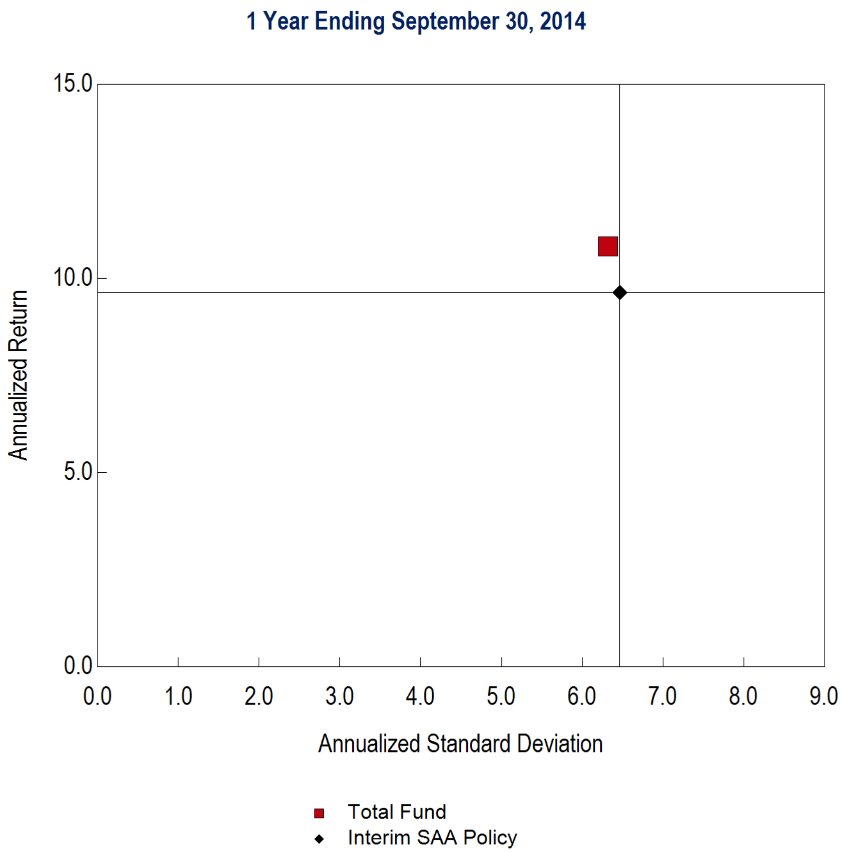
[6] Aggregate Opportunistic asset classes not to exceed 10%.

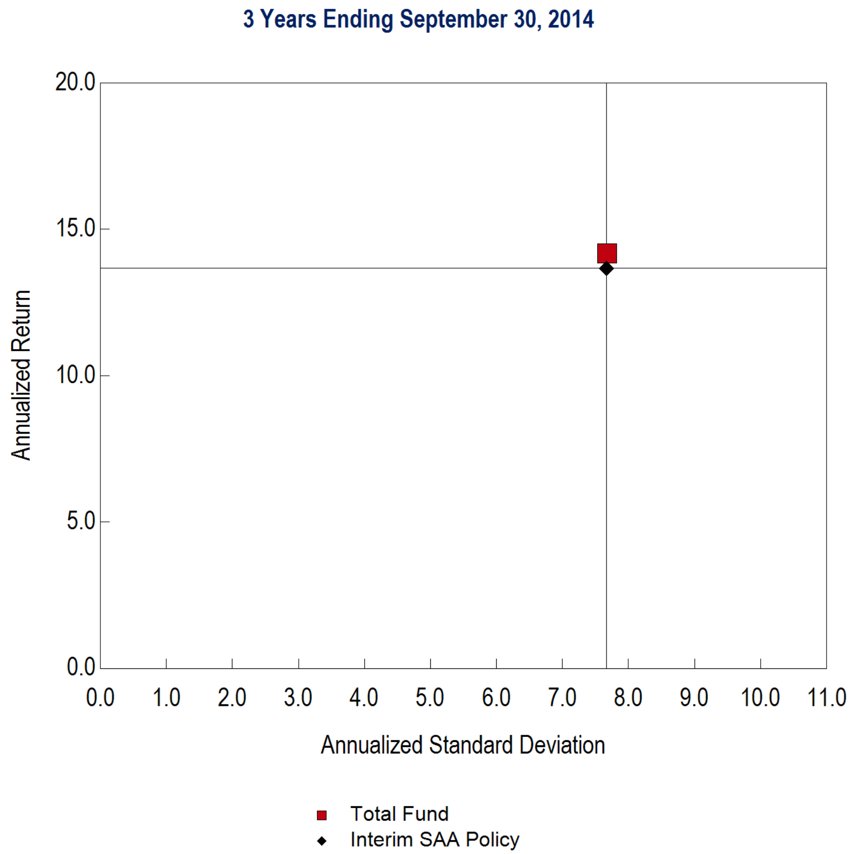
Note: Interim SAA Policy includes proration of 1% Private Equity and 2% Real Estate, which are unfunded.

Policy Ranges shown are relative to the long-term SAAP, causing some asset classes to be out of range while implementation of the long-term SAAP is in process.

Market values include manager held cash.

Total Fund Analysis





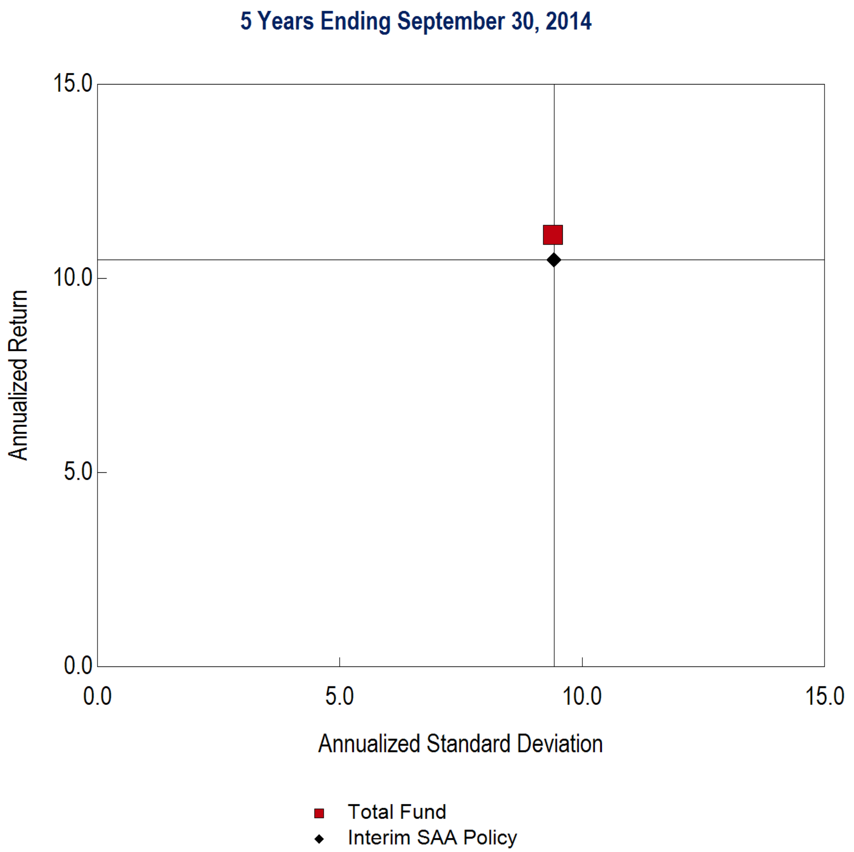
1 Year Ending September 30, 2014

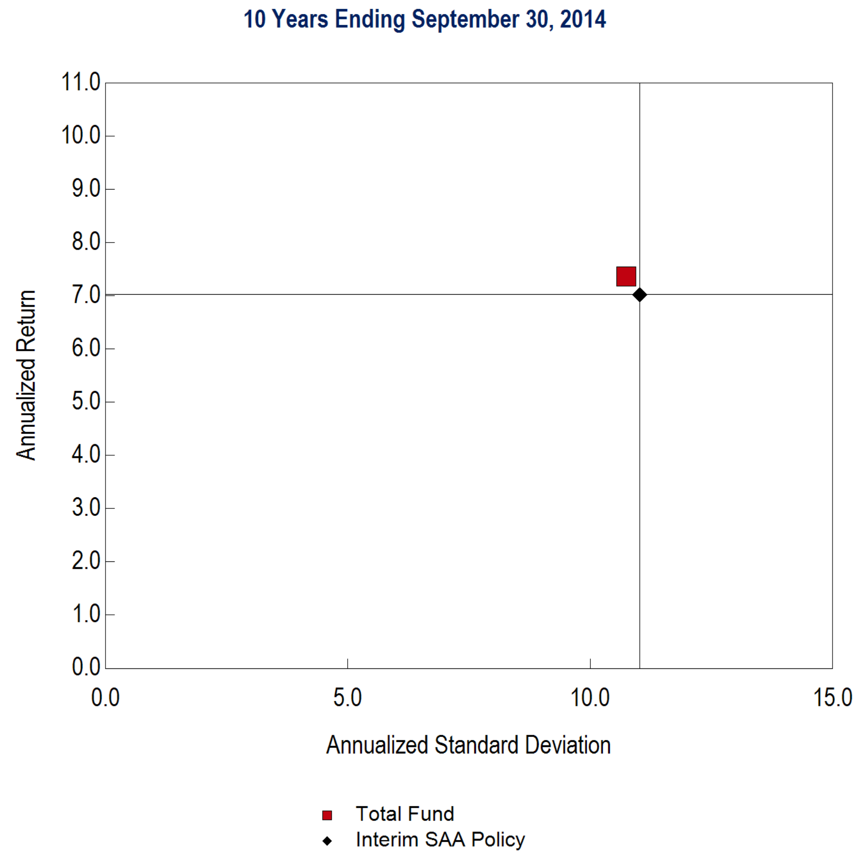
	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	10.8%	6.3%	1.7	6.4
Interim SAA Policy	9.6%	6.5%	1.5	10.9

3 Years Ending September 30, 2014

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	14.2%	7.7%	1.8	2.9
Interim SAA Policy	13.7%	7.7%	1.8	3.0

Total Fund Analysis





5 Years Ending September 30, 2014

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	11.1%	9.4%	1.2	2.0
Interim SAA Policy	10.5%	9.4%	1.1	1.8

10 Years Ending September 30, 2014

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	7.4%	10.8%	0.5	0.8
Interim SAA Policy	7.0%	11.0%	0.5	0.7

Asset Class Performance Summary - Public Markets

	Market Value ($)	% of Portfolio	3 Mo (%)	Rank	9 Mo (%)	Rank	1 Yr (%)	Rank	3 Yrs (%)	Rank	5 Yrs (%)	Rank	10 Yrs (%)	Rank	Inception (%)	Since
Total Fund	**34,058,120,005**	**100.0**	**-1.3**	**--**	**5.0**	**--**	**10.8**	**--**	**14.2**	**--**	**11.1**	**--**	**7.4**	**--**	**9.9**	**Jul-75**
Interim SAA Policy			*-1.9*	--	*3.9*	--	*9.6*	--	*13.7*	--	*10.5*	--	*7.0*	--	*9.7*	*Jul-75*
Over/Under			0.6		1.1		1.2		0.5		0.6		0.4		0.2	
Actual Benchmark			*-1.6*	--	*4.4*	--	*10.5*	--	*14.0*	--	*10.4*	--	*7.1*	--	--	*Jul-75*
Total Domestic and International Equity[1]	**17,844,130,385**	**52.4**	**-2.6**	**--**	**3.4**	**--**	**11.6**	**--**	**19.0**	**--**	**12.7**	**--**	**7.8**	**--**	**6.8**	**Jan-98**
ASRS Custom Total Equity Benchmark			*-2.7*	--	*3.1*	--	*11.3*	--	*19.1*	--	*12.6*	--	*7.8*	--	*6.1*	*Jan-98*
Over/Under			0.1		0.3		0.3		-0.1		0.1		0.0		0.7	
Total Domestic Equity	**10,319,920,286**	**30.3**	**-0.6**	**40**	**5.9**	**34**	**16.7**	**32**	**23.0**	**35**	**16.0**	**35**	**8.8**	**53**	**11.3**	**Jul-75**
ASRS Custom Domestic Equity Benchmark			*-0.8*	*42*	*5.7*	*36*	*16.4*	*34*	*22.9*	*35*	*15.9*	*39*	*8.4*	*64*	*11.4*	*Jul-75*
Over/Under			0.2		0.2		0.3		0.1		0.1		0.4		-0.1	
eA All US Equity Net Median			*-1.7*		*4.0*		*13.5*		*21.8*		*15.3*		*8.9*		*12.6*	*Jul-75*
Total International Equity	**7,007,009,399**	**20.6**	**-5.6**	**54**	**-0.5**	**46**	**3.9**	**61**	**11.9**	**77**	**6.1**	**83**	**6.2**	**90**	**6.3**	**Apr-87**
ASRS Custom Int'l Equity Benchmark			*-5.5*	*51*	*-0.5*	*46*	*4.2*	*58*	*12.4*	*70*	*6.7*	*71*	*7.4*	*69*	*6.0*	*Apr-87*
Over/Under			-0.1		0.0		-0.3		-0.5		-0.6		-1.2		0.3	
eA All ACWI ex-US Equity Net Median			*-5.5*		*-0.9*		*4.9*		*13.6*		*7.8*		*7.8*		*7.7*	*Apr-87*
Total Public Markets Fixed Income	**4,289,081,674**	**12.6**	**-1.1**	**86**	**3.3**	**54**	**3.9**	**51**	**3.0**	**55**	**4.7**	**49**	**5.0**	**40**	**8.5**	**Jul-75**
ASRS Custom Fixed Income Benchmark			*-1.4*	*87*	*3.3*	*55*	*3.7*	*54*	*2.8*	*59*	*4.3*	*57*	*4.7*	*49*	--	*Jul-75*
Over/Under			0.3		0.0		0.2		0.2		0.4		0.3		--	
eA All US Fixed Inc Net Median			*0.0*		*3.5*		*4.0*		*3.3*		*4.6*		*4.7*		*8.2*	*Jul-75*
Total Inflation-Linked Assets	**769,188,043**	**2.3**	**-10.9**	**--**	**-4.5**	**--**	**-5.5**	**--**	**-3.2**	**--**	**--**	**--**	**--**	**--**	**-0.7**	**Feb-10**
ASRS Custom Inflation-Linked Benchmark			*-11.8*	--	*-5.6*	--	*-6.6*	--	*-5.3*	--	*-1.8*	--	*1.4*	--	*-2.7*	*Feb-10*
Over/Under			0.9		1.1		1.1		2.1						2.0	
Total GTAA	**3,729,097,756**	**10.9**	**-2.6**	**59**	**4.6**	**14**	**10.6**	**8**	**14.1**	**6**	**12.5**	**1**	**8.6**	**10**	**8.1**	**Jan-04**
ASRS Custom GTAA Benchmark			*-1.4*	*33*	*4.2*	*15*	*10.2*	*9*	*14.1*	*6*	*10.3*	*6*	*6.8*	*59*	*6.5*	*Jan-04*
Over/Under			-1.2		0.4		0.4		0.0		2.2		1.8		1.6	
eA Global TAA Net Median			*-1.9*		*2.6*		*5.7*		*8.0*		*5.8*		*6.9*		*7.0*	*Jan-04*

[1]Performance of ASRS Total Domestic and International Equity includes the performance of the ASRS Domestic and International Equity asset classes and the Equity Risk Factor Portfolio with an inception date of 6/1/2013. NEPC began calculating Total Domestic and International Equity performance in January 2009. Monthly performance data from January 1998 - December 2008 was provided by State Street.

Note: Performance, ranks and medians are based on net of fee performance data. Rankings are from highest (1) to lowest (100) in the eVestment Alliance Universe.

Composition of Interim SAA Policy and ASRS Custom Asset Class Benchmarks can be found in the appendix.

Asset Class Performance Summary - Private Markets

	Market Value ($)	% of Portfolio	3 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	Inception (%)	IRR (%)	Since
Total Fund	**34,058,120,005**	**100.0**	**-1.3**	**10.8**	**14.2**	**11.1**	**9.9**	**--**	**Jul-75**
Interim SAA Policy			*-1.9*	*9.6*	*13.7*	*10.5*	*9.7*	--	*Jul-75*
Over/Under			0.6	1.2	0.5	0.6	0.2	--	
Actual Benchmark			*-1.6*	*10.5*	*14.0*	*10.4*	--	--	*Jul-75*
Total Private Equity	**2,194,753,936**	**6.4**	**5.1**	**19.5**	**15.0**	**16.7**	**5.2**	**13.4**	**Oct-07**
Russell 2000 1 QTR Lagged			*2.1*	*23.6*	*14.6*	*20.2*	*7.4*	*15.7*	*Oct-07*
Over/Under			3.0	-4.1	0.4	-3.5	-2.2	-2.3	
Total Opportunistic Equity[1]	**359,021,769**	**1.1**	**10.6**	**47.4**	**28.9**	**--**	**26.4**	**39.1**	**Apr-11**
Total Private Debt	**1,203,765,090**	**3.5**	**3.5**	**14.6**	**--**	**--**	**16.2**	**15.6**	**Jul-12**
S&P/LSTA Leveraged Loan Index + 250 bps 1 QTR Lagged			*2.0*	*8.1*	*--*	*--*	*9.0*	*8.2*	*Jul-12*
Over/Under			1.5	6.5			7.2	7.4	
Total Opportunistic Debt[1]	**939,848,457**	**2.8**	**3.7**	**11.6**	**9.4**	**--**	**9.2**	**12.3**	**Jan-08**
Total Real Estate	**2,076,797,083**	**6.1**	**2.9**	**13.8**	**12.4**	**12.0**	**4.0**	**6.1**	**Oct-05**
NCREIF ODCE 1 QTR Lagged			*2.7*	*11.7*	*11.4*	*9.0*	*5.1*	*5.5*	*Oct-05*
Over/Under			0.2	2.1	1.0	3.0	-1.1	0.6	
Total Farmland and Timber	**105,840,746**	**0.3**	**0.2**	**-46.3**	**--**	**--**	**-46.3**	**1.5**	**Jul-13**
CPI ex-Food and Energy + 350 bps 1 QTR Lagged			*1.5*	*5.5*	*--*	*--*	*5.5*	*4.2*	*Jul-13*
Over/Under			-1.3	-51.8			-51.8	-2.7	

[1]Net absolute rate of return expectations range from 10-14% per annum.

Note: Performance is based on net of fee performance data.

Performance data for Total Private Equity, Total Opportunistic Equity, Total Private Debt, Total Opportunistic Debt, Total Real Estate, and Total Farmland and Timber and corresponding benchmarks is lagged by one quarter. Performance data and market values provided by Credit Suisse Fund Group.

Prior to 3Q 2012, the performance of the Total Private Debt and Total Opportunistic Debt asset classes was reported in aggregate. Effective 6/30/2012, the Fund's allocations to Private Debt and Opportunistic Debt were separated and will be reported separately going forward.

Time-weighted performance of private markets portfolios shown to reconcile Total Fund performance as it is reported on a time-weighted basis. Due to the drawdown nature of private markets portfolios in which the investment managers call capital over time, dollar-weighted performance, or internal rate of return (IRR) is a more appropriate measure of ASRS private markets portfolios.

Composition of Interim SAA Policy can be found in the appendix.

Public Market Asset Class Analysis

3 Years Ending September 30, 2014

	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Anlzd AJ	Rank	Tracking Error	Rank	Info Ratio	Rank	Beta	Sharpe Ratio
Total Fund	100.0%	14.2%	--	7.7%	--	0.6%	--	1.1%	--	0.5	--	1.0	1.8
Interim SAA Policy	--	13.7%	--	7.7%	--	--	--	--	--	--	--	--	1.8
Total Domestic and International Equity	52.4%	19.0%	--	11.6%	--	0.2%	--	0.6%	--	0.0	--	1.0	1.6
ASRS Custom Total Equity Benchmark	--	19.1%	--	11.8%	--	--	--	--	--	--	--	--	1.6
Total Domestic Equity	30.3%	23.0%	35	11.3%	25	0.1%	29	0.5%	1	0.1	31	1.0	2.0
ASRS Custom Domestic Equity Benchmark	--	22.9%	35	11.3%	25	--	30	--	--	--	--	--	2.0
Total International Equity	20.6%	11.9%	77	14.1%	55	-0.3%	79	0.7%	1	-0.8	98	1.0	0.8
ASRS Custom Int'l Equity Benchmark	--	12.4%	70	14.4%	64	--	77	--	--	--	--	--	0.9
Total Public Markets Fixed Income	12.6%	3.0%	55	3.7%	69	0.0%	93	0.5%	1	0.3	48	1.1	0.8
ASRS Custom Public Markets Fixed Income Benchmark	--	2.8%	59	3.5%	67	--	93	--	--	--	--	--	0.8
Total Inflation-Linked Assets	2.3%	-3.2%	--	12.3%	--	1.9%	--	2.3%	--	0.9	--	1.0	-0.3
ASRS Custom Inflation-Linked Benchmark	--	-5.3%	--	12.7%	--	--	--	--	--	--	--	--	-0.4
Total GTAA	10.9%	14.1%	6	8.7%	85	-1.1%	35	1.5%	1	0.0	7	1.1	1.6
ASRS Custom GTAA Benchmark	--	14.1%	6	8.0%	60	--	16	--	--	--	--	--	1.8

Note: Performance is reported net of fees.

Underlying composites do not add up to 100% because the chart excludes private markets composites.

Ranks for statistics shown above are based on the respective universe against which the portfolio is ranked on the asset class performance summary that precedes this section of the analysis.

Rankings are from highest (1) to lowest (100) in the eVestment Alliance Universe.

Composition of Interim SAA Policy and ASRS Custom Benchmarks can be found in the appendix.

Public Market Asset Class Analysis

5 Years Ending September 30, 2014

	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Anlzd AJ	Rank	Tracking Error	Rank	Info Ratio	Rank	Beta	Sharpe Ratio
Total Fund	100.0%	11.1%	--	9.4%	--	0.7%	--	1.0%	--	0.7	--	1.0	1.2
Interim SAA Policy	--	10.5%	--	9.4%	--	--	--	--	--	--	--	--	1.1
Total Domestic and International Equity	52.4%	12.7%	--	14.3%	--	0.2%	--	0.7%	--	0.2	--	1.0	0.9
ASRS Custom Total Equity Benchmark	--	12.6%	--	14.4%	--	--	--	--	--	--	--	--	0.9
Total Domestic Equity	30.3%	16.0%	35	14.1%	31	0.1%	33	0.5%	1	0.3	13	1.0	1.1
ASRS Custom Domestic Equity Benchmark	--	15.9%	39	14.0%	30	--	34	--	--	--	--	--	1.1
Total International Equity	20.6%	6.1%	83	16.1%	38	-0.5%	80	1.0%	1	-0.6	99	1.0	0.4
ASRS Custom Int'l Equity Benchmark	--	6.7%	71	16.4%	53	--	71	--	--	--	--	--	0.4
Total Public Markets Fixed Income	12.6%	4.7%	49	3.3%	63	0.4%	84	0.6%	1	0.6	34	1.0	1.4
ASRS Custom Public Markets Fixed Income Benchmark	--	4.3%	57	3.3%	63	--	94	--	--	--	--	--	1.3
Total Inflation-Linked Assets	2.3%	--	--	--	--	--	--	--	--	--	--	--	--
ASRS Custom Inflation-Linked Benchmark	--	-1.8%	--	13.4%	--	--	--	--	--	--	--	--	-0.1
Total GTAA	10.9%	12.5%	1	10.1%	90	2.0%	8	2.0%	9	1.1	1	1.0	1.2
ASRS Custom GTAA Benchmark	--	10.3%	6	9.7%	80	--	36	--	--	--	--	--	1.1

Note: Performance is reported net of fees.

Underlying composites do not add up to 100% because the chart excludes private markets composites.

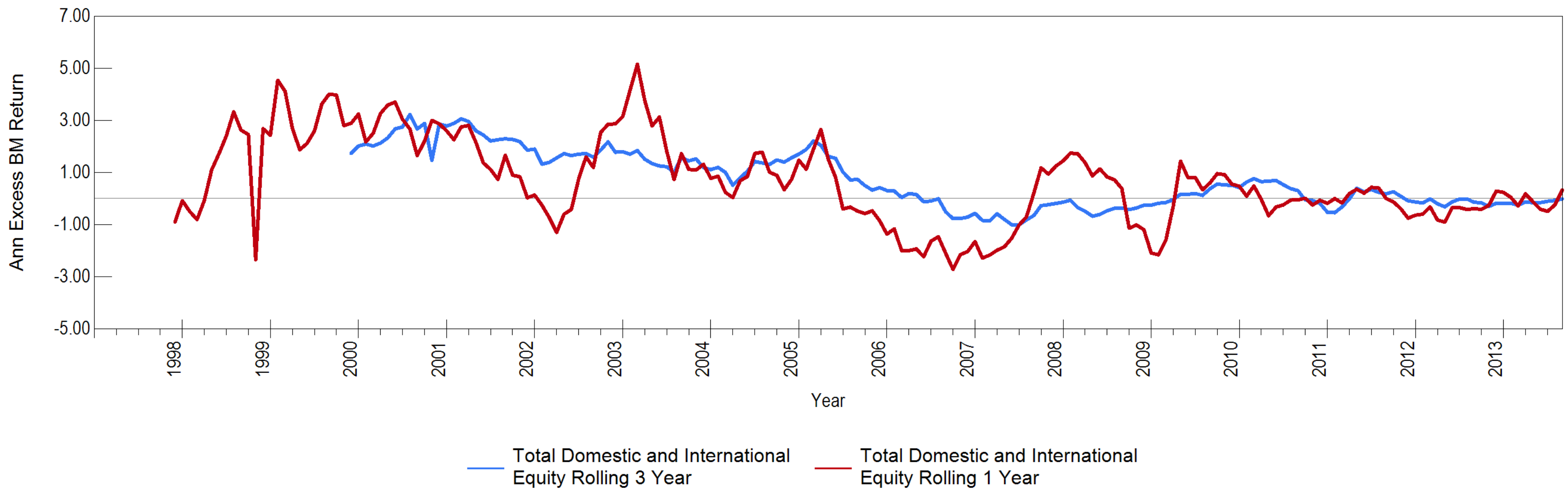
Ranks for statistics shown above are based on the respective universe against which the portfolio is ranked on the asset class performance summary that precedes this section of the analysis.

Rankings are from highest (1) to lowest (100) in the eVestment Alliance Universe.

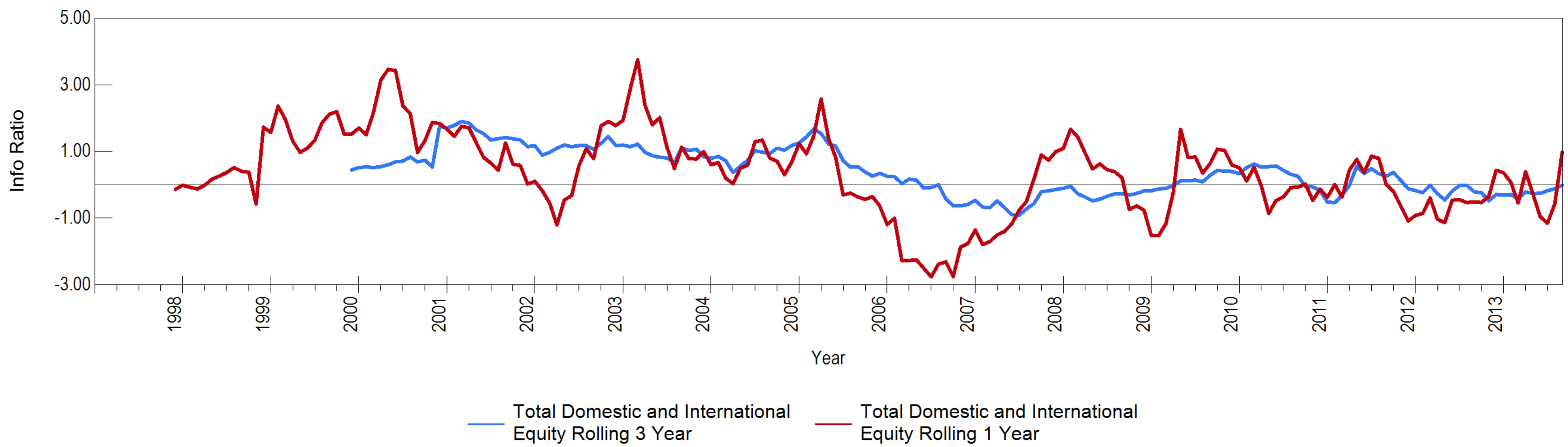
Composition of Interim SAA Policy and ASRS Custom Benchmarks can be found in the appendix.

Asset Class Analysis - Total Domestic and International Equity

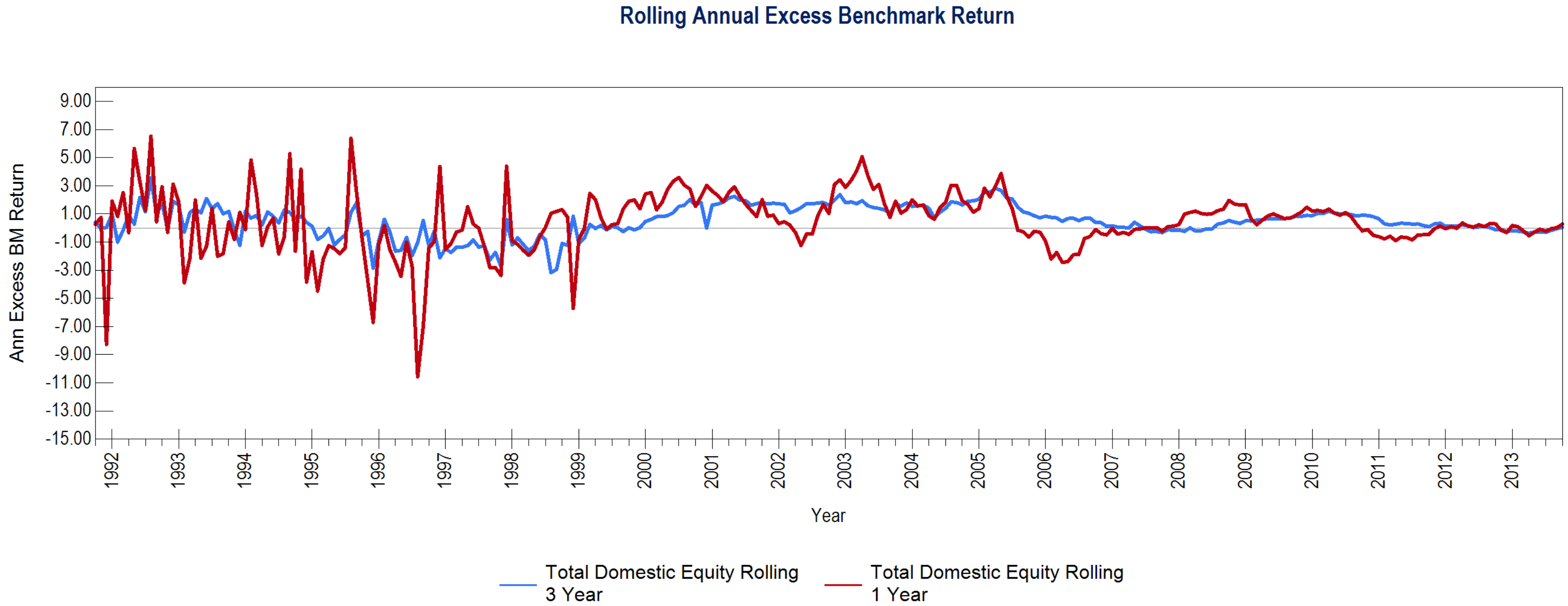
Rolling Annual Excess Benchmark Return

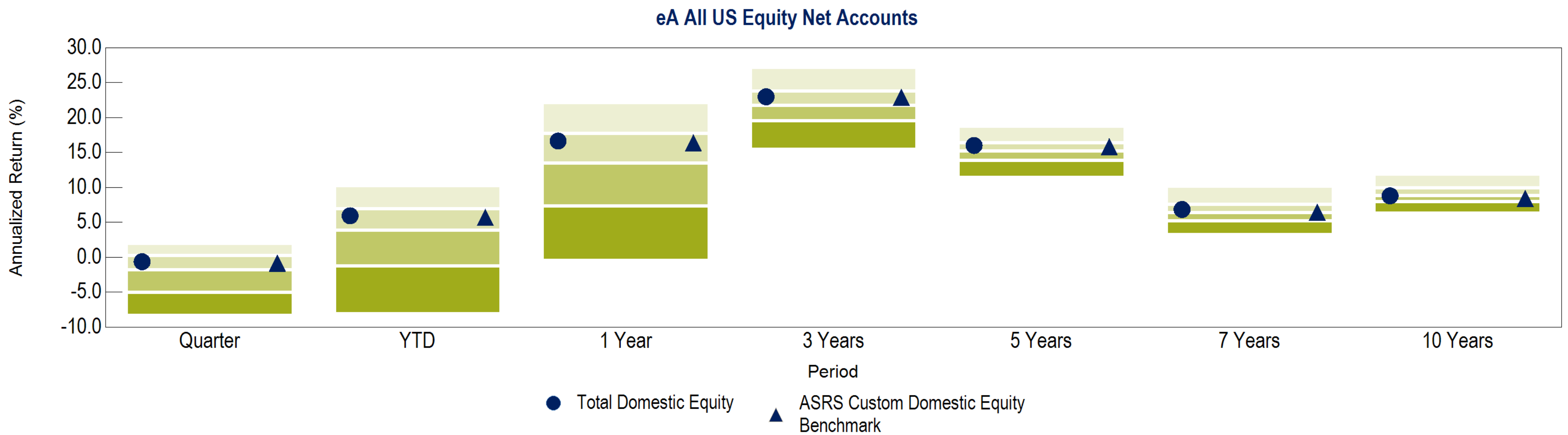


Rolling Information Ratio



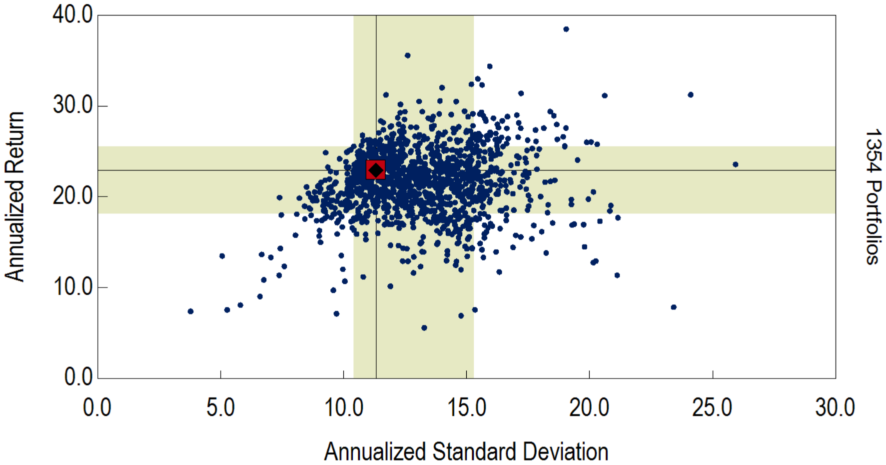
Asset Class Analysis - Total Domestic Equity





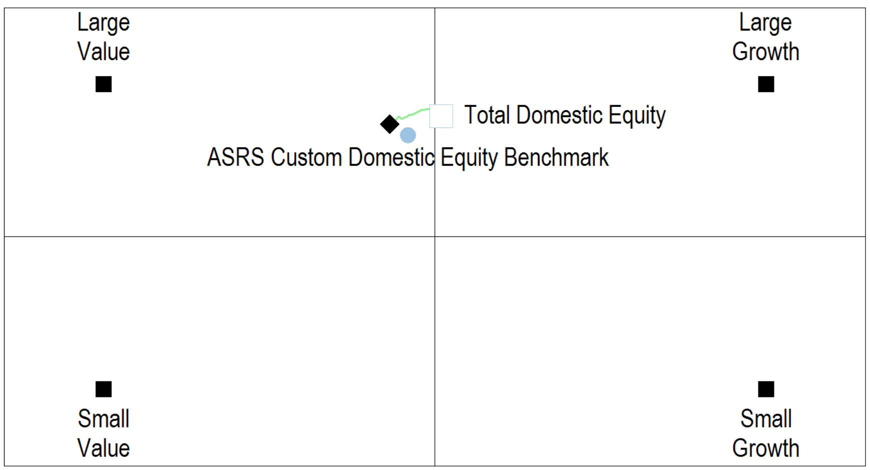
Asset Class Analysis - Total Domestic Equity

3 Year Risk Return



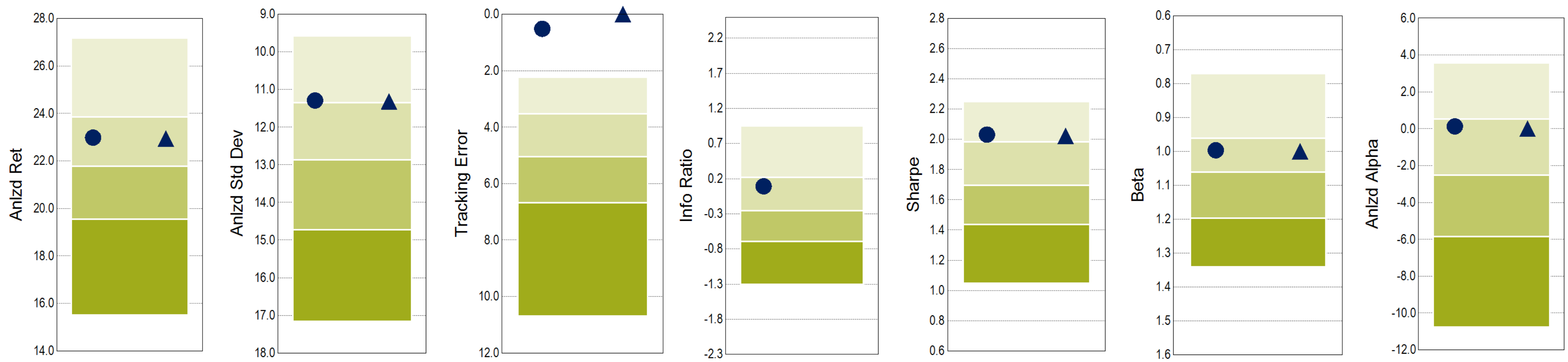
Total Domestic Equity
ASRS Custom Domestic Equity Benchmark
68% Confidence Interval
eA All US Equity Net

3 Year Style Map



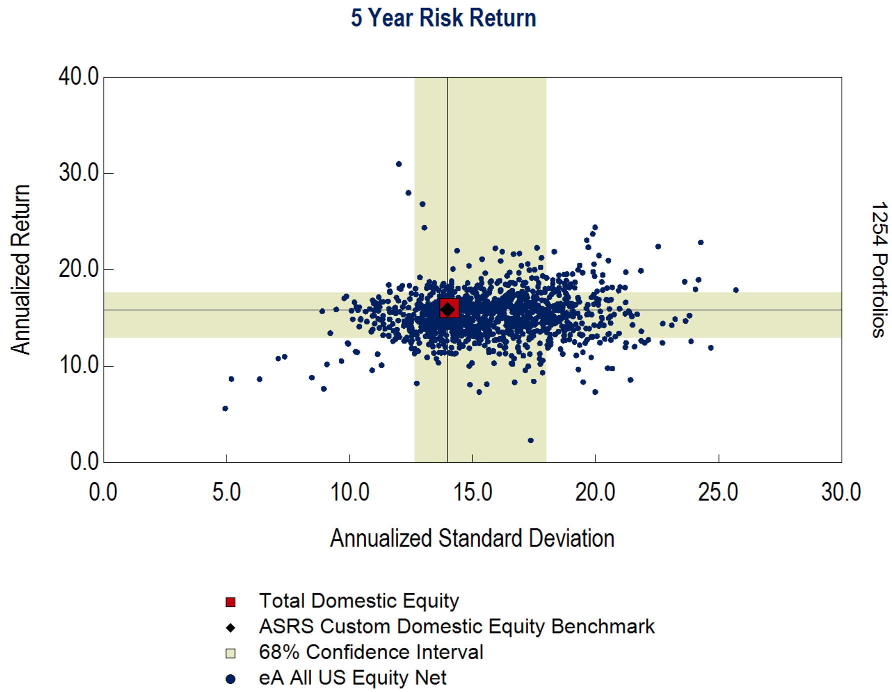
First Rolling Period
Last Rolling Period

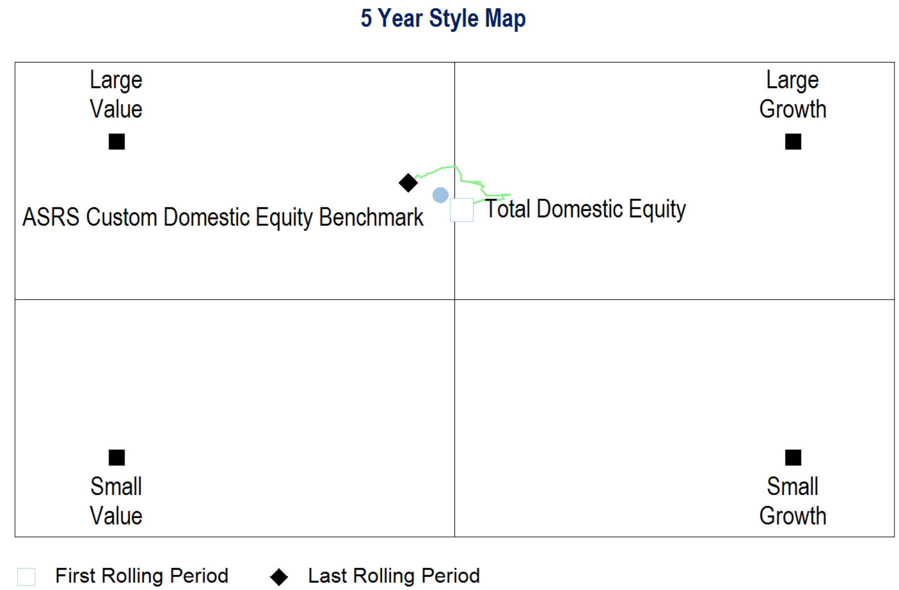
*Style map is returns based.



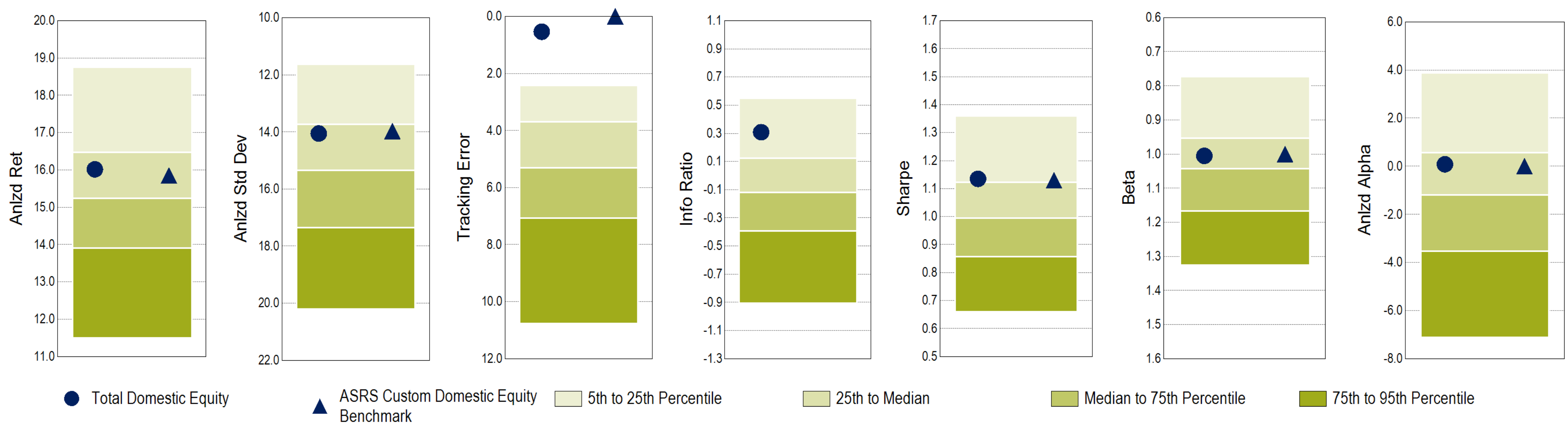
Total Domestic Equity
ASRS Custom Domestic Equity Benchmark
5th to 25th Percentile
25th to Median
Median to 75th Percentile
75th to 95th Percentile

Asset Class Analysis - Total Domestic Equity

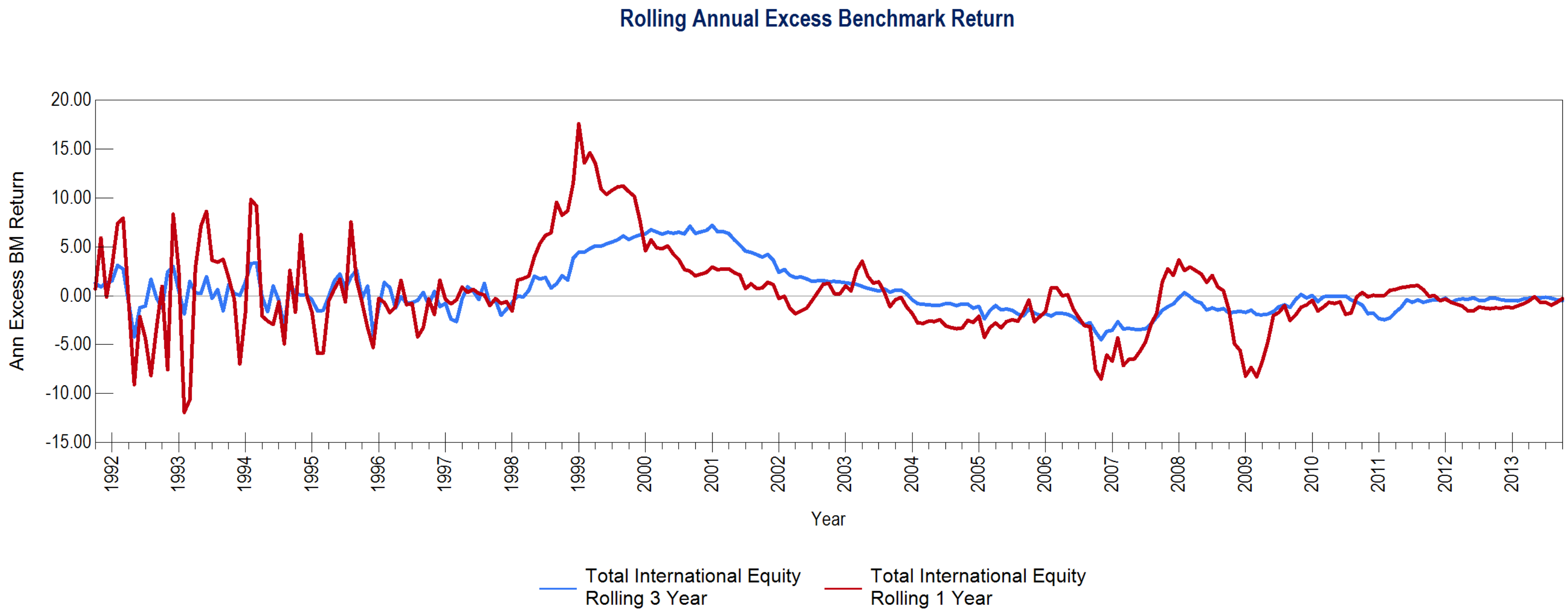


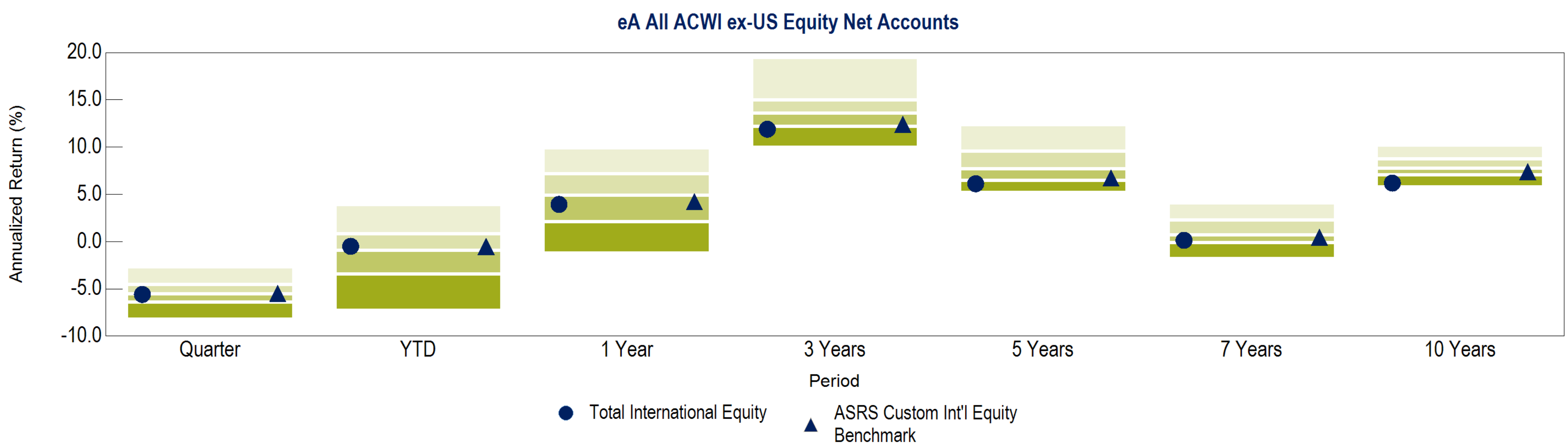


*Style map is returns based.

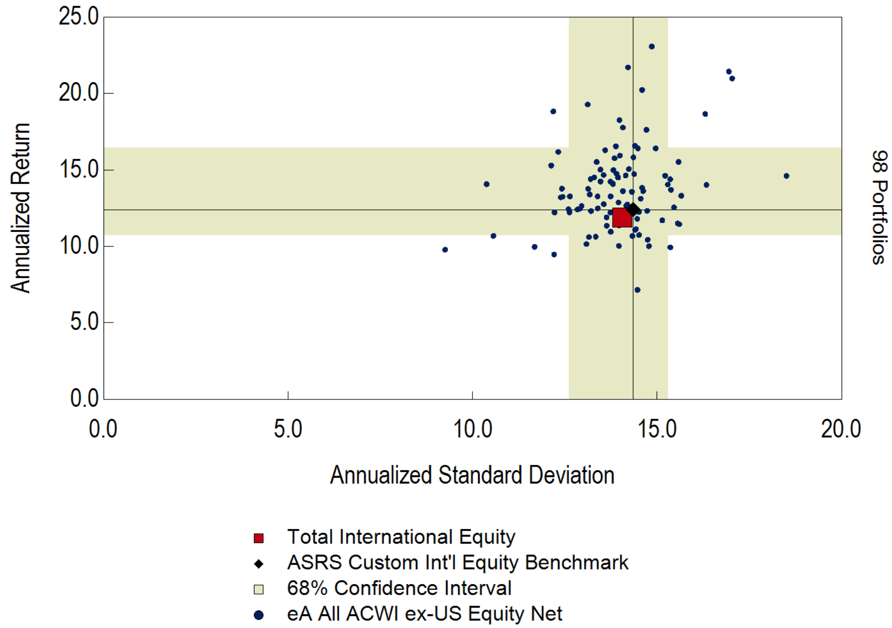


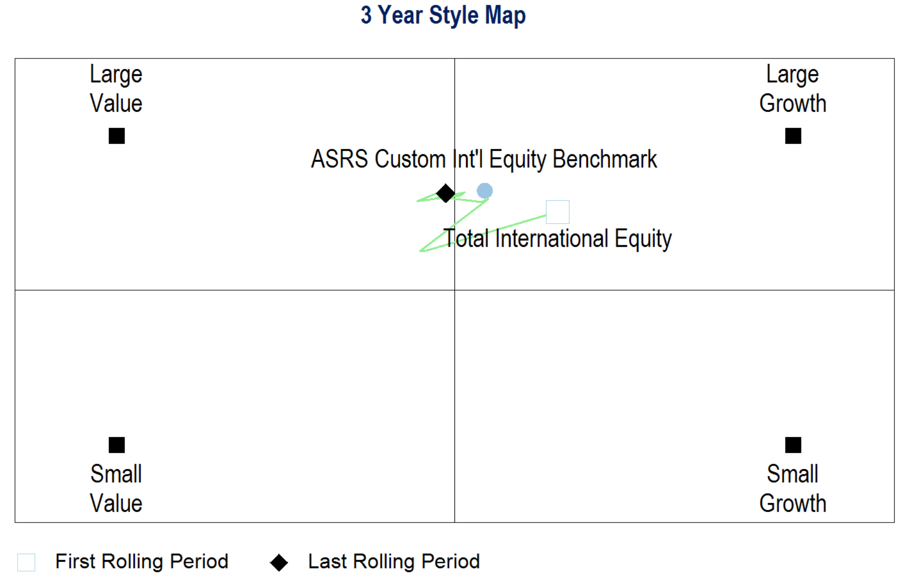
Asset Class Analysis - Total International Equity



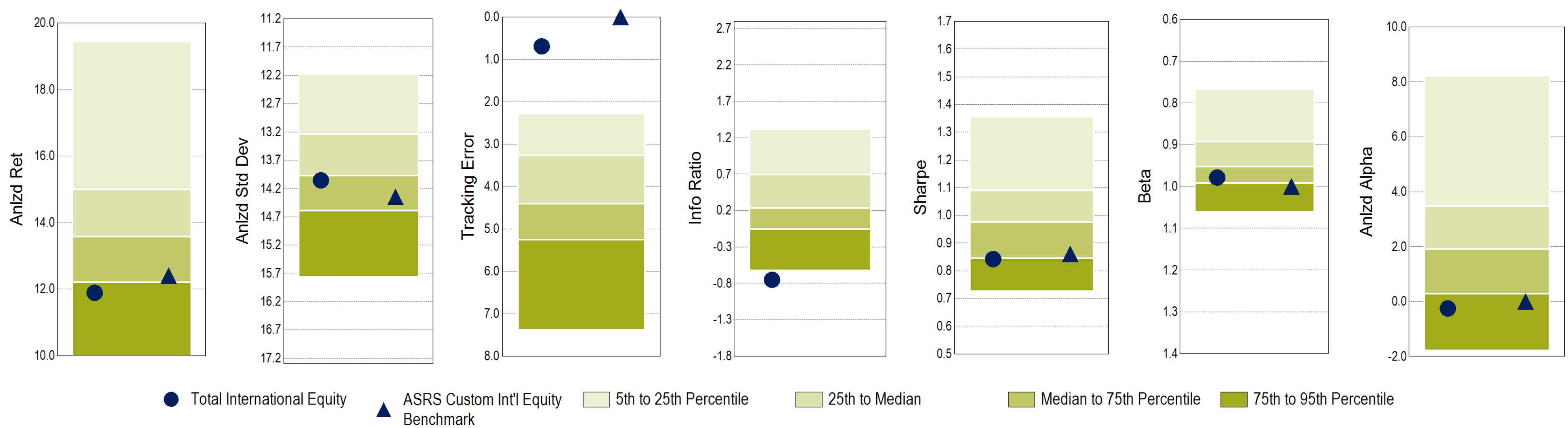


Asset Class Analysis - Total International Equity

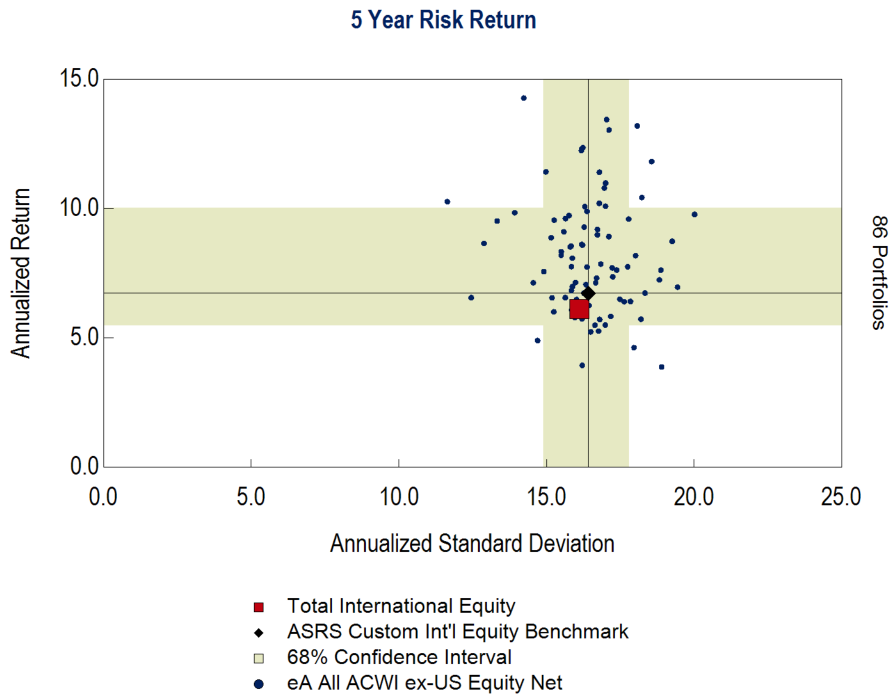


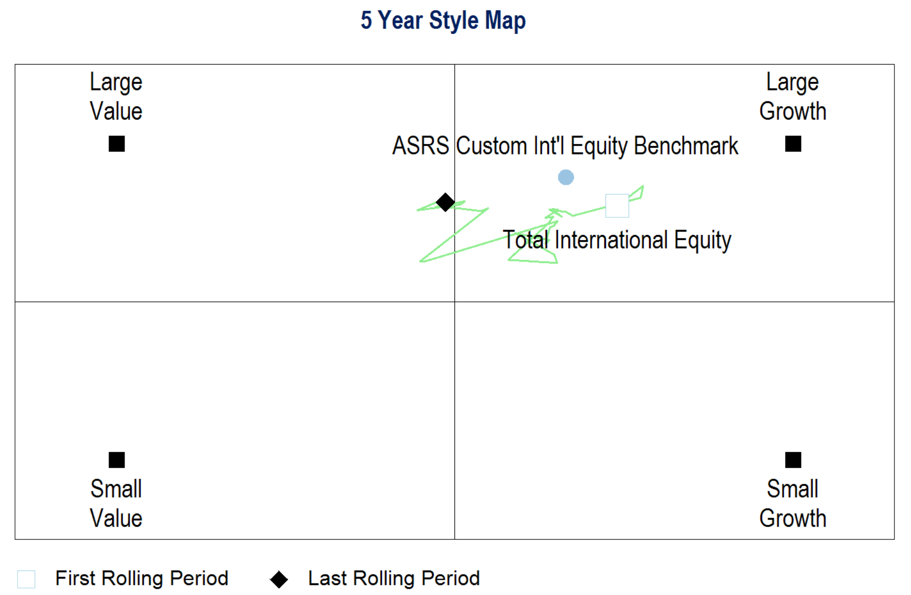


*Style map is returns based.

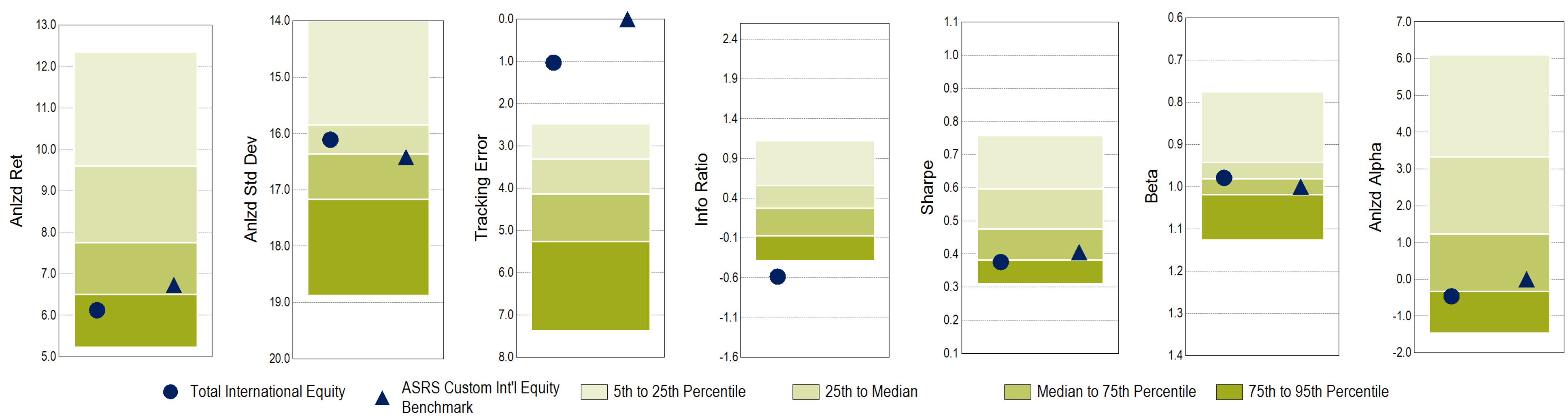


Asset Class Analysis - Total International Equity

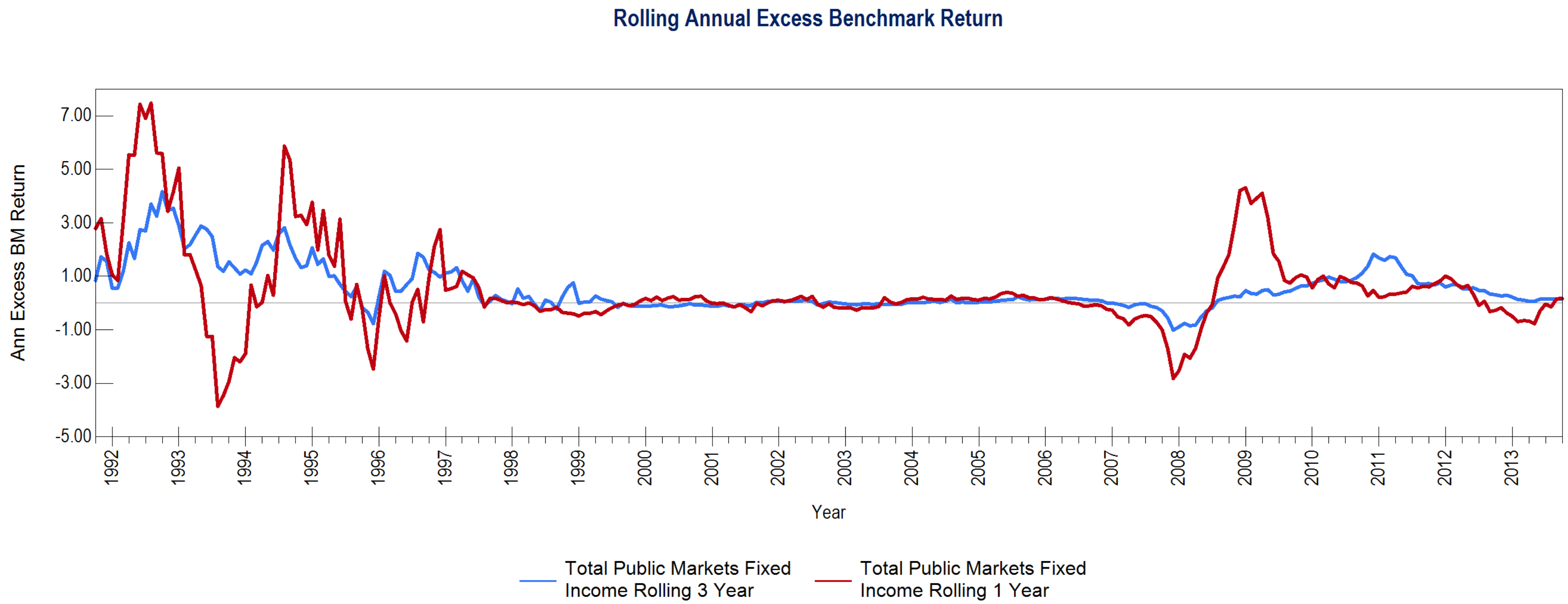


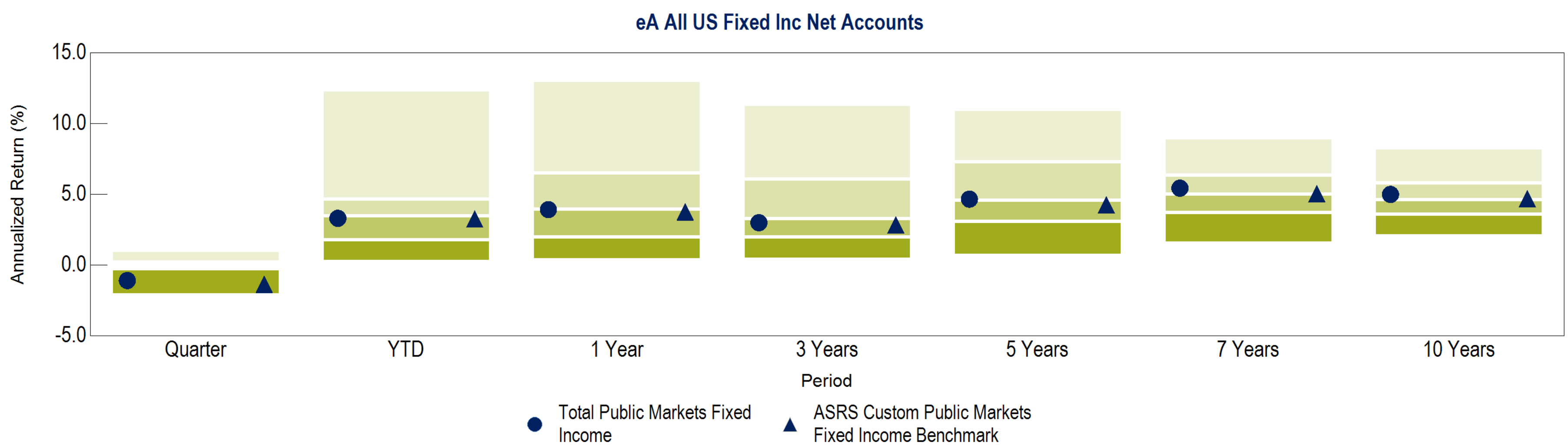


*Style map is returns based.

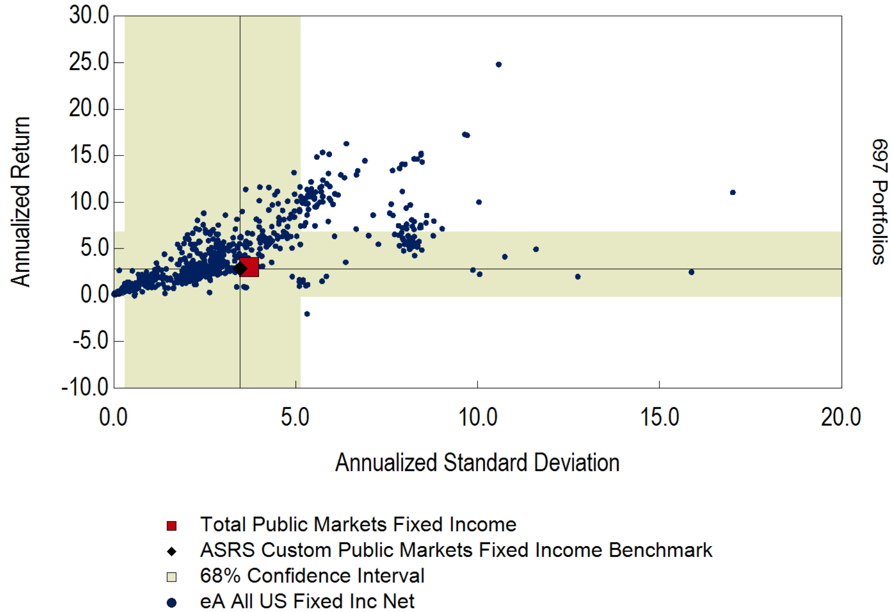


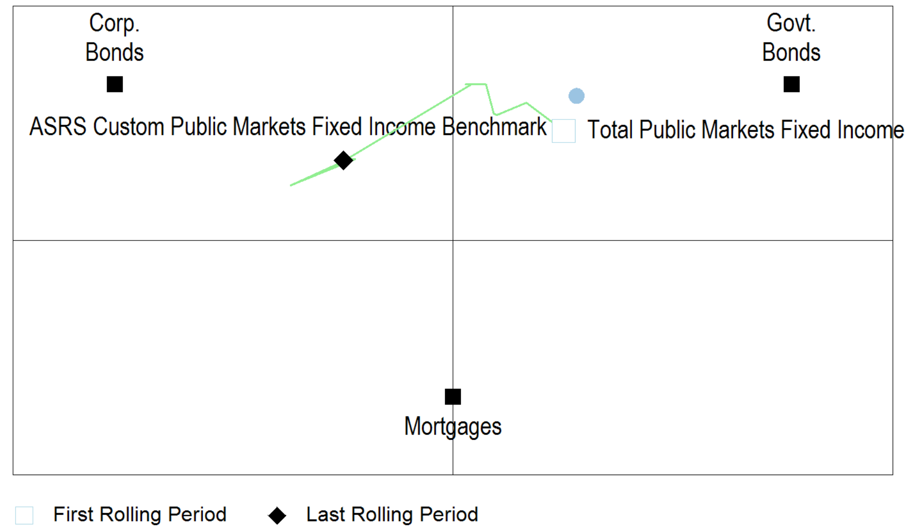
Asset Class Analysis - Total Public Markets Fixed Income



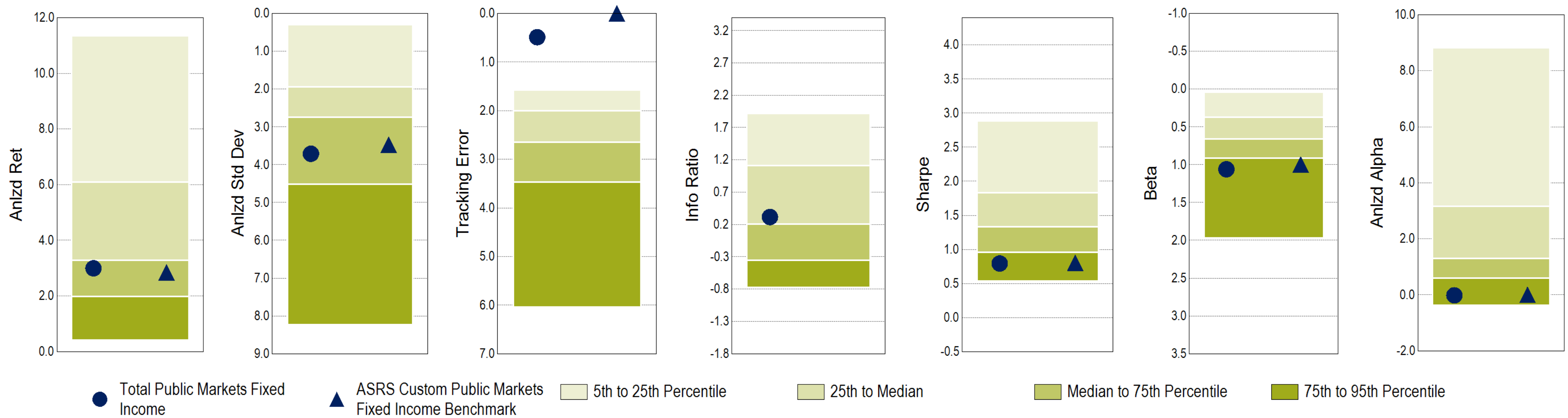


Asset Class Analysis - Total Public Markets Fixed Income

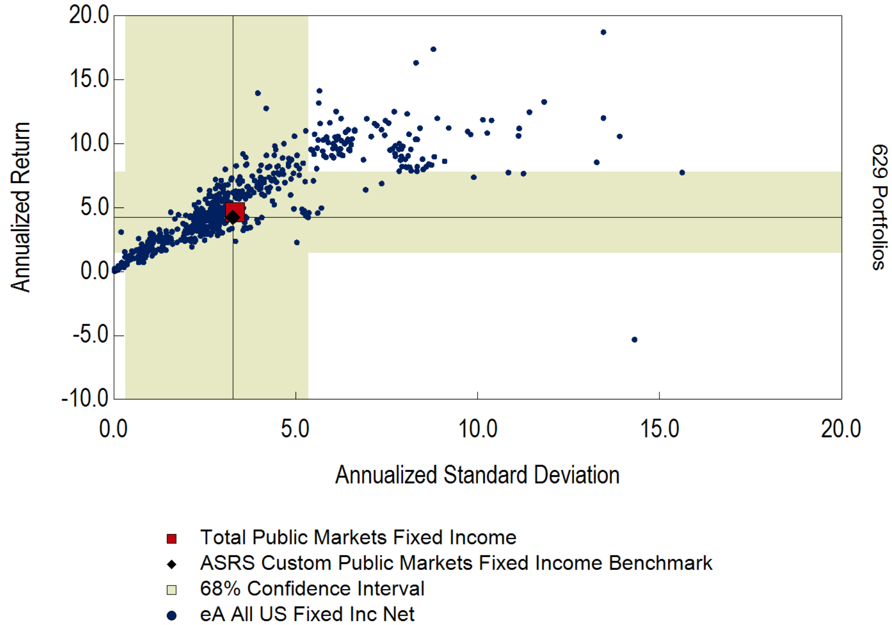


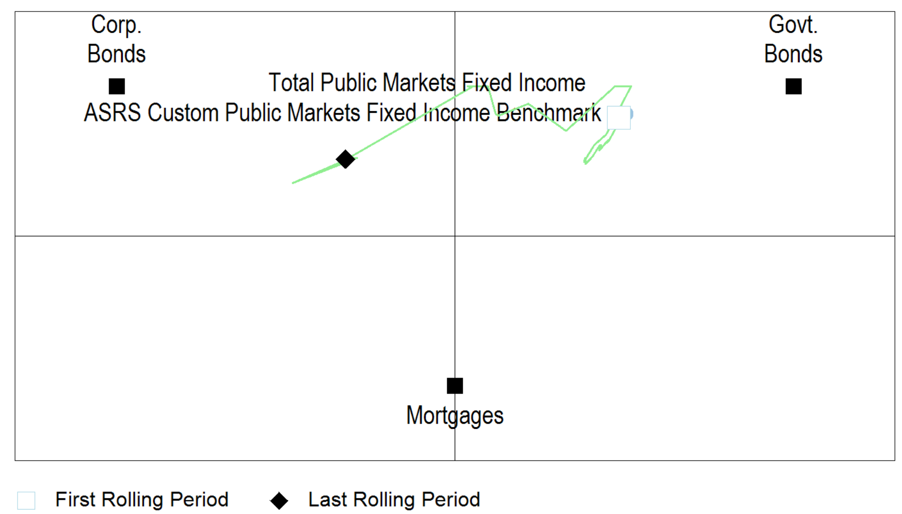


*Style map is returns based.

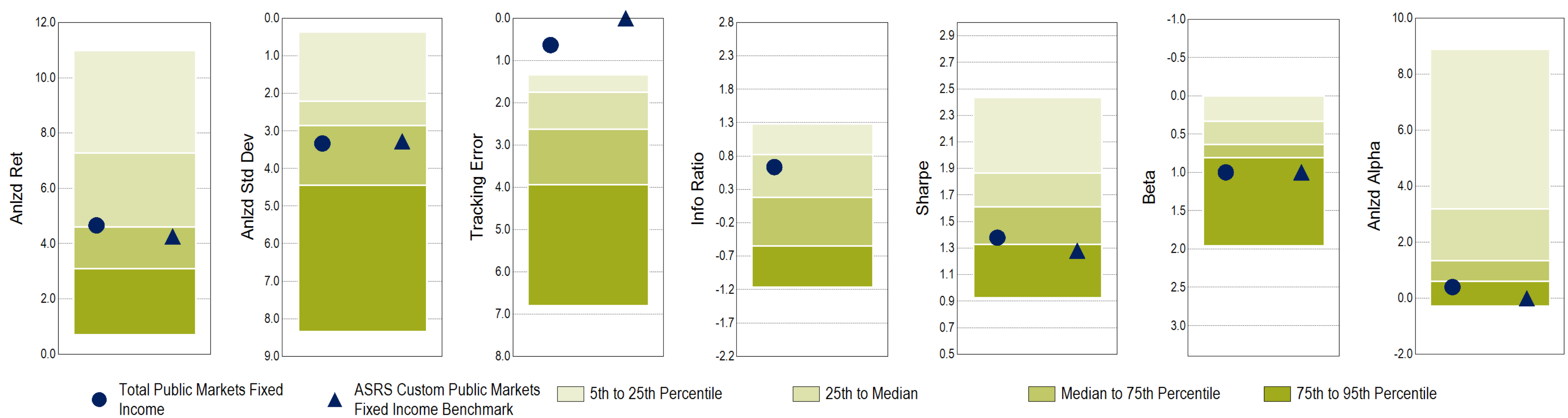


Asset Class Analysis - Total Public Markets Fixed Income

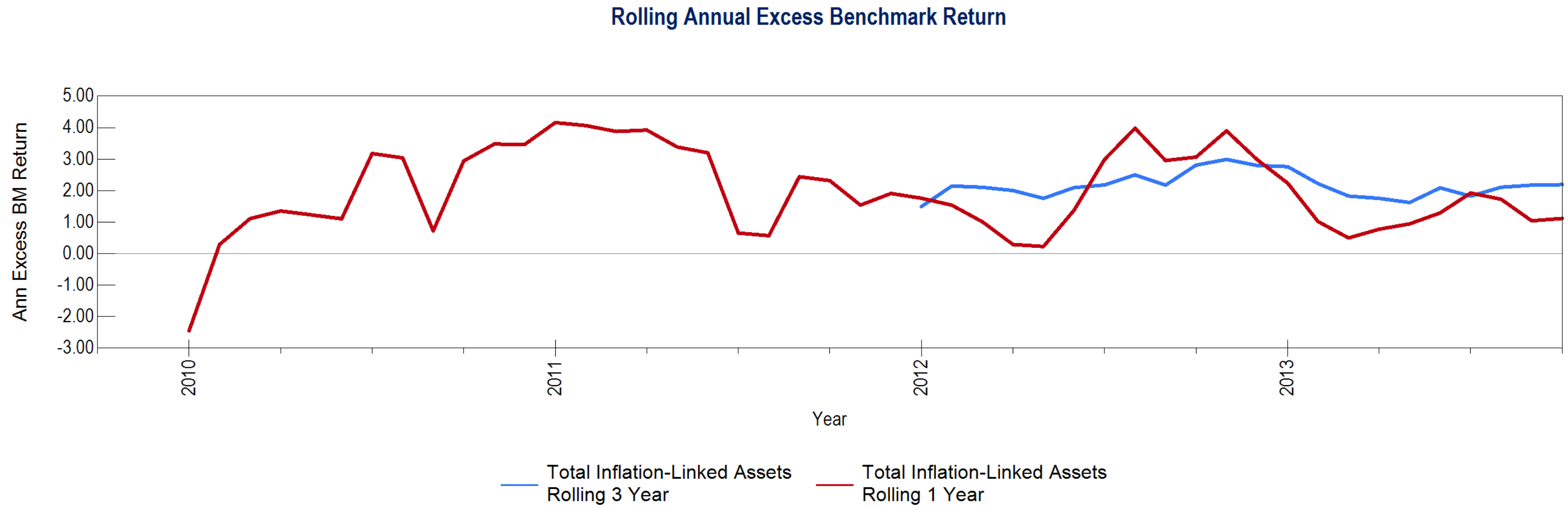


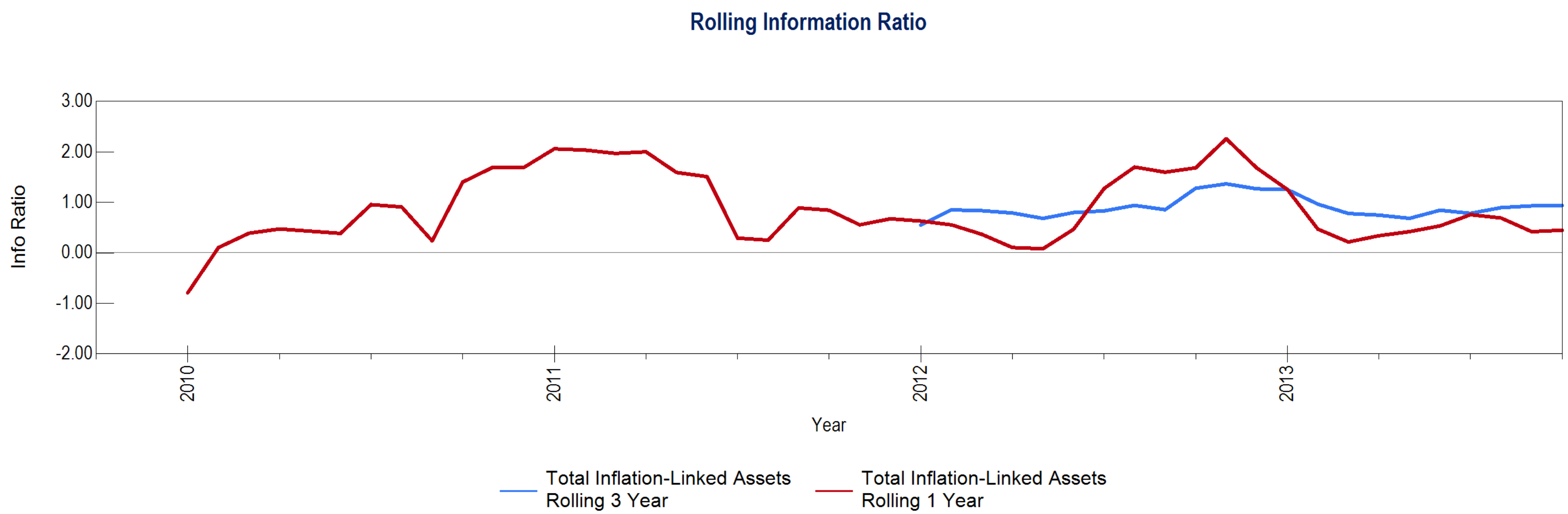


*Style map is returns based.

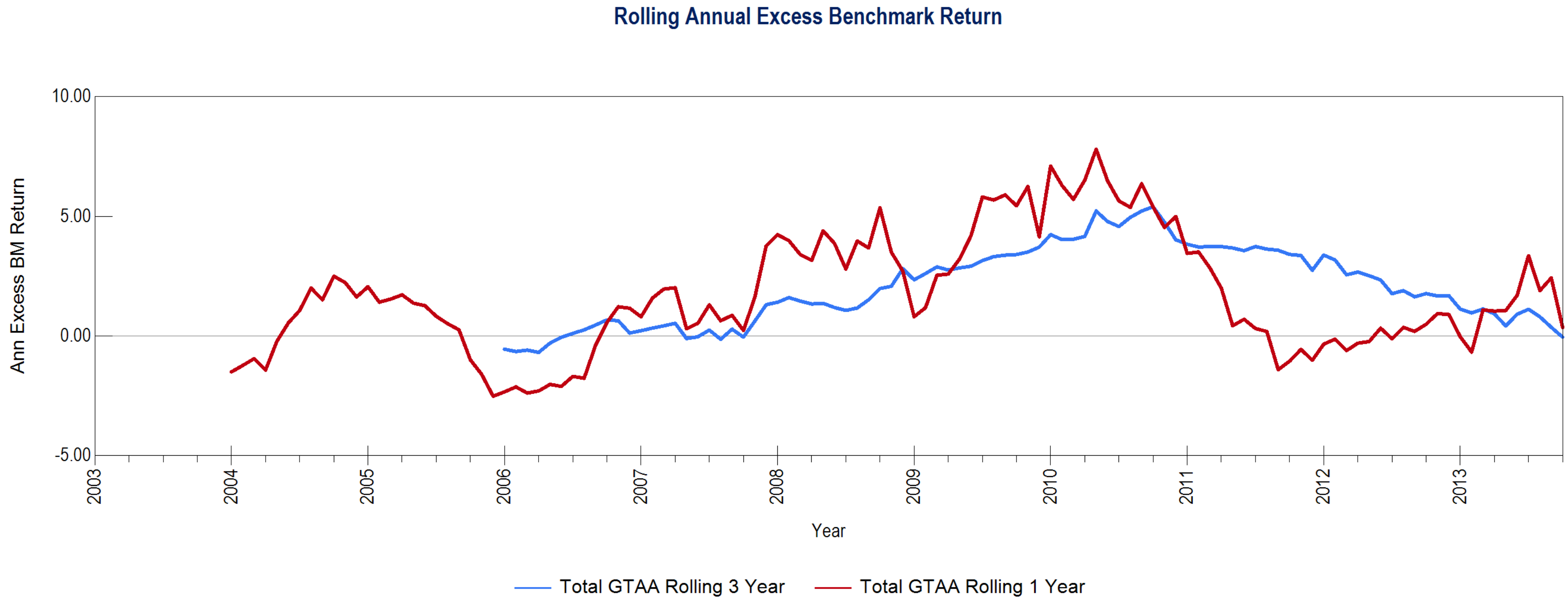


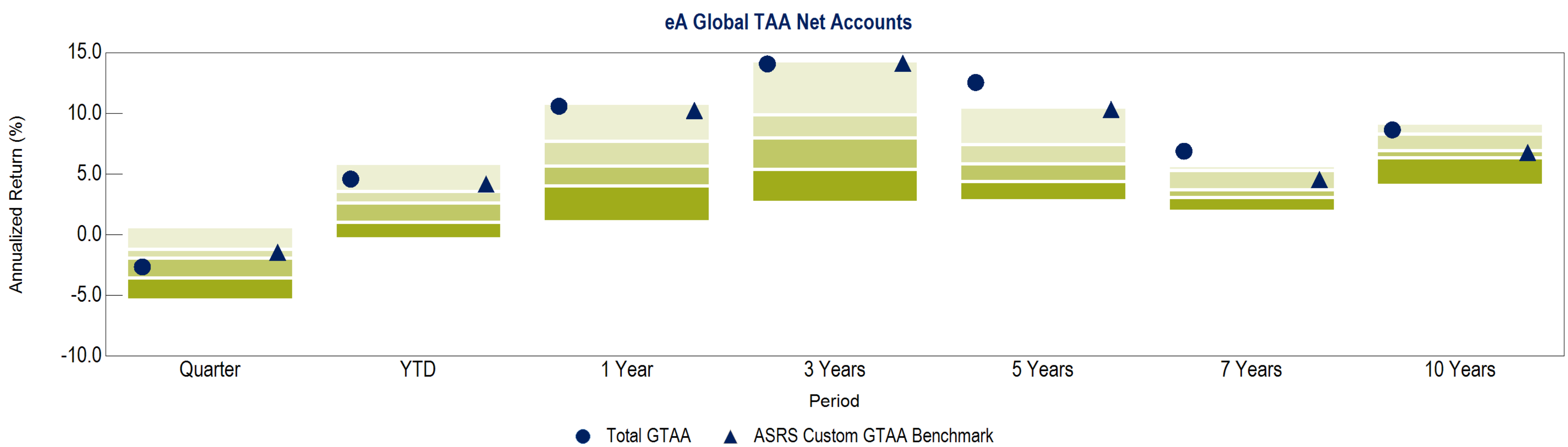
Asset Class Analysis - Total Inflation-Linked Assets



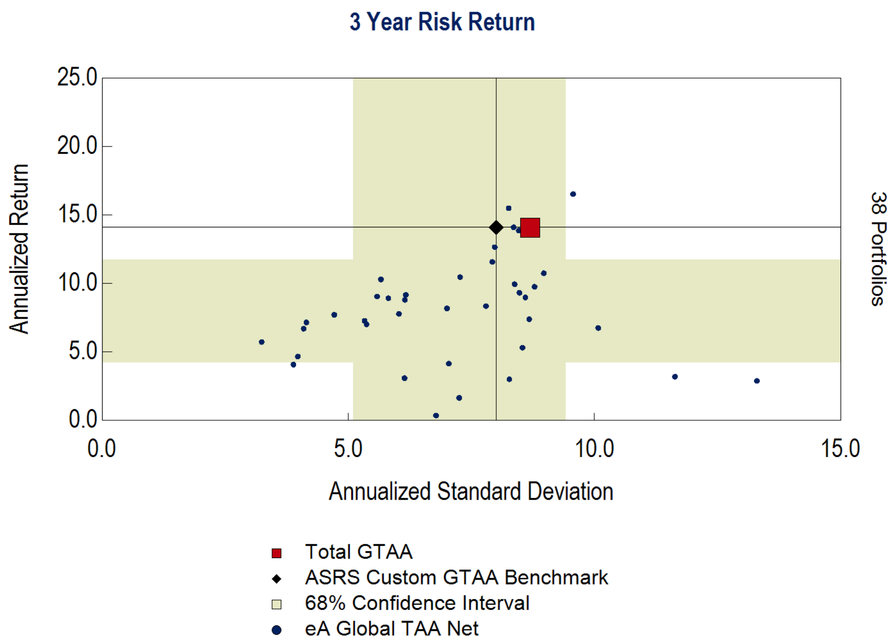


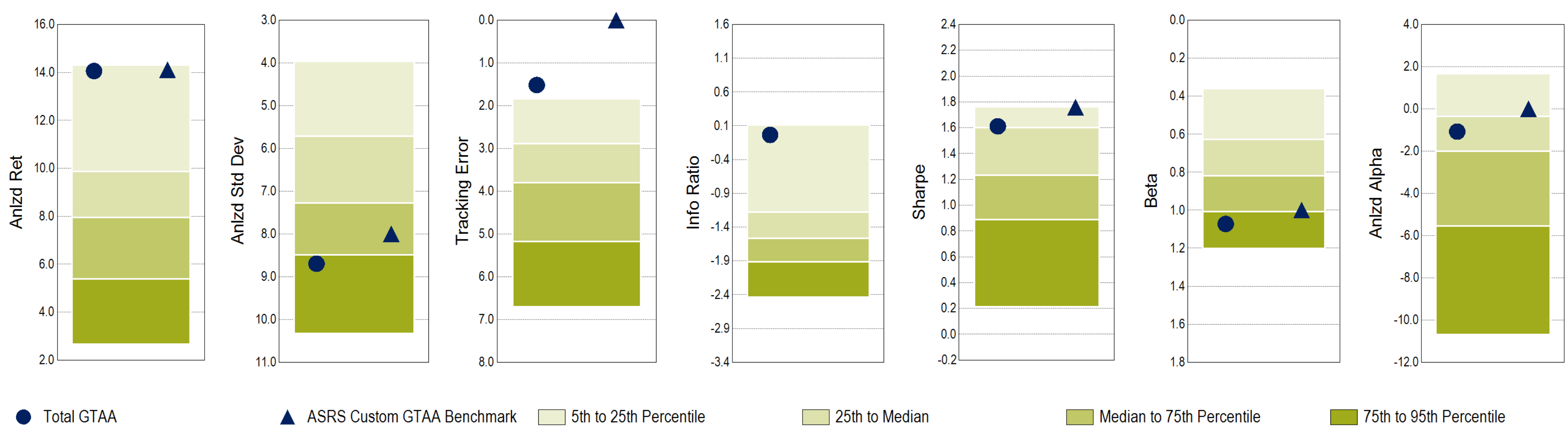
Asset Class Analysis - Total GTAA



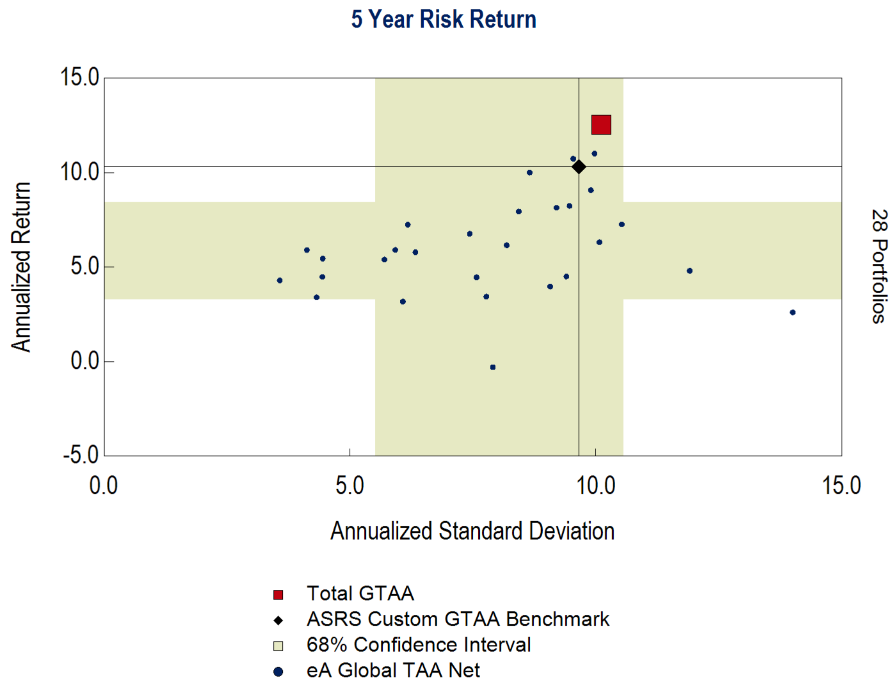


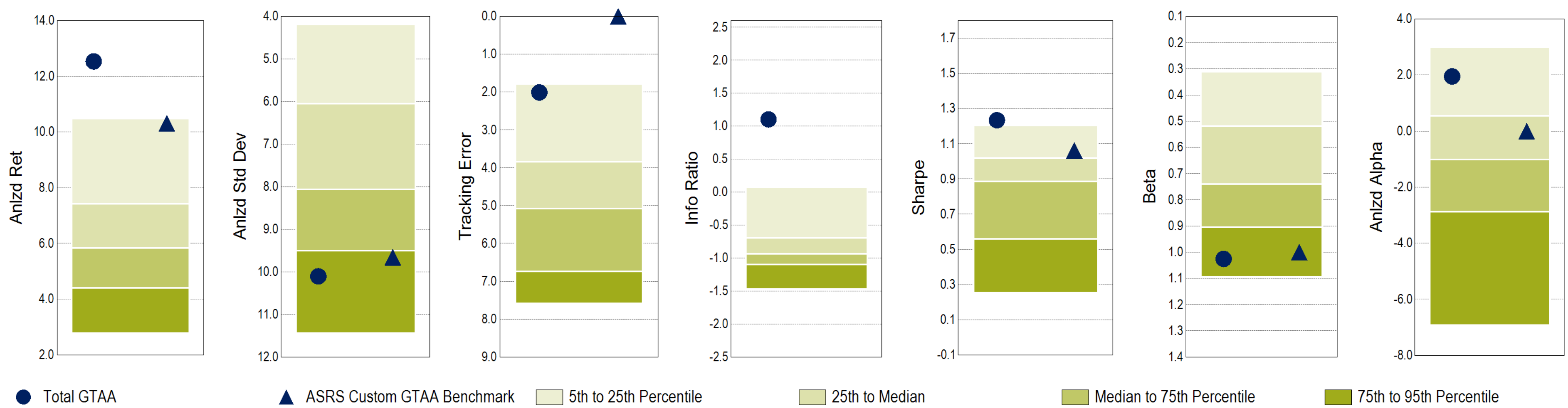
Asset Class Analysis - Total GTAA





Asset Class Analysis - Total GTAA





Asset Class Committee Monitoring

- **Five Asset Class Committee meetings have been held since the last time we provided an update on the ASRS Asset Class Committee Meetings.**

- **August 8, 2014 – Private Markets Committee**
  - General Discussion of Real Estate Matters
    - Separate account monitoring system
    - Status of multi-family property development investment in Brooklyn, NY
      - At the time of this meeting, negotiations were ongoing to potentially sell the assets somewhere between $40 - $42 million, resulting in a double digit internal rate of return on the investment
    - Status of work on energy housing partnership investment
      - RCLCO will continue conducting due diligence on the investment as part of the niche and tactical real estate allocation
      - May need to be considered in fund format rather than separate account due to particular circumstances of the investment
    - No Committee action required
  - Variance Request
    - RCLCO recommended the ASRS approve a request from an existing real estate manager to utilize Rabobank as a depository institution with respect to one of its investment properties
      - The agreement with the investment manager requires limited partner approval for any banking depository relationship other than the initially approved relationship
    - Committee approved the recommendation

- **August 20, 2014 – Private Markets Committee**
  - Monthly Status Report, General Discussion and Deal Flow
  - Private Equity Manager Recommendation ($75 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 7%)
    - The ASRS has invested with this manager in a prior fund(s)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation, recognizing that the commitment could be reduced to $50 million due to oversubscription of the fund

Asset Class Committee Monitoring

- **August 20, 2014 – Private Markets Committee (continued)**
  - Private Equity Manager Recommendation ($75 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 7%)
    - The ASRS has invested with this manager in a prior fund(s)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Private Equity Co-Investment Recommendation ($25 - $50 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 7%)
    - The ASRS has invested with this manager in a prior fund(s) and co-investment opportunities
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation for an amount not less than $25 million but not to exceed $50 million
  - Niche and Tactical Real Estate Investment Disposition Recommendation
    - RCLCO recommended the ASRS approve the recommendation to sell a multi-family rental development project in Brooklyn, NY
      - This was a continuation of the discussion at the August 8, 2014 PRIVMC meeting
    - Over the past several months, it had become increasingly clear that complicated and expensive litigation with the builder over cost disputes was inevitable, and the actual expense and timeline to complete the project would remain uncertain for the foreseeable future
    - Sale price of $40.5 million results in 13%+ internal rate of return on the investment
    - Committee approved the recommendation
  - Variance Request
    - RCLCO recommended the ASRS approve a request from an existing real estate manager to invest in a property that is ready for development
      - SMA guidelines do not allow for land development investments without Committee approval
    - Committee approved the recommendation

- **September 23, 2014 – Private Markets Committee**
  - Monthly Status Report, General Discussion and Deal Flow
  - Niche and Tactical Real Estate Investment Recommendation ($50 million – follow up from discussion at August 8, 2014 PRIVMC meeting)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 8%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Real Estate Investment Manager Recommendation ($100 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 8%)
    - The ASRS has invested with this manager in a prior fund(s)
    - Recommendation intended to replace assets invested with an existing manager (see below)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Real Estate Investment Manager Redemption Recommendation (~$75 million)
    - RCLCO provided a review of an existing investment manager, noting the similarities of the manager with the previously recommended manager in terms of strategy (see above) in addition to their belief in the superiority of the recommended manager's portfolio holdings
    - Discussion included exit queues (none currently), exit valuation methodologies, and other potential risks associated with the investment
    - Committee approved the recommendation
  - Niche and Tactical Real Estate Investment Discussion
    - As the Committee continues to pursue niche and tactical investments in the real estate asset class, it does so in accordance with a documented procedure that includes approval by the Committee before conducting a full due diligence review on a potential investment
    - IMD Staff and RCLCO presented three potential investment opportunities and the Committee authorized further due diligence on two
      - Land banking investment was tabled

- **September 23, 2014 – Private Markets Committee (continued)**
  - Separately Managed Account Portfolio Review
    - RCLCO presented the results of its first semi-annual portfolio review of the separately managed real estate accounts.
  - Private Equity Manager Recommendation ($50 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Equity is 7%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

- **October 17, 2014 – Private Markets Committee**
  - Monthly Status Report, General Discussion and Deal Flow
  - Niche and Tactical Real Estate Investment Recommendation ($100 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 8%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Real Estate Investment Recommendation ($150 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 8%)
    - The ASRS has invested with this manager in a prior fund(s)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Variance Request
    - RCLCO recommended the ASRS approve a request from an existing real estate manager to invest in a property that does not meet the investment criteria of the portfolio
      - SMA guidelines require a minimum bed count of 400; manager seeks to acquire facility with bed count of 330
    - Committee approved the recommendation

Asset Class Committee Monitoring

- **October 17, 2014 – Private Markets Committee (continued)**
  - Niche and Tactical Real Estate Investment Discussion
    - As the Committee continues to pursue niche and tactical investments in the real estate asset class, it does so in accordance with a documented procedure that includes approval by the Committee before conducting a full due diligence review on a potential investment
    - IMD Staff and RCLCO presented a potential investment opportunity and the Committee authorized further due diligence

- **October 23, 2014 – Ad Hoc Private Markets Committee**
  - Private Debt Co-Investment Recommendation (C$12.5 million; $11.1 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Private Debt is 3%)
    - The ASRS previously approved up to $200 million in co-investment opportunities with this investment manager
      - To date, one $10 million co-investment deal has been approved
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
      - Debt portion of the deal was approved; equity portion of the deal was not approved citing SIP 006 policy due diligence requirements. Director, CIO and IMD Staff will present, at a later date, a proposed revision to SIP 006 to clarify the characteristics of co-investment opportunities and solicit feedback from IC members before requesting approval from the Board.

General Observations

- **The Fund continues to make significant progress moving the portfolio from the Interim SAAP toward the long-term SAAP.**
  - Full implementation results in a further reduction of 2% within U.S. Equities and 1% within U.S. Core Fixed Income and an increase of 1% to Private Equity, and 2% to Real Estate.

- **The Fund's exposure to global equities, which has been a significant contributor to strong absolute and relative Total Fund performance over the past several quarters, contributed negatively to absolute performance.**
  - Continued build-out of private debt and opportunistic debt asset classes provides an opportunity to generate equity-like returns with less volatility.
  - Underweight allocations to core, high yield and emerging market debt in favor of private and opportunistic debt strategies has proved to be a source of significant value add at the Total Fund level.

- **Valuations across many asset classes continue to appear stretched.**
  - Excluding emerging markets, equity P/E ratios are above long-term averages.
  - Credit spreads remain tight globally due to insatiable demand.
  - Many commodities futures' prices are in backwardation, meaning a higher forward price is expected relative to the current spot price.

- **We are currently working with IMD Staff to evaluate the Strategic Asset Allocation Policy (SAAP).**

- **Tactical positioning consistent with IMD House Views.**

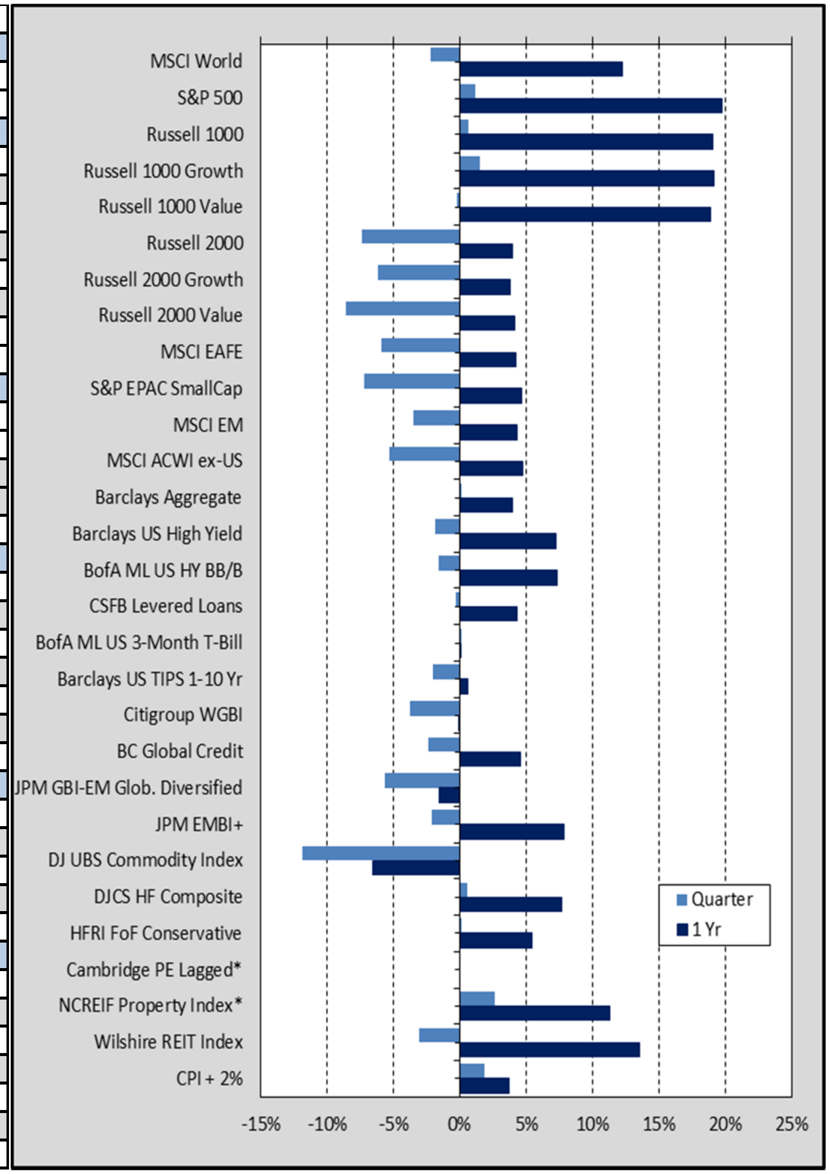
Market Environment Update and Outlook

Economic Environment

- **Third quarter GDP grew at a rate of +3.5% (according to advance estimate) after increasing by 4.6% in the second quarter.**
  - Retail sales (ended September) rose to 3.1% on a year-over-year growth rate basis.
  - The inventory-to-sales ratio has remained mostly flat since early 2010 and closed at 1.29 in August.
  - Corporate profits as a percent of GDP ended three consecutive quarters of decline, slightly increasing to 12.2%, and remain elevated relative to historical levels.
  - The U.S. trade deficit decreased through August.
- **The unemployment rate fell to 5.9% in September; U-6, a broader measure of unemployment, fell to 11.8%.**
- **The Case-Schiller Home Price Index (as of 9/30) rose to 167.32 from 150.79 (as of 6/30) and is now higher than pre-financial crisis levels.**
- **Rolling 12-month CPI decreased to 1.7% at the end of September; Capacity Utilization rose slightly to 79.3% in September.**
- **Fed Funds rate remains at 0.25% while the 10-year Treasury Yield finished Q3 at 2.49%.**
- **The Fed balance sheet continues to increase in 2014, while European Central Bank balance sheet continues to decrease.**
  - ECB announced it will be embarking on an asset purchasing stimulus plan.
- **S&P valuations increased in September remaining above the 10-year and long-term averages, which are nearly equal at 16.4x, using current price/earnings ratios.**
  - Cyclically adjusted Shiller PE Ratio is above the long-term average of 17.6x and above the 10-year average of 22.9x.
- **The U.S. Dollar strengthened 6% against a basket of major currencies, the best quarterly gain since the financial crisis in 2008.**

Market Environment – Q3 2014 Overview

		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
World Equity Benchmarks						
MSCI World	World	-2.2%	12.2%	17.9%	10.9%	7.1%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Domestic Equity Benchmarks						
S&P 500	Large Core	1.1%	19.7%	23.0%	15.7%	8.1%
Russell 1000	Large Core	0.7%	19.0%	23.2%	15.9%	8.5%
Russell 1000 Growth	Large Growth	1.5%	19.2%	22.5%	16.5%	8.9%
Russell 1000 Value	Large Value	-0.2%	18.9%	23.9%	15.3%	7.8%
Russell 2000	Small Core	-7.4%	3.9%	21.3%	14.3%	8.2%
Russell 2000 Growth	Small Growth	-6.1%	3.8%	21.9%	15.5%	9.0%
Russell 2000 Value	Small Value	-8.6%	4.1%	20.6%	13.0%	7.3%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
International Equity Benchmarks						
MSCI EAFE	International Developed	-5.9%	4.3%	13.7%	6.6%	6.3%
S&P EPAC SmallCap	Small Cap Int'l	-7.2%	4.6%	15.3%	9.1%	8.8%
MSCI EM	Emerging Equity	-3.5%	4.3%	7.2%	4.4%	10.7%
MSCI ACWI ex-US	World ex-US	-5.3%	4.8%	11.8%	6.0%	7.1%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Domestic Fixed Income Benchmarks						
Barclays Aggregate	Core Bonds	0.2%	4.0%	2.4%	4.1%	4.6%
Barclays US High Yield	High Yield	-1.9%	7.2%	11.1%	10.6%	8.3%
BofA ML US HY BB/B	High Yield	-1.6%	7.3%	10.3%	9.9%	7.6%
CSFB Levered Loans	Bank Loans	-0.3%	4.3%	6.9%	6.7%	4.9%
BofA ML US 3-Month T-Bill	Cash	0.0%	0.1%	0.1%	0.1%	1.6%
Barclays US TIPS 1-10 Yr	Inflation	-2.0%	0.6%	0.9%	3.4%	4.0%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Global Fixed Income Benchmarks						
Citigroup WGBI	World Gov. Bonds	-3.8%	-0.1%	-0.5%	1.6%	4.1%
BC Global Credit	Global Bonds	-2.4%	4.6%	5.7%	5.6%	5.5%
JPM GBI-EM Glob. Diversified	Em. Mkt. Bonds (Local)	-5.7%	-1.5%	2.2%	4.4%	8.8%
JPM EMBI+	Em. Mkt. Bonds	-2.1%	7.8%	6.9%	7.5%	8.3%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Alternative Benchmarks						
DJ UBS Commodity Index	Commodity	-11.8%	-6.6%	-5.3%	-1.4%	-1.0%
DJCS HF Composite	Hedge Fund	0.6%	7.7%	7.2%	6.4%	6.3%
HFRI FoF Conservative	Fund of Funds	0.1%	5.4%	4.9%	3.4%	2.8%
Cambridge PE Lagged*	Private Equity					
NCREIF Property Index*	Real Estate	2.6%	11.3%	11.1%	11.0%	8.5%
Wilshire REIT Index	REIT	-3.1%	13.5%	16.5%	16.0%	8.3%
CPI + 2%	Inflation/Real Assets	1.9%	3.7%	3.6%	4.0%	4.5%



* As of 6/30/2014

Q3 2014 Market Review

Positives

- **Fed asset purchases coming to an end; generally accepted by marketplace**
  - Divergence in monetary policies signaling different investment environments globally
- **Q3 GDP growth estimated at 3.5%**
  - U.S. employment continues to gain
  - August consumer confidence is highest since 2007, signaling bullish consumption expectations
- **ECB signals further monetary easing through asset purchases in addition to negative short dated interest rates**
- **Developed world inflation is low**

Negatives

- **Geopolitical instability drives volatility**
  - Instability in Mid-East, Ukraine, Scotland
- **Europe continues to see ongoing economic growth challenges**
- **U.S. Dollar strength translated to negative dollar denominated returns in international markets**
- **Valuations remain above 10-year and long-term averages**
  - Developed Equity P/Es above median
  - Credit spreads near historically low levels
- **Volatility re-emerged as the VIX rose substantially toward the end of the quarter**

Market Environment

Global Equity

- **U.S. equities advanced in the third quarter amid increasing volatility.**
- **Large cap stocks outperformed small cap stocks during the quarter, with the S&P 500 Index returning 1.1% versus -7.4% for the Russell 2000 Index.**
- **International equities underperformed U.S. markets during the quarter, returning -5.3% as measured by the MSCI ACWI ex-U.S. Index.**
  - Developed markets returned -5.3% as measured by the MSCI EAFE Index. Europe was the worst performing developed market region, returning -7.0%; subdued economic data in Japan resulted in a weaker Yen, bolstering imports and limiting losses to -2.3%.
  - Emerging markets returned -3.5% as measured by the MSCI Emerging Markets Index in U.S. dollar terms. In local currency terms emerging markets were up 0.6%. Emerging countries in Europe were the largest detractors; with Greece (-20%), Hungary (-12.8%), and Russia (-15.4%) suffering significant drawdowns.

Private Equity

- **New private equity commitments totaled $85.6 billion in Q3 2014, bringing total new commitments to $264.9 billion year-to-date. 2014 is on track to be the fifth straight year of increasing commitments.**
  - While the 2014 global PE fundraising pace increases, U.S. fundraising remains at 2013 pace with high U.S. equity and PE valuations causing investors to look to markets outside of the U.S.
- **Buyout and growth equity fund deal volume in both the U.S. and Europe has gradually declined throughout 2014.**
  - U.S. buyout and growth equity deals totaled $110 billion and European buyout and growth deals totaled $14 billion in the third quarter.
- **Venture capital commitments totaled $37 billion at the end of September, outpacing total commitments for all of 2013.**
  - At 14% of total private equity raised, commitments are just below the 10-year historic relative average.
- **Mezzanine funds continue to face strong headwinds from a robust high yield market and an expanding supply of private debt.**
  - Mezzanine funds raised $12.9 billion or 5% of total private equity funds raised.
- **Asian private equity commitments have accelerated in 2014 to $31.2 billion.**
  - Represents 12% of the 2014 total across all geographies. Nearly 75% of all Asian PE funds raised in 2014 have been China-based.

Fixed Income

- **Risk aversion permeated fixed income markets in the third quarter amid growing concerns around economic growth and geopolitical events.**
- **The 10-year Treasury yield fell 4 basis points during the quarter, finishing at 2.49%.**
- **The Treasury yield curve flattened with the spread between two- and ten-year rates falling 16 basis points to 1.92%.**
- **Treasury Inflation-Protected Securities, or TIPS, underperformed nominal Treasuries due to lower inflation (expectations and actual), with the Barclays U.S. TIPS Index posting a loss of 2.0% during the quarter.**
- **After a long period of credit spreads narrowing, investment grade credit spreads widened 12 basis points to 1.12%.**
  - The U.S. Credit Index was ultimately flat due to a high volume of new issuances.
  - The Long Duration Credit Index returned 0.2% in the third quarter.
- **High yield bonds returned -1.9% as spreads increased to 463 basis points, nearly 100 basis points wider than the lows seen in June 2014.**
  - Unlike previous periods where low quality debt outperformed, higher quality BB-rated bonds outperformed in Q3.
- **Emerging markets debt slowed in the third quarter after a strong first half of the year.**
  - Concerns over geopolitical events, economic growth and a Fed rate increase caused local currency (JP Morgan GBI-EM Global Diversified – Unhedged) to fare worse than external currency (JP Morgan EMBI+) emerging markets debt resulting in losses of 5.7% and 2.1%, respectively.

Commodities

- **Commodities sold off in the third quarter with the Bloomberg Commodity Index losing 11.8%.**
  – Corn and Wheat were the biggest losers, returning -25.8% and -22.0%, respectively, weighing on the agriculture sector as a whole, resulting in losses of 18%.
- **Precious metals and energy sectors declined nearly 12% during the quarter after a negative supply outlook for crude oil from OPEC.**

Real Estate

- **NEPC continues to be neutral on core real estate in the U.S. and remains positive on non-core real estate, that is, value-add and opportunistic strategies.**
- **Within U.S. core real estate, strong fundamentals continue to be the story along with attractive income spreads relative to interest rates.**
  – The concern for U.S. core real estate (and U.S. real estate, broadly) continues to be plentiful capital that is driving up pricing and the market's expectation for higher future interest rates and the impact on capitalization rates and capital values.
- **U.S. REITs traded down relative to net asset values and traded to 4.5% below NAV (long-term average is 2.4% above NAV).**
  – 14.5% compounded return through Q3 versus 1.9% annual return in 2013 and 2.2% 20 year average annual return in U.S. REIT Index
  – 15.1x FFO multiples down from 16x or above (recently) remains above the average of 12.5x since 2000.
- **Overall, the non-core real estate investment environment in the U.S. is normalizing; however, select areas remain attractive.**
- **Europe is viewed as the best place for a marginal dollar of non-core real estate investment.**
  – Europe is emerging from multi-year recession, but recovery is slow.
  – Banks in EU are still overleveraged and have significant real estate exposure (banks in Europe hold 90%+ of real estate debt or €2,300B; in the U.S. banks hold 49% of real estate debt).

Real Assets/Inflation-Linked Assets

- **NEPC believes that energy, specifically in North America, represents an attractive opportunity in the up-stream and mid-stream parts of the energy value chain.**

- **OPEC and Saudi Arabia have indicated a willingness to allow lower oil prices to persist in efforts to cement market share and reduce marginal supply.**

- **NEPC continues to believe in the long-term demand drivers in agriculture.**

- **Timber is an area of portfolios where we would recommend underweight positions as total return targets are low with a relatively small market opportunity and managers seeking deals outside the U.S.**

Outlook

- **Currency volatility is likely to continue.**
  - Effect of divergent central bank policies is ongoing and subject to change themselves.
  - Good opportunity to evaluate currency risk and consider a partially hedged approach.

- **Recent developed equity sell-off is quite normal relative to history.**
  - U.S. has experienced moderate growth rebound and cheaper energy and stronger dollar can provide buffer to the economy.
  - U.S. valuations are above average, but not unreasonably so, while profit margins appear somewhat stretched.
  - European equities have less positive macroeconomic outlook, but ECB actions could provide short-term support.

- **Emerging market dispersion to remain an ongoing theme.**
  - Geopolitical risks continue to simmer in many countries, while others appear to be well positioned for strong growth.
  - Employ active management with well-developed macro views to help navigate tricky environment and avoid pitfalls of benchmark biases.

- **Stay positioned to take advantage of volatility as central bank policy expectations flow through to markets.**
  - Uncertainty remains about the effectiveness of ECB stimulus and the timing of the Fed raising rates.
  - Steep yield curve suggests long-term bonds offer a better risk profile as a duration source.
  - Higher volatility should benefit active management and yield more attractive opportunities for dynamic strategies.

NEPC Updates

Third Quarter 2014

Highlights of Third Quarter Happenings at NEPC

NEPC Research

Recent White Papers Posted

- *Demystifying Systematic Macro Hedge Fund Strategies (October 2014) – Alex N. Kamunya, CAIA, Senior Research Consultant, Hedge Funds*
- *Investing in a Low-Return World: Avoiding Portfolio Paralysis (September 2014) – Timothy McCusker, FSA, CFA, CAIA, Chief Investment Officer*
- *Private Equity Fundraising: Too Fast, Too Furious? (August 2014) – NEPC Private Equity Team*
- *Investment Outsourcing: Evolution of the Industry, Products and Solutions (August 2014) – Steven F. Charlton, CFA, Director of Consulting Services*


INVESTING IN A LOW-RETURN WORLD:
AVOIDING PORTFOLIO PARALYSIS

Timothy McCusker, FSA, CFA, CAIA,
Chief Investment Officer

Introduction

LOW INVESTMENT RETURNS WILL LIKELY POSE A TREMENDOUS CHALLENGE TO INVESTORS

Professional Staff Updates

- David W. Moore, Partner, ARM, CEBS, and CPCU named head of Healthcare Consulting Practice
- Craig A. Svendsen, CFA, Partner named head of DB Corporate Consulting Practice

CIO Magazine's Influential Investment Consultants 2014 Awards

NEPC is excited to announce that two of its professionals appeared on CIO Magazine's (formerly aiCIO) annual list of the world's 25 most influential investment consultants in the institutional investment universe. **Chief Investment Officer, Tim McCusker**, was in the top ten, ranking sixth, and **KC Connors**, a fellow **NEPC Partner and Head of our Philanthropic Practice Team**, ranked eighteenth. The list, released earlier this month, is CIO's yearly ranking of the most influential institutional consultants who have made a positive impact working with their clients. Sourced from interviews with pension and non-profit CIOs, asset managers and former consultants, the list "represents our best approximation of the hierarchy of today's institutional consultant industry," said CIO. To learn more visit: http://www.ai-cio.com/2014_Knowledge_Brokers.aspx

NEPC's Video Series – "Five Questions With…"

We are excited to announce NEPC's Video Series— "Five Questions With…"—and we couldn't think of a better way to kick off this series of investment insights than an interview with our very own CIO, Tim McCusker! Tim discusses his thoughts on the market and investment opportunities, and provides a recap of his first 100 days as NEPC's CIO. The goal of our series is to provide the perspectives of industry leaders and experts, who will discuss the state of the market and opportunities. We hope you enjoy this inaugural video and please be on the lookout for additional interviews in the near future! To view the video please visit: http://www.nepc.com/clients/endowments_foundations

Appendix: SAA Policy History

Strategic Asset Allocation Policy (SAAP) History

- 7/1/75 – 12/31/79 – 40% S&P 500/60% Barclays Capital Aggregate
- 1/1/80 – 12/31/83 – 50% S&P 500/50% Barclays Capital Aggregate
- 1/1/84 – 12/31/91 – 60% S&P 500/40% Barclays Capital Aggregate
- 1/1/92 – 12/31/94 – 50% S&P 500/10% MSCI EAFE/40% Barclays Capital Aggregate
- 1/1/95 – 6/30/97 – 45% S&P 500/15% MSCI EAFE/40% Barclays Capital Aggregate
- 7/1/97 – 12/31/99 – 50% S&P 500/15% MSCI EAFE/35% Barclays Capital Aggregate
- 1/1/00 – 9/30/03 – 53% S&P 500/17% MSCI EAFE/30% Barclays Capital Aggregate
- 10/1/03 – 12/31/06 – 53% S&P 500/15% MSCI EAFE/ACWI ex-U.S.[1]/26% Barclays Capital Aggregate/6% NCREIF ODCE (lagged one quarter)
- 1/1/07 – 10/31/2009 – 31% S&P 500/7% S&P 400/7% S&P 600/18% MSCI ACWI ex-U.S./5% Russell 2000 (lagged one quarter)/26% Barclays Capital Aggregate/6% NCREIF ODCE (lagged one quarter)
- 11/1/2009 – 6/30/2012 – 28% S&P 500/6% S&P 400/6% S&P 600/13% MSCI EAFE/2% MSCI EAFE Small Cap/3% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/24% Barclays Capital Aggregate/2% Barclays Capital High Yield/6% NCREIF ODCE (lagged one quarter)/3% Dow Jones/UBS Commodities Index
- **7/1/2012 – Present – 23% S&P 500/5% S&P 400/5% S&P 600/14% MSCI EAFE/3% MSCI EAFE Small Cap/6% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/13% Barclays Capital Aggregate/5% Barclays Capital High Yield/4% JP Morgan GBI-EM Global Diversified/3% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/8% NCREIF ODCE (lagged one quarter)/4% Dow Jones/UBS Commodities Index**

- *Interim SAA Policy: 25% S&P 500/5% S&P 400/5% S&P 600/14% MSCI EAFE/3% MSCI EAFE Small Cap/6% MSCI Emerging Markets/6% Russell 2000 (lagged one quarter)/14% Barclays Capital Aggregate/5% Barclays Capital High Yield/4% JP Morgan GBI-EM Global Diversified/3% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/6% NCREIF ODCE (lagged one quarter)/4% Dow Jones/UBS Commodities Index

Note: Interim SAA Policy includes a proration of 1% Private Equity and 2% Real Estate, which are unfunded. Private Equity was prorated to domestic equity; Real Estate was prorated to domestic equity and fixed income. Recently approved Strategic Asset Allocation Policy effective July 1, 2012.

[1]MSCI EAFE/ACWI ex-U.S. Benchmark is the MSCI EAFE Index prior to 10/1/2005 and the MSCI ACWI ex-U.S. thereafter.

Note: All MSCI indices changed from Gross to Net of dividend withholding taxes effective 1/1/2014.

ASRS Custom Asset Class Benchmark History

- **ASRS Custom Total Equity Benchmark** was 77% S&P 500, 23% MSCI EAFE through 12/31/1999; 76% S&P 500, 24% MSCI EAFE through 9/30/2003; 78% S&P 500, 22% MSCI EAFE/ACWI ex-U.S.[1] through 12/31/2006; 49% S&P 500, 11% S&P 400, 11% S&P 600, 29% MSCI ACWI ex-U.S. through 10/31/2009; 48% S&P 500, 10% S&P 400, 10% S&P 600, 23% MSCI EAFE, 4% MSCI EAFE Small Cap, 5% MSCI Emerging Markets through 6/30/2012; 41% S&P 500, 9% S&P 400, 9% S&P 600, 25% MSCI EAFE, 5% MSCI EAFE Small Cap, 11% MSCI Emerging Markets thereafter.

- **ASRS Custom Domestic Equity Benchmark** was S&P 500 through 12/31/2006; 74% S&P 500, 13% S&P 400, 13% S&P 600 through 12/31/2010; 70% S&P 500, 15% S&P 400, and 15% S&P 600 thereafter.

- **ASRS Custom International Equity Benchmark** was MSCI EAFE through 9/30/2005; MSCI ACWI ex-U.S. through 12/31/2010; 72% MSCI EAFE, 11% MSCI EAFE Small Cap and 17% MSCI Emerging Markets through 6/30/2012; 61% MSCI EAFE, 13% MSCI EAFE Small Cap and 26% MSCI Emerging Markets thereafter.

- **ASRS Custom Public Markets Fixed Income Benchmark** was Barclays Capital U.S. Aggregate Index through 12/31/2010; 93% Barclays Capital U.S. Aggregate Index, 7% Barclays Capital U.S. High Yield Bond Index through 12/31/2012; 59% Barclays Capital U.S. Aggregate Index, 23% Barclays Capital U.S. High Yield Bond Index, 18% JP Morgan GBI-EM Global Diversified thereafter.

- **ASRS Custom GTAA Benchmark** was 56% S&P 500, 16% MSCI EAFE, 28% Barclays Capital Aggregate through 9/30/2011; 50% S&P 500, 19% MSCI EAFE, 28% Barclays Capital Aggregate, and 3% DJ UBS Commodities Index through 06/30/2012; 43% S&P 500, 25% MSCI EAFE, 28% Barclays Capital Aggregate, and 4% DJ UBS Commodities Index thereafter.

- **ASRS Custom Inflation-Linked Benchmark** was 100% Barclays Capital U.S. TIPS through 7/31/2010; 50% Barclays Capital U.S. TIPS, 50% DJ UBS Commodities Index through 8/31/2010; 30% Barclays Capital U.S. TIPS, 70% DJ UBS Commodities Index through 5/31/2011; 100% DJ UBS Commodities Index thereafter.

[1]MSCI EAFE/ACWI ex-U.S. Benchmark is the MSCI EAFE Index prior to 10/1/2005 and the MSCI ACWI ex-U.S. thereafter.

Note: All MSCI indices changed from Gross to Net of dividend withholding taxes effective 1/1/2014.

Reporting Methodology

- **The client's custodian bank is NEPC's preferred data source unless otherwise directed. NEPC reconciles custodian data to manager data. If the custodian cannot provide accurate data, manager data may be used.**

- **Trailing time period returns are determined by geometrically linking the holding period returns, from the first full month after inception to the report date. Rates of Return are annualized when the time period is longer than a year. Performance is presented gross and/or net of fees as indicated.**

- **For managers funded in the middle of a month, the 'since inception' return will start with the first full month, although actual inception dates and cash flows are included in all respective Composite calculations.**

- **This report may contain forward-looking statements that are based on NEPC's estimates, opinions and beliefs, but NEPC cannot guarantee that any plan will achieve its targeted return or meet other goals.**

Information Disclaimer

- **Past performance is no guarantee of future results.**
- **All investments carry some level of risk. Diversification and other asset allocation techniques are not guaranteed to ensure profit or protect against losses.**
- **Some index returns displayed in this report or used in calculation of a policy, allocation or custom benchmark may not be available from the source or may be preliminary and subject to change.**
- **NEPC's source for portfolio pricing, calculation of accruals, and transaction information is the Plan's custodian bank. 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 herein.**
- **This report is provided as a management aid for the client's internal use only. Performance 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.**

Agenda Item #5

ARIZONA STATE RETIREMENT SYSTEM

3300 NORTH CENTRAL AVENUE • PO BOX 33910 • PHOENIX, AZ 85067-3910 • PHONE (602) 240-2000
7660 EAST BROADWAY BOULEVARD • SUITE 108 • TUCSON, AZ 85710-3776 • PHONE (520) 239-3100
TOLL FREE OUTSIDE METRO PHOENIX AND TUCSON 1 (800) 621-3778
EMAIL ADDRESS: ASKMAC@AZASRS.GOV • WEB ADDRESS: WWW. AZASRS.GOV

Paul Matson
Director

MEMORANDUM

TO: The Arizona State Retirement System (ASRS) Investment Committee (IC)

FROM: Mr. Paul Matson, Director
Mr. Gary Dokes, Chief Investment Officer (CIO)
Mr. Allan Martin, Partner, NEPC
Mr. Chris Levell, Consultant, NEPC

DATE: December 1, 2014

RE: **Agenda Item #5**: Presentation, Discussion and Appropriate Action with respect to ASRS Strategic Asset Allocation Study

Purpose
To present and discuss the IMD and NEPC efforts to date regarding the Strategic Asset Allocation Study

Recommendation
Information item only; no action is required.

Background
The intention of this agenda item is to discuss in detail the various asset allocation mixes put forth by IMD and NEPC and to solicit input from the IC.

By way of background, as stipulated in SIP001, the ASRS conducts a Strategic Asset Allocation study triennially, which is used to determine the long-term strategic asset allocation policy weights in the Plan. This study utilizes an asset-only framework which allows the ASRS to focus on the long-term funded status of the Plan, maximize portfolio return, and minimize pension costs.

Enclosed is an analysis with different asset mixes by IMD & NEPC, which includes 3 & 30 year assumptions by IMD, as well as 5-7 & 30 year assumptions by NEPC. It is expected the discussion today will facilitate informed decision making at the next IC meeting.

Attachments:

- NEPC PowerPoint Presentation

Arizona State Retirement System

Asset Allocation Analysis

December 1, 2014

Allan Martin, Partner, NEPC
Chris Levell, ASA, CFA, CAIA, Partner, NEPC

NEPC, LLC

Table of Contents

Asset Allocation Overview and Assumptions

Expected Return, Volatility and Risk-Adjusted Return Using NEPC Assumptions

	Current Target	Strawman 1	Strawman 2	Strawman 3	NEPC 1	NEPC 2
Large Cap Equities	23%	17%	21%	24%	17%	17%
Small/Mid Cap Equities	10%	8%	11%	12%	8%	8%
Int'l Equities (Unhedged)	14%	14%	16%	10%	14%	14%
Int'l Small Cap Equities	3%	3%	5%	4%	3%	3%
Emerging Int'l Equities	6%	6%	5%	5%	6%	6%
Emerging Small Cap	0%	2%	0%	0%	2%	2%
Total Public Equity	***56%***	***50%***	***58%***	***55%***	***50%***	***50%***
Private Equity	7%	8%	7%	7%	7%	8%
Total Equity	**63%**	**58%**	**65%**	**62%**	**57%**	**58%**
Core Bonds	13%	7%	4%	8%	0%	3%
High Yield Bonds	5%	3%	7%	5%	3%	3%
EMD	4%	5%	2%	2%	5%	5%
Long Govt/Credit	0%	0%	0%	0%	6%	0%
Diversified Fixed Income	0%	0%	0%	0%	0%	4%
Total Public Fixed Income	***22%***	***15%***	***13%***	***15%***	***14%***	***15%***
Private Debt	3%	10%	5%	8%	10%	10%
Total Fixed Income	**25%**	**25%**	**18%**	**23%**	**24%**	**25%**
Real Assets	0%	0%	2%	2%	2%	2%
Real Estate	8%	8%	7%	10%	10%	8%
Commodities	4%	4%	0%	0%	2%	2%
Total Inflation Linked	**12%**	**12%**	**9%**	**12%**	**14%**	**12%**
GTAA/Multi-Asset	0%	5%	8%	3%	5%	5%
Total GTAA	**0%**	**5%**	**8%**	**3%**	**5%**	**5%**

Expected Return (5-7 Year)	***6.9%***	***7.4%***	***7.2%***	***7.1%***	***7.6%***	***7.5%***
Standard Dev of Asset Return	***13.6%***	***14.0%***	***14.4%***	***14.2%***	***14.1%***	***14.3%***
Sharpe Ratio	***0.39***	***0.42***	***0.40***	***0.40***	***0.43***	***0.42***

Expected Return (30 Year)	***8.1%***	***8.4%***	***8.4%***	***8.3%***	***8.5%***	***8.5%***
Standard Dev of Asset Return	***13.6%***	***14.0%***	***14.4%***	***14.2%***	***14.1%***	***14.3%***
Sharpe Ratio	***0.32***	***0.33***	***0.32***	***0.32***	***0.34***	***0.33***

Note: Current Target includes 0% allocation to GTAA/Multi-Asset to account for change in methodology going forward with respect to treatment of GTAA/Multi-Asset strategies.

Expected Return, Volatility and Risk-Adjusted Return Using ASRS IMD Assumptions

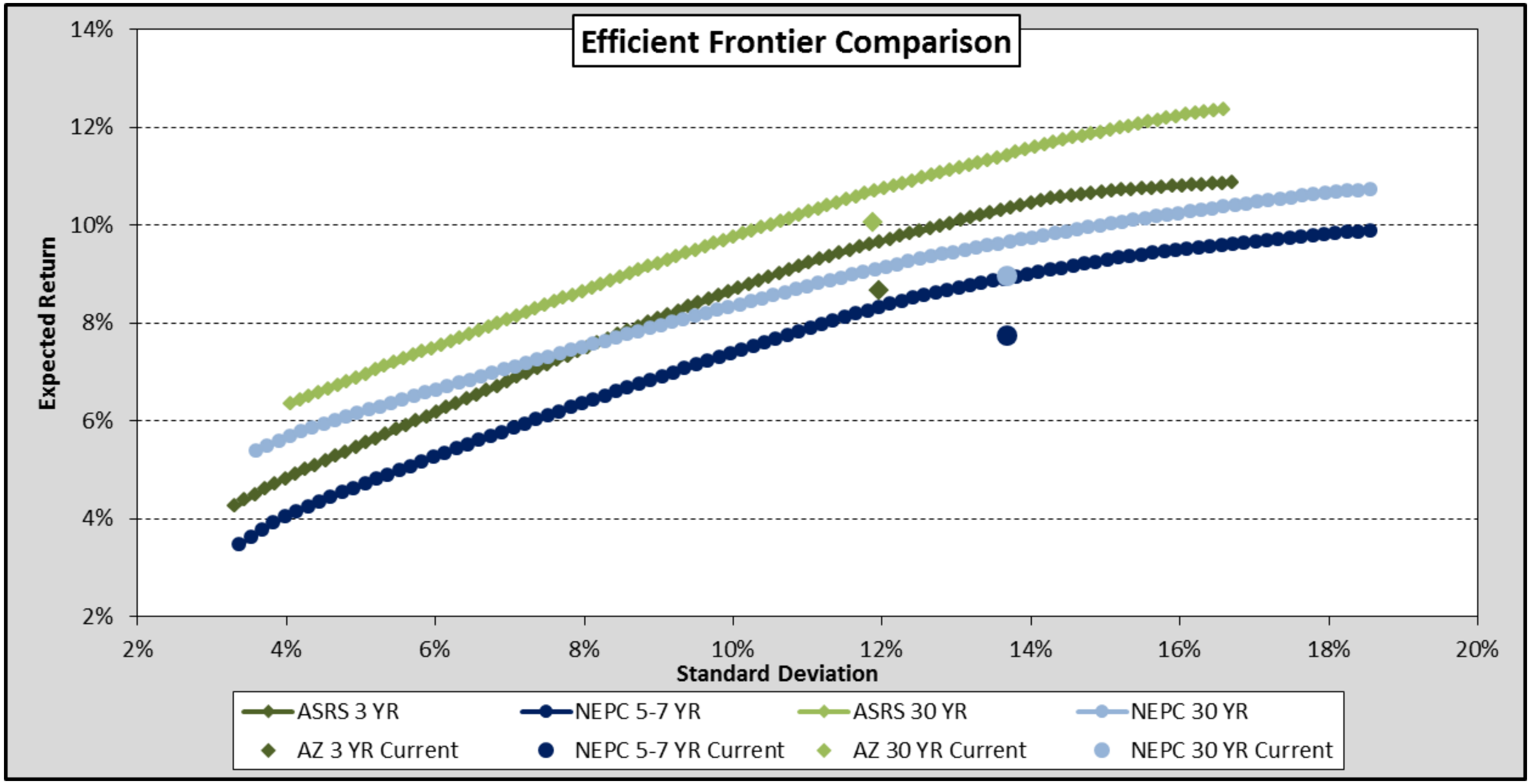
	Current Target	Strawman 1	Strawman 2	Strawman 3	NEPC 1	NEPC 2
Large Cap Equities	23%	17%	21%	24%	17%	17%
Small/Mid Cap Equities	10%	8%	11%	12%	8%	8%
Int'l Equities (Unhedged)	14%	14%	16%	10%	14%	14%
Int'l Small Cap Equities	3%	3%	5%	4%	3%	3%
Emerging Int'l Equities	6%	6%	5%	5%	6%	6%
Emerging Small Cap	0%	2%	0%	0%	2%	2%
Total Public Equity	***56%***	***50%***	***58%***	***55%***	***50%***	***50%***
Private Equity	7%	8%	7%	7%	7%	8%
Total Equity	**63%**	**58%**	**65%**	**62%**	**57%**	**58%**
Core Bonds	13%	7%	4%	8%	0%	3%
High Yield Bonds	5%	3%	7%	5%	3%	3%
EMD	4%	5%	2%	2%	5%	5%
Long Govt/Credit	0%	0%	0%	0%	6%	0%
Diversified Fixed Income	0%	0%	0%	0%	0%	4%
Total Public Fixed Income	***22%***	***15%***	***13%***	***15%***	***14%***	***15%***
Private Debt	3%	10%	5%	8%	10%	10%
Total Fixed Income	**25%**	**25%**	**18%**	**23%**	**24%**	**25%**
Real Assets	0%	0%	2%	2%	2%	2%
Real Estate	8%	8%	7%	10%	10%	8%
Commodities	4%	4%	0%	0%	2%	2%
Total Inflation Linked	**12%**	**12%**	**9%**	**12%**	**14%**	**12%**
GTAA/Multi-Asset	0%	5%	8%	3%	5%	5%
Total GTAA	**0%**	**5%**	**8%**	**3%**	**5%**	**5%**

Expected Return (3 Year)	***7.5%***	***8.0%***	***8.3%***	***8.1%***	***8.2%***	***8.1%***
Standard Dev of Asset Return	***11.9%***	***11.7%***	***12.3%***	***11.8%***	***11.7%***	***12.0%***
Sharpe Ratio	***0.54***	***0.60***	***0.59***	***0.59***	***0.61***	***0.59***

Expected Return (30 Year)	***8.9%***	***9.2%***	***9.5%***	***9.2%***	***9.3%***	***9.3%***
Standard Dev of Asset Return	***11.8%***	***11.6%***	***12.3%***	***11.7%***	***11.7%***	***11.9%***
Sharpe Ratio	***0.46***	***0.50***	***0.50***	***0.50***	***0.51***	***0.49***

Note: Current Target includes 0% allocation to GTAA/Multi-Asset to account for change in methodology going forward with respect to treatment of GTAA/Multi-Asset strategies.

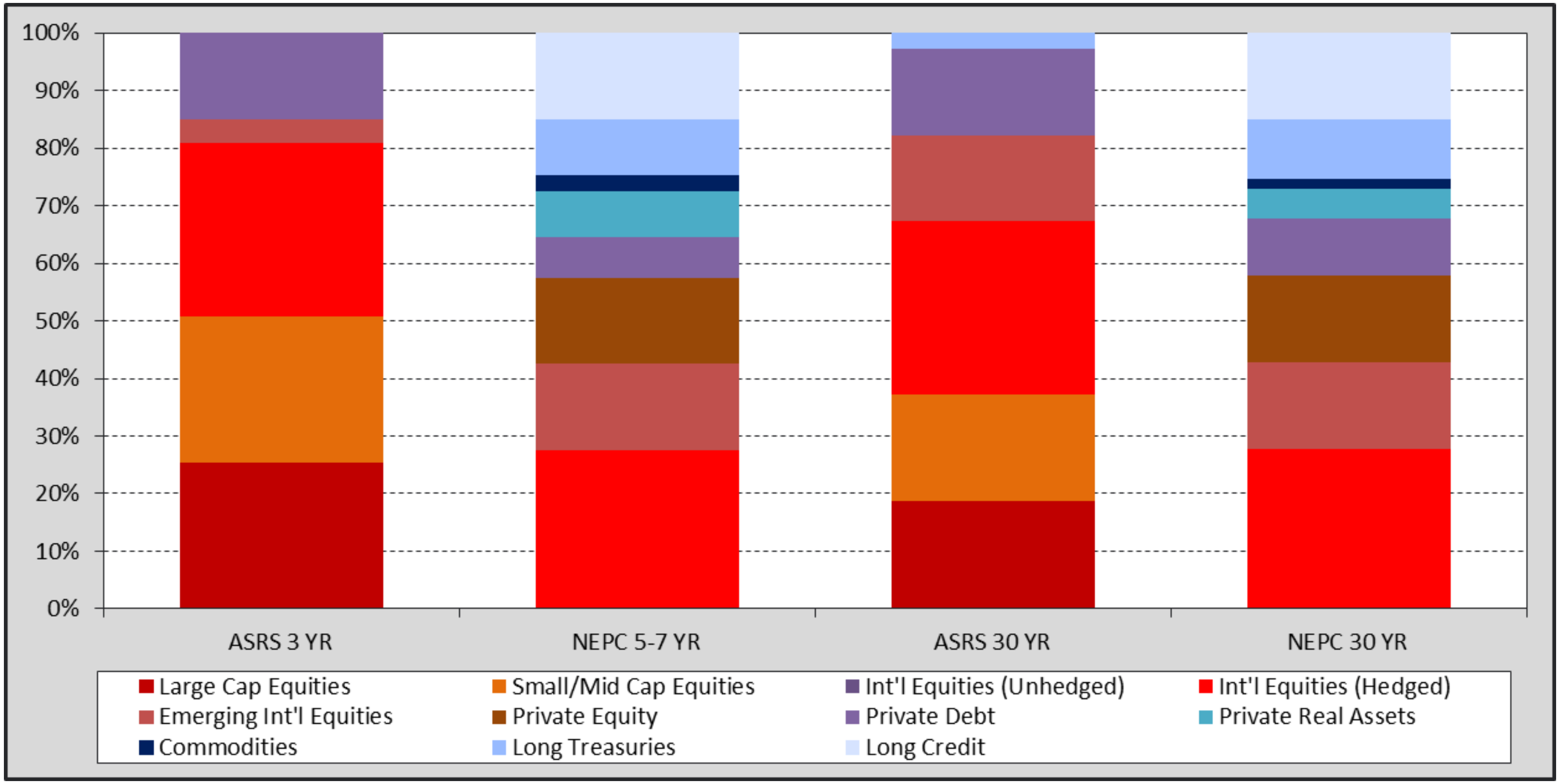
Efficient Frontier Analysis



- **Significant variation in assumptions leads to wide range of efficient frontiers and expected risk/return levels for current target**

- **Portfolios are all below respective efficient frontiers – partially due to strategic decisions, partially due to frontier constraints**

Efficient Portfolio Allocations at 14% Volatility



- **Even with higher volatility, target portfolios vary significantly due to high differentiation in assumptions**

- **Long duration offers good diversification benefits in NEPC assumptions**

Assumptions - Returns

	IMD 3 Yr	IMD 30 Yr	NEPC 5-7 Yr	NEPC 30 Yr
Cash	1.03%	3.42%	1.50%	3.75%
LIBOR	1.35%	3.63%	1.75%	4.00%
Treasuries	2.03%	4.01%	2.00%	4.00%
IG Corp Credit	3.47%	5.22%	3.50%	5.25%
MBS	2.30%	4.28%	2.25%	4.25%
TIPS	2.53%	4.50%	2.50%	4.50%
High-Yield Bonds	4.47%	6.00%	4.50%	6.00%
Global Bonds (Unhedged)	1.34%	3.07%	1.25%	3.00%
Global Bonds (Hedged)	1.45%	3.16%	*1.38%*	*3.13%*
EMD (External)	5.00%	7.01%	5.00%	7.00%
EMD (Local Currency)	5.64%	7.19%	5.75%	7.25%
Large Cap Equities	8.62%	9.85%	6.25%	7.75%
Small/Mid Cap Equities	9.62%	10.85%	6.25%	8.00%
Int'l Equities (Unhedged)	9.05%	10.68%	7.25%	8.25%
Int'l Equities (Hedged)	9.67%	11.30%	*7.49%*	*8.49%*
Emerging Int'l Equities	9.40%	11.72%	9.50%	9.50%
Private Equity	8.48%	9.97%	8.75%	9.75%
Private Debt	9.00%	8.00%	8.00%	8.25%
Private Real Assets	7.23%	7.81%	7.75%	7.75%
Real Estate (Core)	8.00%	9.00%	6.25%	6.50%
Commodities	4.09%	5.55%	5.00%	6.00%
Hedge Funds	5.41%	7.17%	5.50%	7.00%
Hedge Funds – Macro (GTAA)	10.00%	10.00%	5.75%	6.75%
Long Treasuries	3.03%	4.33%	3.00%	4.25%
Long Credit	4.85%	5.92%	5.00%	6.00%
Core Bonds	2.60%	4.43%	2.53%	4.65%

Returns are geometric.

Assumptions - Volatility

	IMD 3 Yr	IMD 30 Yr	NEPC 5-7 Yr	NEPC 30 Yr
Cash	0.96%	0.93%	1.00%	1.00%
LIBOR	1.38%	1.38%	1.50%	1.50%
Treasuries	5.85%	5.70%	6.00%	6.00%
IG Corp Credit	7.38%	7.18%	7.50%	7.50%
MBS	6.59%	6.17%	7.00%	7.00%
TIPS	7.34%	7.17%	7.50%	7.50%
High-Yield Bonds	12.86%	12.46%	13.00%	13.00%
Global Bonds (Unhedged)	8.48%	8.43%	8.50%	8.50%
Global Bonds (Hedged)	5.10%	4.88%	5.00%	5.00%
EMD (External)	12.06%	12.06%	12.00%	12.00%
EMD (Local Currency)	14.78%	14.78%	15.00%	15.00%
Large Cap Equities	15.03%	15.03%	17.50%	17.50%
Small/Mid Cap Equities	18.12%	18.12%	21.00%	21.00%
Int'l Equities (Unhedged)	17.56%	17.56%	20.50%	20.50%
Int'l Equities (Hedged)	17.56%	17.56%	18.50%	18.50%
Emerging Int'l Equities	23.20%	23.20%	26.00%	26.00%
Private Equity	24.51%	23.51%	27.00%	27.00%
Private Debt	8.13%	8.13%	19.00%	19.00%
Private Real Assets	21.22%	20.22%	23.00%	23.00%
Real Estate (Core)	12.00%	12.00%	17.00%	17.00%
Commodities	17.60%	17.60%	18.00%	18.00%
Hedge Funds	9.90%	9.90%	9.00%	9.00%
Hedge Funds – Macro (GTAA)	9.55%	9.80%	9.50%	9.50%
Long Treasuries	11.81%	11.60%	12.00%	12.00%
Long Credit	13.59%	13.07%	14.00%	14.00%
Core Bonds	6.32%	6.27%	6.32%	6.32%

Volatility defined as standard deviation of investment returns.

Assumptions - NEPC 2014 Correlations

Asset Class	Cash	Treasuries	IG Corp Credit	MBS	TIPS	High Yield Bonds	Global Bonds (Unhedged)	Global Bonds (Hedged)	EMD (External)	EMD (Local Currency)	Large Cap Equities	Small/Mid Cap Equities	Int'l Equities (Unhedged)	Int'l Equities (Hedged)	Emerging Int'l Equities	Private Equity	Private Debt	Private Real Assets	Real Estate (Core)	Commodities	Hedge Funds	Long Treasuries	Long Credit
Cash	1.00																						
Treasuries	0.20	1.00																					
IG Corp Credit	0.10	0.75	1.00																				
MBS	0.25	0.90	0.80	1.00																			
TIPS	0.00	0.75	0.60	0.70	1.00																		
High Yield Bonds	-0.05	0.30	0.55	0.30	0.20	1.00																	
Global Bonds (Unhedged)	0.10	0.50	0.50	0.45	0.40	0.10	1.00																
Global Bonds (Hedged)	0.10	0.80	0.65	0.70	0.65	0.20	0.60	1.00															
EMD (External)	0.05	0.40	0.65	0.35	0.30	0.65	0.25	0.35	1.00														
EMD (Local Currency)	0.05	0.30	0.60	0.25	0.25	0.60	0.30	0.25	0.80	1.00													
Large Cap Equities	0.05	0.05	0.55	0.15	0.00	0.70	0.10	0.05	0.60	0.65	1.00												
Small/Mid Cap Equities	-0.05	-0.05	0.35	0.05	-0.10	0.70	0.00	-0.05	0.55	0.60	0.90	1.00											
Int'l Equities (Unhedged)	-0.10	0.00	0.30	0.05	-0.05	0.50	0.40	0.25	0.60	0.65	0.70	0.60	1.00										
Int'l Equities (Hedged)	-0.10	0.00	0.30	0.05	-0.05	0.50	0.30	0.40	0.60	0.65	0.75	0.65	0.90	1.00									
Emerging Int'l Equities	-0.10	-0.10	0.25	-0.10	-0.10	0.55	0.05	0.05	0.75	0.80	0.60	0.65	0.70	0.70	1.00								
Private Equity	-0.10	-0.05	0.20	0.00	-0.10	0.60	-0.10	-0.10	0.35	0.40	0.70	0.80	0.60	0.65	0.45	1.00							
Private Debt	0.00	-0.25	0.15	-0.15	-0.10	0.65	-0.10	-0.10	0.55	0.60	0.65	0.75	0.60	0.60	0.65	0.65	1.00						
Private Real Assets	0.15	-0.20	0.05	-0.15	0.00	0.40	-0.05	-0.05	0.40	0.40	0.55	0.60	0.50	0.50	0.50	0.65	0.60	1.00					
Real Estate (Core)	0.25	-0.05	0.05	-0.05	0.00	0.10	0.00	-0.05	0.10	0.10	0.35	0.25	0.30	0.30	0.15	0.35	0.25	0.40	1.00				
Commodities	0.10	-0.10	0.10	-0.10	0.30	0.20	0.10	0.10	0.35	0.45	0.30	0.30	0.35	0.35	0.40	0.25	0.30	0.45	0.30	1.00			
Hedge Funds	0.00	-0.20	0.35	-0.15	0.20	0.60	0.05	-0.30	0.55	0.60	0.60	0.65	0.70	0.65	0.70	0.75	0.80	0.65	0.25	0.50	1.00		
Long Treasuries	0.10	0.90	0.80	0.75	0.65	0.20	0.50	0.85	0.15	0.15	-0.10	-0.20	-0.15	-0.15	-0.20	-0.20	-0.40	-0.25	-0.05	-0.05	-0.25	1.00	
Long Credit	0.05	0.65	0.90	0.65	0.65	0.50	0.50	0.55	0.55	0.60	0.35	0.30	0.25	0.25	0.20	0.15	0.15	0.05	0.00	0.05	0.25	0.80	1.00

Assumptions - ASRS 2014 Correlations

Asset Class	Cash	Treasuries	IG Corp Credit	MBS	TIPS	High-Yield Bonds	Global Bonds (Unhedged)	Global Bonds (Hedged)	EMD (External)	EMD (Local Currency)	Large Cap Equities	Small/Mid Cap Equities	Int'l Equities (Unhedged)	Int'l Equities (Hedged)	Emerging Int'l Equities	Private Equity	Private Debt	Private Real Assets	Real Estate (Core)	Commodities	Hedge Funds	Long Treasuries	Long Credit
Cash	1.00																						
Treasuries	0.20	1.00																					
IG Corp Credit	0.10	0.45	1.00																				
MBS	0.25	0.90	0.80	1.00																			
TIPS	0.00	0.60	0.66	0.70	1.00																		
High-Yield Bonds	-0.05	-0.23	0.61	0.30	0.40	1.00																	
Global Bonds (Unhedged)	0.10	0.76	0.50	0.45	0.40	-0.06	1.00																
Global Bonds (Hedged)	0.10	0.52	0.53	0.70	0.65	-0.06	0.99	1.00															
EMD (External)	0.05	0.26	0.65	0.35	0.50	0.87	0.27	0.35	1.00														
EMD (Local Currency)	0.05	-0.04	0.60	0.25	0.25	0.82	0.60	0.40	0.80	1.00													
Large Cap Equities	-0.53	-0.28	0.34	0.15	0.16	0.77	-0.26	-0.26	0.63	0.63	1.00												
Small/Mid Cap Equities	-0.05	-0.05	0.35	0.05	-0.10	0.80	0.05	0.05	0.55	0.60	0.90	1.00											
Int'l Equities (Unhedged)	-0.73	0.00	0.30	0.05	-0.05	0.78	0.16	-0.16	0.70	0.65	0.70	0.60	1.00										
Int'l Equities (Hedged)	-0.73	0.00	0.30	0.05	-0.05	0.82	0.16	-0.16	0.70	0.65	0.75	0.65	0.90	1.00									
Emerging Int'l Equities	-0.68	-0.20	0.45	-0.10	0.29	0.60	0.20	-0.11	0.79	0.79	0.60	0.65	0.91	0.91	1.00								
Private Equity	-0.05	-0.05	0.20	0.00	-0.10	0.65	-0.10	-0.10	0.35	0.40	0.70	0.80	0.60	0.65	0.45	1.00							
Private Debt	0.00	-0.25	0.15	-0.15	-0.10	0.60	-0.10	-0.10	0.10	0.10	0.45	0.55	0.50	0.50	0.30	0.65	1.00						
Private Real Assets	0.15	-0.20	0.05	-0.15	0.00	0.50	-0.05	-0.05	0.40	0.40	0.55	0.60	0.50	0.50	0.50	0.65	0.60	1.00					
Real Estate (Core)	0.10	-0.05	0.05	-0.05	0.00	0.15	0.00	-0.05	0.10	0.10	0.35	0.25	0.30	0.30	0.15	0.35	0.25	0.40	1.00				
Commodities	0.00	-0.20	0.26	-0.10	0.30	0.56	-0.23	0.10	0.47	0.47	0.50	0.30	0.59	0.59	0.64	0.25	0.30	0.45	0.30	1.00			
Hedge Funds	-0.60	-0.20	0.35	-0.15	0.20	0.78	0.05	-0.27	0.67	0.60	0.70	0.65	0.88	0.90	0.75	0.80	0.65	0.65	0.25	0.70	1.00		
Long Treasuries	0.10	0.90	0.80	0.75	0.65	0.20	0.50	0.85	0.15	0.15	-0.10	-0.20	-0.15	-0.15	-0.20	-0.20	-0.40	-0.25	-0.05	-0.05	-0.25	1.00	
Long Credit	0.05	0.65	0.90	0.65	0.65	0.50	0.50	0.55	0.55	0.60	0.35	0.30	0.25	0.25	0.20	0.15	0.15	0.05	0.00	0.00	0.25	0.80	1.00

Assumptions – Constraints for Efficient Frontiers

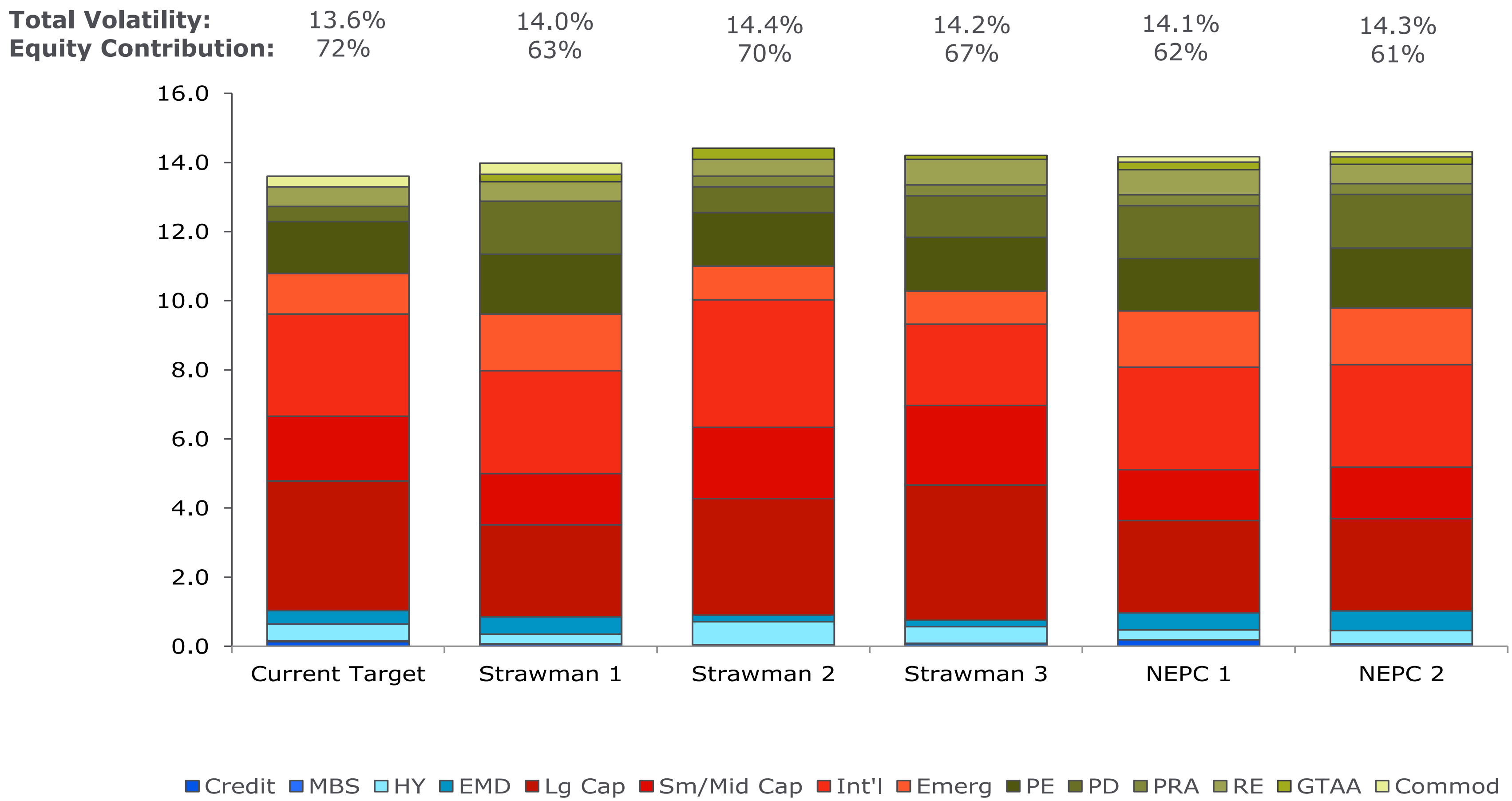
	Min	Max
Cash	0.00%	30.00%
LIBOR	0.00%	30.00%
Treasuries	0.00%	30.00%
IG Corp Credit	0.00%	30.00%
MBS	0.00%	15.00%
TIPS	0.00%	15.00%
High-Yield Bonds	0.00%	15.00%
Global Bonds (Unhedged)	0.00%	15.00%
Global Bonds (Hedged)	0.00%	15.00%
EMD (External)	0.00%	15.00%
EMD (Local Currency)	0.00%	15.00%
Large Cap Equities	0.00%	30.00%
Small/Mid Cap Equities	0.00%	30.00%
Int'l Equities (Unhedged)	0.00%	30.00%
Int'l Equities (Hedged)	0.00%	30.00%
Emerging Int'l Equities	0.00%	30.00%
Private Equity	0.00%	15.00%
Private Debt	0.00%	15.00%
Private Real Assets	0.00%	15.00%
Real Estate (Core)	0.00%	15.00%
Commodities	0.00%	15.00%
Hedge Funds	0.00%	15.00%
Long Treasuries	0.00%	15.00%
Long Credit	0.00%	15.00%

Relative/Group Constraints:
Global Bonds (Unhedged) + Global Bonds (Hedged) </= 15%
Small/Mid Cap Equities </= Large Cap Equities
Int'l Equities (Unhedged) + Int'l Equities (Hedged) </= 30%
Emerging Int'l Equities </= Int'l Equities (Unhedged) + Int'l Equities (Hedged)
Private Equity + Private Debt + Private Real Assets + Real Estate (Core) </= 30%

Risk Budgeting, Scenario, Factor, and Probability Analysis

Note: All of the analysis provided on the following pages is based on NEPC's 5-7 Year Assumptions

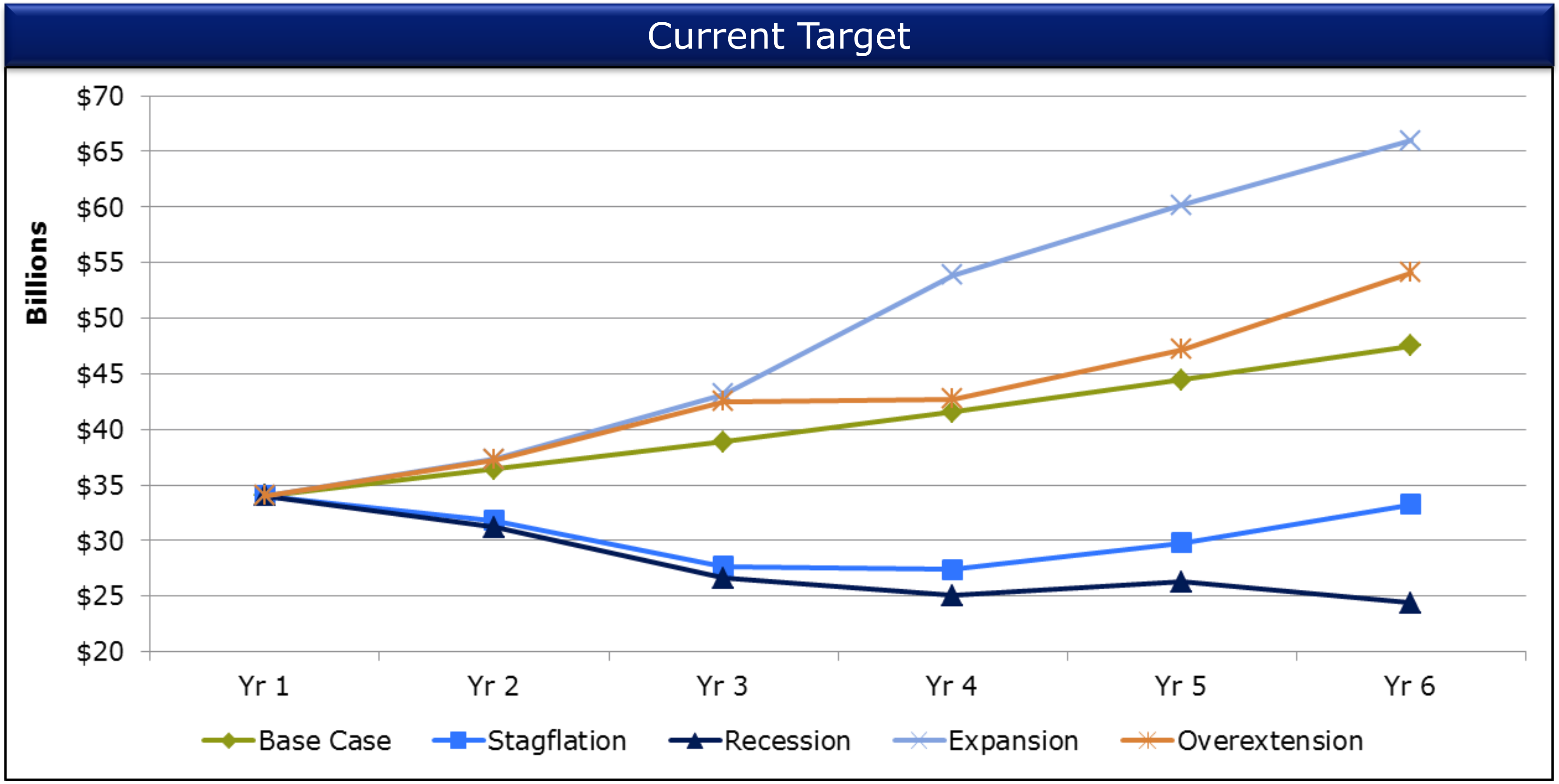
Risk Budgeting Analysis



- **All proposed mixes carry a similar level of expected asset volatility, which is slightly higher than the current target**

- **All proposed asset mixes have less relative risk allocated to equities than the current target**

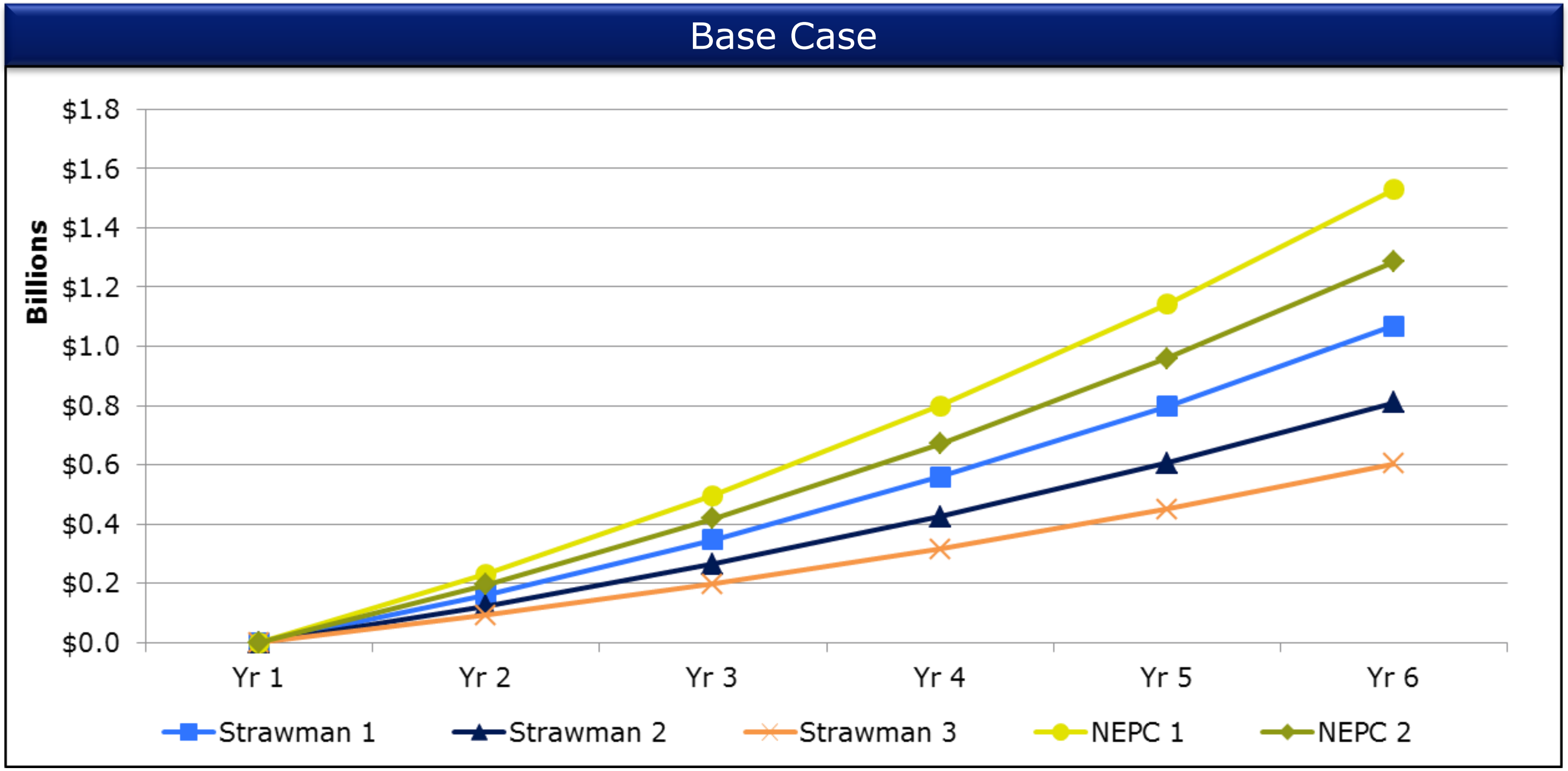
Scenario Analysis – Current Target



- **Strong equity bias means portfolio loses assets in lower than expected growth scenarios and performs positively when growth meets or exceeds expectations**

Note: Analysis does not include assumptions for liabilities or other cash flow items and is calculated using current assets (as of 9/30) only.

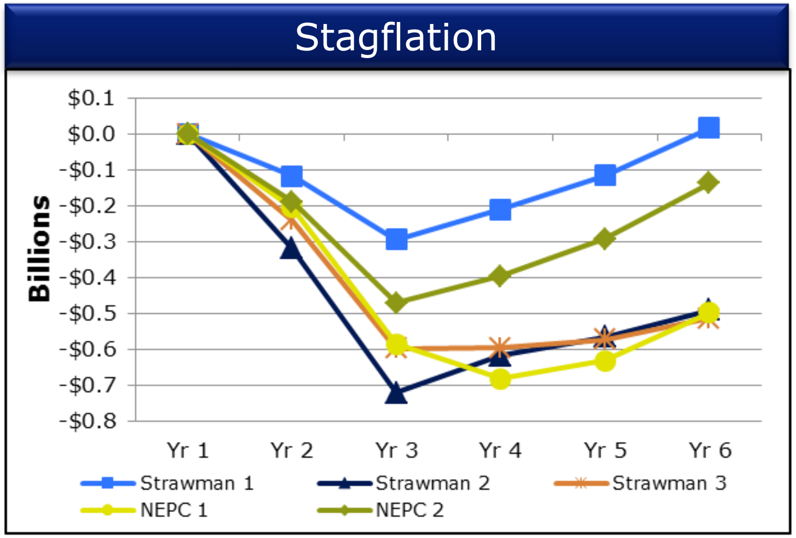
Scenario Analysis – Relative to Current Target

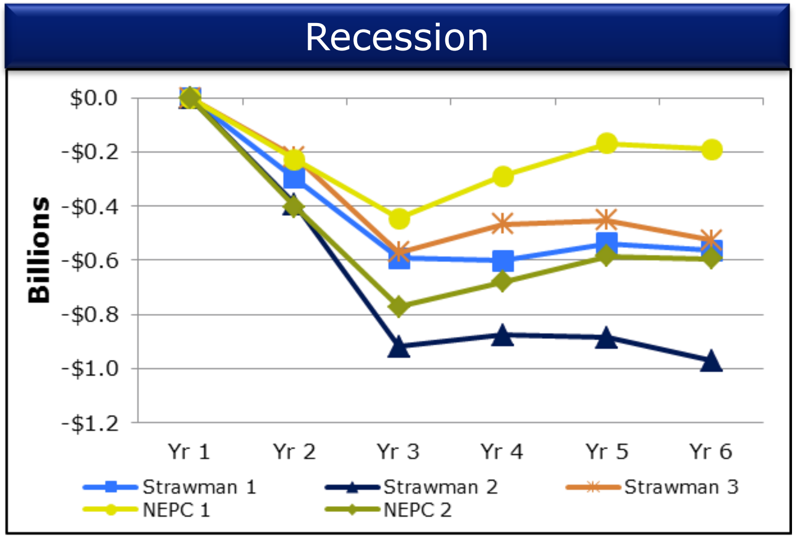


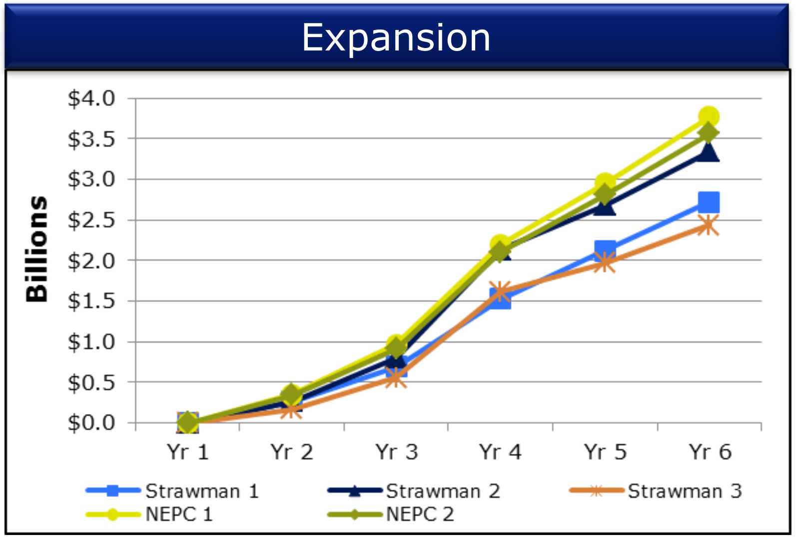
- **All modeled mixes have a higher expected return than the current target in the base case**
- **NEPC 1 and 2 have highest expected returns with marginally higher volatility expectations**

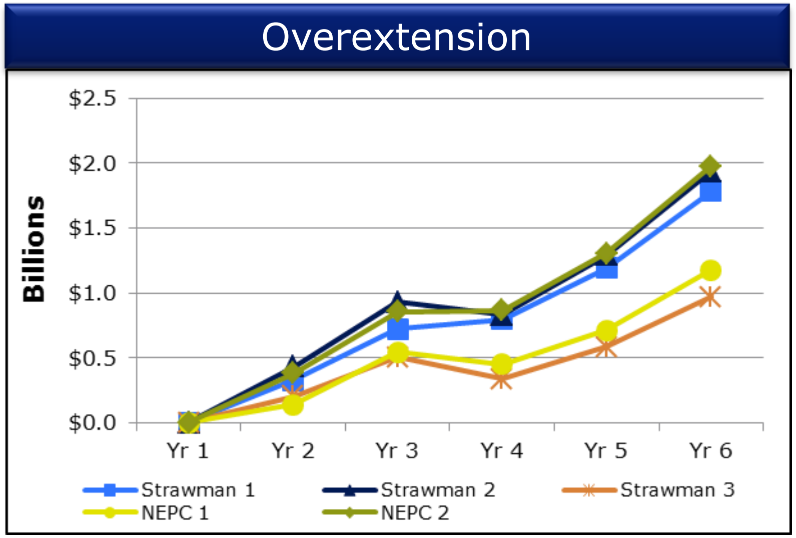
Note: Analysis does not include assumptions for liabilities or other cash flow items.

Scenario Analysis – Relative to Current Target



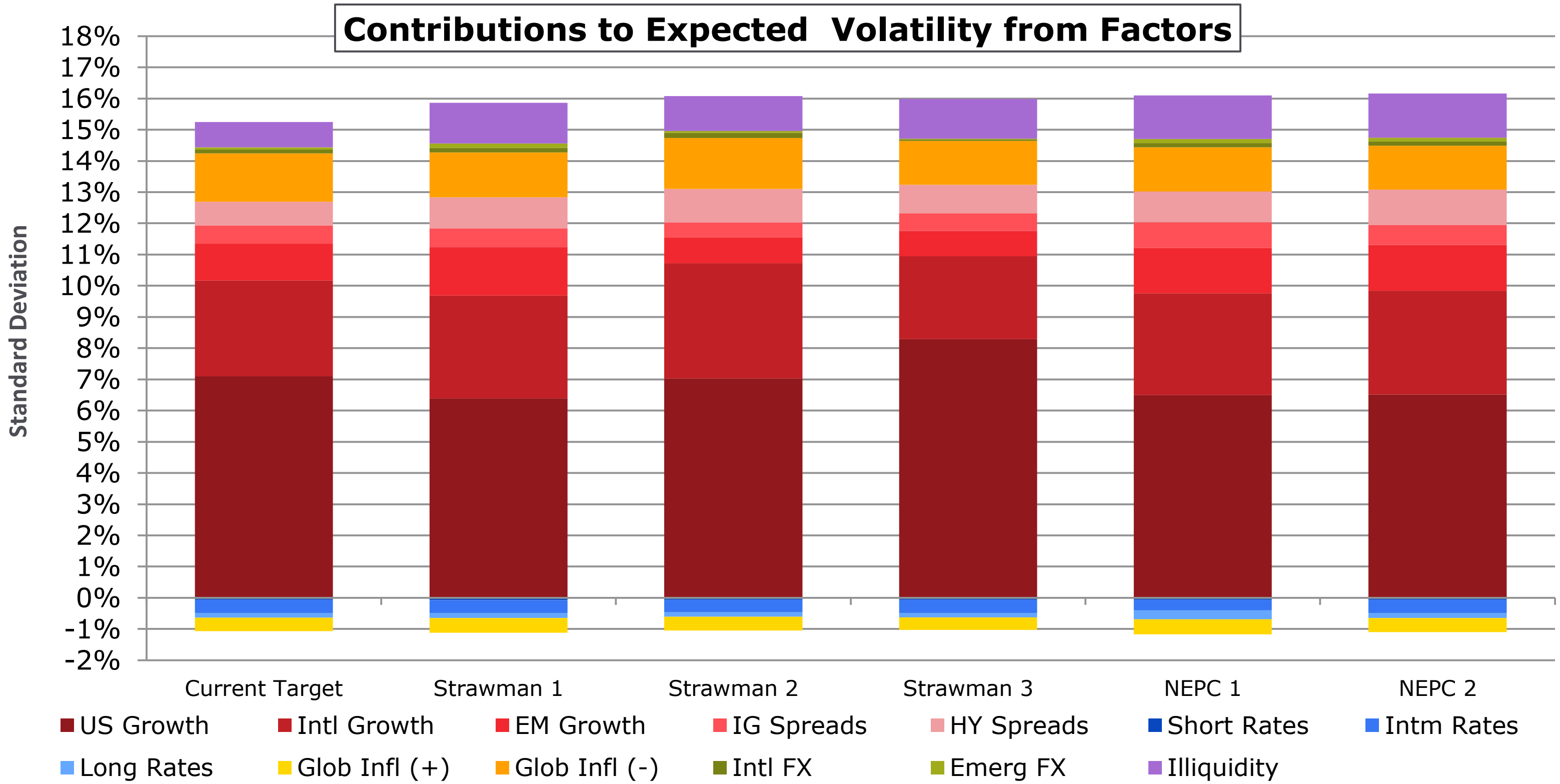






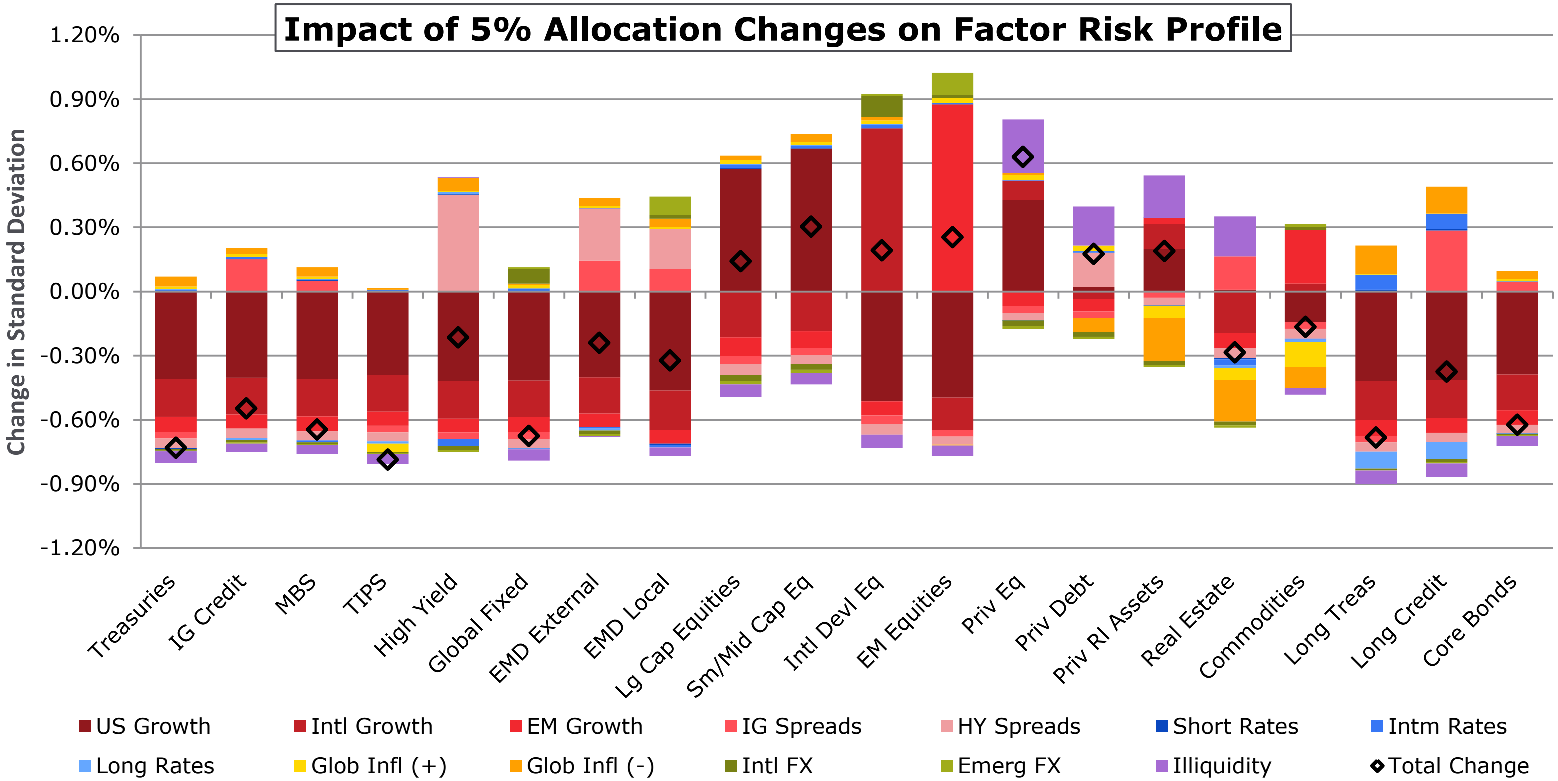
Note: Analysis does not include assumptions for liabilities or other cash flow items.

Factor Analysis



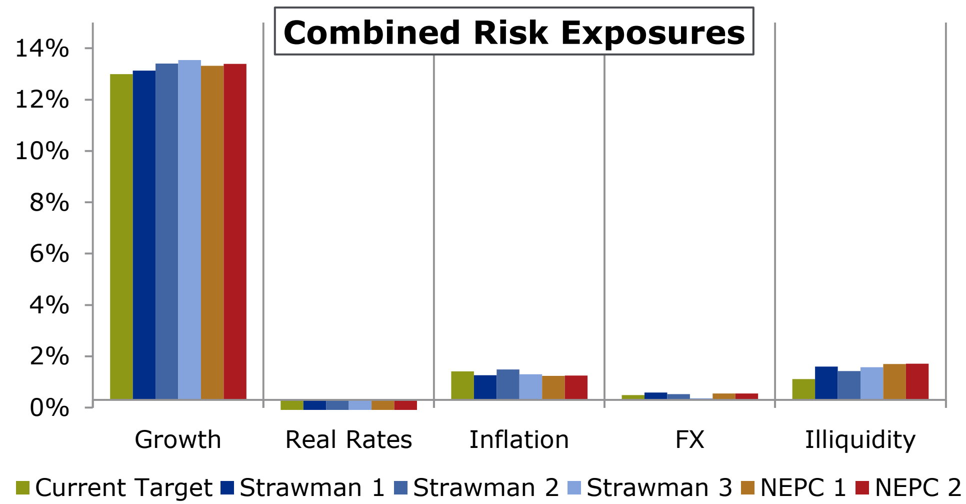
- **All mixes have similar levels of volatility and significant growth bias**
- **Composition of growth risk varies across mixes, along with small differences in exposures to illiquidity and inflation**

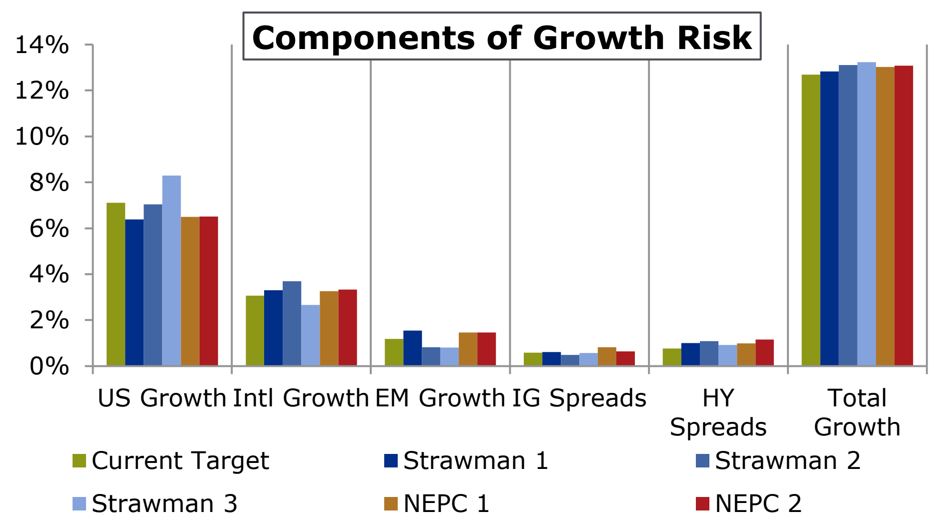
Factor Analysis



- **Because of equity bias, the Plan has a number of options to diversify away from growth risk**
  - However, most come at the expense of reduced expected returns

Factor Analysis





- **Growth is the main risk factor exposure in all mixes**
- **Modest increases in illiquidity risk factor in proposed mixes**
- **Breakdown of growth risk factor shows US bias in all mixes**
  - But to varying degrees; some mixes have a smaller home bias and greater EM growth exposure

Probability Analysis

	Using NEPC 5-7 Year Assumptions					
	Current Target	Strawman 1	Strawman 2	Strawman 3	NEPC 1	NEPC 2
Probability of 1-Year Return Under -5%	19.2%	18.8%	19.8%	19.6%	18.7%	19.2%
Probability of 1-Year Return Under 0%	30.7%	29.9%	30.8%	30.7%	29.6%	30.1%
Probability of 1-Year Return Over 5%	55.5%	56.7%	56.2%	56.0%	57.2%	56.8%
Probability of 1-Year Return Over 8%	46.7%	48.2%	47.9%	47.6%	48.8%	48.5%
Probability of 3-Year Return Under -5%	6.5%	6.3%	7.1%	6.9%	6.2%	6.6%
Probability of 3-Year Return Under 0%	19.1%	18.1%	19.2%	19.2%	17.7%	18.4%
Probability of 3-Year Return Over 5%	59.4%	61.5%	60.6%	60.3%	62.3%	61.7%
Probability of 3-Year Return Over 8%	44.3%	46.8%	46.4%	45.9%	47.8%	47.4%
Probability of 5-Year Return Under -5%	2.6%	2.4%	2.9%	2.8%	2.3%	2.6%
Probability of 5-Year Return Under 0%	12.9%	12.0%	13.1%	13.0%	11.6%	12.2%
Probability of 5-Year Return Over 5%	62.1%	64.7%	63.6%	63.2%	65.7%	64.9%
Probability of 5-Year Return Over 8%	42.7%	45.9%	45.3%	44.7%	47.2%	46.6%

Moderate downside protection, but gives up potential on upside

Better half of outcomes in all return probabilities analyzed

Good downside protection while maintaining most upside

	Using NEPC 30 Year Assumptions					
	Current Target	Strawman 1	Strawman 2	Strawman 3	NEPC 1	NEPC 2
Probability of 30-Year Return Under 0%	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%
Probability of 30-Year Return Under 5%	10.6%	9.2%	10.1%	10.4%	8.7%	9.2%
Probability of 30-Year Return Over 8%	51.6%	56.2%	55.3%	54.0%	57.8%	57.1%
Probability of 30-Year Return Over 10%	22.2%	26.5%	26.5%	25.2%	28.1%	27.9%

Risk Budgeting

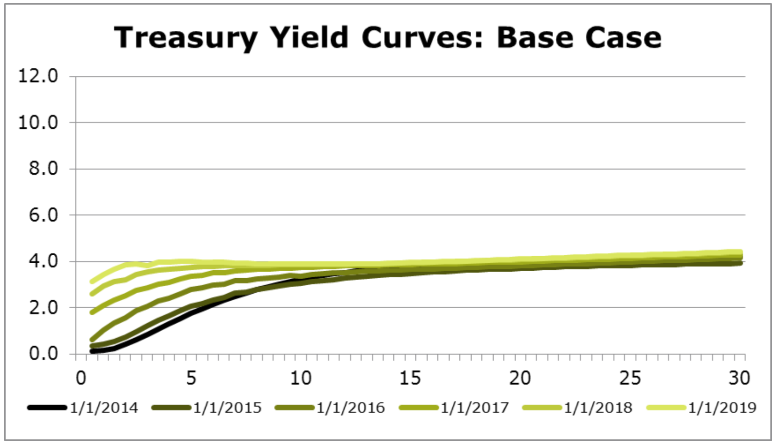
- **Risk budgeting considers the portfolio from a total risk perspective rather than total return**

- **A way to determine the contribution to overall portfolio risk by each asset class in the portfolio, based on**
  - Asset class volatility assumptions
  - Correlations between asset classes

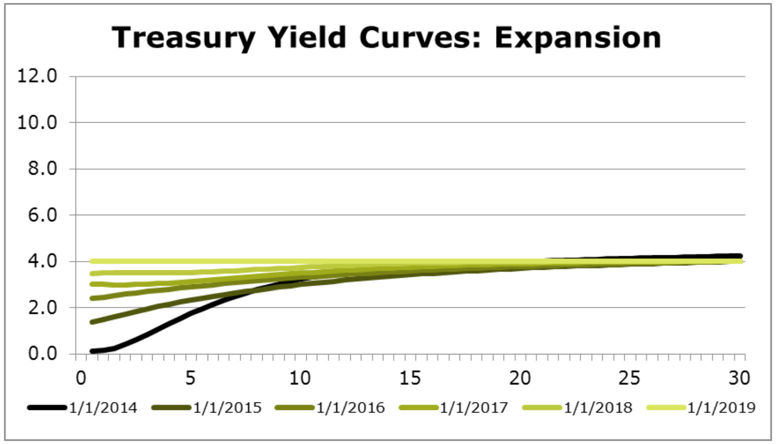
- **Shows the benefit of diversification within a portfolio**
  - Risk exposures in relation to allocation size

Scenarios Considered

- **Base Case**
  - No volatility
  - Asset returns over 5-year period in line with NEPC 2014 5-7 Year Assumptions

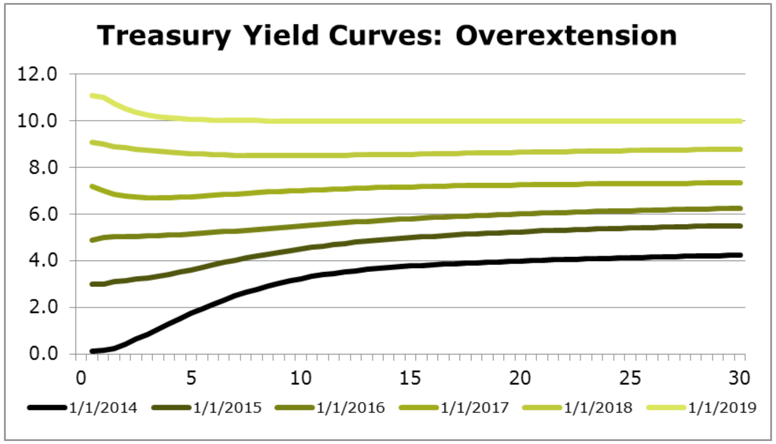


- **Expansion**
  - Economy is growing by a strong, but seemingly sustainable level
  - Bond yields are stable, inflation is manageable, equities and other high volatility asset classes perform quite well in this environment
  - Historical example: 2004-2006
  - *Large cap equities time-series: 10%, 17%, 28%, 12%, 10%*

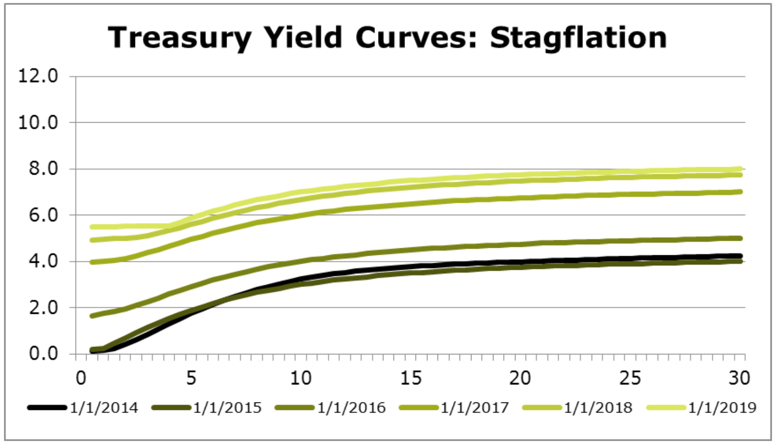


Scenarios Considered

- **Overextension**
  - Economy is growing at a rapid pace, inflation increases significantly – booming times but at the cost of future growth
  - Bond yields move higher as a result of inflation; high yield does well with confidence in the economy
  - Equities, real estate, and commodities fuel rapid expansion
  - Historical example: Vietnam War era (1967-1971)
  - *Large cap equities time-series: 12%, 16%, 0%, 12%, 16%*

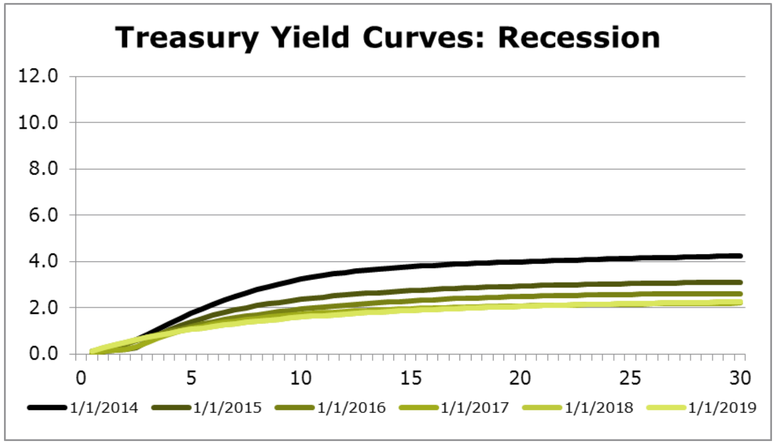


- **Stagflation**
  - Two problems – (1) the economy is not growing, (2) inflation has skyrocketed
    - Inflation is sticky – once it gets high, it stays high for several years
    - Fed has limited options to kick-start economy because easing only promotes further inflation
  - Equities sag; bonds lose real value; real assets such as TIPS perform well on a relative basis because they are linked to inflation
  - Historical example: flat stock market and double digit inflation of the mid-1970s
  - *Large cap equities time-series: -8%, -15%, 0%, 9%, 12%*



Scenarios Considered

- **Recession**
  - Economy stalls – there is a flight to quality as investors lose confidence
    - Equity markets fall
    - Bond yields fall
  - Interest-sensitive securities (bonds, especially long duration bonds) will perform well in this environment
  - Historical example: early 1990s
  - *Large cap equities time-series: -8%, -18%, -8%, 4%, -10%*



NEPC's Macroeconomic Risk Factors

- **We focus on five key underlying macroeconomic risk factors**
  - Sub-factors used for modeling purposes in order to express differences in risk outlook
- **Volatility becomes a function of factor movements relative to expectations**
  - Example: Experience volatility when real rates rise more than expected; not necessarily when any rise occurs
- **Factor analysis is a risk exercise**
  - Investment recommendations also reflect how we expect an investor will be compensated for holding each risk factor

Growth	Real Rates	Inflation	Currency	Illiquidity
Domestic Growth	Short Real Rates	Rising Global Inflation	Developed vs. Base	Contractual Illiquidity
Developed Int'l Growth	Intermediate Real Rates	Falling Global Inflation	Emerging vs. Base	Pricing Illiquidity
Emerging Growth	Long Real Rates			
IG Credit Spreads				
HY Credit Spreads				

Risk/Reward of Factor Exposures

Factor	Description
Growth	**Common and easily obtainable source of return, but brings volatility that may be difficult to hedge away without sacrificing return**
Real Rates	**Generally lower return and volatility than growth factor; may be a lone bright spot in low/negative growth environment**
Inflation	**Sensitivity to higher inflation is present in almost all investments but can be partially offset through a real assets program**
Currency	**Introduces additional volatility with a small risk premium from emerging currencies but without a positive expected return from developed currencies**
Illiquidity	**Attractive supplemental return source from being willing to lock up money contractually or taking on investments with lower market liquidity, but may introduce additional risks beyond traditional measures of volatility**

Understanding the Pros & Cons of Factor Analysis

Benefits

- **Avoid misleading diversification**
- **Improved perspective on where risk is being taken and how changing market conditions will impact the portfolio**
- **Understand benefits of adding new asset classes**

Challenges

- **May be difficult to obtain (or even define) data for investment program's unique definition of risk factors, particularly inflation**
- **Traditional ways of "bucketing" asset classes may be difficult**
- **Still uses portfolio theory framework which can oversimplify risk, particularly over shorter time periods**

Appendix: Capital Market Assumption Development

Development of Asset Class Assumptions

- **Relies on a combination of historical data and forward looking analysis**
  - Expected returns based on current market pricing and forward looking estimates
  - Volatility based on history, while recognizing current uncertainty
  - Correlations based on a mix of history and current trend
- **Historical data is used to frame current market environment as well as to compare to similar historical periods**
  - Historical index returns, volatility, correlations, valuations, and yields
- **Forward-looking analysis is based on current market pricing and a building blocks approach**
  - Return equals yield + changes in price (valuation, defaults, etc.)
  - Use of key economic observations (inflation, real growth, dividends, etc.)
  - Structural themes (supply and demand imbalances, capital flows, etc.)
- **Assumptions prepared by Asset Allocation Committee**
  - Asset Allocation team plus members of various consulting practice groups meet throughout Q4 to develop themes and assumptions
  - Public markets, hedge funds and private markets teams provide market insights
- **Assumptions and Actions reviewed and approved by Partners Research Committee**

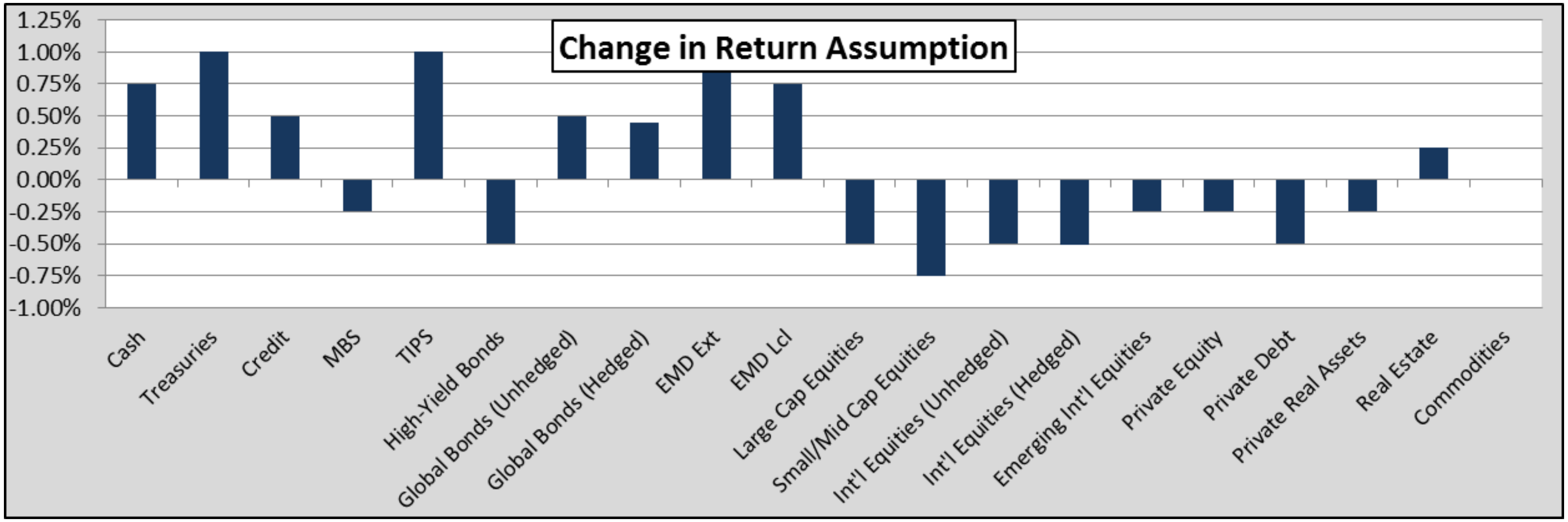
Themes for 2014 Asset Class Assumptions

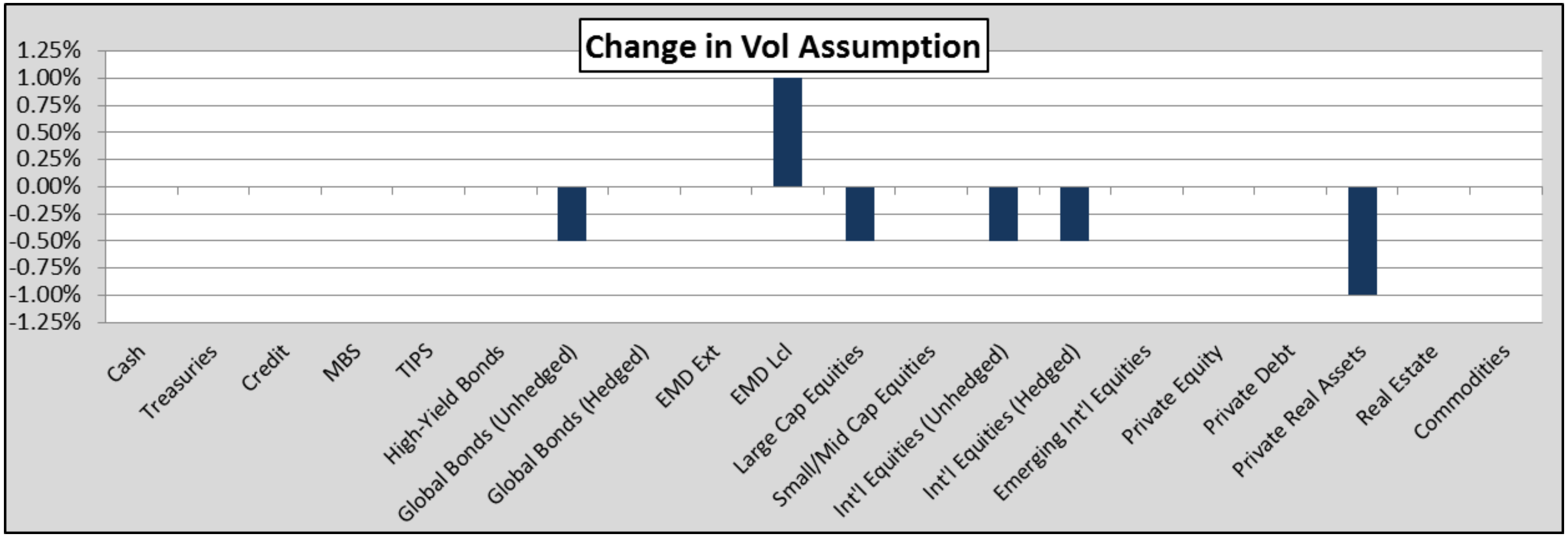
- **5-7 year return expectations diverge relative to prior year**
  - Broad expected return outlook remains subdued
  - Strong performance of developed equity markets leads to reduction in expectations
    - Despite underperformance, EM equities reduced modestly to reflect lower growth
  - Higher yields relative to prior year boost bond market forecasts
  - Increase in expectations for credit markets is more muted due to further spread compression
  - Alternative asset classes generally lower in line with liquid risky asset adjustments
- **30-year returns have similar themes to 5-7 year forecasts**
  - Yield increases flow through to longer-term returns in fixed income
  - US equity markets reduced modestly
- **Volatility expectations reduced incrementally in certain asset classes**

Changes To Assumption Development

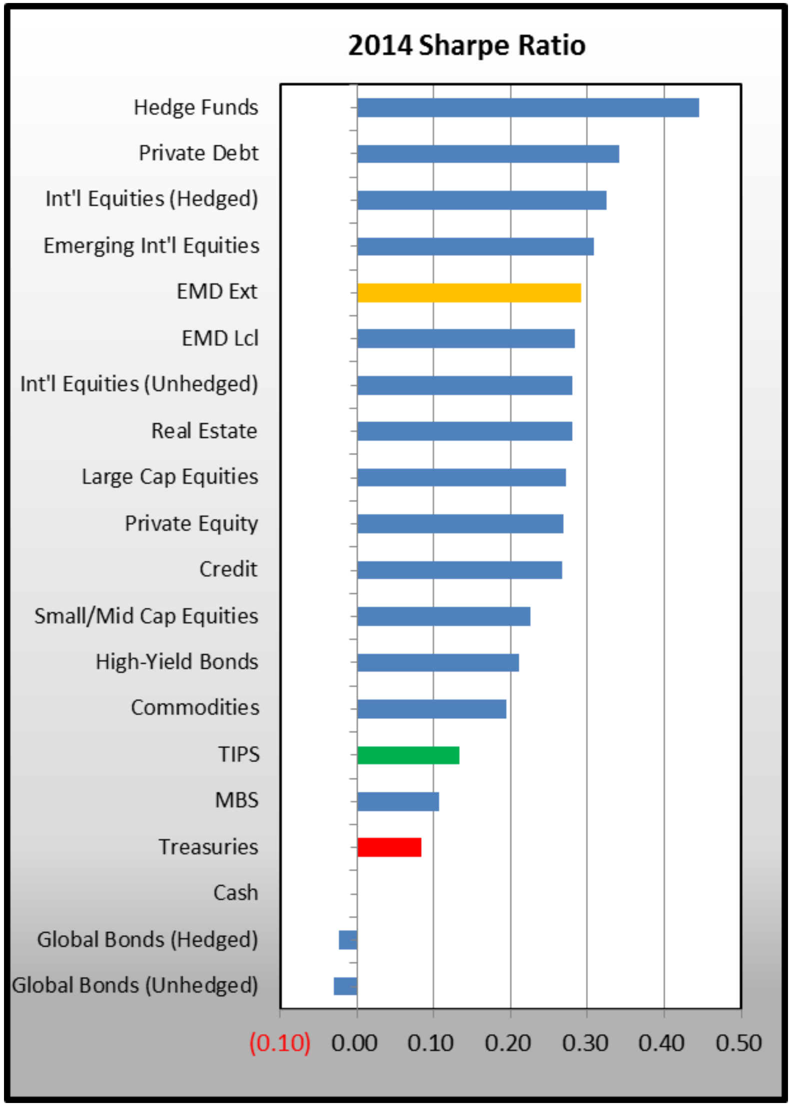
- **We continue to refine our process and make enhancements where appropriate**
  - Changes are evolutionary rather than revolutionary
- **Added Master Limited Partnerships**
  - Recognizing distinct role as tax-advantaged solution for private investors
- **Refined "growth" building block in equity forecast model to better reflect corporate earnings growth**
  - Historical input was economic/GDP growth as a proxy for earnings growth
  - New input based on earnings growth and then adjusts for profit margin changes
  - Can now distinguish valuation changes and margin adjustments in building blocks
- **Further refined term premium adjustment in fixed income model**
  - Better reflect uncertainty in rate expectations in later years of forecasts
- **Refined Hedge Fund assumptions to one broad hedge fund assumption instead of historical "Low Vol"/"Mod Vol" modeling**
  - Based on modeling of underlying strategy types
    - Equity, Credit, Macro

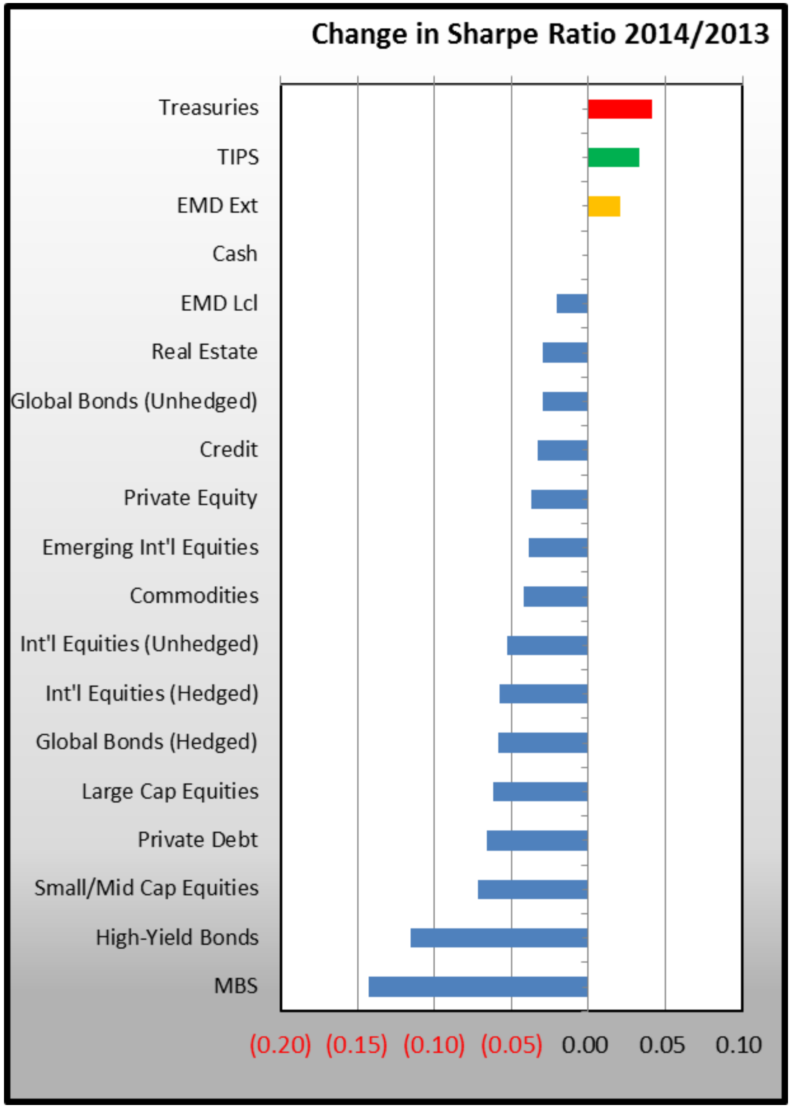
Summary of Changes to 2014 Return and Volatility Expectations





Relative Asset Class Attractiveness





Sharpe Ratio defined as the excess return over cash, divided by the standard deviation.

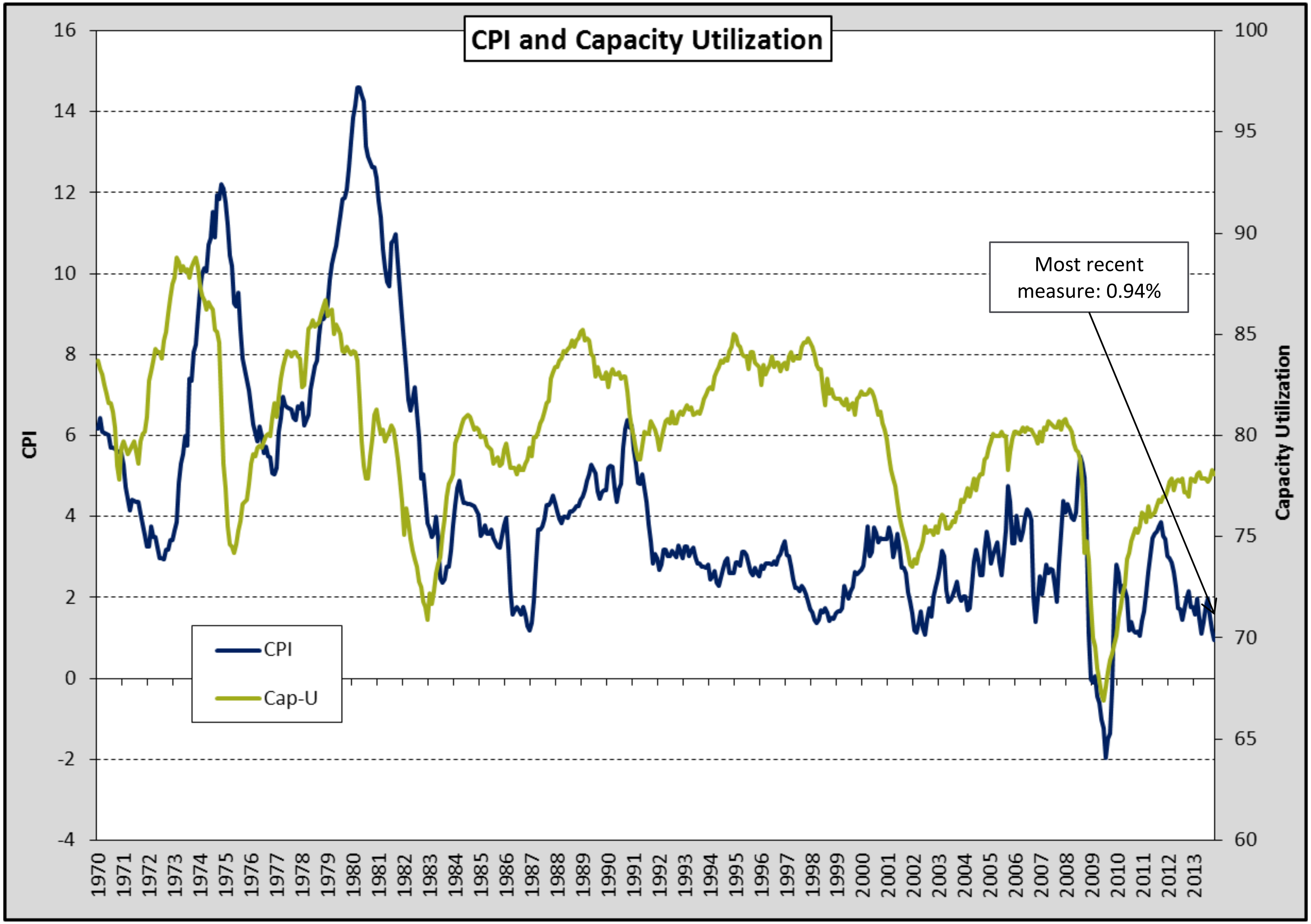
Inflation

- **Inflation is an important component of our asset allocation assumptions**
  - An essential building block for projecting returns in stocks, bonds, and commodities
- **There are several measures of inflation used to inform our view (all of which have issues)**
  - Consumer Price Index
  - Producer Price Index
  - TIPS break-even inflation
- **We are projecting 3% inflation over the next 5-7 years**
  - This assumption represents the geometric mean of a time series
  - Inflation could take several different paths over 5-7 years to arrive at a 3% mean
  - Given the wide-ranging potential inflation paths (US 1970s or Japan 1990s), we continue to use an elevated estimate of inflation volatility
- **While muted credit growth leaves inflation expectations unchanged in the near term, pressures for higher long-term inflation continue to build**
  - Monetary stimulation continued in 2013
  - Taper in US throughout 2014 but still remain stimulative globally
- **Given increasing long-term inflation pressures, a modestly higher inflation assumption (3.25%) is utilized for determining 30 year return expectations**

Inflation (cont.)

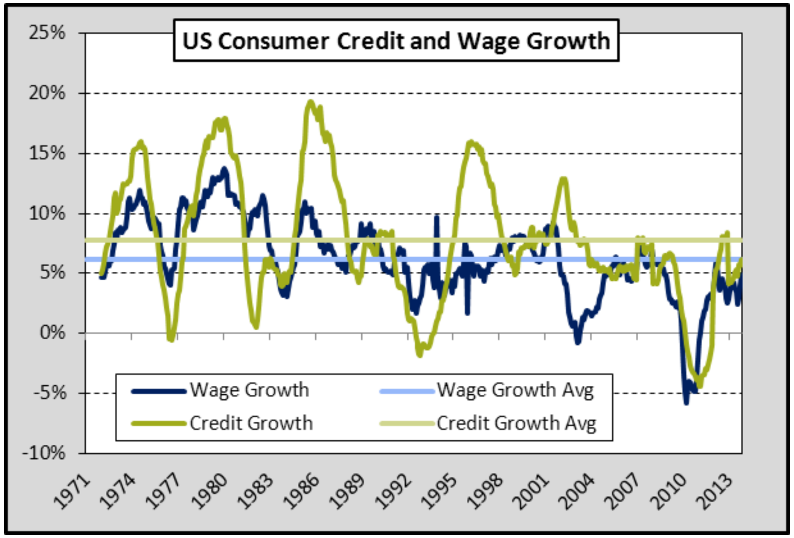
- **For asset class assumptions, we use a broader but less measurable concept of inflation**
  - Thought of as the inflation that flows through to ending corporate earnings for equities, required market yields on fixed income, or spot price returns on commodities
- **NEPC thinks of inflation on a global basis**
  - Considered from an investment perspective
    - That which passes through to the end investor across global investments
- **The inflation measure represents an average of inflation experience across all assets and all countries, including a meaningful weight to emerging markets**
- **Institutional investment pools will experience asset inflation globally, encompassing both developed and emerging countries.**
  - Can be different from inflation experienced on local/home country liabilities or spending needs

Inflation Has Stayed Low

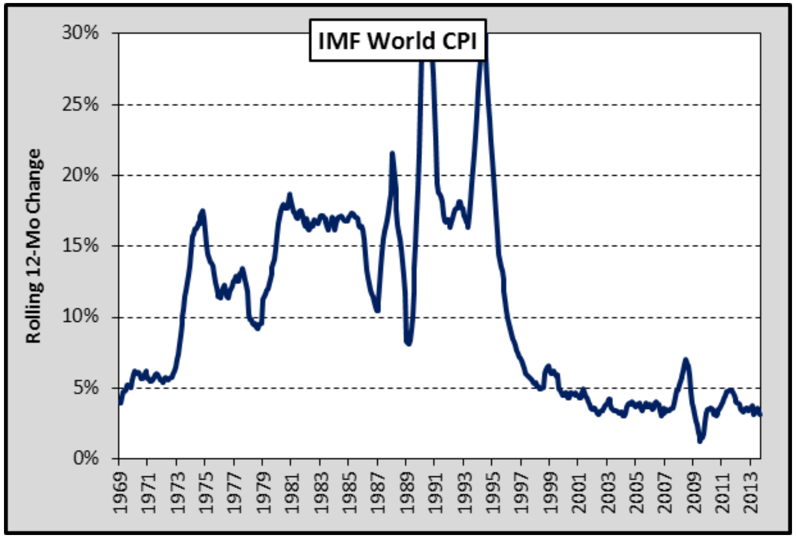


Source: St. Louis Fed as of 11/30

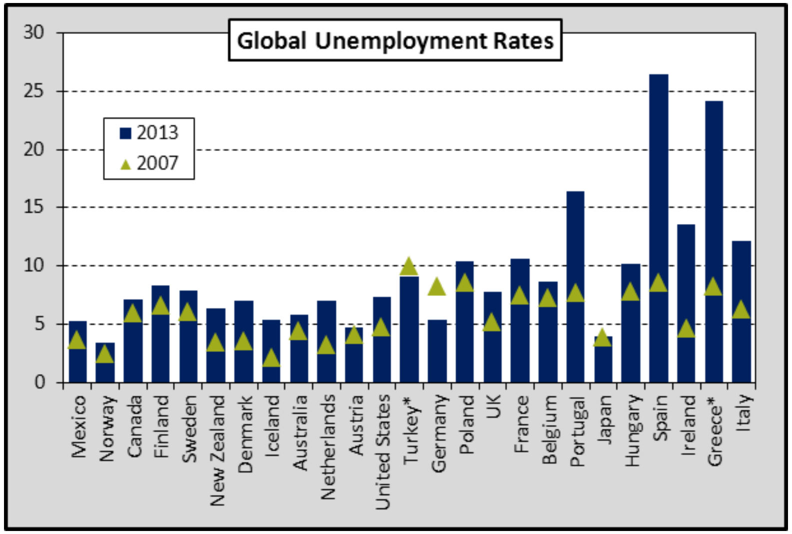
Many Economic Factors Driving Inflation Remain Subdued



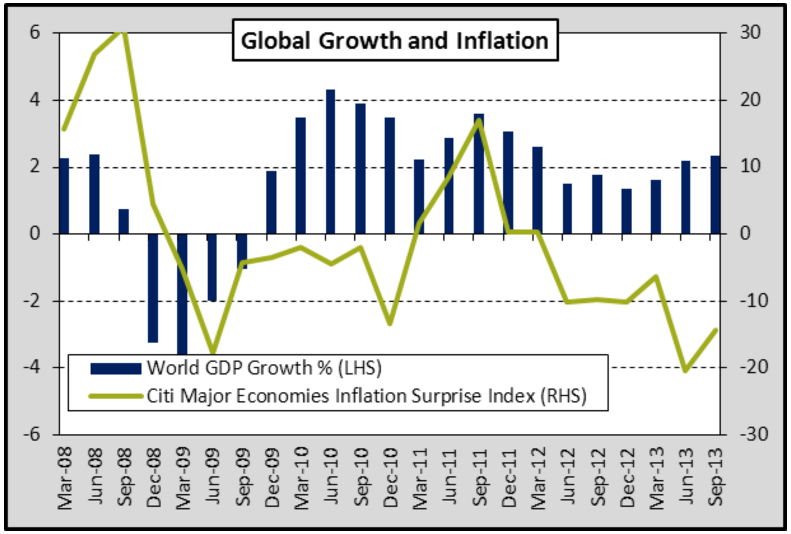
Source: Board of Governors of the Federal Reserve System as of 10/1



Source: Bloomberg as of 9/30

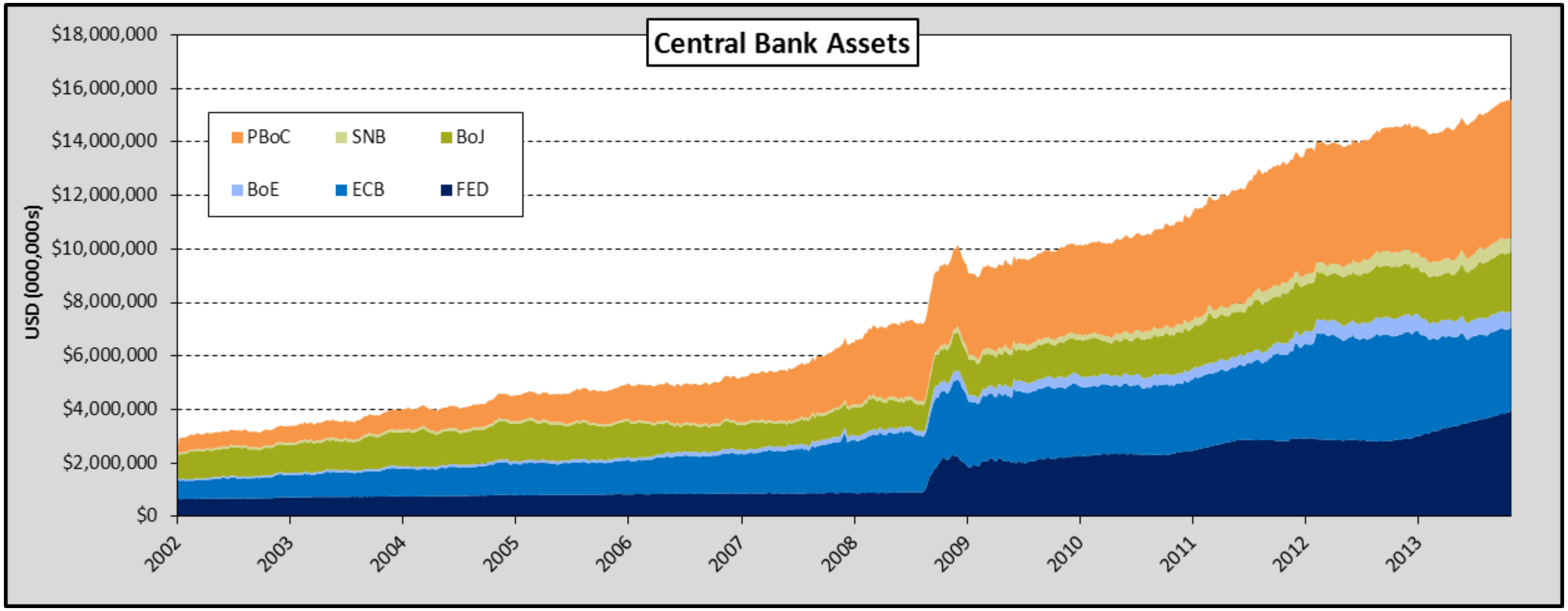


*Source: Bloomberg as of 9/30 *as of 12/31/2012*



Source: Bloomberg as of 9/30

Long-Term Inflation Pressures Continue to Build as Central Banks Stimulate

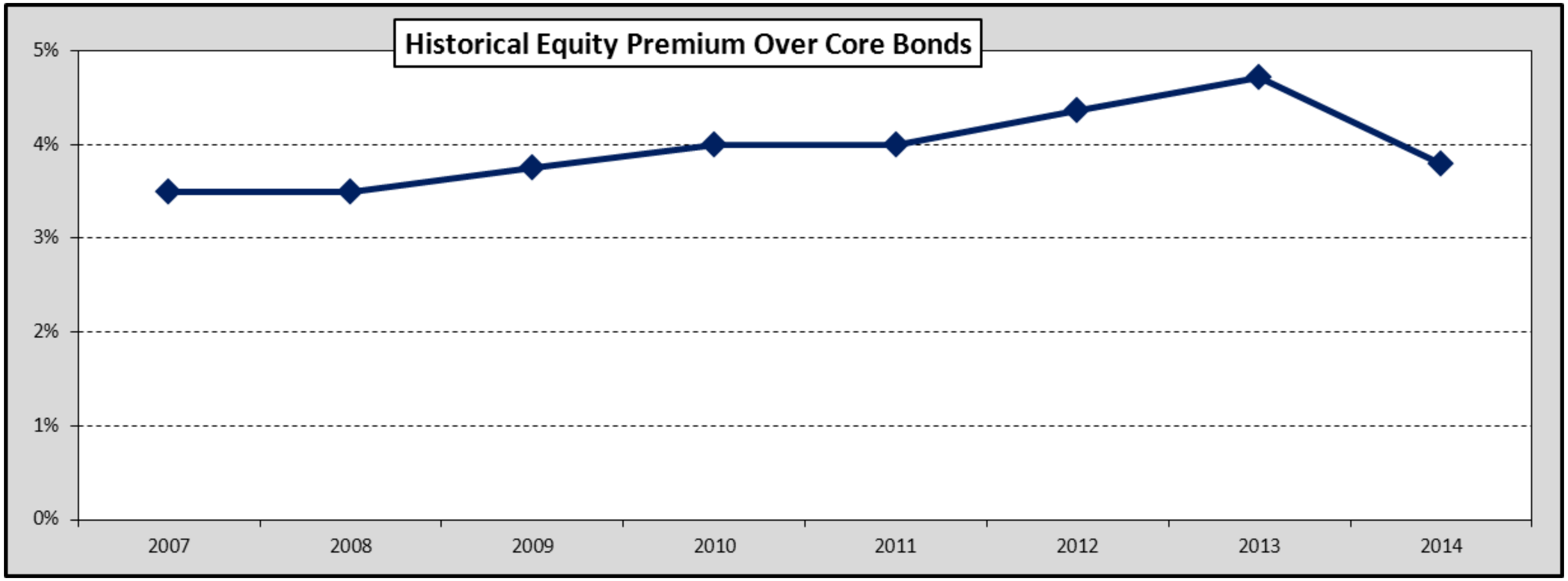


Source: Bloomberg as of 11/30

- **Major central bank balance sheets have grown by a 5.3x factor since February 2002 (when PBoC data begins)**
  - While not an apples to apples comparison, US Consumer prices have increased by 1.3x factor over this same time
- **Much of the increases come from the end of 2007 to the present, with very muted inflation**
  - Cumulative CPI increases are 1.1x in this period

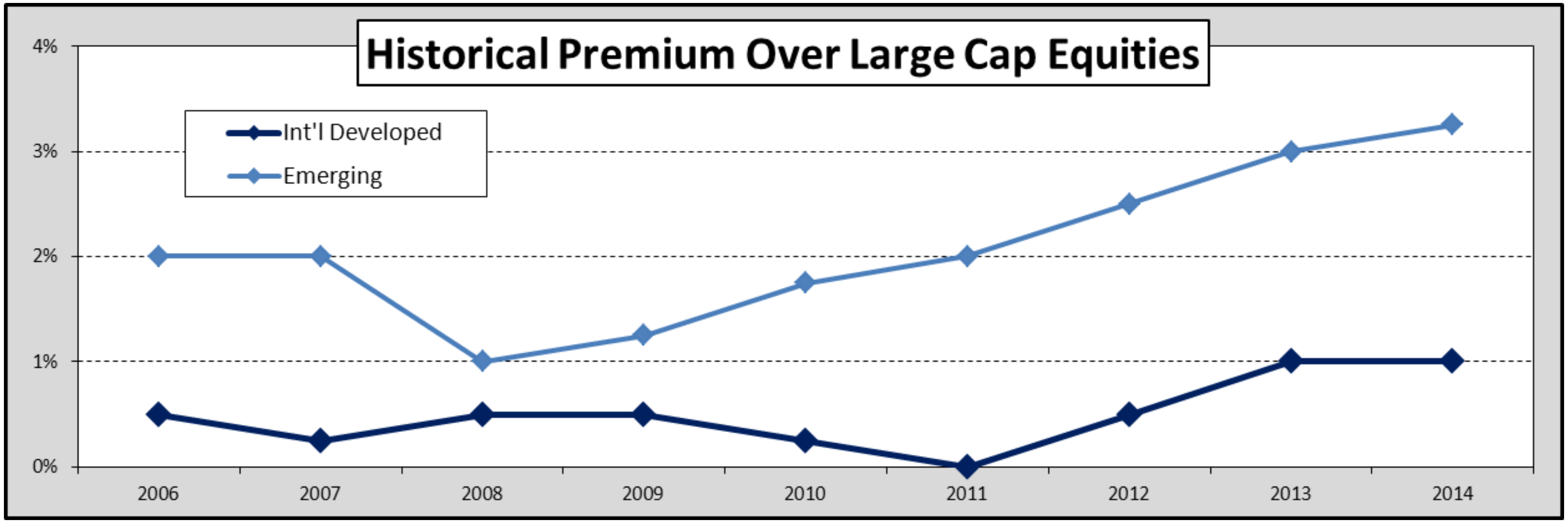
Major Asset Class Review (Geometric)

Asset Class	Historical Long Term Geometric Average[1]	5-to-7 Year NEPC Assumptions 2007	2008	2009	2010	2011	2012	2013	2014
Cash	3.5%	4.00%	4.00%	3.00%	2.00%	2.00%	1.25%	0.75%	1.50%
Core Bonds[2]	8.0%	5.00%	5.00%	5.50%	3.75%	3.00%	2.88%	2.03%	2.53%
Large Cap	10.1%	8.50%	8.50%	9.25%	7.75%	7.00%	7.25%	6.75%	6.25%
International[3]	9.3%	8.75%	9.00%	9.75%	8.00%	7.00%	7.75%	7.75%	7.25%
US Equity Premium Over Core Bonds		*3.50%*	*3.50%*	*3.75%*	*4.00%*	*4.00%*	*4.37%*	*4.72%*	*3.72%*



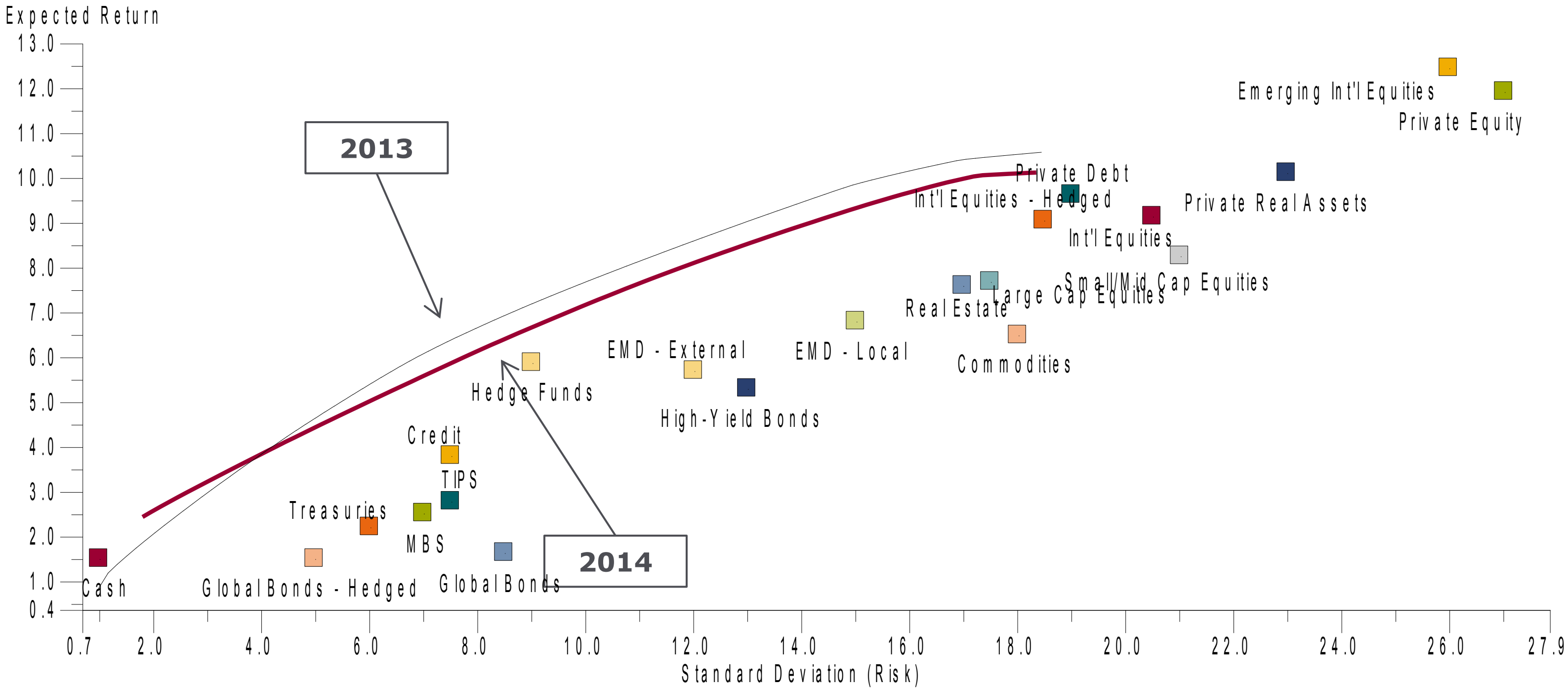
1. Reflects average since inception (1926 except as noted below) of the respective index through 11/30/2012
2. LB/BC Aggregate reflects average compound annual return since 1976
3. International reflects average annual return since 1970

Comparison of International Equity and U.S. Large Cap Equity Expectations



- **Total return expectations for non-US Equities are reduced relative to last year**
- **Yet expectations for US equities are reduced as well**
  - Consistent spread of 1% for developed non-US relative to US Large Cap
  - Increased premium for emerging equity
- **Meaningful downside risks remain in both developed and emerging world**
- **While we expect investors to be compensated over 5-7 years with a higher relative return for holding non-US equities, it is appropriate to use active management to attempt to minimize exposure to downside risks**

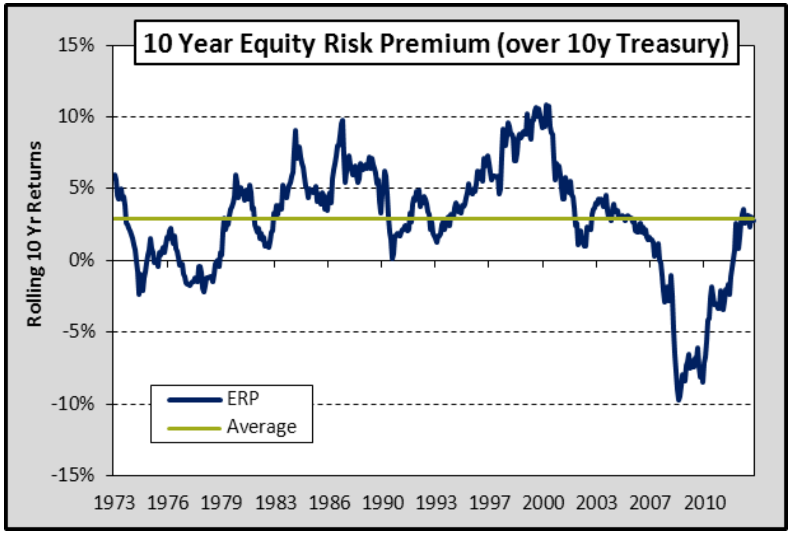
Efficient Frontier Comparison



Assumption Development – U.S. Large Cap Equity

- **Sources of Return**
  - Valuation
  - Earnings growth
    - Adjusted for changes in margin
  - Dividend yield
  - Inflation

Return Source	Starting Value	Expected Forecast Values	Return Contribution
Real Earnings Growth	2.5%	2.5%	--
Profit Margin Adjustment		-1.0%	1.5%
Dividend Yield	2.0%	2.0%	2.0%
Inflation	3.0%	3.0%	3.0%
Valuation & Other*	16.3	16	-0.25%
		Total Expected Return	6.25%

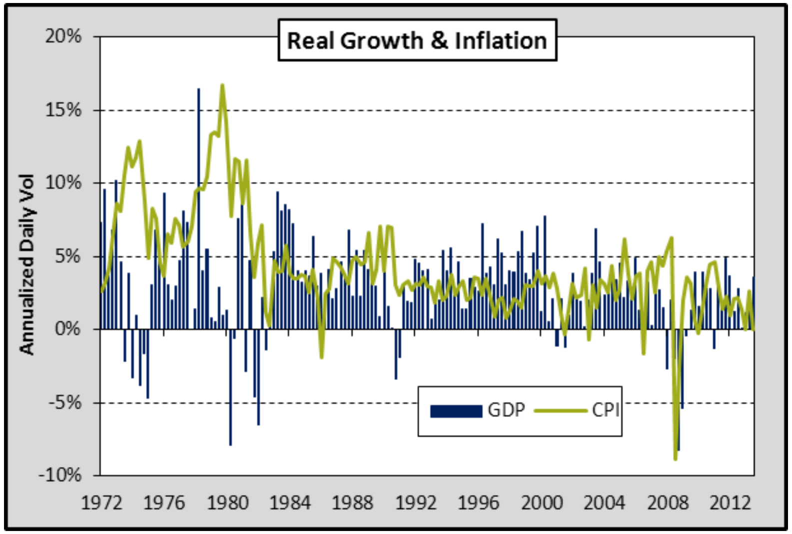


- **Equity Risk Premium over 10 year Treasury is volatile**
  - Long-term average of 2.9%
  - Stock and bond forecasts imply an Equity Risk Premium of 4.25%
  - While high relative to the long-term average, almost 40% of observations exceed this level over the last 50 years
- **Downward adjustment reflects higher but still low interest rates supportive of an elevated equity risk premium**

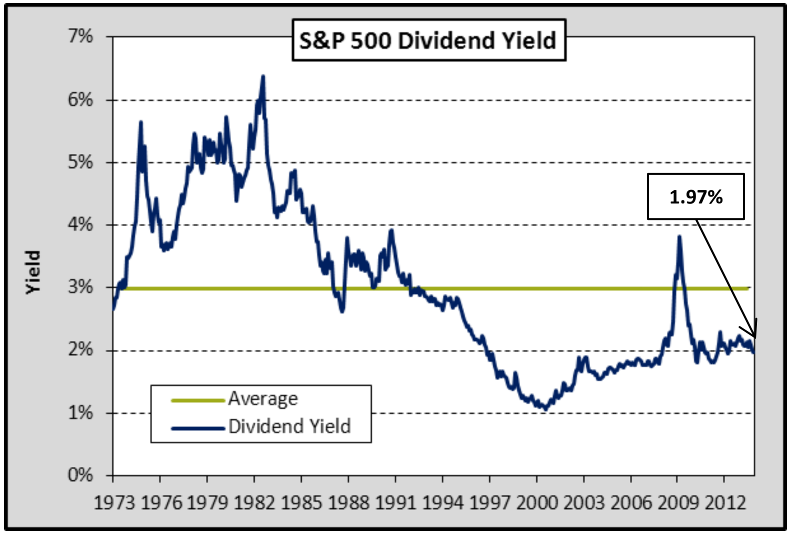
Source: Ibbotson as of 11/30

** - Valuation & Other incorporates adjustment for P-E ratios as well as other factors such as rounding, geometric compounding, etc.*

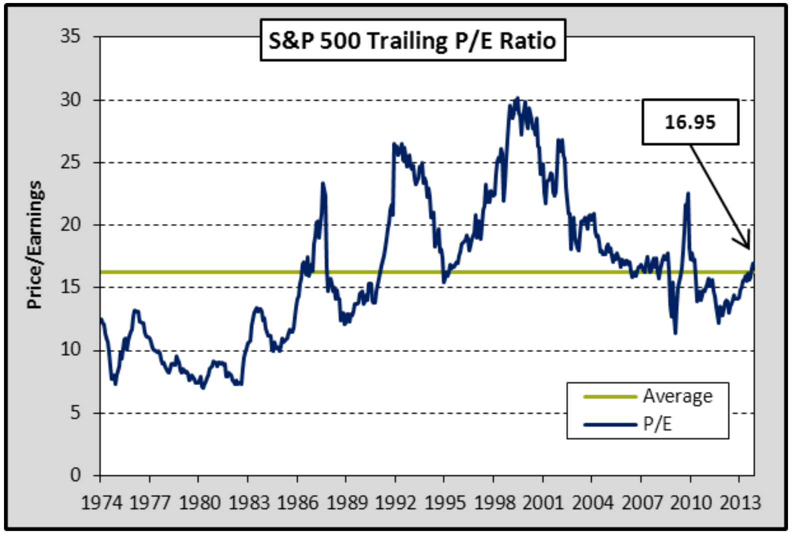
U.S. Large Cap Equity Building Blocks



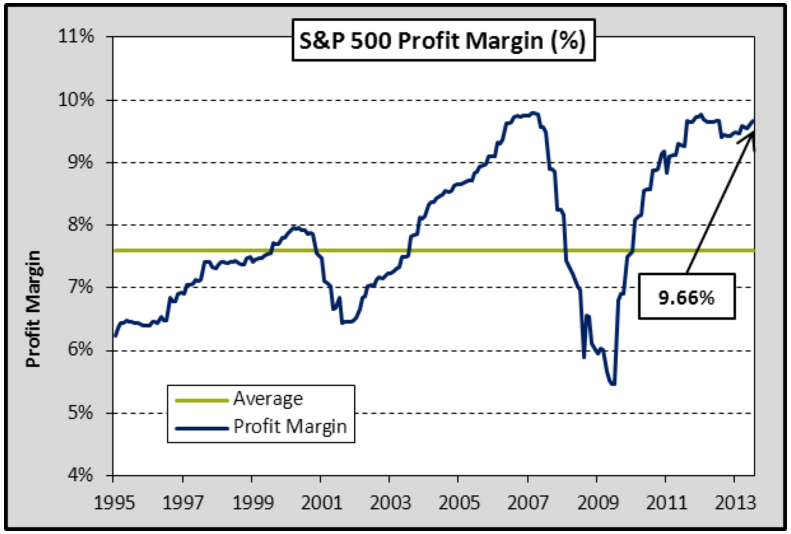
Source: Bloomberg as of 11/30



Source: Bloomberg as of 11/30



Source: Bloomberg as of 11/30

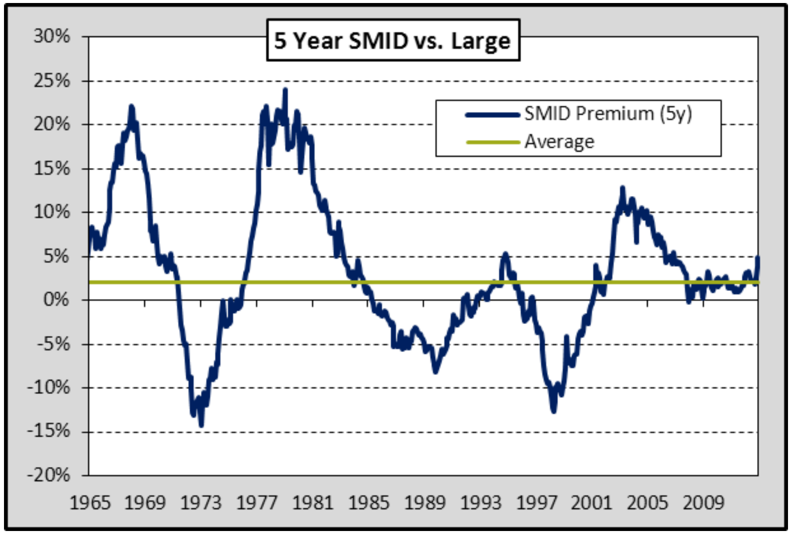


Source: Bloomberg as of 11/30

Assumption Development – U.S. Small/Mid Cap Equity

- **Sources of Return**
  - Valuation
  - Earnings growth
    - Adjusted for changes in margin
  - Dividend yield
  - Inflation

Return Source	Starting Value	Expected Forecast Values	Return Contribution
Real Earnings Growth	3.5%	3.5%	--
Profit Margin Adjustment		-0.75%	2.75%
Dividend Yield	1.5%	1.5%	1.5%
Inflation	3.0%	3.0%	3.0%
Valuation & Other*	23.6	22	-1.00%
		Total Expected Return	6.25%

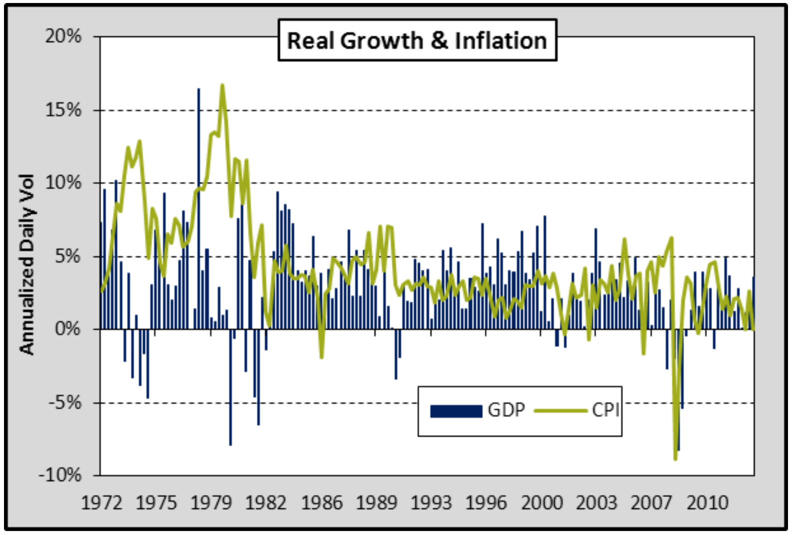


Source: Ibbotson as of 11/30

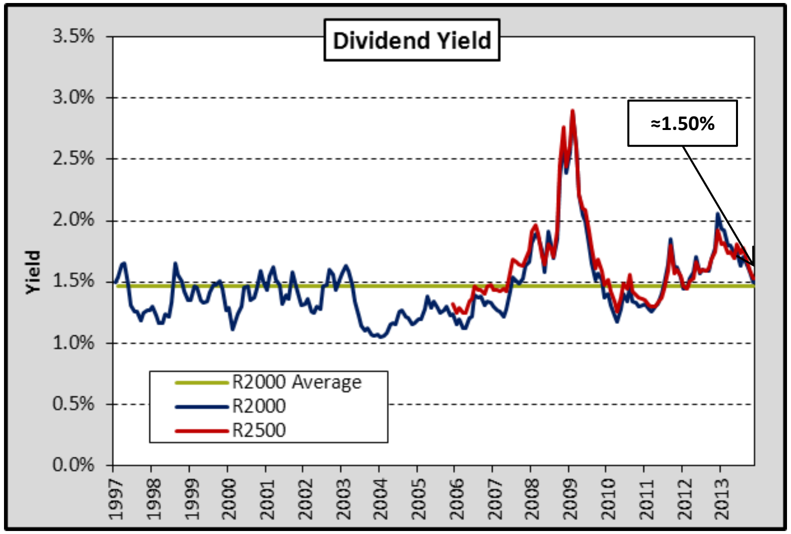
- **Small/Mid Cap equities have earned a premium over Large Cap equities historically**
  - Small/mid cap equities significantly outperformed Large Cap in 2013
  - Trailing 5 year premium slightly above historical average
  - Profit margins remain elevated
    - Potential for mean reversion in earnings
  - Following strength of 2013 performance, no premium expected over Large Cap Equities over 5-7 years

** - Valuation & Other incorporates adjustment for P-E ratios as well as other factors such as rounding, geometric compounding, etc.*

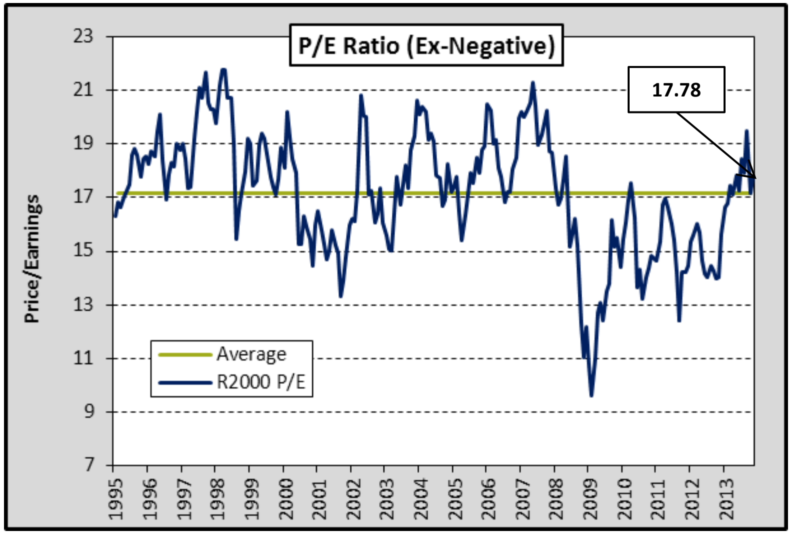
U.S. Small/Mid Cap Equity Building Blocks



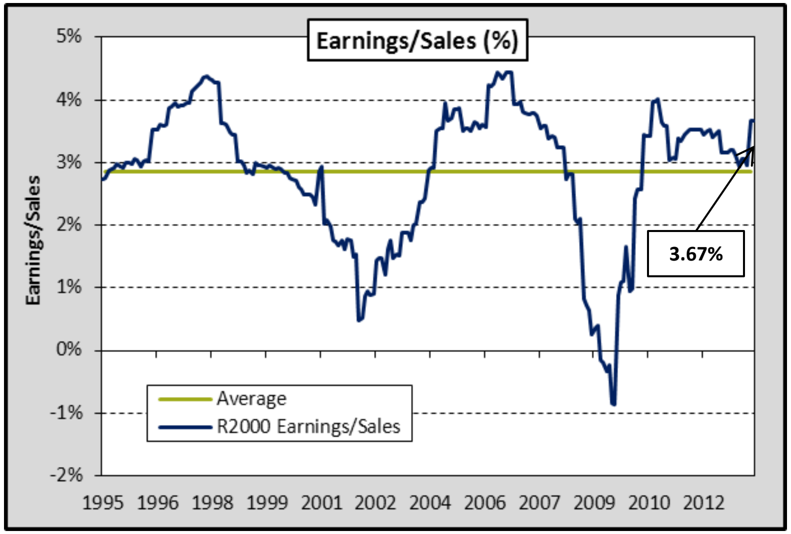
Source: Bloomberg as of 11/30



Source: Bloomberg as of 11/30



Source: Bloomberg as of 11/30



Source: Bloomberg as of 11/30

Assumption Development – International Equities

- **Developed Markets**
  - Improving growth prospects
  - Higher dividend yields
  - Continued recovery after several years of poor returns
    - Still lagging US markets significantly over trailing 5 years
  - *100 bps premium over US*

Return Source	Starting Value	Expected Forecast Values	Return Contribution
Real Earnings Growth	2.0%	2.0%	--
Profit Margin Adjustment		0.5%	2.5%
Dividend Yield	3.1%	3.0%	3.0%
Inflation	3.0%	3.0%	3.0%
Valuation & Other*	15.1	14	-1.25%
		Total Expected Return	7.25%

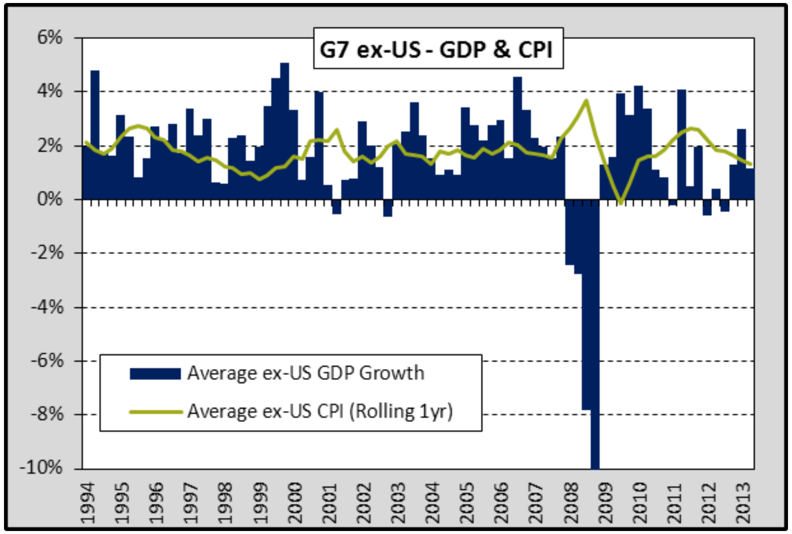
- **Emerging Markets**
  - Reasonable valuation
  - Subdued growth prospects relative to last decade but still well above developed world
  - Meaningful challenges and uncertainty ahead, particularly for countries with potential balance of payment challenges
  - *325 bps premium over US*
  - *225 bps premium over Intl Developed*

Return Source	Starting Value	Expected Forecast Values	Return Contribution
Real Earnings Growth	3.5%	3.5%	--
Profit Margin Adjustment		--	3.5%
Dividend Yield	2.6%	2.5%	2.5%
Inflation	3.0%	3.0%	3.0%
Valuation & Other*	11.9	12	0.5%
		Total Expected Return	9.50%

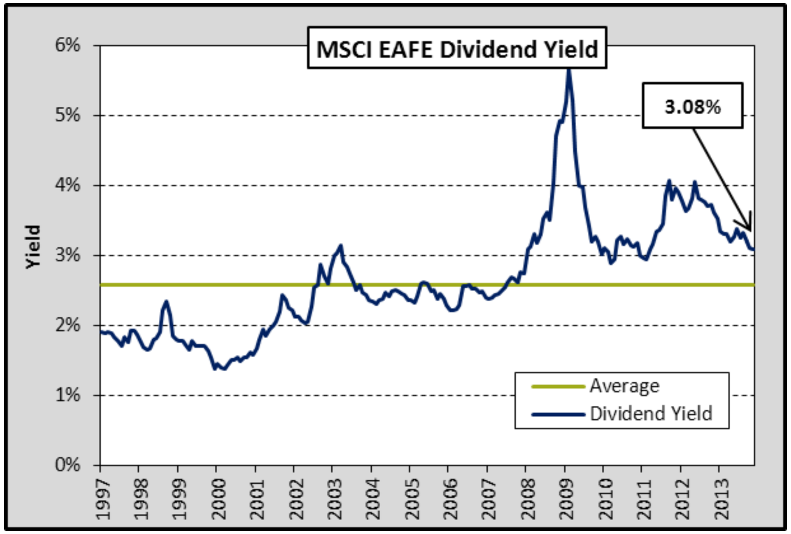
Source: Bloomberg, NEPC

** - Valuation & Other incorporates adjustment for P-E ratios as well as other factors such as rounding, geometric compounding, etc.*

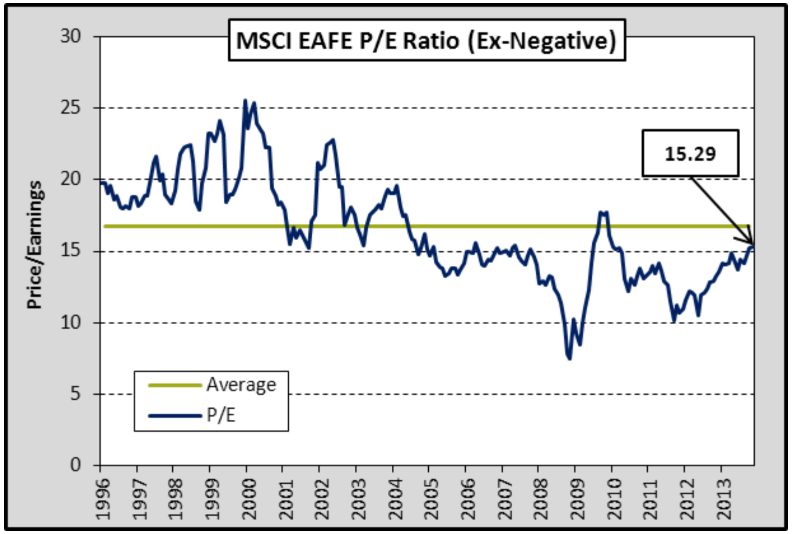
International Developed Equity Building Blocks



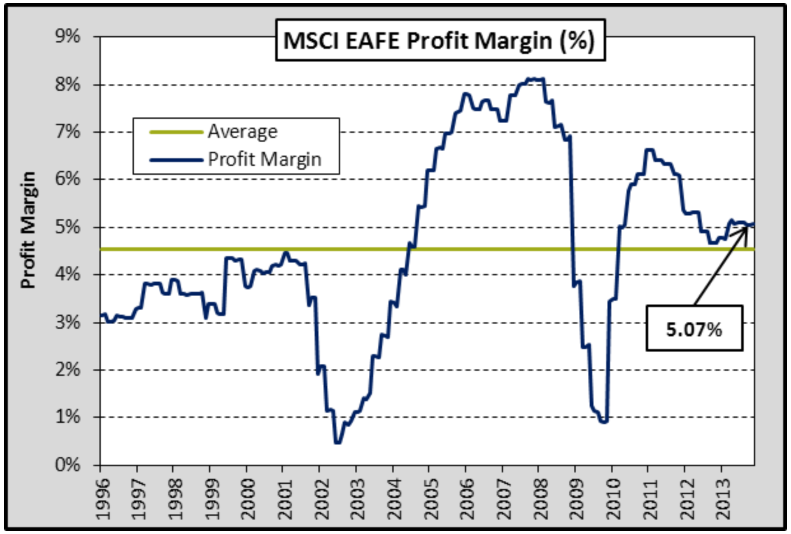
Source: Bloomberg as of 11/30



Source: Bloomberg as of 11/30

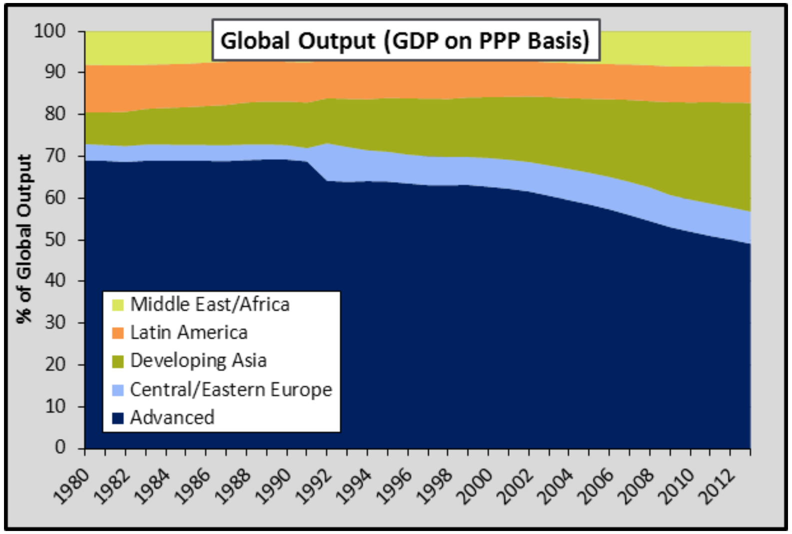


Source: Bloomberg as of 11/30

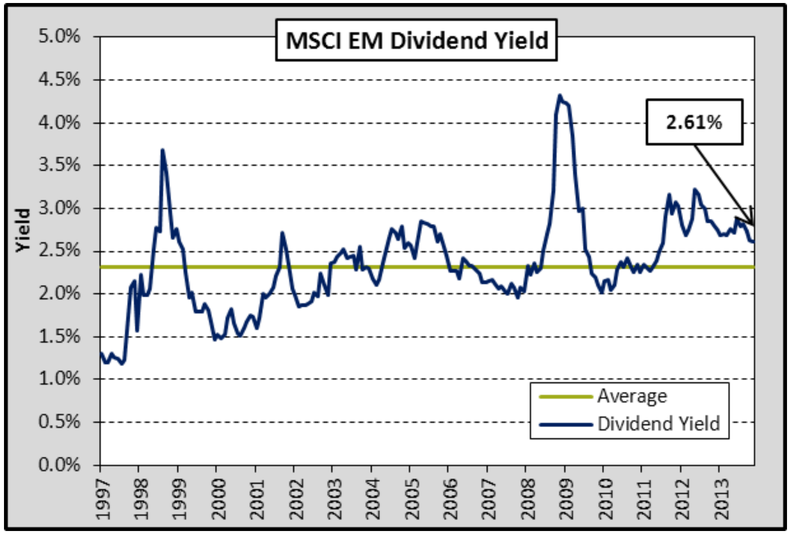


Source: Bloomberg as of 11/30

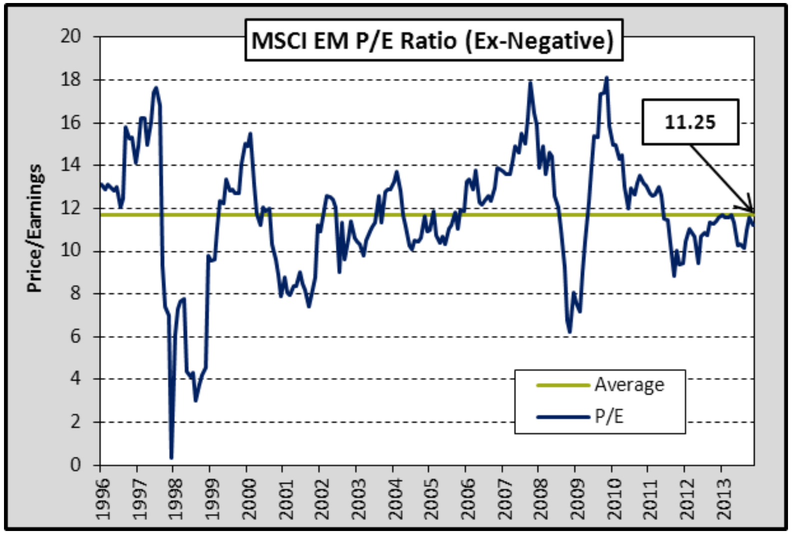
Emerging Equity Building Blocks



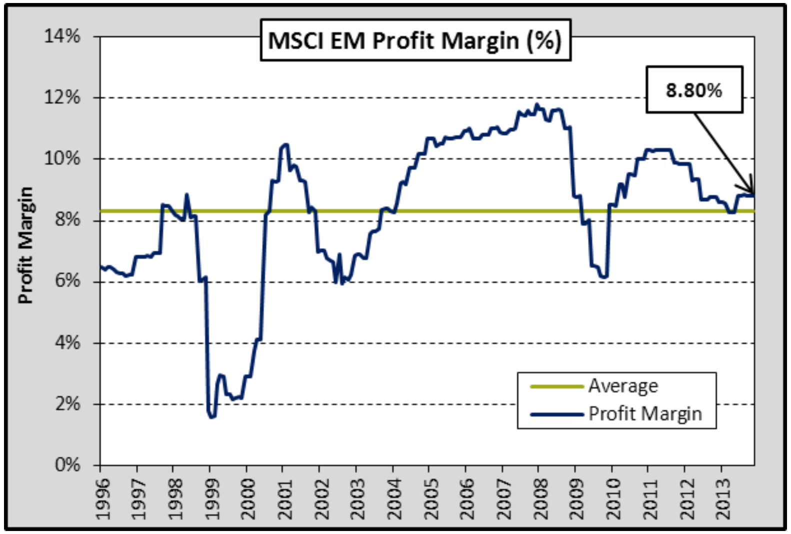
Source: IMF



Source: Bloomberg as of 11/30

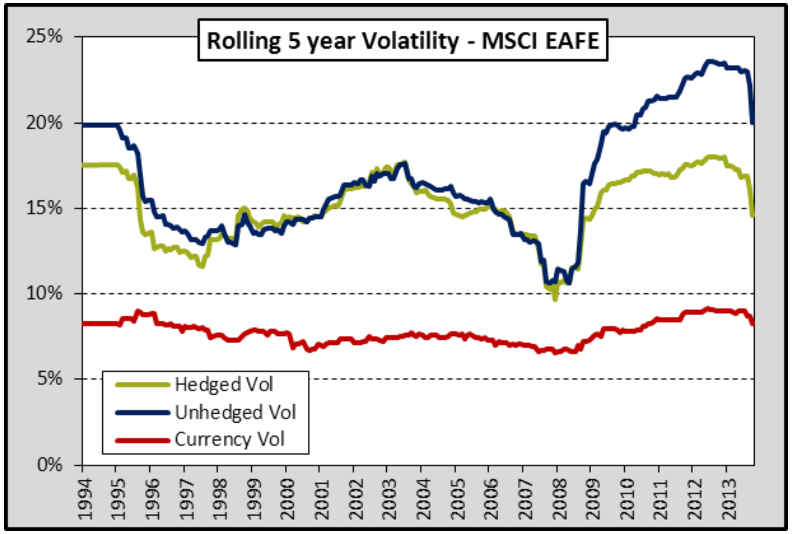


Source: Bloomberg as of 11/30

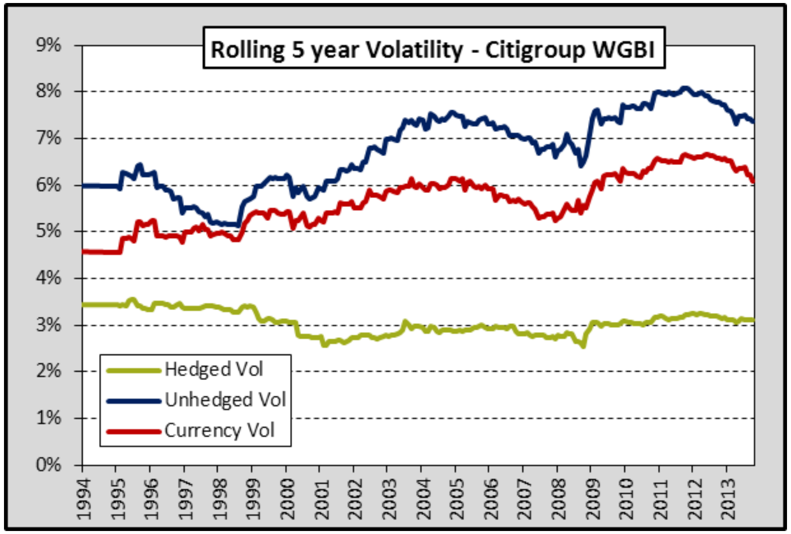


Source: Bloomberg as of 11/30

Currency Hedged Asset Class Assumptions



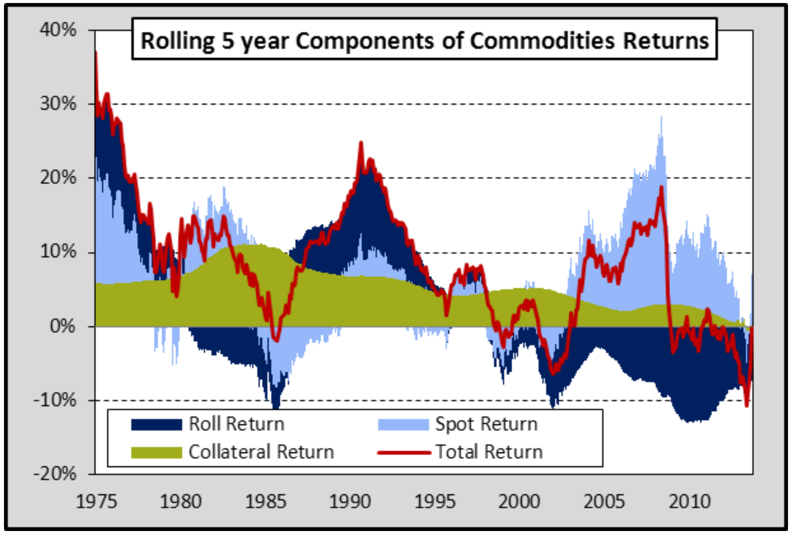
Source: Bloomberg as of 11/30



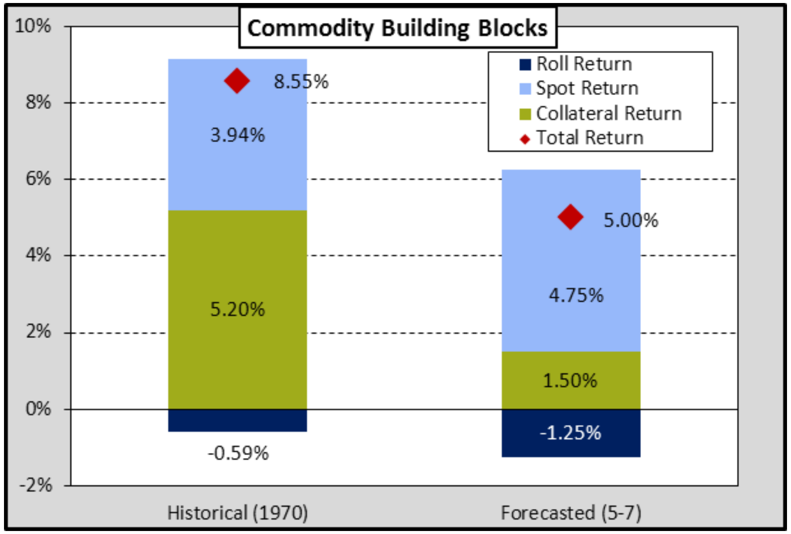
Source: Bloomberg as of 11/30

- **Currency risk is additive to non-dollar asset classes**
- **Volatility differential (or currency impact on volatility) has increased over last five years**
  - Most notably in MSCI EAFE
- **We use similar arithmetic returns (net of hedging costs) and lower expected volatility based on relative contribution to risk from currency**

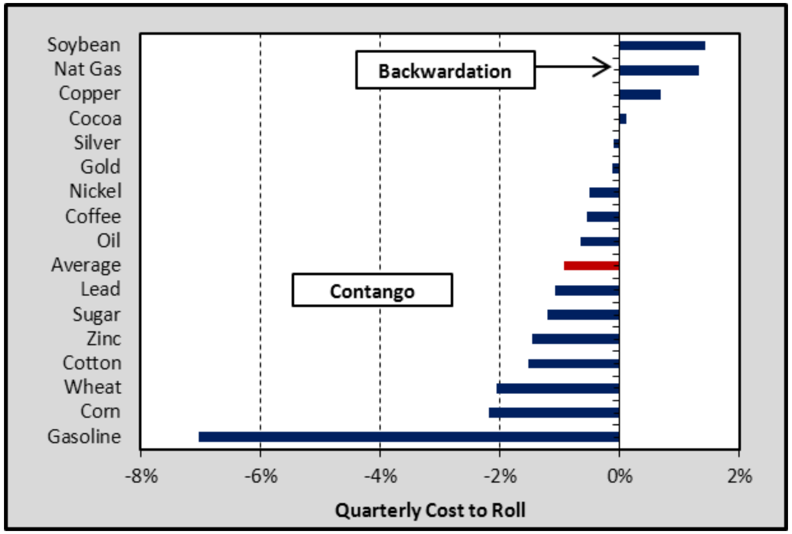
Assumption Development – Commodities



Source: Ibbotson as of 11/30



Source: Ibbotson, NEPC as of 11/30



Source: Bloomberg as of 11/30

- **History of blended GSCI and GSCI non-energy index used to approximate 40+ year history for DJ-UBS Index**
  - DJ-UBS Index history begins in 1994
- **We expect over 5-7 years:**
  - Higher collateral returns than 2013 forecast but low relative to history
    - In line with 2014 cash assumption of 1.50%
  - Higher than historical spot return (but less than 2013 forecast)
    - Reduced due to lower outlook on emerging market demand and potential for larger global energy supply
  - Less negative roll yield than recent history
    - Still higher than full history
    - Many markets remain in contango

Fixed Income Factor Model

- **Return/volatility/correlation assumptions for fixed income sectors**
  - Discrete returns for subsectors creates opportunity to build customized allocations across fixed income markets and maturities
- **Assumptions built for:**
  - US Treasury
    - 1-3 year; Long
  - US Investment Grade Credit
    - 1-3 year; Long
  - US MBS
  - US TIPS
  - US High Yield Credit
    - 1-3 year
    - Bank Loans
  - Developed Global Bonds (Sovereign)
    - Hedged and Unhedged
  - Emerging Market Debt (Sovereign)
    - Local and External (USD Denominated)
  - US Municipals

Fixed Income Factor Model Inputs

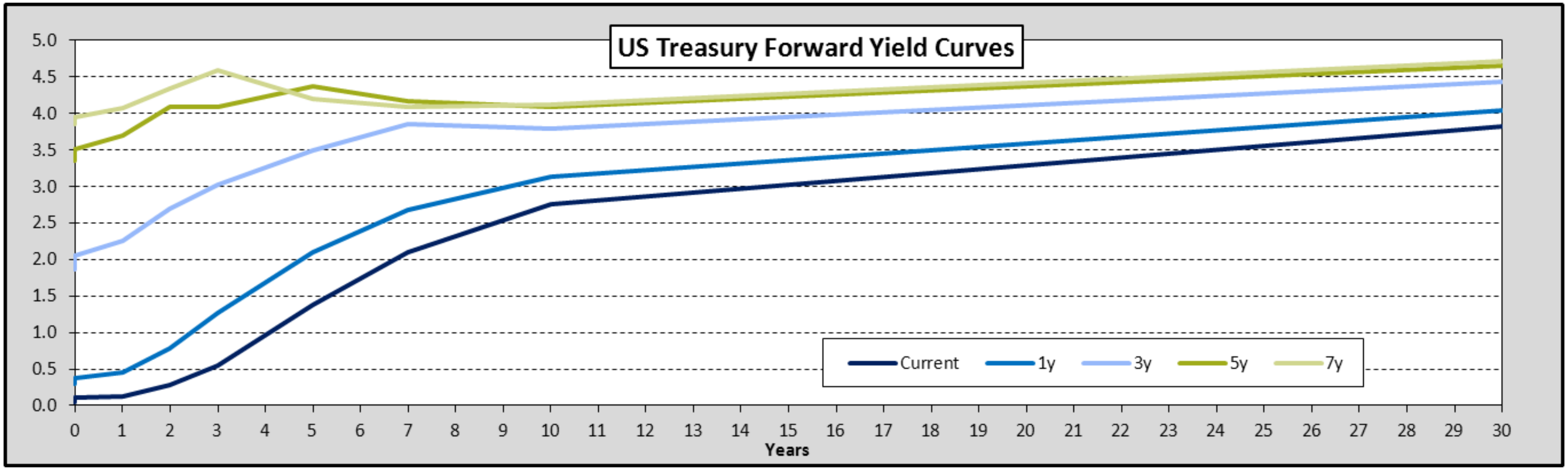
- **Market based inputs**
  - 30 years of forward US, UK, Europe and Japanese sovereign yield curve assumptions from Bloomberg
    - Both Nominal and Real for US only
  - Current spreads for IG, MBS, HY & EMD Credit
  - Current duration inputs for 1 year through 10 year, 20 year and 30 year Treasury

- **Adjusted market based inputs**
  - Horizon end point for IG, MBS, HY & EMD Credit spreads
    - Straight line compression from current levels to target spreads
  - Volatility figures adjusted up from historical medians
    - Higher than current in some cases
    - Heightened rate volatility in 2013 brought many in-line
    - Adjusted by a review of periods of rising yields (mid-70s to early-80s)
  - Modified durations calculated based on current and projected yields

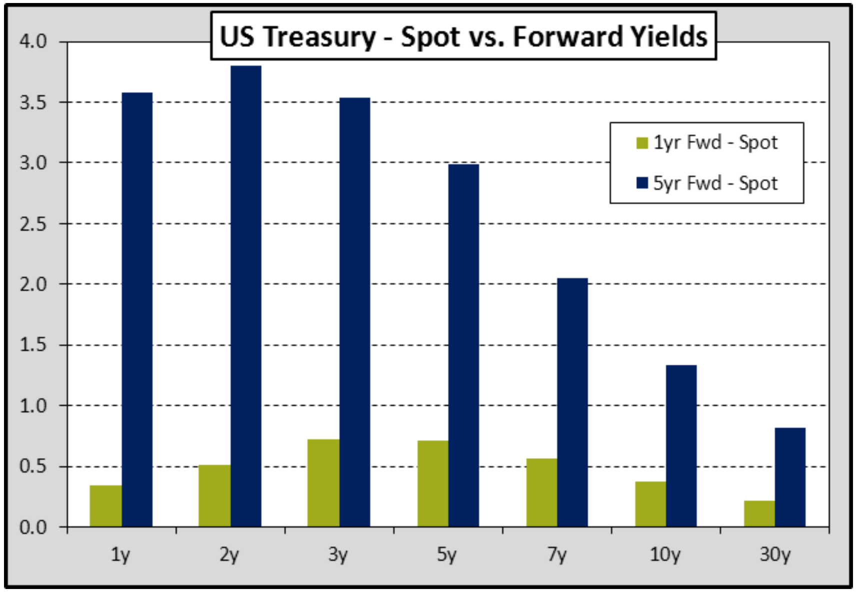
Fixed Income Factor Model Methodology

- **Each subsector return calculated:**
  - Annual Return = Price x (Yield + Yield differential x Duration)
    - Price = Starting par value adjusted for yield changes, curve roll down and defaults
  - Computed for each year and annualized to geometric return figure
  - Returns then adjusted for expectations
  - Defaults incorporated for High Yield and Bank Loans

U.S. Spot and Forward Rates – Current



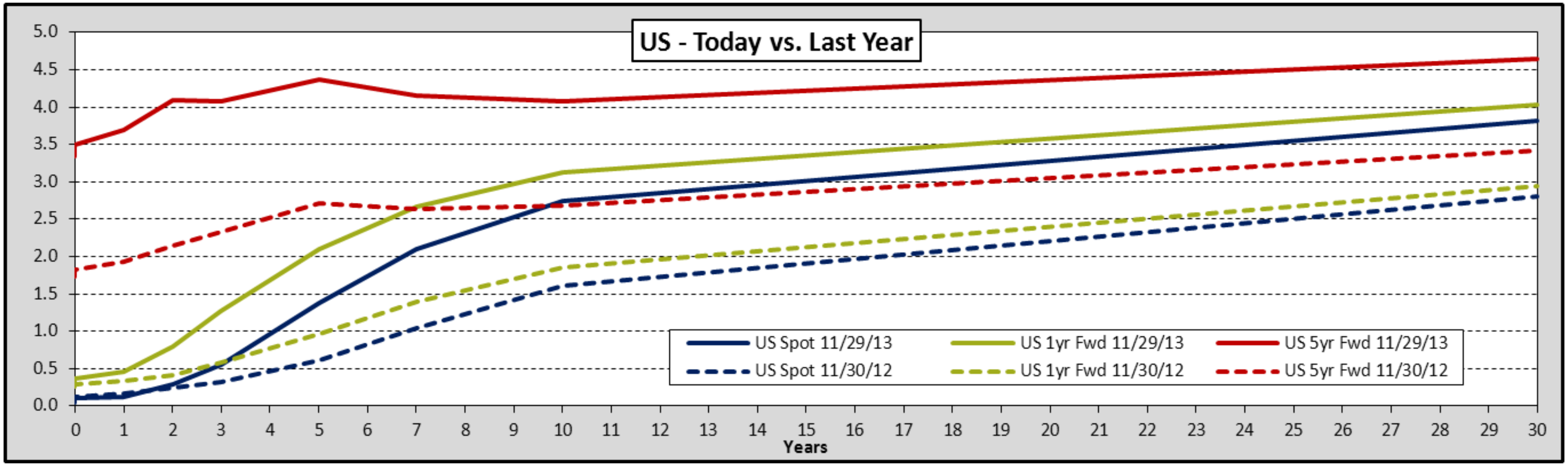
Source: Bloomberg as of 11/30



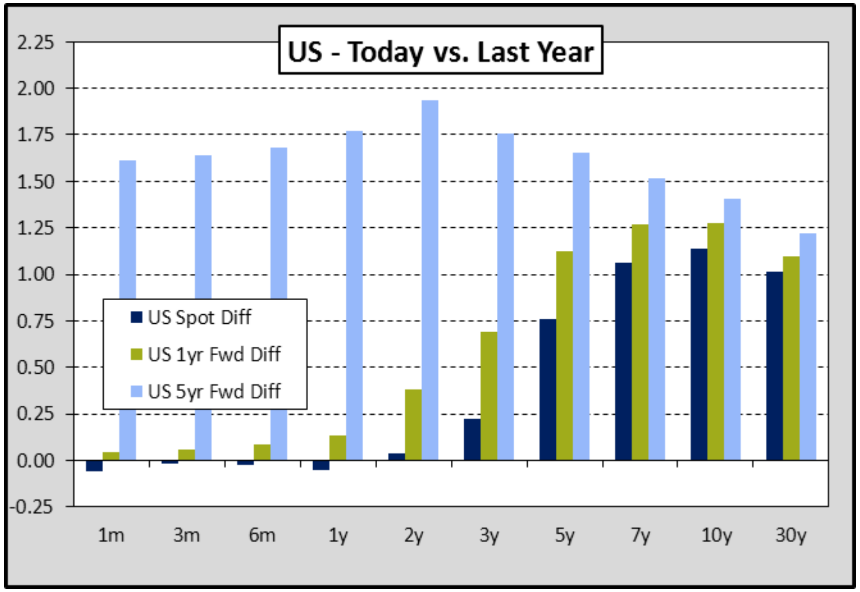
Source: Bloomberg as of 11/30

- **US Treasury expectations reflect higher spot and forward rates relative to prior year**
- **Yields in US Treasury market are expected to move higher based on forward curve**
  - Principal losses but higher reinvestment rates results in a return in line with current yields
- **Incorporated increased term premium reflecting potential for greater uncertainty**

U.S. Spot and Forward Rates – Change from last year



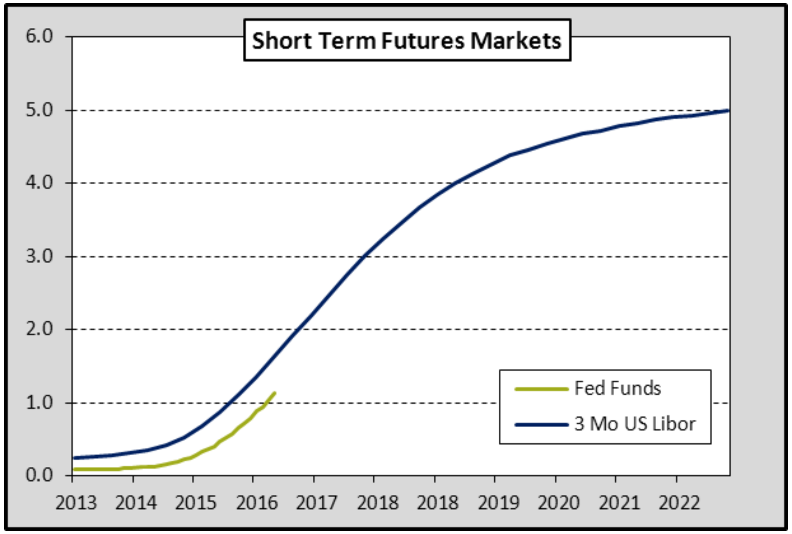
Source: Bloomberg as of 11/30



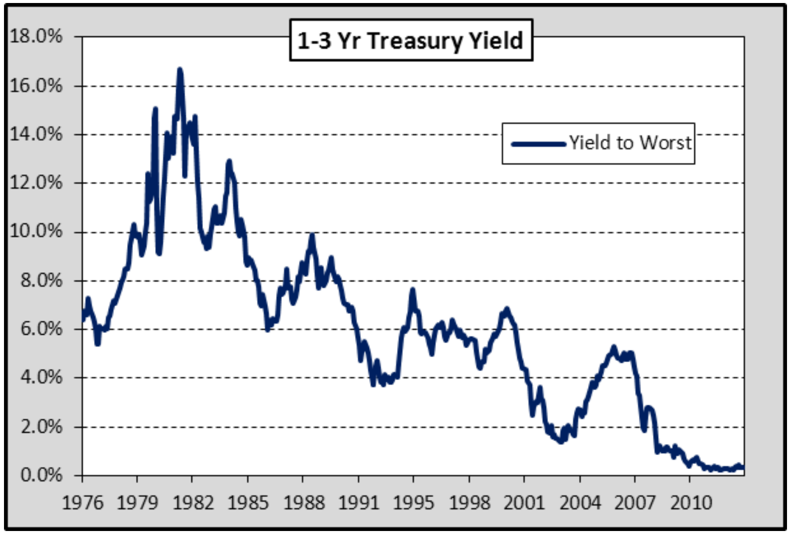
Source: Bloomberg as of 11/30

- **US Treasury market is elevated across the curve**
  - Most spot and forward rates are substantially higher than one year ago
- **Spot changes are muted on short end of the curve**
  - Up 75-125 bps beyond 5 years
- **1 year forward expectations up**
  - Muted on short end, but 25-150 bps beyond the 2 year point
- **5 year forward expectations have risen much more**
  - About 100-200bps across the curve

Assumption Development – Cash



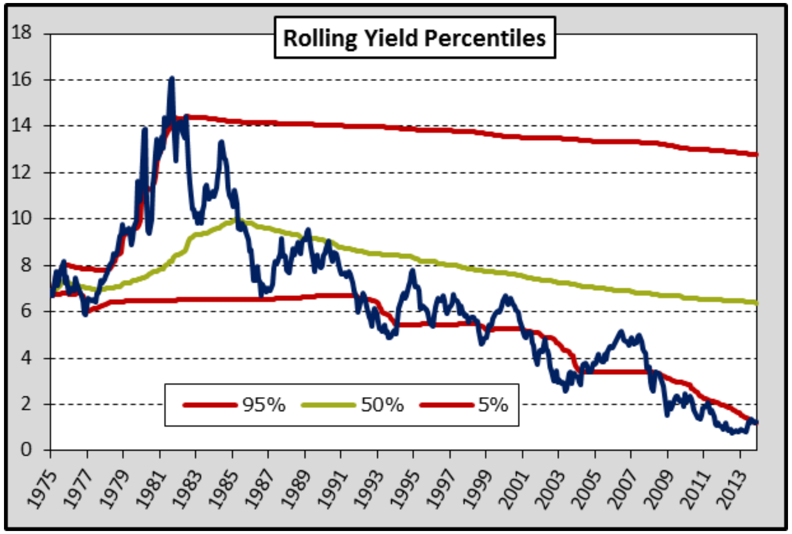
Source: Bloomberg, NEPC as of 11/30



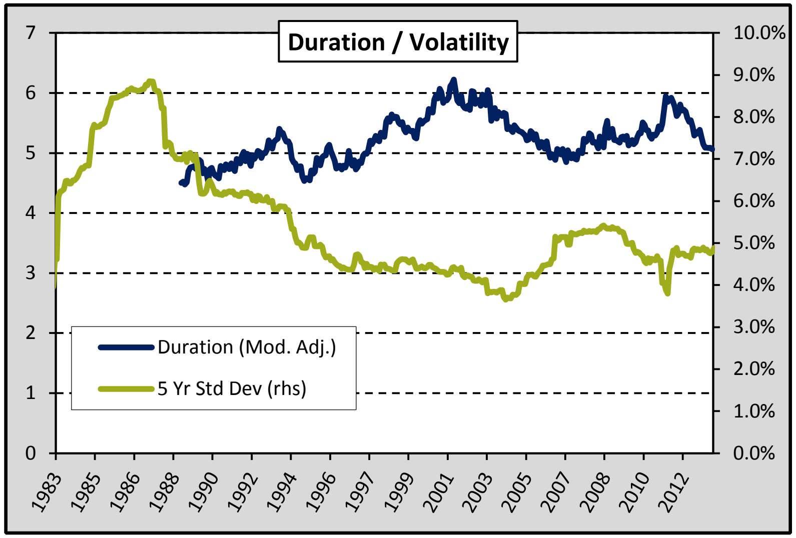
Source: BarCap Live as of 11/30

- **Cash markets expected to remain at extreme lows**
  - In 2012 the Fed renewed its pledge to keep rates low "at least through mid-2015"
  - Encouraging economic data has prompted speculation of a medium-term increase
- **Moving out on the "risk-free" curve does not offer relief for cash investors**
  - Short duration treasury yields remain near historic lows despite rate increases in 2013 further out on the yield curve

Assumption Development – U.S. Treasuries



Source: BarCap Live, NEPC as of 11/30



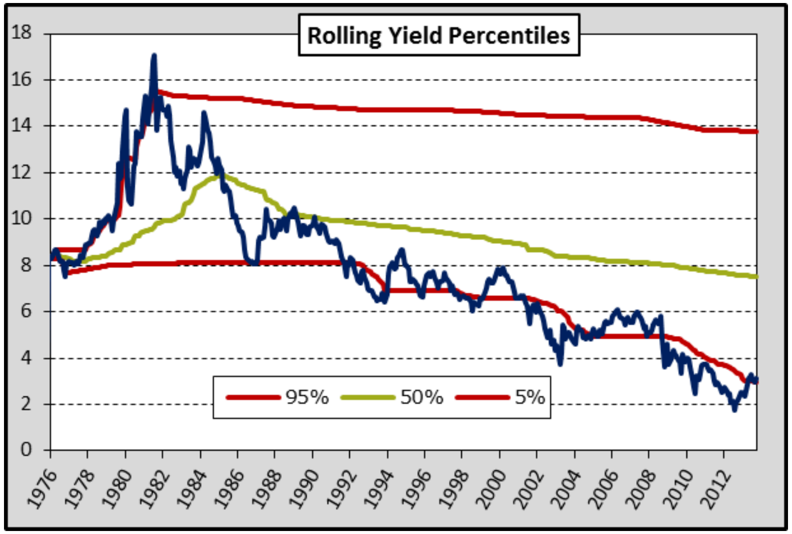
Source: BarCap Live as of 11/30

- **US Treasury index saw a small reversal, currently yielding 1.24%**
  - Compared to 0.8% on 11/30/2012
  - 1 year return (-2.3% at 11/30) was hindered by periods of high volatility but increased yields mean a more positive outlook going forward

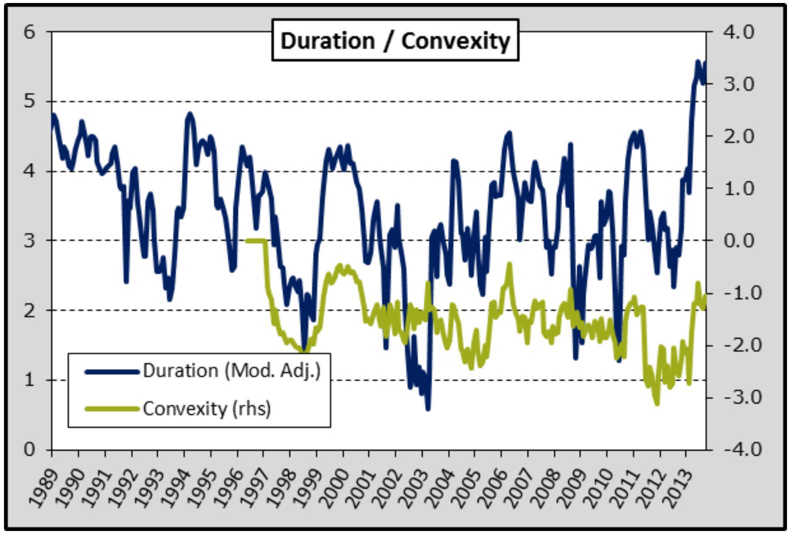
- **Long-term history of rates, back to 1970s, show periods of very high realized volatility when rates rise unexpectedly**

- **Treasury index duration is down in 2013**

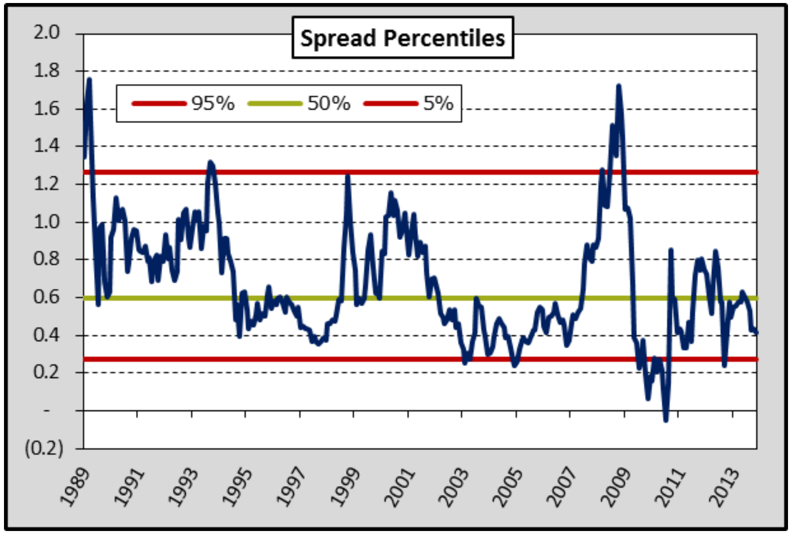
Assumption Development – MBS



Source: BarCap Live, NEPC as of 11/30



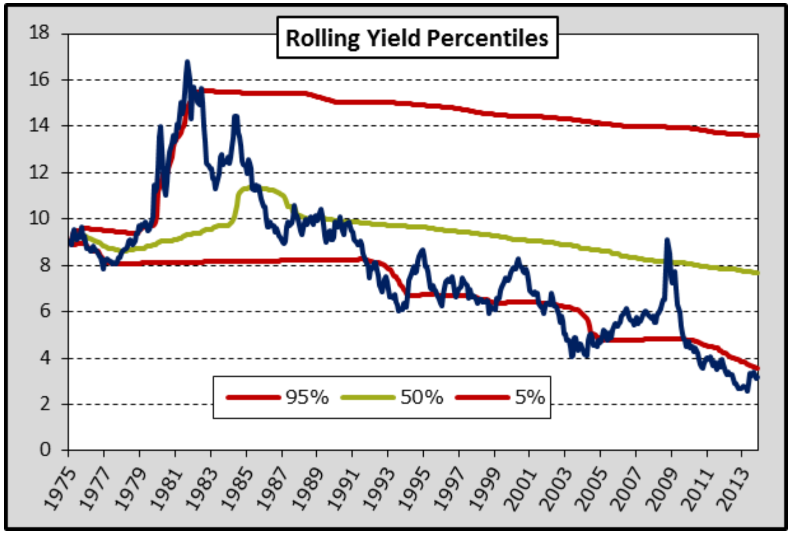
Source: BarCap Live as of 11/30



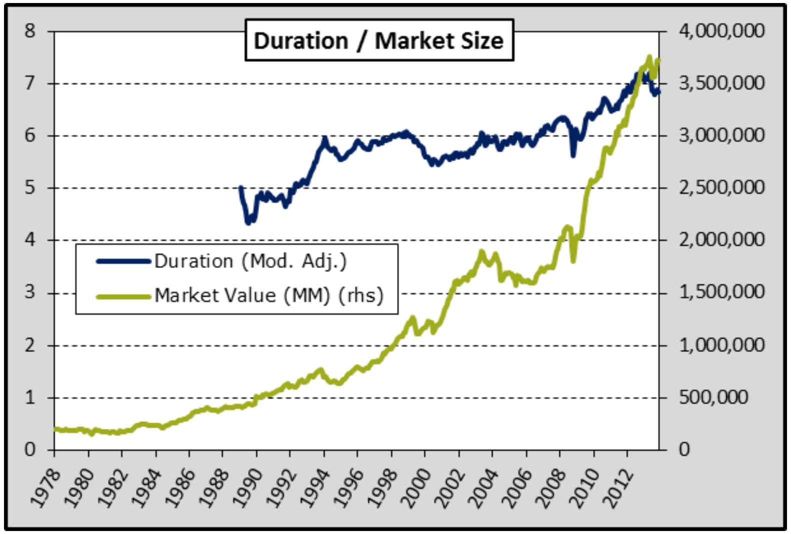
Source: BarCap Live, NEPC as of 11/30

- **MBS total yields increased in 2013 by nearly 1%**
  - Spreads declined 41 bps
- **Duration nearly doubled to 5.56 years as mortgage rates rose**
  - Reflecting slower pre-payment expectations
  - Leaving MBS more exposed to price impact from rising rates
- **Negative convexity hurts in rising rate environment**
  - Extension risk in recent refis and new entrants

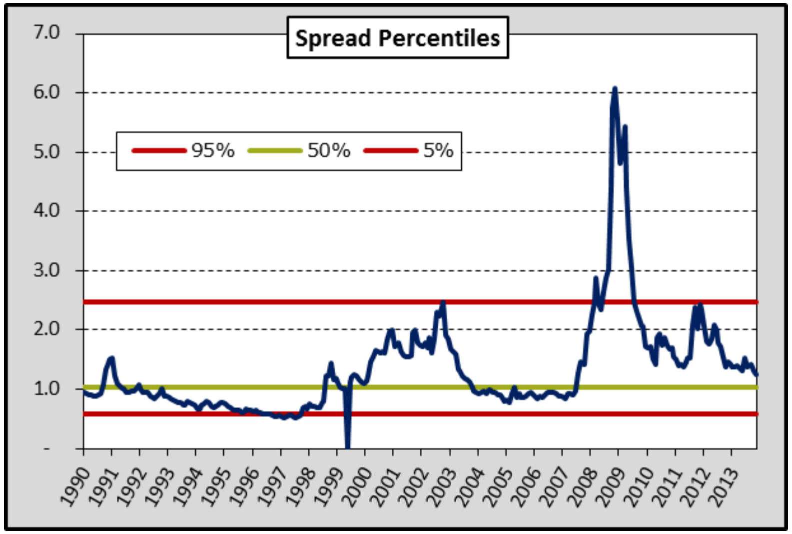
Assumption Development – Investment Grade Credit



Source: BarCap Live, NEPC as of 11/30



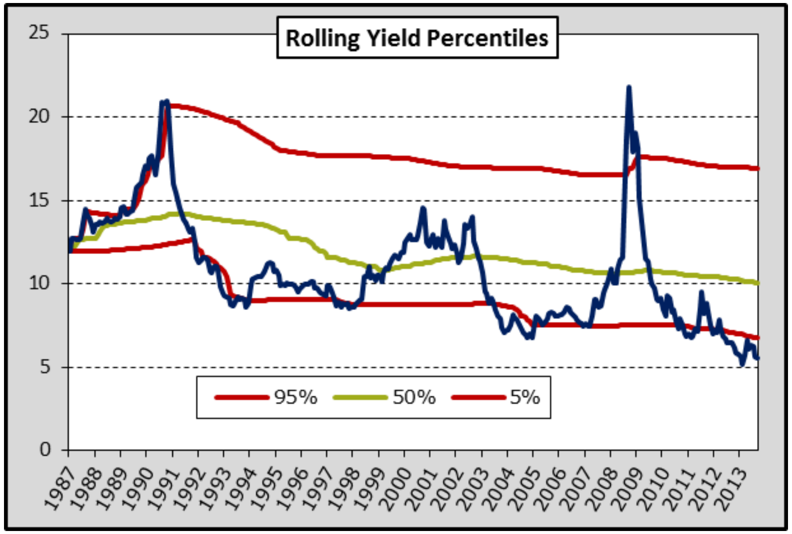
Source: BarCap Live as of 11/30



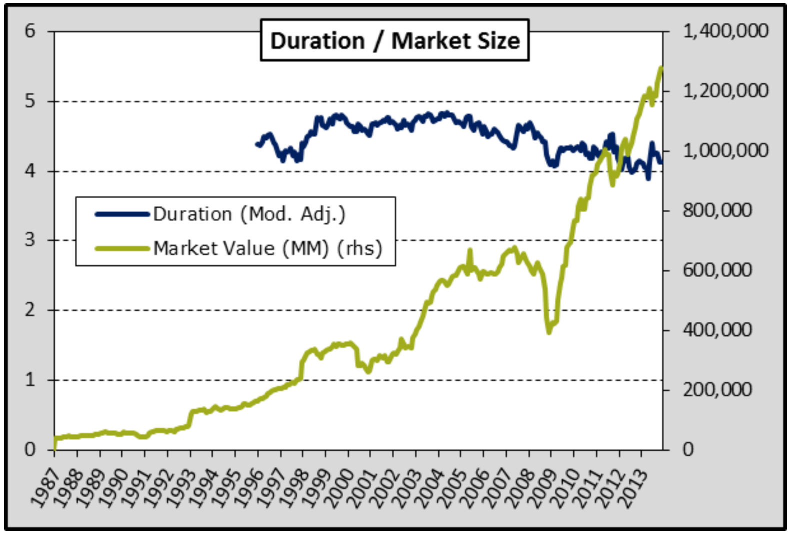
Source: BarCap Live, NEPC as of 11/30

- **IG spreads compressed in 2013**
  - Total spreads now equal 125 bps
    - Not yet at median level
- **Yields rose but still low relative to history**
  - 3.15% at 11/30
- **Duration fell slightly**
  - Down to 6.84 years

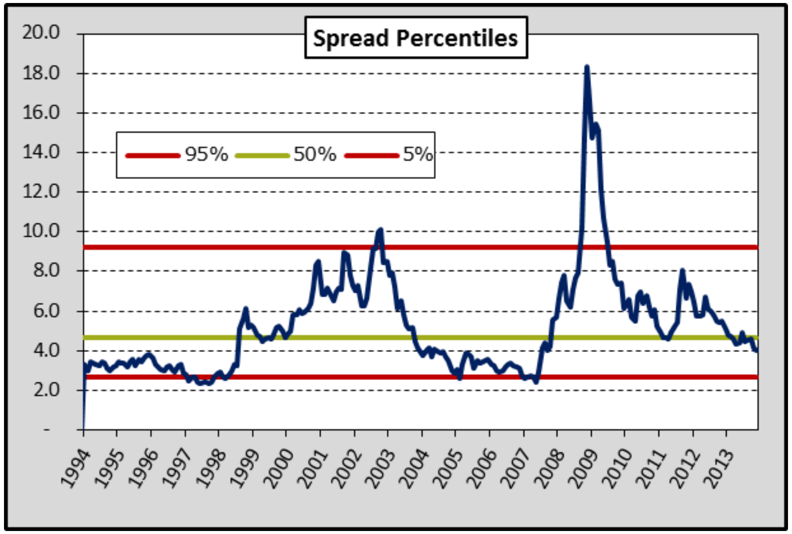
Assumption Development – High Yield



Source: BarCap Live, NEPC as of 11/30



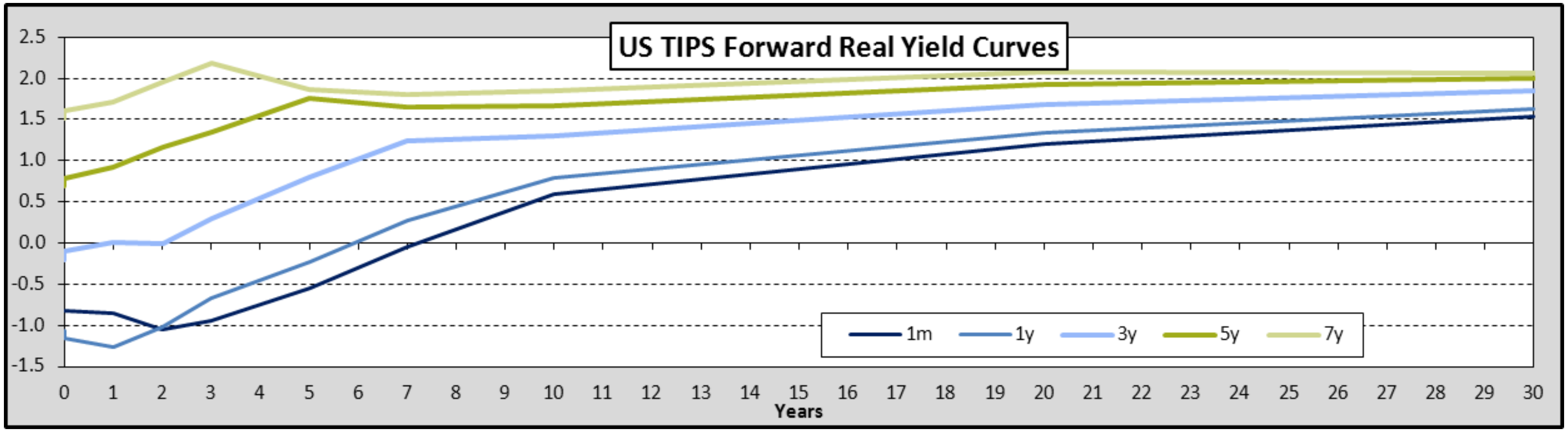
Source: BarCap Live as of 11/30



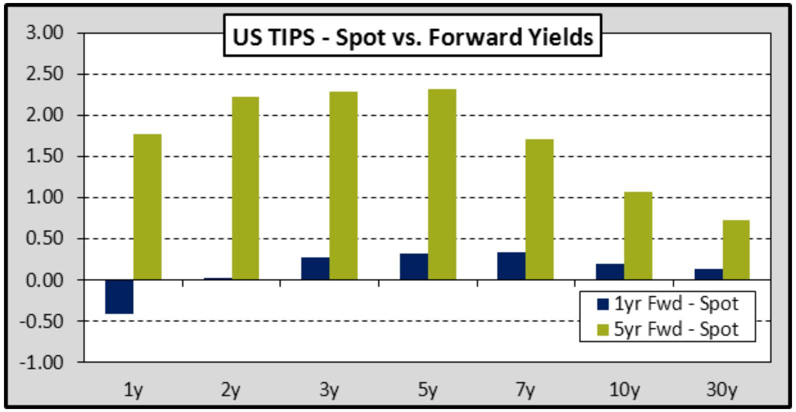
Source: BarCap Live, NEPC as of 11/30

- **Spreads compressed further in 2013, from 511 bps to 404 bps**
  - Below historical median of 469 bps
- **Investors in search of yield have supported continued robust issuance**
  - Still holds some relative attractiveness in fixed income but not as much as in recent years

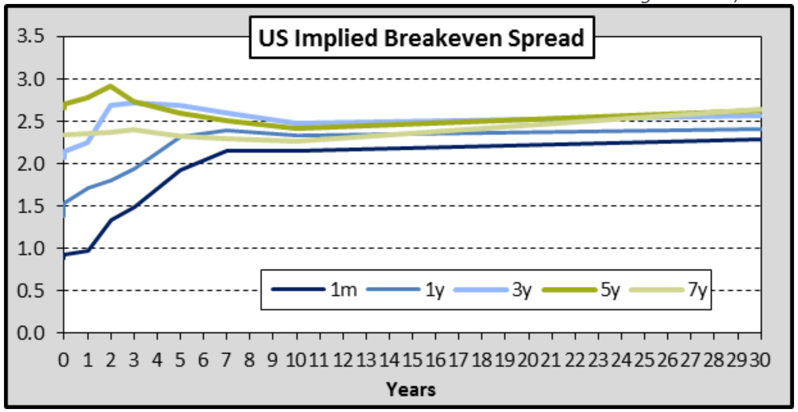
U.S. Spot and Forward Real Rates – Current



Source: Bloomberg as of 11/30



Source: Bloomberg as of 11/30

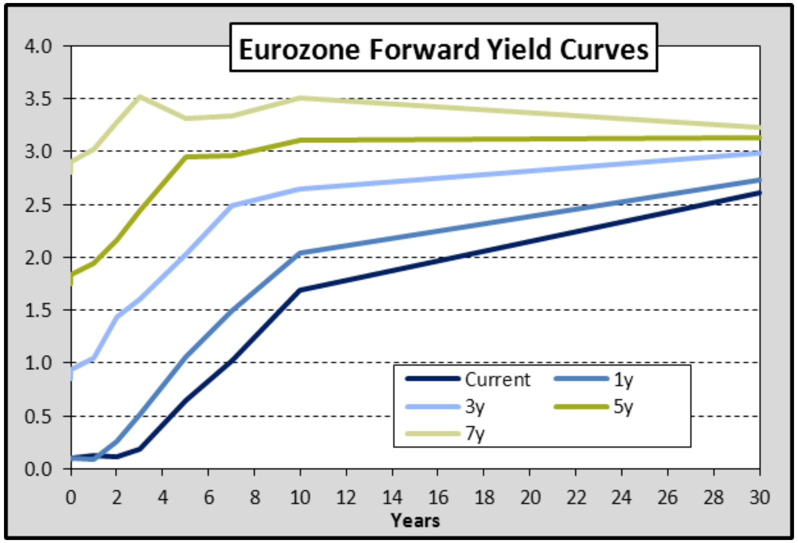


Source: Bloomberg as of 11/30

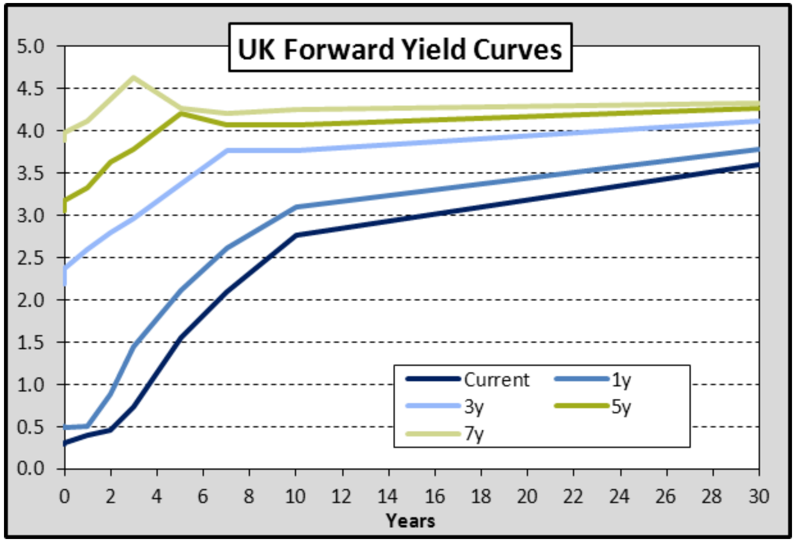
- **Real yields experienced a sharper increase than nominals in 2013 as breakeven spreads moved lower**
  - Curves have moved from mostly negative to mostly positive

- **Over the longer term, breakevens converge near a long term 2.5% expected inflation premium for TIPS**

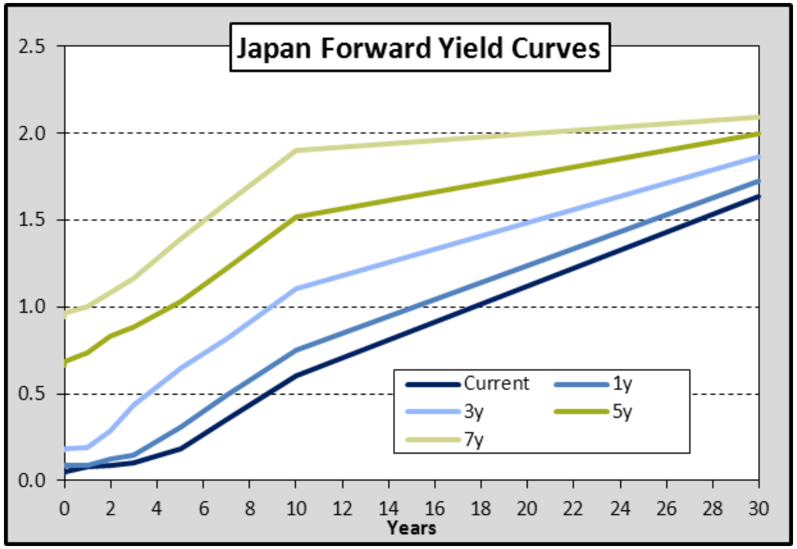
Assumption Development – Global Developed Bonds



Source: Bloomberg as of 11/30



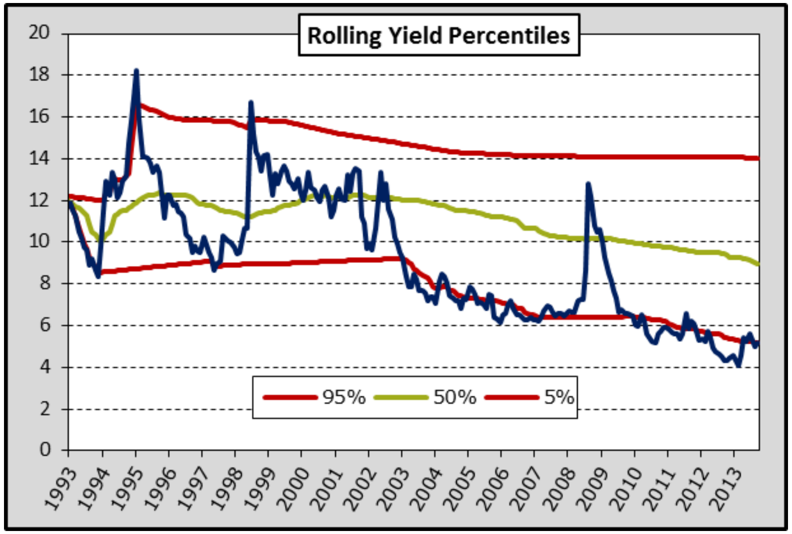
Source: Bloomberg as of 11/30



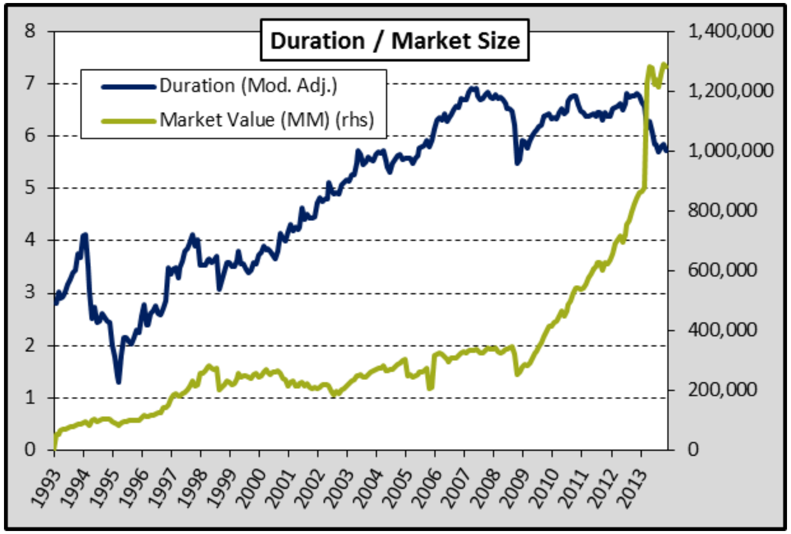
Source: Bloomberg as of 11/30

- **Global sovereigns have similar forward profile as US**
  - Front end of the curve still pinned down by monetary policy but less so than going into 2013
  - Japan remains an outlier as unprecedented monetary stimulation has compressed yields
  - Long rates are higher but still relatively low with modest growth and inflation expectations

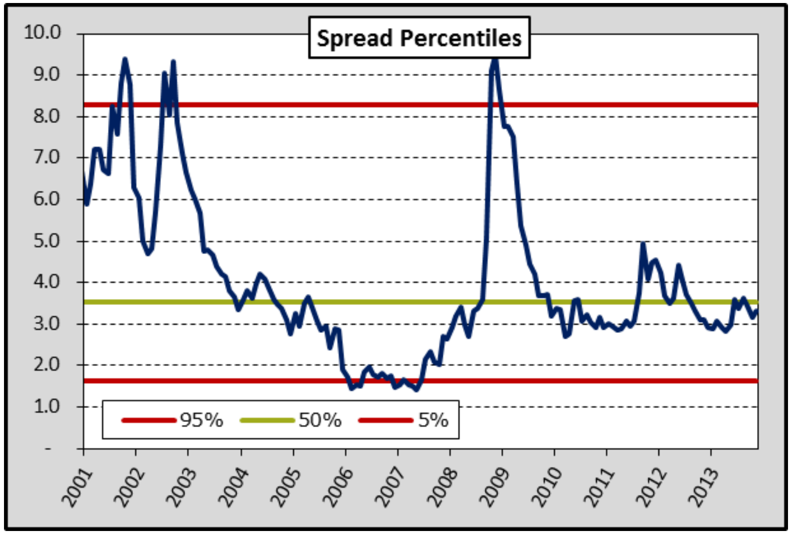
Assumption Development – Emerging Markets Debt (USD)



Source: BarCap Live, NEPC as of 11/30



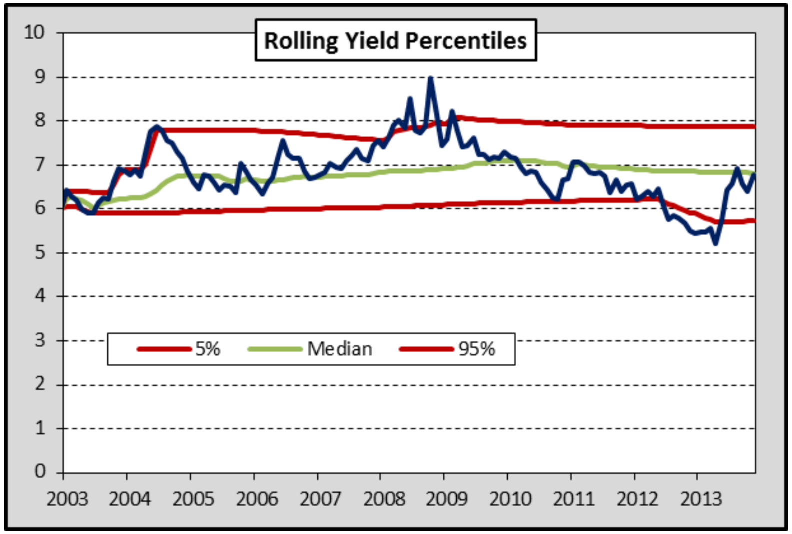
Source: BarCap Live as of 11/30



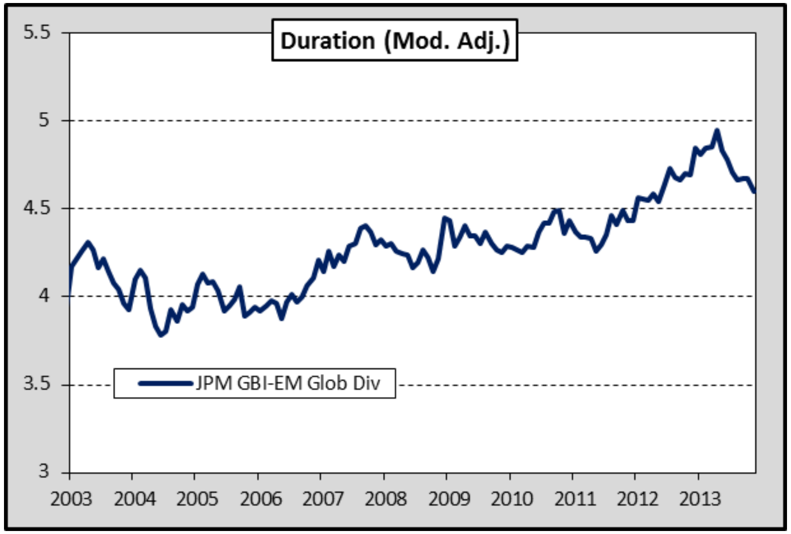
Source: BarCap Live, NEPC as of 11/30

- **EM External Debt yields remain low versus history**
- **OAS also remains below historical medians**
  - Compression likely to continue as credit quality is improving
    - Driving medians lower over time
- **Duration fell over a full year from year end 2012**

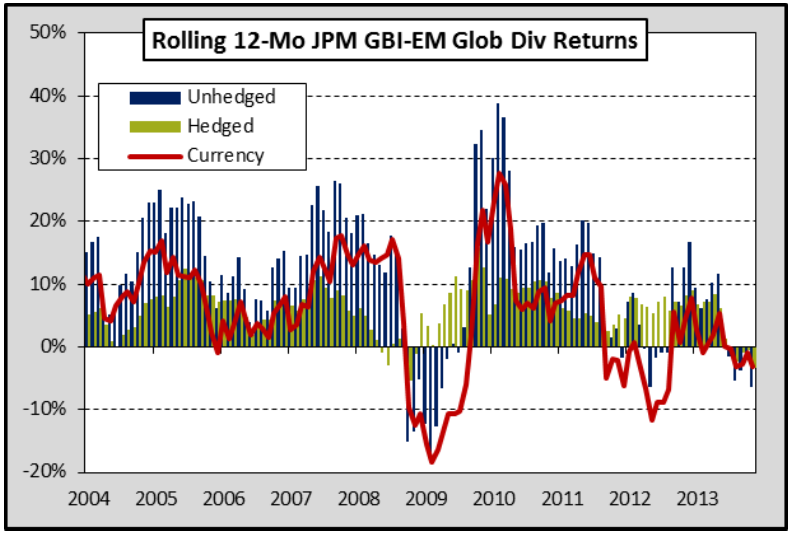
Assumption Development – Emerging Markets Debt (Local)



Source: Bloomberg, NEPC as 11/30

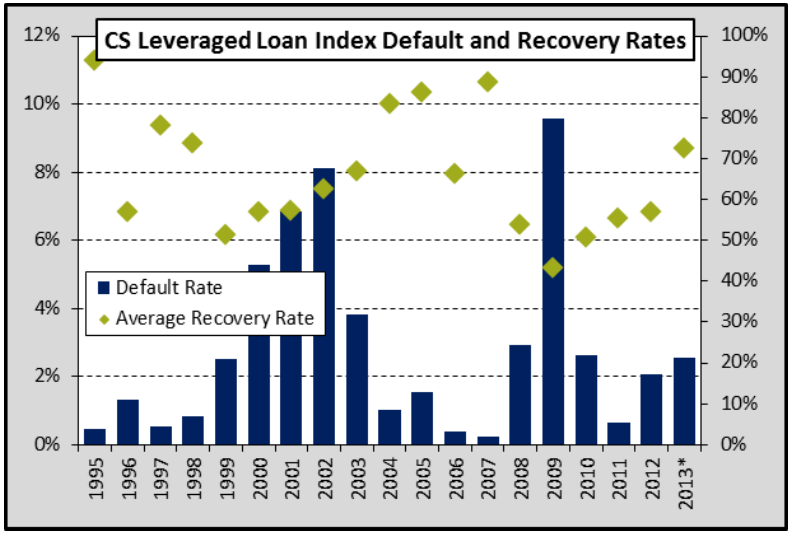


Source: Bloomberg as of 11/30

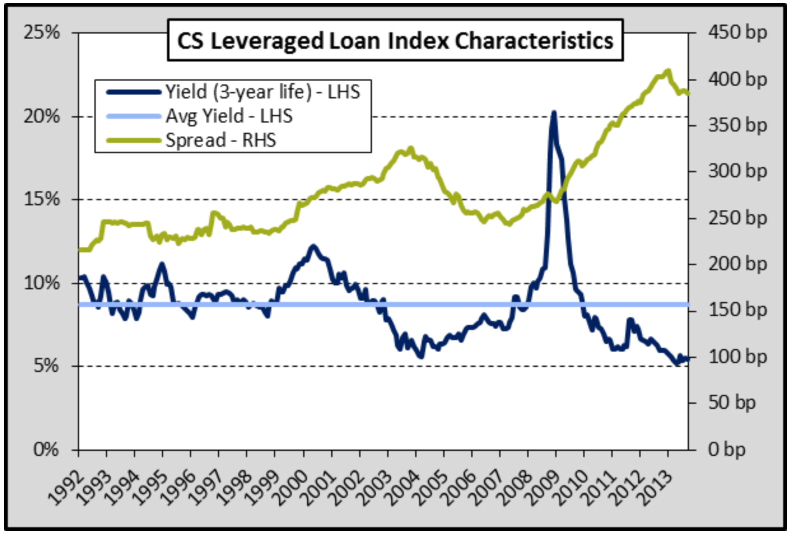


- **Local currency EMD remains attractive on a fundamental basis**
  - High yields and relatively low duration
- **Unresolved country by country issues could drive currency volatility**

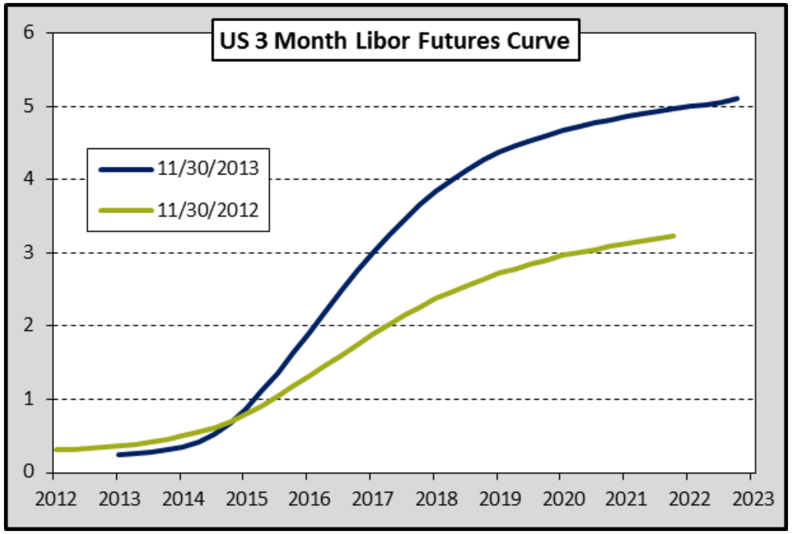
Assumption Development – Bank Loans



Source: Credit Suisse as of 9/30; *2013 figures as of 9/30



Source: Credit Suisse as of 9/30



Source: Bloomberg as of 11/30

- **Yields have fallen in 2013**
- **Spreads compressed modestly**
  - Less than other credit markets
- **As of October 31, 2013, 82% of the S&P/LSTA Leveraged Loan Index had a LIBOR floor with an average floor of 1.14%**
  - Incorporated into return expectations

Alternative Assumptions

- **Mean/variance framework can be used to show diversification benefits of alternatives, but does not properly characterize all risks**
  - Hedge funds – develop strategic targets to various hedge fund categories and use deep qualitative research to identify strategies
  - Private investments – utilize liquidity analysis to set appropriate target weights relative to traditional investments

- **Actual implementations should use Research teams to address distinctions of sub-categories and current manager strategies in the market**

- **Focus on modified IRR rather than IRR when distributions are harvested**
  - IRR will overstate return in most situations

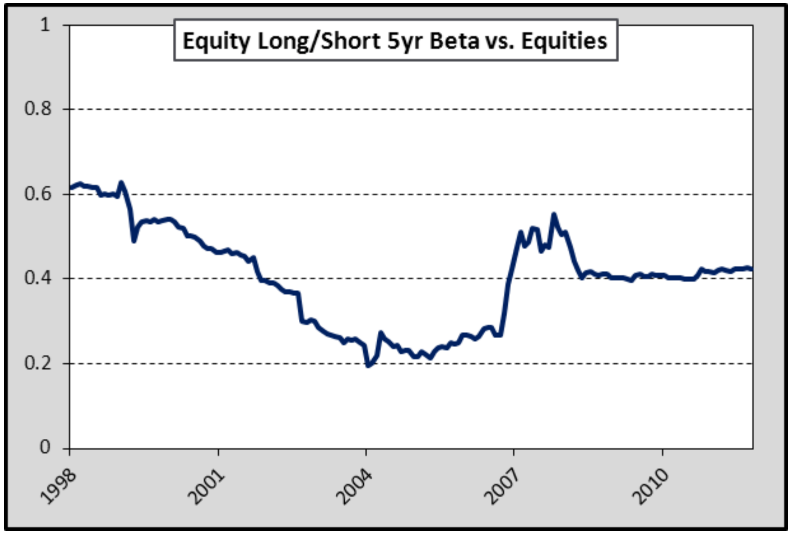
Hedge Funds

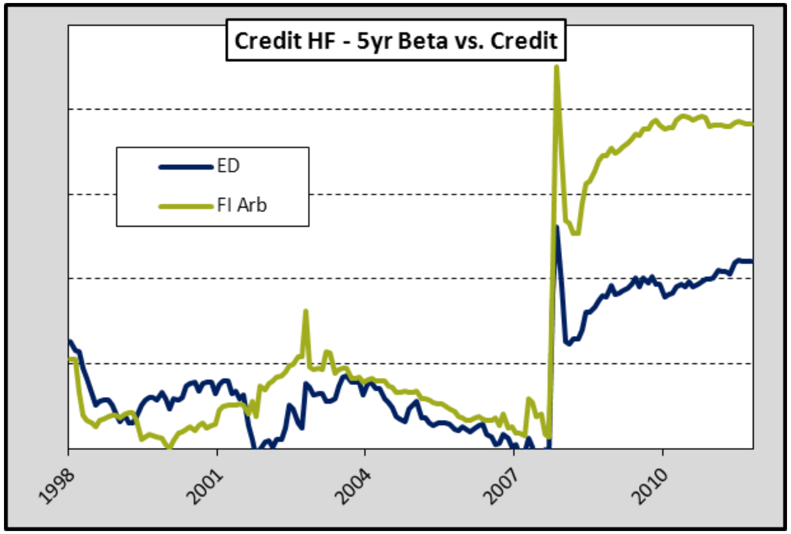
- **Hedge Fund assumption developed from building blocks of broad hedge fund categories**
  - Build up of 45% Equity, 45% Credit, and 10% Macro
  - Based on analysis of historical return, risk and correlation for underlying strategies and total universe
  - Use NEPC standard market betas as building blocks as well as a component of alpha

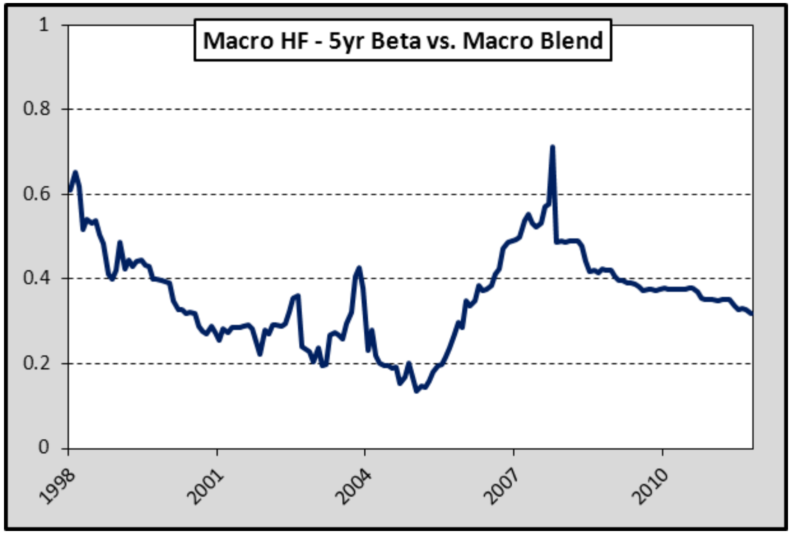
- **Hedge Fund assumptions for 2014**
  - Return – 5.5%
  - Volatility – 9.0%

	Hedge Funds	Equity Hedge Funds	Credit Hedge Funds	Macro Hedge Funds
Beta Exposure	0.5	0.5	0.5	0.5
Underlying Market Beta	Blended market betas from Equity, Credit/Event, Macro	Global Equity	Global Credit	Global Relative Value (Rates, Equities, Commodities)
Total Return (5-7 yr)	**5.5%**	**6%**	**5%**	**5.75%**
Volatility Expectation	**9%**	**11.5%**	**8%**	**9.5%**

Assumption Development Detail – Beta Exposures

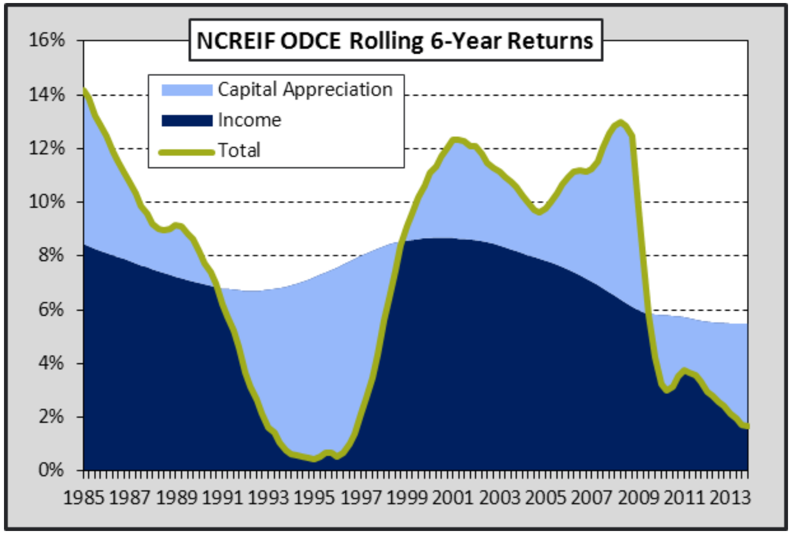


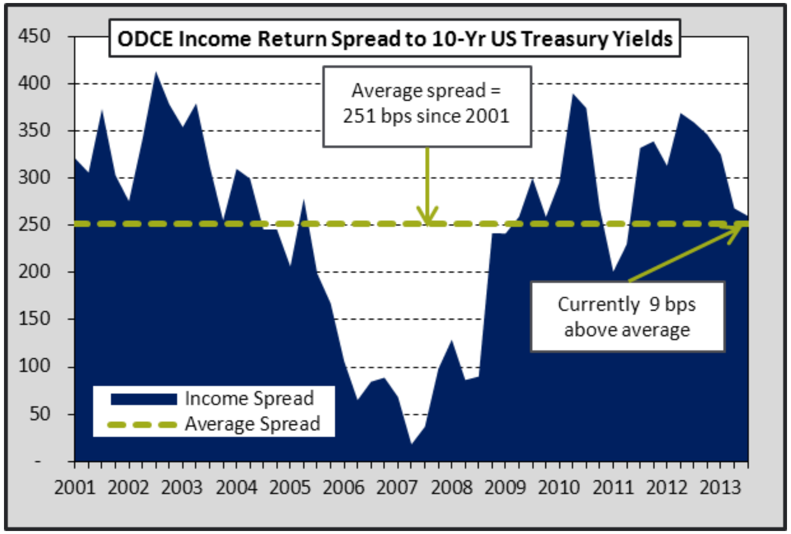




- **Broad Hedge Fund assumption is based on build up of these three strategies**

Assumption Development – Real Estate



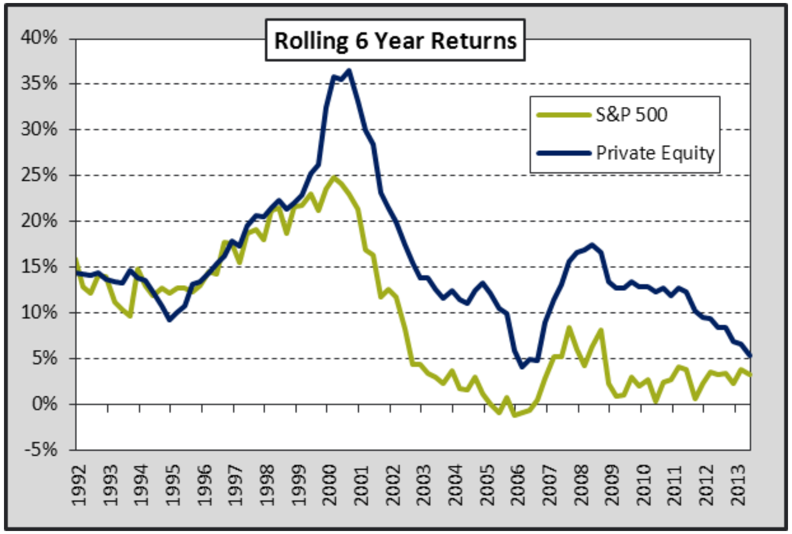


Sources: NCREIF, US Department of Treasury as of 9/30

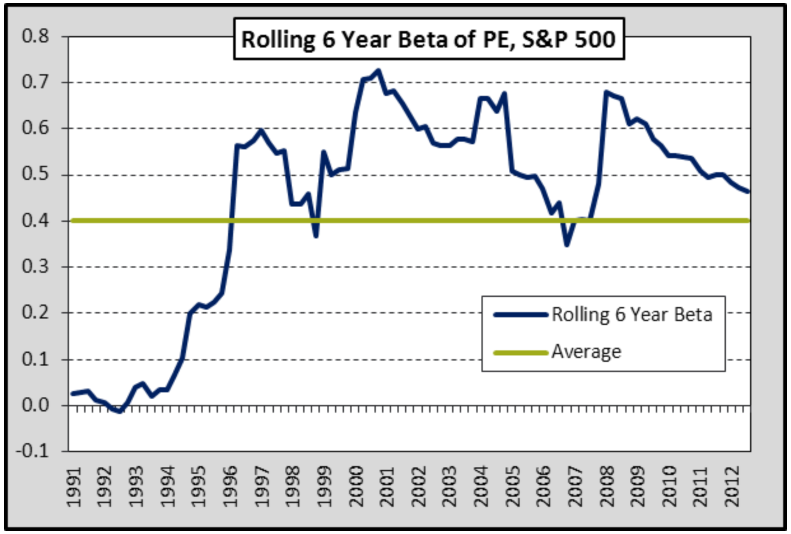
Sources: NCREIF as of 9/30

- **Core real estate assumption represented by NCREIF Open-End Diversified Core (ODCE)**
  - Our 5-7 year assumption is based on 5.25% income (2.75% treasury yield + 2.50% spread) + 1.00% capital appreciation = 6.25%
  - 17% volatility assumption is representative of underlying economics

Assumption Development – Private Equity



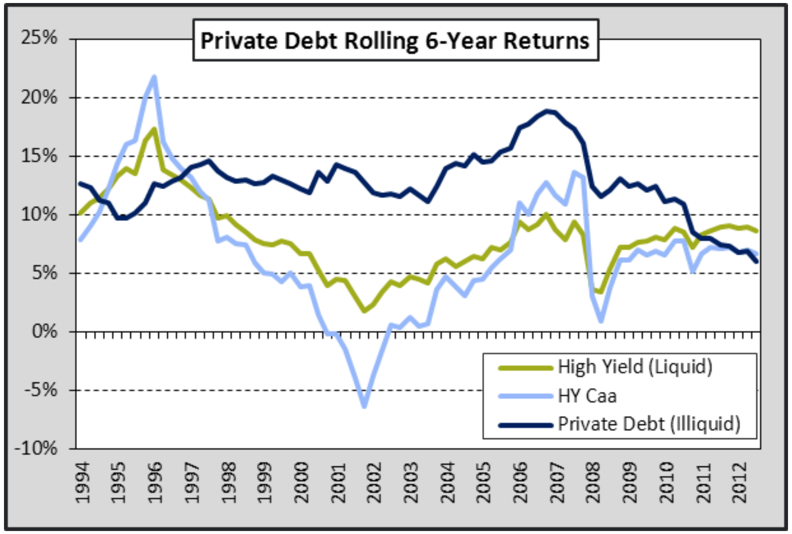
Sources: Burgiss Group, Ibbotson as of 9/30



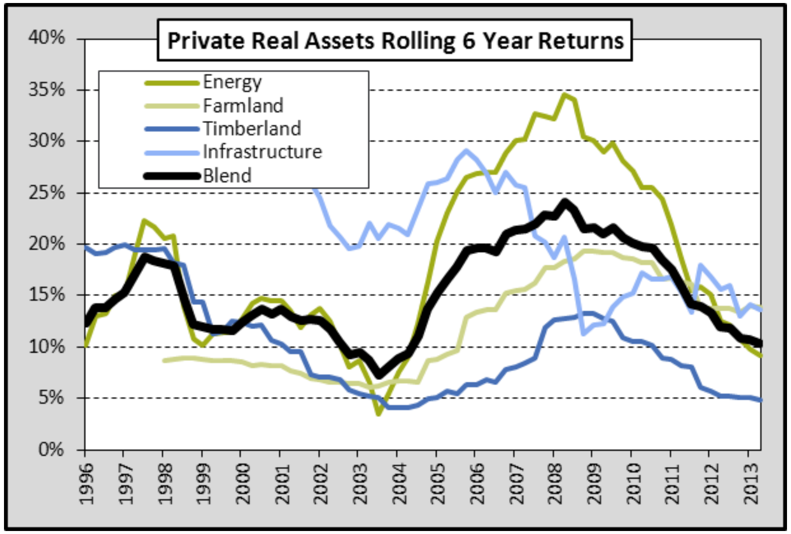
Sources: Burgiss Group, Ibbotson as of 9/30

- **Private equity represented by Burgiss Group PE Index**
- **Forward-looking return assumption based on US equity return assumption of 6.25% + 2.50% illiquidity premium = 8.75%**
  - 27% volatility assumption is representative of underlying economics

Assumption Development – Private Debt and Private Real Assets



Source: Ibbotson, Burgiss Group as of 9/30



Source: Ibbotson, Burgiss Group as of 9/30

- **Private Debt represented by Burgiss Group US Mezzanine and Distressed Debt**
  - Return assumption based on distressed premium over broad high yield + illiquidity premium
  - Historical volatilities support 6% premium above high yield (19%)

- **Private Real Assets constructed from a blend of several indices**
  - Burgiss Group PE Energy, Alerian MLP Infrastructure, NCREIF Farmland, and NCREIF Timberland

Arithmetic vs. Geometric Returns

- **Why the distinction? Stems from the need to reflect volatility**
- **Example: -50% return in year 1; +100% return in year 2**
  - Arithmetic (average) return is 25%
  - But $1 invested yields $1*(0.5)*(2) = $1, a 0% return
- **Geometric return is the better metric for expressing expected multi-period returns (i.e. 5-7 or 30 year annualized expectations)**
- **However, when using stochastic or efficient frontier analysis, volatility is incorporated which introduces probabilities for lower (and higher) than expected returns**
- **The geometric return is the convergence value of an infinitely compounded arithmetic return**

Information Disclaimer

- **Past performance is no guarantee of future results.**
- **Information on market indices was provided by 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.**
- **The goal of this report is to provide a basis for substantiating asset allocation recommendations.**
- **All investments carry some level of risk. Diversification and other asset allocation techniques do not ensure profit or protect against losses.**
- **This report is provided as a management aid for the client's internal use only. This report may contain confidential or proprietary information and may not be copied or redistributed to any party not legally entitled to receive it.**

Agenda Item #6

ARIZONA STATE RETIREMENT SYSTEM

3300 NORTH CENTRAL AVENUE • PO BOX 33910 • PHOENIX, AZ 85067-3910 • PHONE (602) 240-2000
7660 EAST BROADWAY BOULEVARD • SUITE 108 • TUCSON, AZ 85710-3776 • PHONE (520) 239-3100
TOLL FREE OUTSIDE METRO PHOENIX AND TUCSON 1 (800) 621-3778
EMAIL ADDRESS: ASKMAC@AZASRS.GOV • WEB ADDRESS: WWW. AZASRS.GOV

Paul Matson
Director

MEMORANDUM

TO: The Arizona State Retirement System (ASRS) Investment Committee (IC)

FROM: Mr. Gary R. Dokes, Chief Investment Officer

DATE: November 18, 2014

RE: **Agenda Item #6:** Presentation, Discussion, and Appropriate Action Regarding the Investment Committee Meeting 2015 Schedule

Purpose
To present and discuss a proposed Arizona State Retirement System (ASRS) Investment Committee (IC) meeting schedule for the calendar year 2015.

Recommendation
The IC accept or modify the proposed IC meeting schedule for calendar year 2015.

Background
The proposed 2015 IC meeting schedule for the calendar year 2015 (six meetings per year) is similar to the meeting periodicity, dates and starting times that occurred over the past few years. To accommodate the IC Trustees' schedules, the IC meetings typically have occurred on Monday in the same week as the ASRS Board meetings are held.

Scheduling bi-monthly meetings appears to work well with IC Trustees and IMD staff; meeting periodicity allows for a manageable number of agenda items to be discussed, sufficient time to generate associated investment material and help with IMD resource management.

Attachments:
Proposed IC Meeting Schedule for the Calendar Year 2015

2015 Investment Committee (IC) Schedule

January						
Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

February						
Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

March						
Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

April						
Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

May						
Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

June						
Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

July						
Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

August						
Su	Mo	Tu	We	Th	Fr	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

September						
Su	Mo	Tu	We	Th	Fr	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

October						
Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

November						
Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

December						
Su	Mo	Tu	We	Th	Fr	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

2015 IC Board Meeting Dates will be bi-monthly on the Monday preceding all Board Meetings.

IC Meetings
Board Meetings

Agenda Item #7

ARIZONA STATE RETIREMENT SYSTEM

3300 NORTH CENTRAL AVENUE • PO BOX 33910 • PHOENIX, AZ 85067-3910 • PHONE (602) 240-2000
7660 EAST BROADWAY BOULEVARD • SUITE 108 • TUCSON, AZ 85710-3776 • PHONE (520) 239-3100
TOLL FREE OUTSIDE METRO PHOENIX AND TUCSON 1 (800) 621-3778
EMAIL ADDRESS: ASKMAC@AZASRS.GOV • WEB ADDRESS: WWW. AZASRS.GOV

Paul Matson
Director

MEMORANDUM

TO: The Arizona State Retirement System (ASRS) Investment Committee (IC)

FROM: Mr. Gary R. Dokes, Chief Investment Officer
Mr. Karl Polen, Head of Private Markets Investing
Mr. Eric Glass, Portfolio Manager of Private Markets

DATE: November 17, 2014

RE: **Agenda Item #7**: Presentation, Discussion and Appropriate Action Regarding the Inflation-Linked Asset Class

Purpose
To present and discuss material regarding the ASRS Inflation-Linked Asset Class program.

Recommendation
Information only; no action required.

Background
The ASRS in its 2012 strategic asset allocation study added inflation linked investments as a newly defined asset class. Inflation linked investments include assets which hedge inflation because their valuation or cash flow are positively linked to inflation. The ASRS includes real estate, commodities, farm land, infrastructure and timber as members of the inflation linked asset class. The enclosed report reviews the strategies and performance of these assets.

Attachment:
Inflation Linked Assets Presentation

Inflation Linked Assets

Asset Class Review

Karl Polen & Eric Glass

Arizona State Retirement System

December 1, 2014

Outline

Inflation Linked Assets

- Inflation linked assets are positively linked to inflation through their value and income streams
- Inflation linked assets are one of three major asset classes (along with equities and fixed income) as defined in the ASRS strategic asset allocation
- Inflation linked assets are implemented in both private and public markets
- Private market inflation linked assets are
  - Real estate
  - Farm land
  - Infrastructure
  - Timber
- Investments in commodities are generally implemented through highly liquid derivatives markets

The 2009 Asset Allocation Study

- The 2009 Strategic Asset Allocation Study established Inflation-linked as an asset class
  - Commodities & TIPS
    - Positive short and medium-term correlation to inflation
    - Diversification benefits from low correlation to traditional asset classes & low correlation among one another
- During 2009-2011 used TIPS opportunistically
  - Blackrock US TIPS passive
- In Q3 2010 ASRS hired two commodities managers
  - Gresham & Cargill

2009 Inflation Linked Allocations

Asset Class	Target	Range	Benchmark
Commodities	3%	0-5%	DJ UBS Total Return
TIPS	0%	0-5%	Barclay's TIPS
Total IL	3%	0-10%	

The 2012 Asset Allocation Study

- The 2012 Strategic Asset Allocation Study further built out the Inflation-linked program
  - Real Estate: Increased target allocation to 8% from 6%
  - Commodities: Increased target allocation from 3% to 4%
  - Farmland & Timber, Infrastructure, and Opportunistic Inflation-linked each established as asset classes, with 0% target allocation and 0-3% range

2012 Inflation Linked Allocations

Asset Class	Target	Range	Benchmark
Commodities	4%	1-7%	DJ UBS Total Return
Real Estate	8%	6-10%	NCREIF ODCE
Infrastructure	0%	0-3%	Core CPI plus 3.5%
Farmland & Timber	0%	0-3%	Core CPI plus 3.5%
Opportunisitic	0%	0-3%	Investment Specific
Total IL	12%	8-16%	

Real Estate Investment Philosophy

- As part of the inflation linked category, the primary role of real estate is cash flow generation from properties where we believe there is a likelihood of rental increases in the long run
- The real estate strategic plan establishes a goal for the portfolio of 65% (+/- 10%) in core and value add properties implemented primarily through separate accounts or open end funds in a long term hold strategy. The remainder of the assets are targeted to be held in opportunity fund style investments.
- The program is benchmarked against the NCREIF ODCE index, but is structured to achieve a target return of 8%. The real estate strategic plan provides the following guidance:

"By selecting the NFI-ODCE as benchmark, the ASRS considers this benchmark as an opportunity cost, not a model portfolio. The ASRS expects that its portfolio will vary significantly from the ODCE index. The ASRS will manage its investments actively and dynamically in the real estate asset class in order to target a net return expectation of 8%. The 8% net objective represents a significant premium over the 6.5% net long term expectation for passive, stable, equity real estate positions."

Real Estate Implementation Philosophy

- Real estate assets are long term assets and frequent trading tends to detract from returns
- Rental increases occur in situations with high demand and constraints on supply
- Trends tend to be durable in real estate and should not be ignored. Some important trends are:
  - The demographics of baby boomers and their children profoundly affect real estate demand
  - E-commerce affects utilization of industrial and retail space
  - The structure of employment away from goods producing to service occupations affects the geographic dispersion of economic activity
  - Urbanization is a continuing trend with a pattern of globally significant cities emerging
  - Office utilization is becoming much more efficient with a strong downward trend of space utilization per employee

Demand Driven Investing

- In order to capitalize on these trends, we are creating a customized investment strategy that we refer to as "demand driven investing".
  - We believe the risk of real estate is not having tenants
  - We search for opportunities with strong demand fundamentals driven by age and income demographics, education levels, concentrations of high quality jobs and other relevant location criteria
- We identify sectors that have favorable demand dynamics with demographic or other economic tail wind and search for markets with supply barriers
  - Apartments, industrial, self-storage, medical office, senior housing, student housing, value-add multi-strategy
- We have implemented a robust search and recruitment process to find the most qualified parties to be our partners in this program
  - Identify first tier operators in each of these sectors to implement through custom separate account arrangement

Niche and Tactical Investing

- In 2014, we commenced a niche and tactical investing program
- These investments focus on
  - niche opportunities requiring specialized execution
  - tactical investment stemming from temporal opportunities or dislocation
- We have invested in the following strategies under this program
  - Urban retail
  - Apartments in locations benefiting from energy development
  - Value add office in non-core markets trading at a wide spreads to core office

Current Portfolio

- The current portfolio construction is described in the next four slides
- The current portfolio is underweight in total allocation compared to the strategic target of 8%
- The current portfolio is substantially overweight to opportunity fund strategies compared to the strategic plan targets
- This will be transitioned to strategy weights as legacy positions liquidate and through implementation the strategic manager program

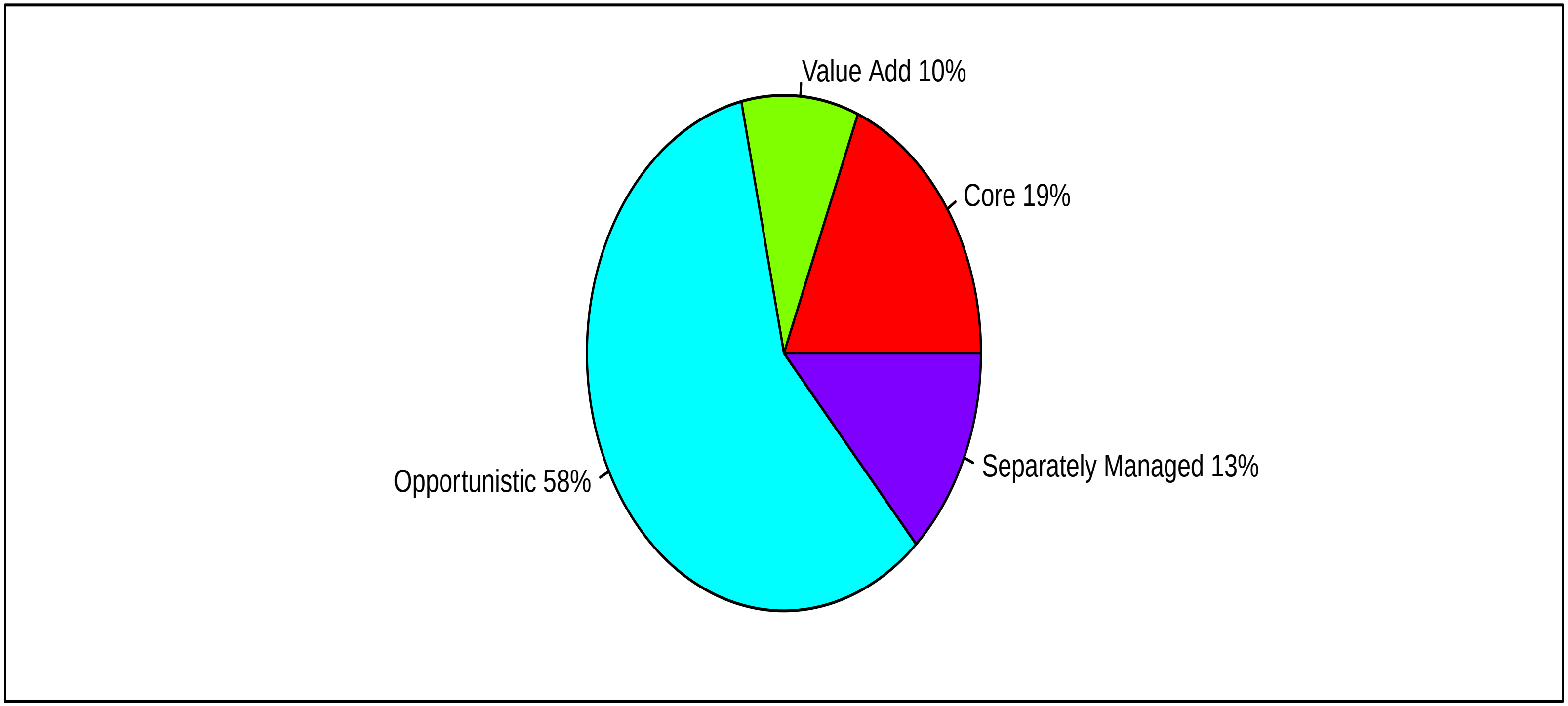
Current Portfolio

Real Estate Portfolio as of June 30, 2014

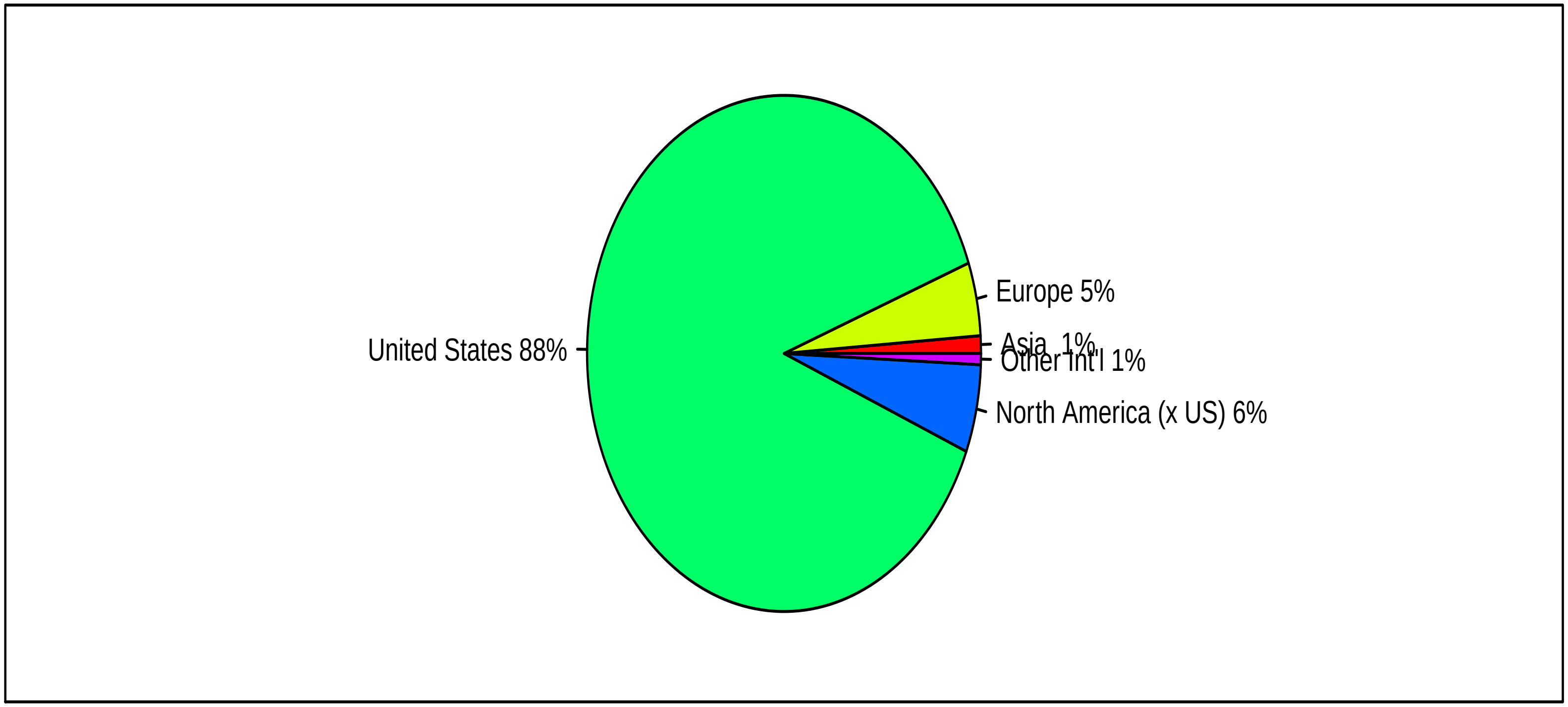
	$ millions	Percent of ASRS Total Fund
Net Asset Value	2,077	5.96%
Total Commitments to RE partnerships	3,233	9.27%

- Current Portfolio is $712 million below the target funding of 8%
- Commitments exceed target funding in order to achieve the target because later stage funds return cash offsetting capital demands from newer investments
- We update a pacing study each year to determine amount of new commitments

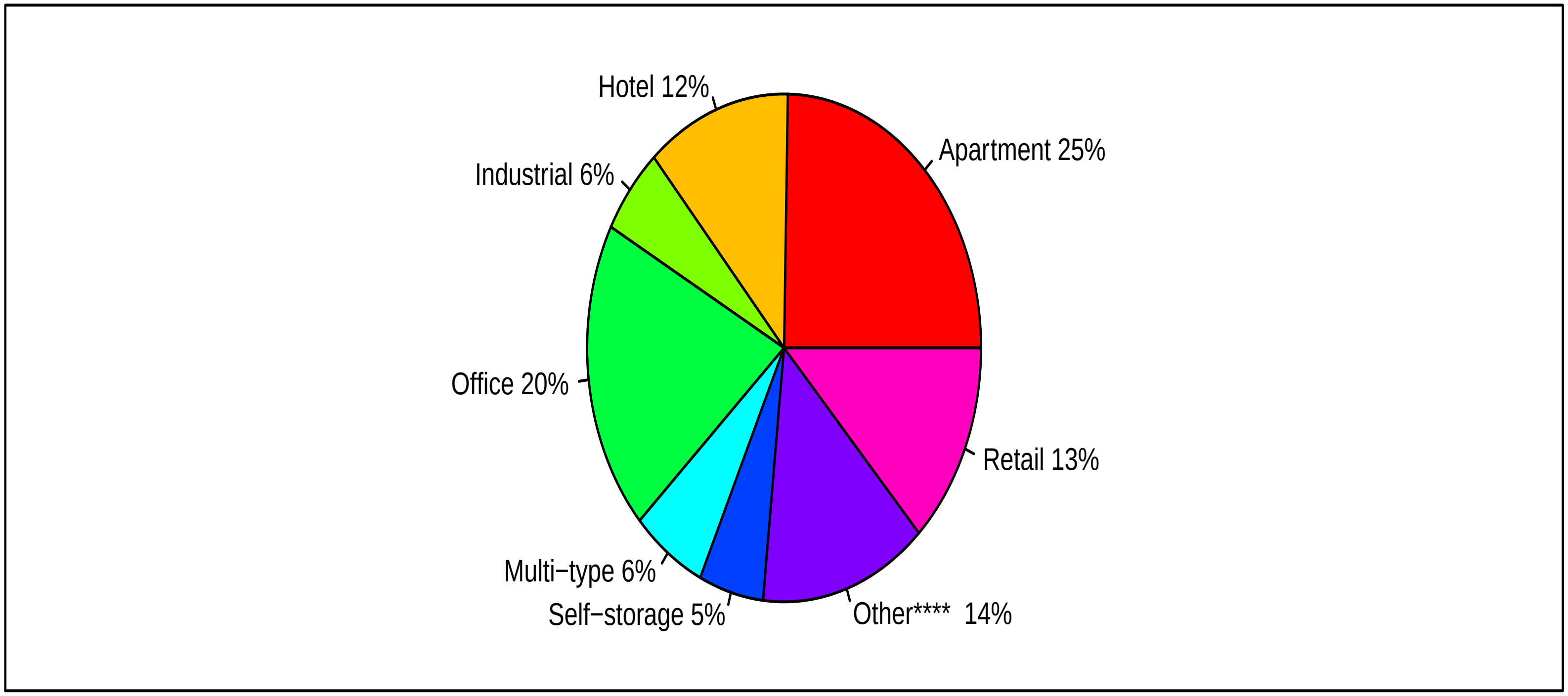
Current Portfolio by Strategy



Current Portfolio by Geography

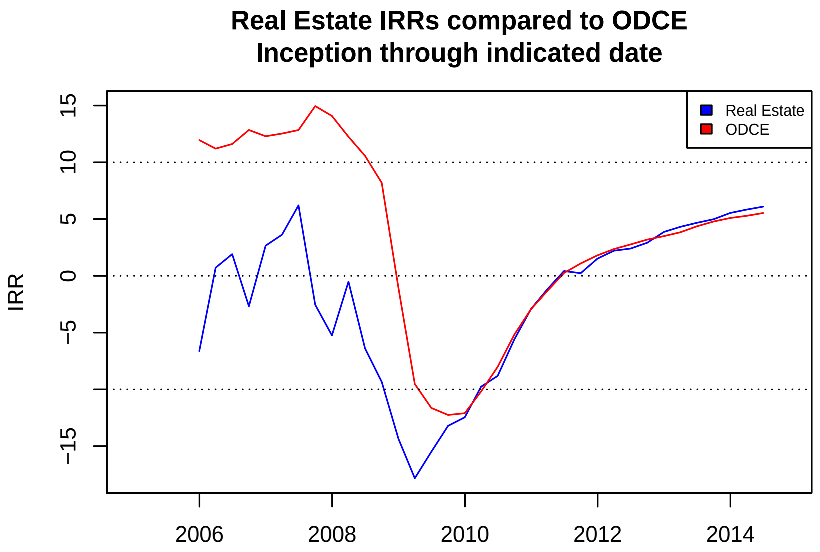


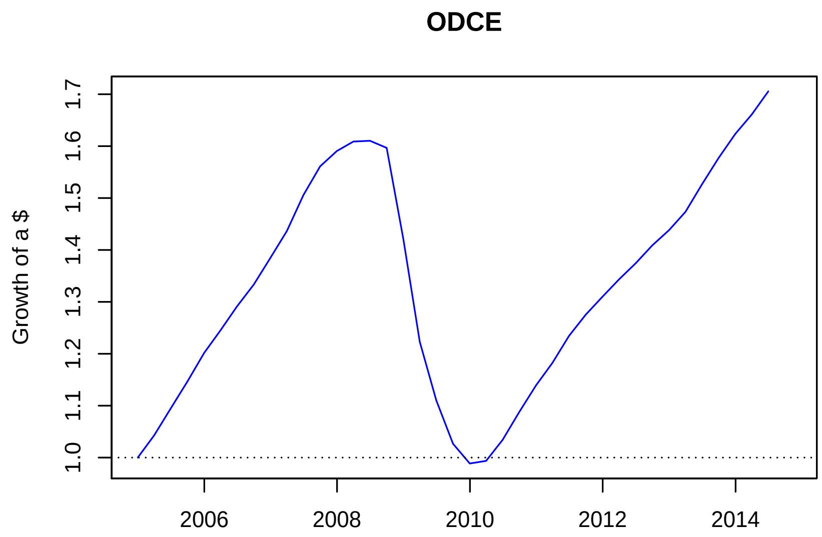
Current Portfolio by Property Type

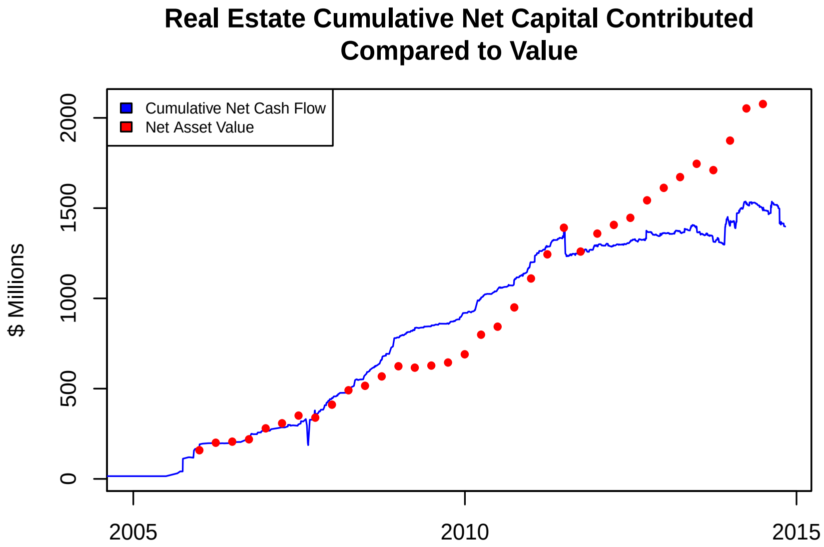


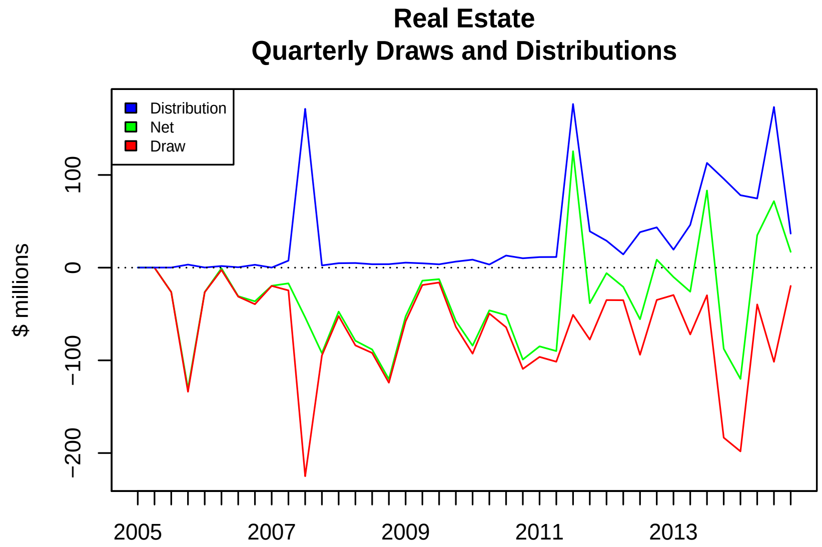
Performance

- The charts and tables on the following pages illustrate the performance of the real estate portfolio
- The real estate portfolio underperformed its benchmark in its early years, but recent out-performance has brought the inception to date performance above benchmark levels
- As noted above a majority of assets are invested in opportunity funds which have, as would be expected, underperformed during down markets but outperformed in up markets
- While it will be a number of years before these investments are fully realized, there does not appear to be strong evidence that the additional risk from opportunity fund concentration has been rewarded
- This performance history led to a reconsideration of strategies and amendments to the strategic plan that are now being implemented


Real Estate IRRs compared to ODCE
Inception through indicated date
Real Estate
ODCE
IRR
15
10
5
0
−5
−15
2006
2008
2010
2012
2014


ODCE
Growth of a $
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
2006
2008
2010
2012
2014


Real Estate Cumulative Net Capital Contributed
Compared to Value
Cumulative Net Cash Flow
Net Asset Value
$ Millions
2000
1500
1000
500
0
2005
2010
2015


Real Estate
Quarterly Draws and Distributions
Distribution
Net
Draw
$ millions
100
0
−100
−200
2005
2007
2009
2011
2013

Returns for Periods Ended June 30, 2014

Time Weighted Returns

	One Quarter	One Year	Three Years	Five Years	Inception
Real Estate TWR	2.87%	13.78%	12.36%	12.02%	3.97%
ODCE TWR	2.69%	11.75%	11.38%	8.97%	5.05%

IRRs

	One Quarter	One Year	Three Years	Five Years	Inception
Real Estate IRR	2.90%	13.68%	12.41%	12.79%	6.10%
ODCE IRR	2.69%	11.70%	11.35%	10.25%	5.53%

Opportunistic Investments

Real Estate Related Opportunistic Investments

	Commitment	Net Amount Inveted	NAV	Inception IRR
OCM STR Co-Invest 1, L.P.	150	139.44	181.22	19.2%
56th and Park (NY) Holdings, LLC	50	35.95	95.63	194.4%

- These investments are included in the private opportunistic equity portfolio
- OCM Store is a private REIT based in Scottsdale investing in single tenant net lease properties
- 56th and Park is a condominium at 432 Park in Manhattan

Performance Accountability

The following table shows performance for legacy real estate investments and those by the current management team.

Portfolio Returns

	Portfolio IRR	ODCE IRR	Outperformance
Total RE Legacy Portfolio	5.27	5.03	0.23
Total RE Current Portfolio	15.78	11.44	4.34
Real Estate Opportunistic	37.53	11.31	26.22
Combined Current Real Estate	20.85	11.41	9.44

The following table shows performance of the current consulting team.

Consultant Returns

	Portfolio IRR	ODCE IRR	Outperformance
RCLCO Real Estate	3.05	11.10	-8.05
RCLCO Opportunistic	194.39	10.61	183.77
RCLCO Combined	34.96	11.14	23.82

- The real estate returns reflect the strategic manager program and the opportunistic return is 432 Park
- The strategic manager program achieved positive returns ahead of schedule with less than a year of operation

State of the Real Estate Market

- Real estate markets have recovered unevenly
  - Major markets have high investor demand and are at new peak prices
  - Non-major markets are still below prior peaks
- Supply demand fundamentals vary by region and property type
- Real estate investment fund raising has improved and global dry powder exceeds $200 billion

Cap Rates and Interest Rates

- Cap Rates have fallen to a national average of a little over 6%
- Cap Rates in major markets are below 4% for stable property
- This 200bp to 400bp spread to treasuries is higher than historical average leaving some room for rate increases without disrupting property markets

Property Fundamentals

- Apartments nationally have less than 5% vacancy and exhibit steady rental growth
  - high demand urban markets have housing shortages and high rental growth
- Office recovery is mixed with national vacancy still above 15%
- Retail performance is mixed with "big box" formats impacted by e-commerce but grocery anchored in good locations performing well
- Industrial absorption has been averaging over 100 million square feet per year nationally with shortages of space in strategic locations

Looking Forward

- The challenge in real estate investing in coming years will be to adapt to a rising interest rate environment
- ASRS strategy in this context is
  - Avoid new investments in stabilized core in coastal markets
  - Pursue special property types with favorable demographic demand drivers (medical office, senior housing, student housing, self-storage)
  - Pursue "build-to-core" style development opportunity when risk is mitigated by
    - High demand/high barrier apartment/senior housing location
    - Substantial pre-leasing
    - Partnership with a highly experienced operator with large co-invest
- We review strategies annually and will present an implementation plan to the private markets committee in December

Farm Land Investing

- ASRS invests in farm land for its long-term inflation protection linked to the value of land and its income generation
- ASRS invested $175 million International Farming Corp (IFC)
  - IFC is a multi-generational U.S. farming corporation with deep operational expertise
  - They pursue a diversified and value add approach to agricultural investing
    - Diverse crop mix and geography
    - prefer properties with crop optionality
    - prefer properties with natural resource optionality (water and mineral rights)
    - Avoids the expensive Midwest 'I' states (Iowa, Illinois, and Indiana)
    - Current focus is southern California, northwest, lower Mississippi and Florida
  - ASRS negotiated custom structure with right-of-first-offer (ROFO) rights to buy assets upon sale from the fund
  - Inception IRR through June 30, 2014 is 1.5% reflecting less than a one year hold on the assets

Infrastructure

- ASRS invests in infrastructure for long-term inflation protected income streams from assets and systems that support transportation, energy, shipping, and communications
  - Global needs exist to support rising populations and antiquated operations
- ASRS invested $300 million with Industry Funds Management (IFM), an Australian-based infrastructure manager that invests globally using a core strategy in an open end fund structure
  - No capital has been called as yet, but ASRS is next in the queue
  - Fund structure provides diversity of exposure across strategies and geography
  - Long term vehicle structure is aligned with long term character of assets
  - Focused on OECD countries; current portfolio invests across US, UK, and Europe
  - Investments include airports, a petroleum pipeline, power generation & transmission facilities, regulated water & wastewater treatment company, and broadcast and wireless communication infrastructure

Timber

- Timber is a permitted asset in the inflation linked group because it can provide long-term inflation protection income derived from the rising utilization of timber and shrinking forest sizes
- Timber has a low correlation with other asset classes combined with low volatility
- ASRS has has made no investments in timber but monitors the space
- Should ASRS pursue this strategy, it will seek alignment of asset and vehicle life similar to other private markets inflation-linked assets

Background of ASRS Commodities Program

- ASRS approved a 3% (0%-5%) strategic allocation to commodities in October 2009. After an in-depth search, ASRS invested just over half of the allocation with two long-only commodities investment managers
  - Gresham - $200M on 8/30/2010
    - Systematic rules-based approach is used to construct and rebalance the portfolio. A discretionary, market-driven approach is used to implement and roll commodity futures.
  - Cargill - $200M on 9/30/2010
    - Fundamental, bottom up approach using trading desks to construct a regional and global supply/demand balance sheet for each commodity market in which Cargill participates
  - ASRS legged into its allocation to avoid chasing returns and because of valuation concerns.
  - ASRS GTAA managers' benchmark also included a 3% allocation to commodities.

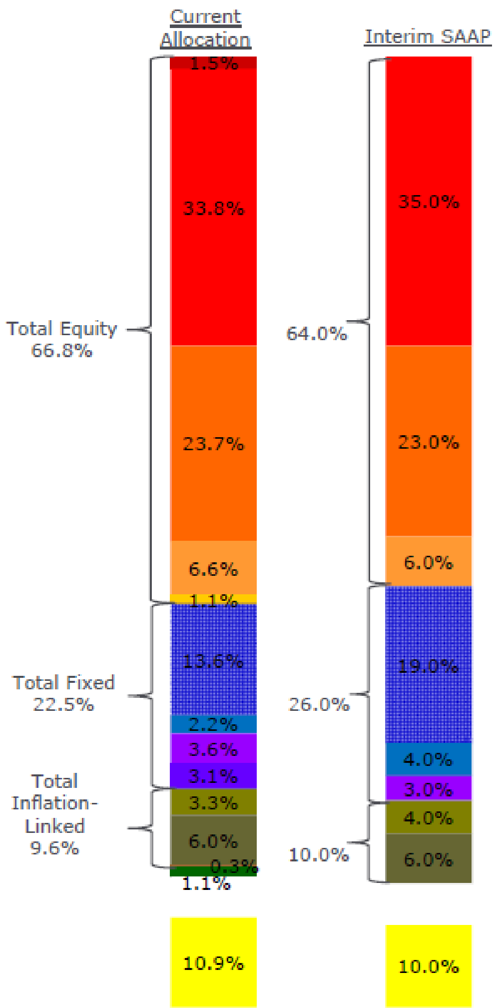
Background of ASRS Commodities Program (2)

- At the Board meeting on June 15, 2012, ASRS approved new strategic asset allocation policy targets which included a 4% (1%-7%) strategic allocation to commodities.
  - Over the past year, ASRS has maintained its tactical underweight to commodities.
    - Relative underperformance of asset class has resulted in further underweight to commodities from -0.5% (9/30/2013) to -0.7% (9/30/2014).
    - ASRS maintains its single manager relationship in commodities with Gresham. ASRS is comfortable with Greshams' role due to consistent outperformance, exceptional client service, and low fees
  - ASRS GTAA managers' benchmark also includes a 4% allocation to commodities.

ASRS Commodities Asset Class Overview as of 9/30/2014

Arizona State Retirement System

SAA Policy Compliance



	Current Mkt Value	Current Allocation	Interim SAAP	Difference	Policy Range	Within Range
Total Domestic and International Equity[1]	$20,107,558,419	59.0%	58.0%	1.0%		
Domestic Equity[3]	$11,503,593,068	33.8%	35.0%	-1.2%	26% - 38%	Yes
U.S. Large Cap[2]	*$8,666,173,427*	*25.4%*	*25.0%*	*0.4%*		
U.S. Mid Cap	*$1,485,956,040*	*4.4%*	*5.0%*	*-0.6%*		
U.S. Small Cap	*$1,351,463,600*	*4.0%*	*5.0%*	*-1.0%*		
International Equity[3]	$8,086,764,651	23.7%	23.0%	0.7%	16% - 28%	Yes
Developed Large Cap[2]	*$4,932,651,025*	*14.5%*	*14.0%*	*0.5%*		
Developed Small Cap	*$1,201,570,116*	*3.5%*	*3.0%*	*0.5%*		
Emerging Markets	*$1,952,543,510*	*5.7%*	*6.0%*	*-0.3%*		
Private Equity[4]	$2,249,040,843	6.6%	6.0%	0.6%	5% - 9%	Yes
Opportunistic Equity[4,6]	$378,636,388	1.1%	0.0%	1.1%	0% - 3%	Yes
Total Equity	$22,735,235,649	66.8%	64.0%	2.8%	53% - 70%	Yes
U.S. Fixed Income[3]	$4,628,342,436	13.6%	19.0%	-5.4%	8% - 28%	Yes
Core[2]	*$3,665,661,126*	*10.8%*	*14.0%*	*-3.2%*		
High Yield	*$962,681,310*	*2.8%*	*5.0%*	*-2.2%*		
Emerging Market Debt	$735,153,288	2.2%	4.0%	-1.8%		
Private Debt[4]	$1,241,477,856	3.6%	3.0%	0.6%		
Opportunistic Debt[4,6]	$1,062,075,523	3.1%	0.0%	3.1%	0% - 10%	Yes
Total Fixed Income	$7,667,049,102	22.5%	26.0%	-3.5%	15% - 35%	Yes
Commodities[2]	$1,108,360,052	3.3%	4.0%	-0.7%	1% - 7%	Yes
Real Estate[2,4]	$2,056,715,973	6.0%	6.0%	0.0%	6% - 10%	Yes
Infrastructure	$0	0.0%	0.0%	0.0%	0% - 3%	Yes
Farmland and Timber[4]	$116,218,653	0.3%	0.0%	0.3%	0% - 3%	Yes
Opportunistic Inflation-Linked[6]	$0	0.0%	0.0%	0.0%	0% - 3%	Yes
Total Inflation-Linked	$3,281,294,679	9.6%	10.0%	-0.4%	8% - 16%	Yes
Cash[5]	$374,540,574	1.1%	0.0%	1.1%		
Total	**$34,058,120,005**	**100.0%**	**100.0%**	**0.0%**		
Global Tactical Asset Allocation (GTAA)[2]	$3,729,097,756	10.9%	10.0%	0.9%	5% - 15%	Yes

[1]Total Domestic and International Equity includes Equity Risk Factor Portfolio with assets of $517.2 million.

[2]GTAA allocation distributed into U.S. Large Cap Equity, Int'l Developed Large Cap Equity, Core Fixed Income, Commodities and Real Estate.

[3]Domestic Equity, International Equity and U.S. Fixed Income market values include residual values remaining in terminated manager accounts.

[4]Values shown for private markets portfolios include cash flows that occurred during 3Q 2014.

[5]Cash includes money for the upcoming monthly pension distribution. Value shown also includes assets in liquidating GTAA account.

[6]Aggregate Opportunistic asset classes not to exceed 10%.

Note: Interim SAA Policy includes proration of 1% Private Equity and 2% Real Estate, which are unfunded.

Policy Ranges shown are relative to the long-term SAAP, causing some asset classes to be out of range while implementation of the long-term SAAP is in process.

Market values include manager held cash.

Commodities Performance

Arizona State Retirement System

Asset Class Performance Summary - Public Markets

	Market Value ($)	% of Portfolio	3 Mo (%)	Rank	9 Mo (%)	Rank	1 Yr (%)	Rank	3 Yrs (%)	Rank	5 Yrs (%)	Rank	10 Yrs (%)	Rank	Inception (%)	Since
Total Inflation-Linked Assets	769,188,043	2.3	-10.9	–	-4.5	–	-5.5	–	-3.2	–	–	–	–	–	-0.7	Feb-10
ASRS Custom Inflation-Linked Benchmark			*-11.8*	–	*-5.6*	–	*-6.6*	–	*-5.3*	–	*-1.8*	–	*1.4*	–	*-2.7*	*Feb-10*
Over/Under			0.9		1.1		1.1		2.1						2.0	

as of 9/30/14

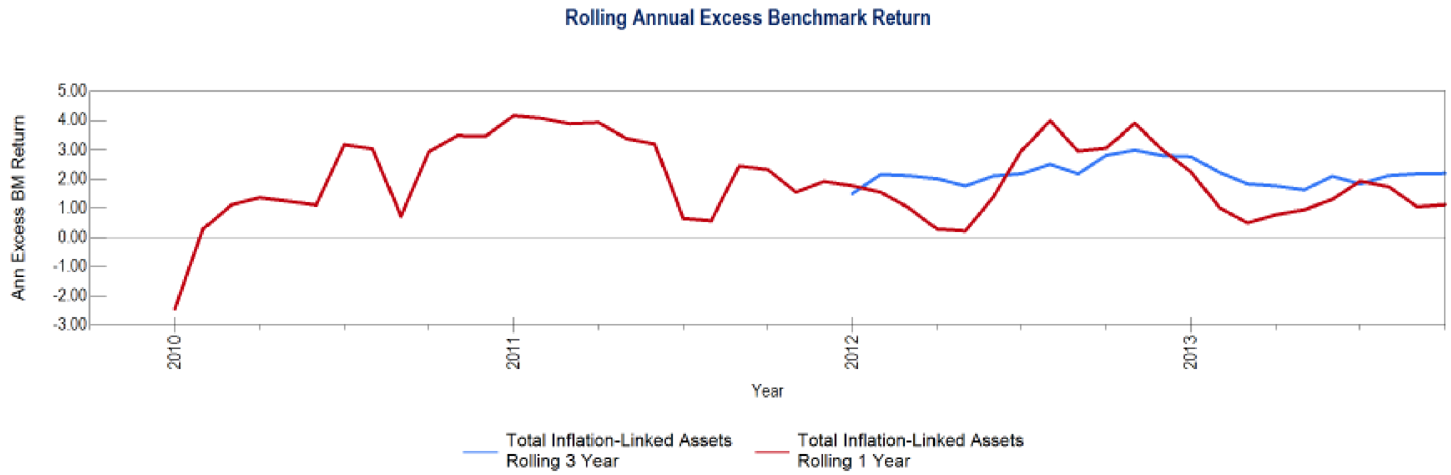
				Net Returns (%)								Excess Returns (basis points)							
								Annualized								Annualized			
	Style	Inception	Amount ($mil.)	Month	3 Months	YTD	1 Year	3 Years	5 Years	10 Years	ITD	Month	3 Months	YTD	1 Year	3 Years	5 Years	10 years	ITD
GLOBAL INFLATION LINKED																			
GRESHAM	FUNDAMENTAL	09/01/2010	761	-1.08	-8.02	-5.57	-5.61	-5.65	---	---	0.34	-27	-7	78	33	194	---	---	277
Bloomberg Commodity Index Total Return				-0.80	-7.95	-6.35	-5.94	-7.59	---	---	---								
TOTAL GLOBAL INFLATION LINKED			$ 761																

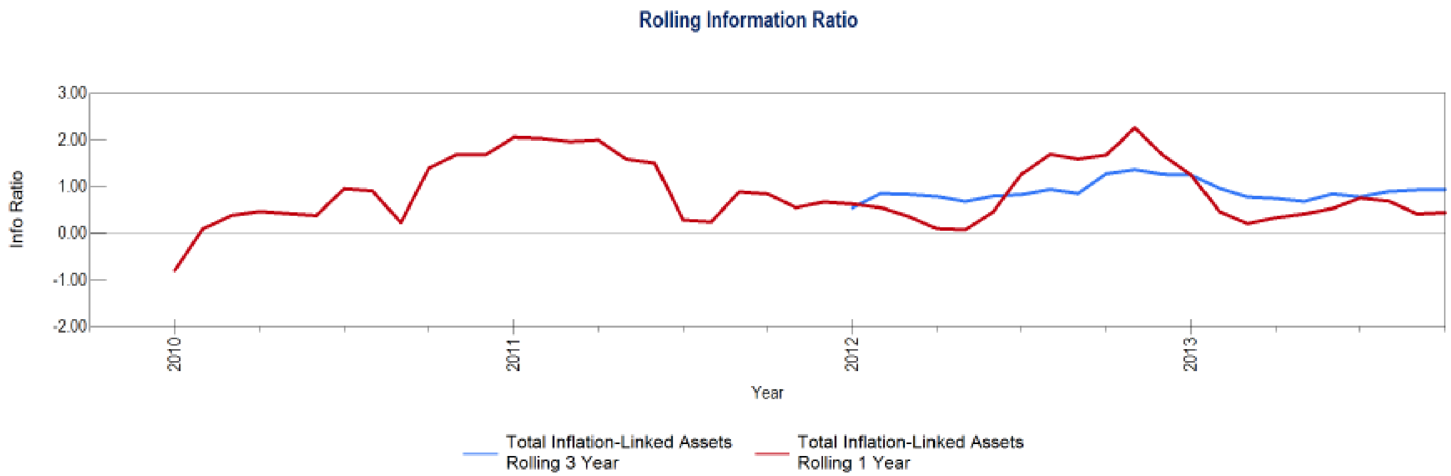
as of 10/31/14

Commodities Excess Return

Arizona State Retirement System

Asset Class Analysis - Total Inflation-Linked Assets



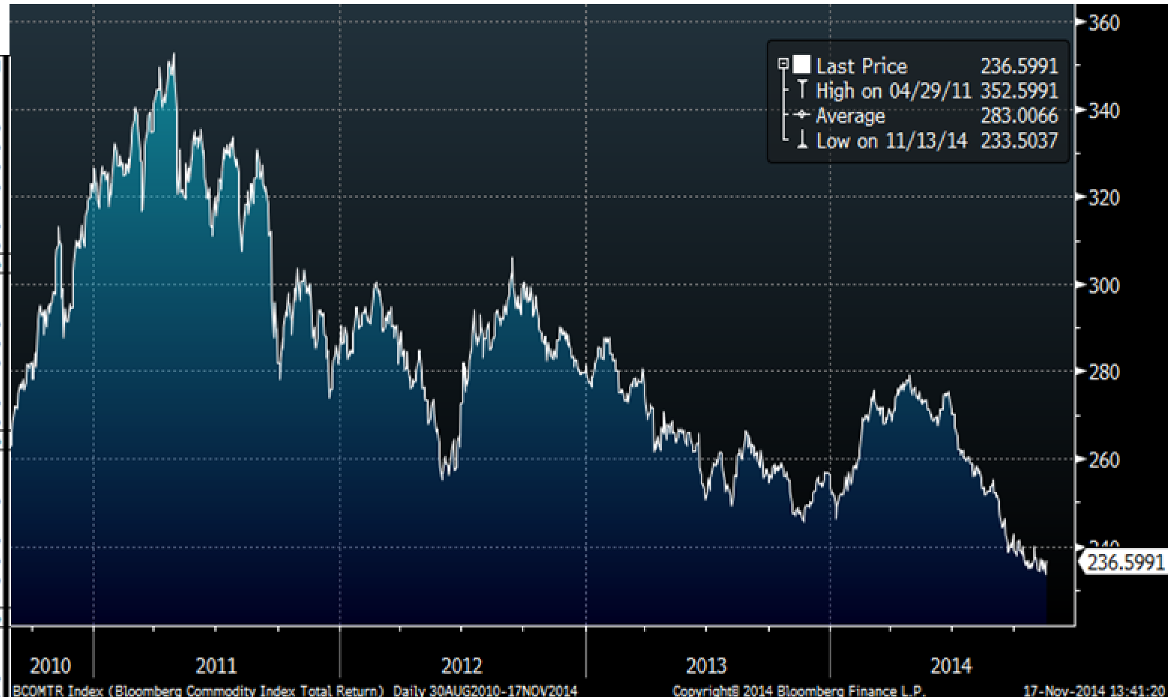


Commodities Profile

Bloomberg Commodities Total Return Index

9/30/2014 weights

	BCOM
AGRICULTURE	
Corn	5.75%
Soybean	4.32%
Wheat (CBOT)	2.81%
Wheat (KC)	1.11%
Wheat (MGE)	
Soybean Meal	2.05%
Soybean Oil	2.56%
Group SubTotal	18.59%
ENERGY	
Crude Oil	8.75%
Brent Crude	6.19%
Heating Oil	3.55%
Gas Oil	
Natural Gas	9.68%
Unleaded Gas (RBOB)	3.48%
Group SubTotal	31.65%
INDUSTRIAL METALS	
Aluminum	5.50%
Copper (LME)	
Copper (NY)	7.13%
Nickel	2.63%
Zinc	2.74%
Lead	
Group SubTotal	18.00%
LIVESTOCK	
Live Cattle	4.16%
Lean Hogs	2.20%
Feeder Cattle	
Group SubTotal	6.35%
PRECIOUS METALS	
Gold	12.05%
Silver	3.79%
Platinum	
Palladium	
Group SubTotal	15.84%
FOODS & FIBERS	
Cotton	1.21%
Sugar	4.30%
Coffee (ICE)	4.06%
Coffee (LIFFE)	
Cocoa	
Group SubTotal	9.57%
GROSS EXCESS RETURI	100.00%



Aug'10 - Apr'11	+35%	'risk on': positive global recovery
May'11	-9%	concerns re: Europe & global growth
Jun'11 - Aug'11	Range bound	mixed economic results
Sep'11	-16%	'risk off': Greece, Fed Twist, double dip fears
Oct'11 - Jan'12	Range bound	mixed economic results
Feb'12 - May'12	-14%	concerns re: Europe & global growth
Jun'12 - Sep'12	+16%	drought driven grains rally & Fed stimulus
Oct'12 - Dec'13	-14%	China slowdown, modest growth, anticipation of tapering
Jan'13 - Apr'14	+10%	momentum in growth, expectation of inflation
May'14 - Nov'14	-15%	broad supply strength, slowdown in grwoth ex-US

Commodities Index: Energy

- Performance [1]
  - YTD WTI (-23%) and Brent (-29%) have been very weak
    - The N. American shale gas story continues as the US ramps up production and reduces the Brent spread
    - Demand has not been robust as growth in the world ex-US has been weak
    - Saudi Arabia has met WTI production with production increases of its own
  - Natural gas (+2%) has been resilient as US infrastructure is being built out
- Market Commentary and Outlook
  - The US continues to set records for production and the petroleum complex is well supplied
  - Domestic growth continues to be moderate and not likely to surge
  - Geopolitical factors are unpredictable but have not been impactful

[1] as of 11/17/14

Commodities Index: Precious and Industrial Metals

- Performance YTD [2]
  - Gold (-1%) and silver (-17%) have been modestly weak as the Fed has ended its tapering program
  - Copper (-9%) has performed poorly as China has experienced a slowdown
- Market Commentary and Outlook
  - As a proxy for hedging against inflationary money printing and USD devaluation, gold and silver have a soft outlook
    - Relative US economic strength has positioned the USD for buoyancy
  - China's growth has moderated and its infrastructure build out for urbanization has shifted to a focus on a consumer driven economy
    - Industrial metals continue to be well supplied

[2] as of 11/17/14

Commodities Index: Ags, Livestock, and Softs

- Performance YTD [3]
    - Corn (-11%) and soybeans (-21%) have suffered meaningful losses driven by good weather and increases in global stocks
    - Cattle (+11%) and hogs (+18%) have been strong on the back of global protein demand and a virus that has thinned hog supplies
    - Coffee (+45%) has experienced the largest gains as Brazil has dealt with crop issues
- Market Commentary and Outlook
    - The weather has largely cooperated for a strong growing season in row crops. Final harvest numbers may create further downside price pressure.
    - Increased grain storage capacities over the past several years dampen these effects

[3] as of 11/17/14

Commodities House Views

COMMODITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **NEGATIVE**
   - The Fed ended its tapering program in November but reiterated that inflation continues to run below the FOMC's long-term objective. As Europe has begun to deal with its economic weakness with stimulus, the US dollar has strengthened on a relative basis.
   - Most commodity sectors appear well supplied, particularly for the current global growth environment.
   - Corn and wheat stockpiles have recently hit multi-year highs while world food prices continue to slide. Energy markets reflect the continued growth in US production as WTI and Brent prices have fallen by more than $20 from their June highs. Metals have weakened as precious metals have suffered from US dollar strength while industrial metals still exhibit weak demand.
2. Valuations: **NEUTRAL**
   - The index rose to nearly 280 in April 2014 but has steadily sold off to its current level of 235.
   - YTD: coffee, cattle, & hogs have been the leaders; gas oil and silver are the biggest laggards.
   - The index on a year-to-date basis is down 7.7% as all of the index sub-groups have posted negative returns.
3. Sentiment: **NEGATIVE**
   - The moderate growth and weak inflation environment in the U.S. year-to-date has tempered investor enthusiasm for commodities and resulted in outflows from commodities.
   - Exogenous geopolitical shocks have not resulted in price spikes; weather has been favorable.
   - Looking across the individual commodities, most remain well supplied, which has been reflected in prices as inflationary fears have abated.

Commentary:

IMD has maintained a tactical underweight relative to the SAAP during 2013 and into 2014 after recognizing the potential effects of Fed tapering and Chinese transition. IMD recognizes that Fed's actions will be data dependent but the QE program has ended.

The North American shale play has resulted in increased US energy production and represents a long-term phenomenon. China's growth rate is also moderating and the era of infrastructure build-out which fueled a portion of the demand for commodities (particularly industrial metals) is abating. Precious metals may also be challenged as the US has moved to the front of the global recovery and other countries' stimulus should result in US dollar strength at the margin. While grains are currently well supplied, the unpredictability of weather inhibits long-term forecasting.

IMD will closely monitor the growth and inflation dynamics globally with improving economic conditions and inflationary pressures serving as a catalyst which may initiate a neutral position.

CURRENT PORTFOLIO POSTURE: Underweight vs. SAA target

Arizona State Retirement System
Investment Beliefs

FRAME OF REFERENCE

The following *Investment Beliefs* have been established to ensure the development of congruent and synergistic investment strategies, and to ensure the effective and efficient allocation of resources. These *Investment Beliefs* determine the general paradigm within which investment strategies are developed, investment ideas are reviewed, and investment decisions are implemented.

Modifications to these *Investment Beliefs* will occur if experiential, academic, conceptual, and/or practical perspectives suggest that a superior belief system exists.

INVESTMENT BELIEFS

1. Asset Class Decisions are Key

In general, decisions with respect to which asset classes and sub-asset classes to invest in, and the allocations to these asset classes and sub-asset classes, have a greater impact on total fund investment returns than decisions in which specific securities to invest.

2. Theories and Concepts Must be Sound

Over longer periods of time, investment outcomes (e.g. rates of return, volatility) conform to logical theories and concepts. Significant deviations (e.g. internet bubble, pre-subprime erosion of risk premiums) from theoretically and conceptually sound investment constructs are usually not sustainable and are typically self-reverting.

3. House Capital Market Views Are Imperative

The development and articulation of sound *House Views* (e.g. views on interest rates, corporate spreads, asset valuations) will ensure consistency among investment decisions, clarity of investment direction, baselines for debates, and conformity of understanding.

4. Investment Strategies Must be Forward Looking

Investment strategies will be developed based on forward-looking insights, rather than simply on successful strategies of the past.

Asset class valuations and security valuations are significantly affected by endogenous outcomes (e.g. earnings, GDP growth rates, competitive barriers) that are probabilistic, and these outcomes are typically well analyzed by the investment industry.

Asset class valuations and security valuations are also significantly affected by random outcomes (e.g. natural disasters, certain supply & demand shocks) that are virtually unpredictable, and these outcomes are typically not analyzed directly by the investment industry.

Asset class valuations and security valuations are also significantly affected by exogenous outcomes (e.g. foreign policies, global cultural interactions) that can possibly be modeled, and these outcomes are typically not analyzed by the investment industry.

5. Public Markets are Generally Informationally Efficient

Asset Class Valuations

Asset class valuations (e.g. stock market levels versus interest rate levels) are often in equilibrium with one another, but anomalous situations do occur which result in disequilibria between asset class valuations. These disequilibria offer valuable investment opportunities which we will pro-actively seek and capitalize on.

Security Valuations

Security valuations (e.g. IBM versus Cisco) are often in equilibrium with one another, but private markets and anomalous public market situations do occur which result in disequilibria between security valuations. These disequilibria offer valuable investment opportunities which we will pro-actively seek and capitalize on.

The extent of informational efficiency varies across asset classes.

Private markets offer significant opportunities for asset mispricing and manager excellence which we will pro-actively seek and capitalize on.

6. Market Frictions are Highly Relevant

Market frictions (e.g. management fees, carried interest, revenue sharing, expenses, costs, transaction spreads, market impacts, taxes, commissions) can be significantly detrimental to investment performance and as a result transactions will be initiated only to the extent there is a strong level of conviction that they will result in increased investment returns or decreased risks net of all market frictions.

7. Internal Investment Professionals are the Foundation of a Successful Investment Program

In-house investment management capability engaged in direct portfolio management results in superior investment decision-making.

In-house investment management pro-actively monitors capital markets in order to determine mispricing opportunities & allocate capital and will successfully increase risk adjusted returns.

In-house investment professionals are more closely aligned with, and have a better understanding of, the purpose and risk & reward tolerance of the ASRS than external parties.

In-house investment professionals will impact direct investment negotiations, better align economic interests, and influence investment industry conditions (e.g. private deal structures, fee levels, introduction of innovative products & strategies).

8. External Investment Management is Beneficial

External investment organizations can often offer greater expertise, resources, and/or flexibility than internal personnel for various investment strategies.

9. Investment Consultants

Investment consultants will be effectively utilized in the following four general categories, and utilization of consultants will be focused on situations where there is a demonstrable need in at least one of the four areas:

- Independence: When oversight or controls should be enhanced
- Perspective: When internal perspectives are not broad enough
- Special Skills: When internal skills are not deep enough
- Resource Allocation: When internal resources are not broad enough

10. Trustee Expertise

Trustees often have expertise in various areas of investment management, and this expertise should be utilized while ensuring separation between Board oversight and staff management.