How...

ASRS Employees Deliver Service With PRIDE!

PROFESSIONALISM

We promote, strive for and expect individuals, teams, and divisions to possess professional qualities and skills to lead the organization.

- Displays a friendly, respectful and courteous demeanor even when confronted by adversity
- Has proactive and responsive approach to internal and external customer needs
- Possesses good communication and active listening skills
- Is a trusted contributor (manager, leader, SME, analyst, teammate)
- Takes personal accountability • Has subject matter expertise
- Has critical thinking skills • Has an honest, fair, non-judgmental mind-set
- Is adaptable to beneficial change • Adheres to the ASRS Code of Conduct

RESULTS

We treasure the achievements of individuals, teams, divisions and the agency that energize the organization.

- Meets goals and objectives
- Completes projects
- Produces quality work products
- Satisfies customers
- Attains individual accomplishments
- Manages risks successfully

IMPROVEMENT

We appreciate individuals, teams or divisions who drive the agency forward with new,innovative ideas and solutions.

- Promotes new ideas
- Enhances outcomes and performance
- Solves problems
- Enhances morale
- Improves relationships
- Increases efficiency, effectiveness or reduces costs

DIVERSITY

We recognize that utilizing different talents, strengths and points of view, strengthens the agency and helps propel outcomes greater than the sum of individual contributors.

- Encourages an attitude of openness and a free flow of ideas and opinions
- Treats others with dignity and respect
- Works effectively to accomplish goals with teams comprised of dissimilar individuals
- Recognizes and promotes skills in others attained on and off the job

EXCELLENCE

We celebrate individuals, teams and divisions who exceed expectations and deliver service with a PRIDE that permeates the organization.

- Surpasses member, stakeholder and associate expectations
- Demonstrates a willingness to go the extra mile to engender a positive public image
- Embraces change in a manner that inspires others
- Accepts responsibility and challenges with enthusiasm
- Takes a personal interest in promoting teamwork through effective use of communication (verbal, non-verbal, written and technological techniques)
- Creates a motivated, healthy and productive work environment that celebrates and rewards the accomplishments of others

ARIZONA STATE RETIREMENT SYSTEM

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

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, August 24, 2015
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 August 24, 2015 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.)..Mr. Tom Connelly
Chair, Investment Committee

2. Approval of Minutes of the June 22, 2015 Investment Committee Meeting (Action item; estimated time 1 min.)...Mr. Tom Connelly

3. Presentation, Discussion, and Appropriate Action Regarding ASRS Investment Program Updates (Informational and discussion item; estimated time 20 min.) .... Mr. Gary Dokes
Chief Investment Officer, ASRS
.... Mr. Dave Underwood
Assistant Chief Investment Officer, ASRS
.... Mr. Al Alaimo
Portfolio Manager of Fixed Income, 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

Regarding the following 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. The executive session will take place in the 14th floor conference room.

4. Presentation, Discussion, and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight of the ASRS Investment Program – Includes Total Fund and Investment Performance Report Q2-15 (Informational and discussion item; estimated time 20 min.) .... Mr. Allan Martin
Partner, NEPC
.... Mr. Dan LeBeau
Consultant, NEPC

5. Presentation, Discussion, Update and Appropriate Action Regarding the Real Estate Strategic Plan (Action item; estimated time 15 min.) .... Mr. Gary Dokes
.... Mr. Karl Polen

6. Presentation, Discussion, and Appropriate Action Regarding the ASRS Private Market Selection, Diligence, Fees and Monitoring (estimated time 45 min.) .... Mr. Gary Dokes
.... Mr. Karl Polen

7. Request for Future Agenda Items (Informational and discussion item; estimated time 5 min.)
.... Mr. Tom Connelly
.... Mr. Gary Dokes

8. 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(H) 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.

9. The next ASRS Investment Committee Meeting is scheduled for Monday, October 26, 2015 at 2:30 p.m., at 3300 N. Central Avenue, 14^{th} Floor Conference room, Phoenix, Arizona.

10. 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 with a disability 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 August 17, 2015

ARIZONA STATE RETIREMENT SYSTEM

Gloria Trujillo Committee Administrator	Gary R. 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, June 22, 2015
2:30 p.m.

The Arizona State Retirement System (ASRS) Investment Committee (IC) met at 3300 N. Central Avenue, 14th Floor, Phoenix, AZ 85012. Mr. Tom Connelly, Chair, called the meeting to order at 1:32 p.m.

1. Call to Order; Roll Call; Opening Remarks

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

A quorum was present for the purpose of conducting business.

2. Approval of Minutes of the April 20, 2015 Investment Committee Meeting Minutes

Motion: Prof. Dennis Hoffman moved to approve the minutes of the April 20, 2015 public meeting. Mr. Tom Connelly seconded the motion.

By a vote of 2 in favor, 0 opposed, 0 abstentions, 0 excused, and 1 vacancy, the motion was approved.

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

Mr. Gary Dokes, ASRS Chief Investment Officer (CIO), provided the Committee with an update on his perspective on the market, ongoing activities with the Investment Management Division (IMD) and a general overview of the House Views. He noted the over/underweights of each asset class and provided the Committee with a detailed explanation of the allocation to cash due to the recent change to the ASRS Strategic Asset Allocation. He made note of the methods of which cash is distributed within the portfolio, procedural changes of the Cash Management Program, and the goals set for the program. He further recognized Mr. Dave Underwood, Assistance Chief Investment Officer, for the Investor Intelligence Award he recently received for his work on equity risk factors and their implementation within the ASRS portfolio.

Mr. Connelly inquired on the expectations of future Public Markets meetings. Mr. Dokes responded that he expects to see one to two Public Market Meetings occur between now and the end of the 2015 calendar year.

Mr. Kien Trinh, State Street Investment Analytics, presented the State Street Risk Report. He discussed the monthly reallocation summary, month-end risk profile and total plan overview exposure.

4. Presentation, Discussion, and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight of the ASRS Investment Program – Includes Total Fund and Investment Performance Report Q1-15

Mr. Allan Martin, New England Pension Consultants (NEPC) Consultant, presented information on the investment performance and monitoring/oversight of the ASRS investment program. He advised the Committee his report provided the status of the Fund as of March 31, 2015, and noted the Fund's market value at approximately $34.9 billion.

Performance results: (as of March 31, 2014)

- 8.5% (20-year annualized net return) vs. 8% (actuarial assumer interest rate.)

	Quarter	**1 Year**	**3 Years**	5 Years	10 Years	Since Inception 06/30/75
Total Fund	2.8%	**6.5%**	**10.4%**	10.2%	7.0%	9.9%
Interim SAA Policy*	2.5%	**4.4%**	**9.6%**	9.5%	6.7%	9.7%
Excess Return	0.3%	**2.1%**	**0.8%**	0.7%	0.3%	0.2%

5. Presentation, Discussion, and Appropriate Action Regarding Total Fixed Income (Private and Public) Asset Class Presentation

Mr. Dokes provided the Committee with a brief overview of the agenda item and turned the meeting to Mr. Al Alaimo, ASRS Fixed Income Portfolio Manager, who gave his perspective on the Fixed Income asset class and provided the Committee with detailed information on the current program strategies, portfolio composition and performance.

6. Presentation, Discussion, and Appropriate Action Regarding an ASRS Risk Assessment of the Agency Investment Management Program

Ms. Lisa King, ASRS Policy Analyst, presented the Committee with an overview of the Enterprise Risk Management (ERM) Committee and its key functions in assessing risks and threats of the ASRS. She highlighted the Committee's objectives and noted the Committee's most recent focus to the ASRS Investment Management Division (IMD). She then turned the meeting over to Mr. Dokes, who elaborated on the methods used by the Committee to measure risks, and further highlighted key investment risks, threats and the ERM's assessment of them.

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

There were no requests from Trustees for this agenda item.

8. Call to the Public

No members of the public requested to speak.

9. Adjournment

The meeting adjourned at 5:06 p.m.

Respectfully submitted,

ARIZONA STATE RETIREMENT SYSTEM

Gloria Trujillo Date	Gary R. 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: August 12, 2015

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 Short-Term Cash Management Risks

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 Metric.

Attachments:

From ASRS

- Investment Program Updates Report

From State Street

- truView Risk Report – as of June 30, 2015

From ASRS

- Short-Term Cash Management Risk Report – as of July 31, 2015

Arizona State Retirement System

Investment Committee

Investment Program Updates

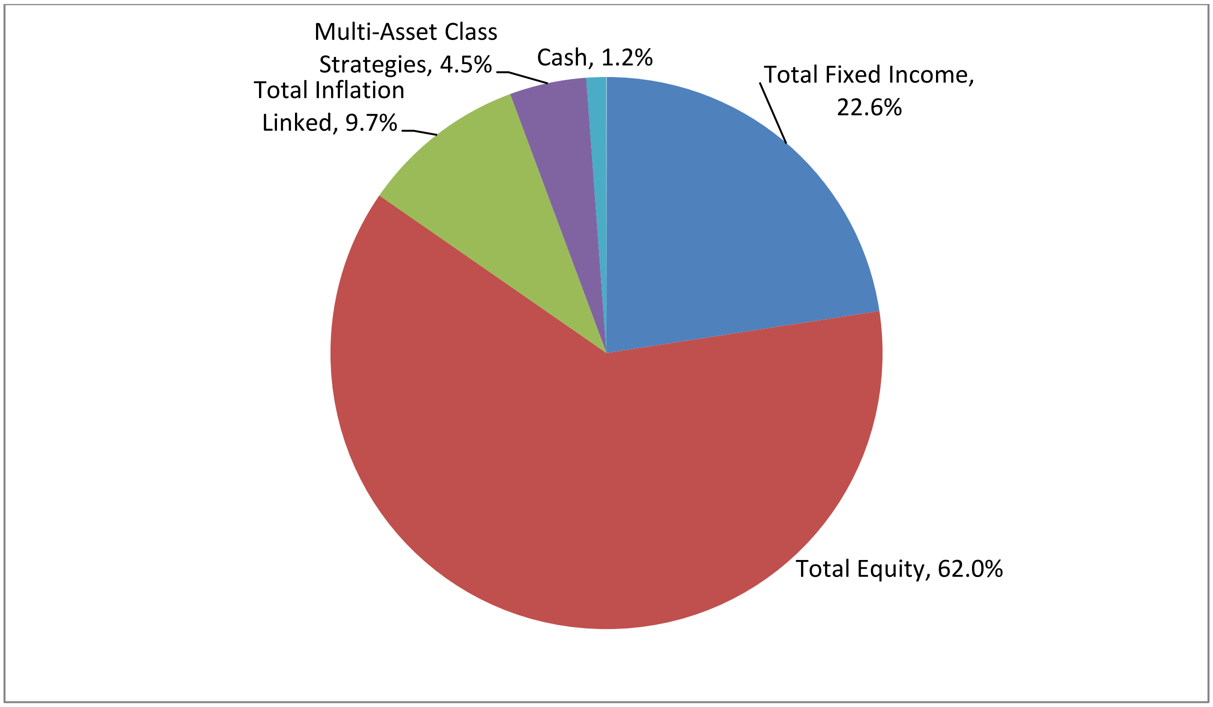
August 24, 2015

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

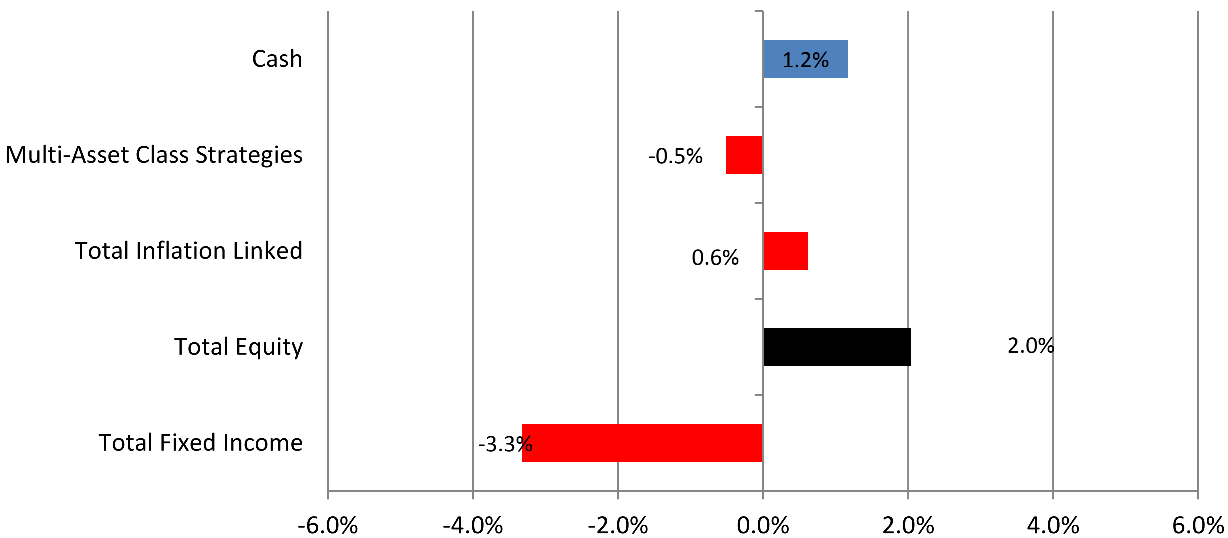
TABLE OF CONTENTS

TOTAL FUND POSITIONING – 7/31/2015

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** **Friday, July 31, 2015**

Account Manager	Account Manager Style	Fixed Income		Equity		Inflation Linked	Multi-Asset	Total	Pct of Fund
		Active	Enh/Passive	Active	Enh/Passive	Active	Active		
State Street B&T: Boston	Tactical Cash (non-assetized)							0	0.00%
								Tactical Cash Policy Range: 0% - 3%	0.00%
	Operating Cash (non-assetized)		21,895,821					21,895,821	0.06%
	Operating Cash (assetized)		383,626,331					383,626,331	1.11%
	Cash Total							**$405,522,152**	1.17%
								Cash Policy: 0%	0.00%
	Treasuries (Long Duration) Total							$0	0.00%
								Treasuries (Long Duration) Policy Range: 0% - 10%	0.00%
Blackrock: San Francisco	Passive (Intermediate Gov Credit)		24,342,689					24,342,689	0.07%
ASRS: Phoenix	Enhanced Passive F2		1,869,170,593					1,869,170,593	5.39%
Blackrock: San Francisco	Passive (US Debt Index)		1,809,100,945					1,809,100,945	5.21%
	Core Fixed Income Total							**$3,702,775,122**	10.67%
								Interest Rate Sensitive: 11%	11.00%
Columbia: Minneapolis	Active	818,006,292						818,006,292	2.36%
JP Morgan: Indianapolis	Active	486,455,003						486,455,003	1.40%
	High Yield Fixed Income Total							**$1,304,475,050**	3.76%
								High Yield Fixed Income Policy	4.00%
	Opportunistic Debt	1,142,333,468						**$1,142,333,468**	3.29%
								Opportunistic Debt Policy:	0.00%
	Private Debt Total	1,685,070,560						**$1,685,070,560**	4.86%
								Total Private Debt: 8% - 12%	10.00%
	Fixed Income Total							**$7,834,709,695**	22.58%
								Total Fixed Income Policy Range: 18% - 35%	25.00%
Intech: FL	Active (Growth)			435,762,644				435,762,644	1.26%
LSV: Chicago	Active (Value)			767,327,459				767,327,459	2.21%
ASRS: Phoenix	Passive E2				5,140,455,927			5,140,455,927	14.81%
ASRS: Phoenix	Enhanced Passive E7				656,773,432			656,773,432	1.89%
ASRS: Phoenix	Enhanced Passive E8				562,086,326			562,086,326	1.62%
ASRS: Phoenix	Risk Factor Portfolio				571,317,840			571,317,840	1.65%
	Large Cap Equity Total							**$8,133,723,628**	23.44%
								Large Cap Policy	20.00%
Wellington: Boston	Active (Core)			287,545,406				287,545,406	0.83%
ASRS: Phoenix	Passive E3 (Growth)				398,081,085			398,081,085	1.15%
ASRS: Phoenix	Passive E4 (Value)				342,825,585			342,825,585	0.99%
	Mid Cap Equity Total							**$1,028,508,981**	2.96%
								Mid Cap Policy	3.00%
TimesSquare: New York	Active SMID (Growth)			383,749,640				383,749,640	1.11%
DFA: Santa Monica	Active (Value)			281,365,536				281,365,536	0.81%
ASRS: Phoenix	Passive E6				333,831,140			333,831,140	0.96%
	Small Cap Equity Total							**$999,008,988**	2.88%
								Small Cap Policy	3.00%
	U.S. Equity Total							**$10,161,241,597**	29.28%
								US Equity Policy Range: 16% - 36%	26.00%
Brandes: San Diego	Active (Value)			609,646,537				609,646,537	1.76%
American Century	Active (EAFE)			597,800,193				597,800,193	1.72%
Trinity Street	Active (EAFE)			340,061,169				340,061,169	0.98%
Thompson Siegel Walmsley	Active (EAFE)			317,361,972				317,361,972	0.91%
Blackrock: San Francisco	Passive (EAFE)				4,296,143,145			4,296,143,145	12.38%
	Large Cap Developed Non-US Equity Total							**$6,163,981,345**	17.76%
								Large Cap Developed Policy	17.00%
AQR: Greenwich	Active (EAFE SC)			98,818,518				98,818,518	0.28%
DFA: Santa Monica	Active (EAFE SC)			107,772,991				107,772,991	0.31%
Franklin Templeton: San Mateo	Active (EAFE SC)			230,996,862				230,996,862	0.67%
Blackrock: San Francisco	Passive (EAFE SC)				254,793,234			254,793,234	0.73%
	Small Cap Developed Non-US Equity Total							**$692,384,042**	2.00%
								Small Cap Developed Policy	2.00%
William Blair: Chicago	Active (EM)			383,981,151				383,981,151	1.11%
Eaton Vance: Boston	Active (EM)			387,036,501				387,036,501	1.12%
LSV: Chicago	Active (EM)			233,630,595				233,630,595	0.67%
Blackrock: San Francisco	Passive (EM)				513,361,245			513,361,245	1.48%
	Emerging Markets Equity Total							**$1,518,009,492**	4.37%
								Emerging Markets Policy	5.00%
	Non-US Equity Total							**$8,374,374,879**	24.13%
								Non-US Equity Policy Range: 14% - 34%	24.00%
	Private Equity Total			2,506,234,221				**$2,506,234,221**	7.22%
								Private Equity Policy Range: 6% - 10%	8.00%
	Opportunistic Equity			497,874,148				**$497,874,148**	1.43%
								Opportunistic Equity Policy:	0.00%
	Equity Total							**$21,539,724,844**	62.07%
								Total Equity Policy Range: 48% - 65%	58.00%
Gresham: New York						453,637,265		453,637,265	1.31%
	Commodities Total							**$453,637,265**	1.31%
								Commodities Policy Range: 0% - 4%	2.00%
	Real Estate Total					2,431,643,668		**$2,431,643,668**	7.01%
								Real Estate Policy Range: 8% - 12%	10.00%
	Infrastructure Total					294,905,096		**$294,905,096**	0.85%
								Infrastructure Policy Range: 0% - 3%	0.00%
	Farmland & Timber Total					182,544,404		**$182,544,404**	0.53%
								Farmland & Timber Policy Range: 0% - 3%	0.00%
	Inflation Linked Total							**$3,362,730,432**	9.69%
								Inflation Linked Policy Range: 10% - 16%	12.00%
Windham							425,036,587	425,036,587	1.22%
Bridgewater							1,134,704,288	1,134,704,288	3.27%
	Multi-Asset Class Strategies							**$1,559,740,876**	4.49%
								Multi-Asset Class Policy Range: 0% - 12%	5.00%
	TOTAL Amounts	$4,131,934,574	$4,108,297,274	$8,468,893,219	$13,070,831,625	$3,362,730,432	$1,559,740,876	**$34,702,428,000**	Total Fund
	TOTAL Percent	11.91%	11.84%	24.40%	37.67%	9.69%	4.49%		

Asset Class	Actual Portfolio	SAAP Target (Range)	Interim SAA* Adj Policy	Actual - Interim SAA** % diff	$ diff	Policy Band check Actual - Adj Policy
Tactical Cash	0.00%	0% (0-3%)	0.00%	0.00%		
Cash	1.17%	0.00%	0.00%	1.17%	405,522,152	
Interest Rate Sensitive	10.67%	11%	15.67%	-5.00%		
High Yield	3.76%	4%	5.37%	-1.61%		
Opportunistic Debt	3.29%	0%	0.00%	3.29%	$1,142,333,468	
Private Debt	4.86%	10% (8-12%)	4.86% (3-7%)	0.00%		
Total Fixed Income	**22.58%**	**25% (18-35%)**	**25.9% (19-36%)**	**-3.32%**	**-$1,152,477,044**	**OK**
Large Cap	23.44%	20%	21.95%	1.49%	$518,224,347	
Mid Cap	2.96%	3%	3.00%	-0.04%	-$12,563,859	
Small Cap	2.88%	3%	3.00%	-0.12%	-$42,063,852	
US Equity	**29.28%**	**26% (16-36%)**	**27.95% (18-38%)**	**1.34%**	**$463,596,636**	**OK**
Developed Large Cap	17.76%	17%	17.87%	-0.11%	-$36,625,163	
Developed Small Cap	2.00%	2%	2.00%	0.00%	-$1,664,518	
Emerging Markets	4.37%	5%	5.00%	-0.63%	-$217,111,908	
Non-US Equity	**24.13%**	**24% (14-34%)**	**24.87% (15-35%)**	**-0.74%**	**-$255,401,590**	**OK**
Private Equity	7.22%	8% (6-10%)	7.22%	0.00%	$0	**OK**
Opportunistic Equity	1.43%	0%	0.00%	1.43%	$497,874,148	
Total Equity	**62.07%**	**58% (48-65%)**	**60.04% (50-67%)**	**2.03%**	**$706,069,195**	**OK**
Commodities	1.31%	2% (0-4%)	2.06%	-0.75%	-$261,183,278	**OK**
Real Estate	7.01%	10% (8-12%)	7.01%	0.00%	$0	**OK**
Infrastructure	0.85%	0% (0-3%)	0.00%	0.85%	$294,905,096	**OK**
Farmland & Timber	0.53%	0% (0-3%)	0.00%	0.53%	$182,544,404	**OK**
Opportunistic I/L	0.00%	0%	0.00%	0.00%	$0	
Total Inflation Linked	**9.69%**	**12% (10-16%)**	**9.07% (7-11%)**	**0.62%**	**$216,266,221**	**OK**
Multi-Asset Strategies* **	**4.49%**	**5% (0-12%)**	**5% (0-12%)**	**-0.51%**	**-$175,380,524**	**OK**
Total	**100.00%**	**100%**	**100.00%**	**0.00%**	**$0**	

Internally Managed Portfolios:	
$9,303,224,088	27%

***Interim SAA includes a proration of unfunded Private Equity, Private Debt, and Real Estate**

****Private Equity is prorated to domestic equity; Real Estate is prorated to equity, commodities, and fixed income; Private Debt is prorated to Interest Rate Sensitive and High Yield**

Opportunistic definitions:
An investment in a category that is not included in the ASRS Asset Allocation policy and represents an investment opportunity that is tactical in nature.
Opportunistic investments have a 0% target (0%-10% range), regardless of asset class.

Total Opportunistic		
Opportunistic Debt	**$1,142,333,468**	**3.3%**
Opportunistic Equity	**$497,874,148**	**1.4%**
Opoprtunistic IL	**$0**	**0.0%**
	$1,640,207,616	**4.7%**

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

AUGUST 2015

U.S. EQUITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **POSITIVE**
   - Economic data still shows stable, sub-trend growth in 2015.
   - U.S. unemployment, is displaying sustained improvement. Income growth has not, although some localized instances of upward pressure has begun to surface.
   - 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 growth has decelerated, mostly due to the impact of lower energy prices; revenues are still in a modest uptrend; high profit margins are no longer expanding.

2. Valuations: **NEUTRAL**
   - U.S. equity markets have been trendless since reaching highs first in March, then and again in May, apparently buffeted by mixed macro data, downward revisions to earnings estimates and anxiety over the timing and scale of the first upward reset to interest rates and more volatility in foreign exchange markets.
   - Though marginally rich, price/earnings multiples remain near historic averages: S&P 500, 15.8x-17.6x; S&P MID, 16.0x-19.8x; S&P SC600, 17.8x-20.9x.
   - 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, whereas those of mid- and small-caps are around 4.0%.

3. Sentiment: **NEUTRAL**
   - Short-term caution has moved up a notch following the sustained advance of equity markets without a significant pullback throughout 2013 and 2014.
   - Lessened near-term equity market volatility (i.e., VIX Index) still reflects growing acceptance of risk-oriented assets.
   - The relative strength of the U.S. Dollar continues to encourage assets into U.S. equities.

Commentary:

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

We reduced the allocation of U.S. equities during 1Q2015 to align toward the newly adopted Strategic Asset Allocation Policy (SAA) and use proceeds to fund private market capital calls and external cash flows.

Long-term prospects for the U.S. equities markets remain constructive even if the current phase of price fluctuations appear to weaken that case. The major indexes of U.S. stocks have responded generally as anticipated. Robust, macro-driven momentum of the past two years was overdue for some deceleration, even a downright pause, if only to allow fundamentals time to catch up with prices. Having reached an all-time high, prices have backed off a bit, snuffing out positive year-to-date returns and eroding investor confidence.

There is a positive macro environment for domestic equities, with an essentially sound U.S. economy in a setting of unusually low interest rates. Although some stumbling is likely as the cycle of rising interest rates gets underway, and perhaps the markets have prematurely telescoped-in some of that already this year, history has shown that stocks tend to fare reasonably well as interest rates ascend. Official Federal Reserve policy remains clear in its expectation to normalize the level of the federal funds rate only gradually and reflect the slow, but continuing diminution of economic headwinds. Thus any interest rates increases will be a function of sustained improvement in the U.S. economy, not because the FOMC wants to forestall an overheated economy and induce recession. That's hardly a precursor for falling corporate earnings and stock prices.

Almost perversely, analysts have been taking down 2015 earnings estimates since last November, coinciding with a period in which the both the rise of the exchange rate of the U.S. Dollars and the decline in oil prices accelerated. Reductions in estimates for energy sector earnings and the effects of the higher USD exchange rate account for the 2015 year-on-year growth rate of S&P 500 earnings tumbling to 2%. Viewed at the index level and not necessarily from a top-down context, nor sector by sector, the markets seemed to have inferred that business was undergoing a widespread weakening. However, the benefits derived from quantitative easing provoking global reflation haven't been translated into the present cohort of non-energy corporate earnings estimates. They are apt to be meaningful catalysts to stocks as 2015 rolls on.

Misconceptions about the speed and magnitude by which the FOMC will move interest rates upward, apprehension over the direction of earnings estimates revisions, and transient anxieties about the potential impact from fluctuating Chinese equity markets have triggered recent bouts of relatively minor volatility. This is likely to go on until visible signs appear later this year from the positive combined follow-on effects of ex-U.S. QE programs, of the favorable relative exchange rates engendered by those programs, and from low energy prices. As those signs appear, widespread U.S. corporate earnings growth rates should also turn up.

CURRENT PORTFOLIO POSTURE: OVERWEIGHT vs. SAA target

NON – U.S. EQUITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **POSITIVE**
   - Eurozone and Japanese economic conditions are firming, if irregularly; they remain soft in lesser-developed economies.
   - Relatively inexpensive and available money supports a shift toward risk assets.
   - Monetary and economic policies are focused on promoting economic growth and stemming disinflation.

2. Valuations: **POSITIVE**
   - Reasonable global valuations relative to U.S.; price-to-book values of 1.4x - 1.6x; P/Es of 11.9x – 15.2x on trend earnings.

- Dividend yields are incrementally more favorable -ranging from 1.1x to 1.9x that of the S&P500.

3. Sentiment: **POSITIVE**
   - With the exception of the emerging markets, money flows continue toward the developed counterparts, biased more toward non-U.S. equities than to domestic U.S. markets. Investors are less guarded and remain constructive on global risks despite some near tern risk aversion volatility.
   - Major non-U.S. markets performance have mostly strengthened in 2015.

Commentary:

The "POSITIVE" opinions on Fundamentals, Sentiment and Valuations are unchanged.

Staff raised the allocation to the overall Non-U.S. Equities class in April. It now more closely aligns with the SAA policy target. Later in the cycle it may exceed that slightly. We reduced both the Emerging Markets sub-class and EAFE/Small-cap asset subclasses during June to move them to the new policy target weights. Proceeds were reapportioned to the developed markets EAFE asset subclass to also align its weight with the new policy target weight.

Overall Non-U.S. equities allocations have been more neutral to the (previous) SAA policy since late 4Q2013, awaiting sustainably stronger ex-U.S. economic growth before moving to increase the proportion relative to that of U.S. equities. These preconditions are materializing, but remain challenged in the slow growth world.

The case for global equities is still upbeat on the back of the global reflationary effort. Flow-driven major markets remain capable of posting high, single digit returns (in USD terms) by year-end. Both the distant past and recent history have shown that liquidity injections, when delivered in sufficient size and duration, can greatly surpass most other market influences. ECB quantitative easing of over a trillion Euros certainly meets those criteria.

Some risks still threaten, e.g.: Investor leverage, threats to profitability, crowding of trades and some geopolitical risks. The effects of moving foreign exchange rates dominate most factors and have led to Japanese and European equities responding to profitability-driven margin expansion. The markets don't seem to have priced this in completely, yet momentum risk-on, and reflation oriented strategies, especially in the European markets, seem to be prevailing.

Support from robust liquidity in Europe, and a stronger than expected economy, are impressive enticements to under-owned, low-leverage equities. Upside potential remains, although an overly strong rise too early in the process could burn that out. The impact of quantitative and qualitative easing in Japan has effectively collared the downside of its markets even as overall returns on corporate equity are normalizing further to the upside.

That large, globally-exposed corporations now face more significant revenue and earnings headwinds is one negative consequence in the U.S. from a stronger U.S. Dollar (USD). In contrast, the weakening of currencies against the USD should help augment the revenues of large, multinational equities based outside the U.S. Similarly, European corporate earnings are destined to grow at a double-digit pace, despite lingering weakness in the peripheral regional economies. European equities currently benefit from three significant tailwinds: the fall in the EUR exchange rate; a reduction in borrowing costs; and the resulting boost to growth from protracting lower oil prices. The European Central Bank's quantitative easing program should continue to support the first two tailwinds in the near term, while oil prices should continue to fall in year-on-year terms for several months, even should the clearing price cease falling further, which supports the third tailwind.

UK equities have fallen out of favor since the Scottish referendum in September last year. Although, the recent UK elections outcomes aren't necessarily capital markets friendly the markets seem discounted the political risks even though the UK market faces a zero expected return in 2015.

Emerging market economies are still beset by political interference, intractable labor markets and structural problems with what drives those economies. Despite sustained liquidity coursing through their capital markets, the stocks are largely unresponsive. Moreover, capital flows into the USD will continue weighing on the EMs.

A persistently rising USD is not a common theme in markets. It appears to be less prevalent during a "risk on" trend – driven by economics and fundamentals – rather than during a "risk-off' mode. Still, the ramifications of a strong USD in 2015 will be important globally and across assets Many of the first-round consequences of a strong USD have already been felt. The strength of the USD has helped to push commodity prices and inflation down, restraining bond yields and leading to increased flows into U.S. equities and bonds. These trends should persist and even second-round influences may emerge. The latter might surface as financial conditions in some EM economies tighten further and should any further firming in U.S. consumption elevate the rate of GDP growth. Again, this bolsters the case for multinational non-U.S. companies with sizeable revenues from exports to the U.S.

Also, a rising USD has significant effect on the global flows of capital. The implications are substantial for financial conditions globally and probably felt most acutely by those countries running current account deficits and where a higher proportion of debt is issued in USD. Economic, asset price and currency outperformance in the U.S. may hinder domestic investors from aggressively deploying assets abroad. Meanwhile, investors in weak economies where currencies are depreciating and asset price performance is equally meager are apt to invest the U.S. These potential secondary forces suggest to us that the significant outperformance of U.S, and of developed non-U.S., equity markets relative to those of emerging economies is a multi-year, structural theme.

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 ended for the most part in 2014. In addition, the Fed has kept the target Fed Funds rate at effectively zero for several years. With a seemingly improved economy, the bond market is facing the prospect that the accommodative Fed policy is likely near its end. Most economists believe the Fed will likely raise short-term rates in the next several months. It is possible that long-term rates may rise as well, which would be negative for the returns of core fixed income. That being said, long-term U.S. interest rates may remain relatively low by historical standards for a number of reasons. These include slowing growth and disinflationary (or deflationary) pressures in many regions of the world including Europe and China, accommodative monetary policies in other countries including most

notably the recent adoption of quantitative easing by the European Central Bank ("ECB"), and very low competing long-term interest rates in other developed countries.

2. Valuations: **NEGATIVE**
   - The core fixed income market is likely to generate low returns due to low overall yields as Treasury rates remain at low levels and investment-grade credit and agency MBS spreads are relatively tight. 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 (excluding the energy sector of the high yield market) and an overall demand in the market for yield, the valuation of high yield bonds is much less attractive than in the immediate years after the credit crisis of 2008-2009. Despite the potential for defaults in the energy sector, the outlook for the vast majority of industries the high yield market remains quite favorable and we believe the high yield market will likely achieve low to mid-single-digit returns this year.
   - 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 Total Fixed Income relative to its SAAP policy. Core fixed income offers important defensive characteristics which help to balance out the overall risks of the total fund portfolio however the current low levels of U.S. Treasuries and tight spreads in the investment-grade bond markets are relatively unattractive compared to other select credit markets -- particularly private debt and opportunistic debt -- where compelling yield and total return opportunities exist. Opportunistic debt includes a number of mandates mostly in distressed debt and that are not included in SAAP.

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.
   - In July, REITs were trading at an average dividend yield of 3.97% (161bp above 10y treasury) and a 3% discount to NAV. The dividend yield spread is above the historical average of 110 while the historical difference to NAV is a 4% premium.

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. The ASRS 2015 real estate pacing plan called for $700 million to $1.2 billion in new commitments; including $500 to $750M allocated to new managers, $100M to $200M in closed-end funds, and $100M to $300M to existing separate account managers.

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.

- ◊ Oil prices have remained in the range of their 2014 price correction which will result in reduced service costs and tempered production growth in the medium term. Debt markets have locked up and equity transactions will take time to sort out. We expect industry consolidation at the margin favoring low cost producers with less leverage and more production hedged.
- ◊ 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 increasing its stimulus efforts by buying €60B per month. 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.

2. Valuations: **NEUTRAL**
    - U.S. median purchase price multiples in 2014 were 8.9x, down from the 10.0x 2013 levels (which were close to the previous peak).
    - The leveraged loan and high yield debt markets were active in 2014 but down from 2013 highs. Single B high yield spreads have widened to ~530bps.
    - The U.S. median Debt/EBITDA ratio of 5.8x in 2014 was down from 6.5X in 2013 (slightly above the previous peak).

3. Sentiment: **NEUTRAL**
    - Globally, $495B (994 funds) have closed in 2014 compared to $528B (1,187 funds) in 2013. Dry powder of nearly $1.2T globally has remained flat.
    - The global number of buyout deals rose from 3,260 in 2013 to 3,423 in 2014 while the aggregate value of deals increased from $302B to $332B.
    - Exits were up in 2014 to 1,691 from 1,622 in 2013 while the 2014 aggregate value of $441B was considerably higher than the $330B in 2013.
    - The IPO market in 2014 remained strong ($87B) but was down slightly from the 2013 level ($91B).

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 and continue to monitor Europe for a favorable reentry point and look for opportunities to capitalize upon distress. IMD's pacing plan called for $700M in commitments for 2015.

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

COMMODITIES

Primary Market Metrics & Indicators:

1. Fundamentals: **NEGATIVE**
    - The US dollar has strengthened on a relative basis as the Fed appears poised to raise interest rates. China's economy has slowed down while Europe has begun to deal with its economic weakness with stimulus.

- Most commodity sectors appear well supplied, particularly for the current global growth environment.
- The decision by Saudi Arabia not to reduce production with the potential addition of Iranian supply has kept energy markets depressed, resulting in rig lay downs in the U.S. while the budgetary impacts globally continue to add up.
- Corn and wheat stockpiles have recently hit multi-year highs while world food prices continue to slide. Energy markets reflect the continued growth in global production as WTI and Brent prices are both below $50. Metals have weakened as precious metals have suffered from U.S. dollar strength while industrial metals still exhibit weak demand.

2. Valuations: **NEGATIVE (from NEUTRAL)**
   - The Bloomberg Commodities Index fallen to 12 year lows as global supplies outpace demand.
   - On a trailing twelve-month basis, commodities are down 30% with ags being the least impacted sector with a decline of 19%.

3. Sentiment: **NEGATIVE**
   - The moderate growth and weak inflation environment in the U.S. has tempered investor enthusiasm for commodities and resulted in outflows from commodities.
   - The slowdown in the Chinese economy and its equity market has tempered enthusiasm for commodities.
   - Geopolitical news (particularly regarding Iran) has hurt energy prices. Looking across the individual commodities, most remain well supplied, which is reflected in prices as inflationary fears are muted.

Commentary:

IMD has maintained a tactical underweight relative to the SAA approved in 2015 which reduced the commodities target from 4% to 2%, recognizing the effects of the Chinese slowdown and sufficient global supplies. As a result of the changing dynamics in the energy markets IMD reduced its exposure to commodities in December and further reduced its exposure in July as inflationary pressures are still soft.

The North American shale play has resulted in increased U.S. 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 U.S. 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 maintain a tactical underweight relative to the SAAP and look to potentially further underweight. Improving economic conditions and inflationary pressures would serve as a catalyst to initiate a neutral position should the conditions arise.

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. 5.5% 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.

2015 ASSET CLASS COMMITEE AND IC MEETINGS

2015		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	
1st	January	01/23 01/29	2					8
	February	02/27	1			02/09 02/23	2	
	March	03/19 03/20 03/27	3					
2nd	April	04/21	1			04/20/15	1	4
	May	05/18	1					
	June	06/04 06/23	1					
3rd	July	07/20 07/29	2					3
	August			08/14	1			
	September							
4th	October							
	November							
	December							
Totals			11		1		3	15

6/23/2015

- **Real Estate**
  - The Committee approved an increase to $300 million from $200 million to an existing real estate manager. Legal negotiations are pending.
  - The Committee approved granting a variance for a potential investment opportunity in downtown Los Angeles, CA.
  - The Committee approved the proposed changes to the real estate strategic plan with changes to clarify the definition of “commercial” and “for sale” real estate, and with mention of the existing practice that real estate separate accounts will include a term allowing the termination of investment periods preventing new assets from being added to the account following such termination.
  - The Committee confirmed a future meeting date of July 17, 2015. This meeting has since been canceled.

07/20/2015

- **Real Estate**
  - The Committee approved a $200 million commitment in a niche neighborhood real estate opportunity in the Los Angeles market. Legal negotiations are pending.
  - The Committee approved a $200 million commitment in medical office buildings throughout the United States. Legal negotiations are pending.
  - The Committee approved granting a variance to pursue a potential real estate investment located in Port St. Lucie, FL.
  - The Committee approved granting a variance on a real estate investment located in San Antonio, TX.
  - The Committed approved the termination of the investment period of a current real estate manager.
  - The Committee confirmed the following future meeting date: July 29, 2015 (continuation of the meeting scheduled July 20t), August 17, 2015 and September 22, 2015.
- **Private Opportunistic Equity**
  - The Committee discussed a $100 million commitment to a no-fee, no-carry co-investment with Pinebrook. The Committee continued the discussion of this agenda item on July 29, 2015.

07/29/2015

- **Private Opportunistic Equity**
  - The Committee approved a $100 million commitment to a no-fee, no-carry co-investment with Pinebrook. Legal negotiations are pending.

TACTICAL PORTFOLIO POSITIONING

Since the last IC meeting, no significant portfolio repositioning has occurred; however, selective asset classes and portfolios within these asset classes were the primary funding source to replenish ASRS Cash Assetization Program.

From an Investment House Views perspective, the Fund remains net underweight in total fixed income vs. policy with a bias to private/opportunistic over public debt; net overweight in total equity; slightly underweight net inflation-linked; and approximately a policy weight in the multi-asset strategies.

The CIO and his staff will discuss the rationale for asset class positioning and perspectives on ASRS strategic and tactical investments.

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

- Cole Smith, ASRS Equity Portfolio Manager, successfully passed the Level III CFA exam and, as a result, is expected to receive the distinguished Chartered Financial Analyst (CFA) designation in September.

- IMD has commenced discussions focusing on the continued issues in the Chinese economy, and the potential impact these may have on global growth and in the valuation of all risky assets particularly in non-U.S. and emerging markets. A series of conference calls have occurred with select knowledgeable external parties. The objective of these internal and external discussions is to affirm or potentially modify ASRS House Views which could result in subsequent tactically portfolio repositioning.

- IMD continues to fund ASRS private markets program (debt, equity and real estate); a formal review of implementation and pacing plans for CY 2016 are scheduled for Q4-15.

- IMD continues to manage the ASRS Securities Lending Program (base and opportunistic) consistent with a risk/return profile that reflects IMD's assessment of the opportunities and conditions present in the current lending market. During FY2015, the ASRS securities lending program earned approximately $6.4 million.

- Operational and oversight enhancements to ASRS Cash Management "Assetization" Program have been implemented. The goals of this program are to provide Fund liquidity, mitigate cash drag, minimize transaction costs and optimize manager portfolios rebalancing. Rather than raising cash frequently from across the Fund to cover internal and external cash flow needs, monies are raised in a single funding, which approximates cash requirements for a 3-6 month period. Until drawn, those monies are assetized, i.e., exposed to the capital markets via index futures in proportions that reflect ASRS SAAP/Investment House Views.

- IMD participated in the ASRS Sunset Review and Performance Audit which included an operational review of ASRS investment strategies, alternative assets, investment procedures and fees paid to external investment managers. The report findings were favorable, recommended enhancements which will be implemented and was supportive of ASRS best practice.

- 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 112 investment managers: Private markets (RE, PE, Debt) – 41 and Public markets (Equity and Debt) – 73.

- IMD internally manages 7 public equities and fixed income portfolios which had an approximate aggregate market value of over $10 billion or 30% of Total Fund. On a calendar year-to-date through June 30, 2015, 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 June 30, 2015

Produced by State Street Investment Analytics, Risk Services

Monthly Reallocation Summary*

Month Ending June 30, 2015

Portfolio Reductions

- TOTAL FIXED INCOME
  - $20M – F2 (Core Fixed Income)
- TOTAL INTERNATIONAL EQUITY
  - $2.8M – AQR (Intl Developed Small Cap Equity)
  - $15M – Franklin Templeton (Intl Developed Small Cap Equity)
  - $105M – Blackrock Emerging (Intl Emerging Equity)
  - $62.5M – Eaton Vance (Intl Emerging Equity)
  - $40M – LSV (Intl Emerging Equity)
  - $62.5M – William Blair (Intl Emerging Equity)
- TOTAL CASH
  - $170M – CASH–ASSETIZED
- **TOTAL REDUCTIONS****
  - **$477.8M**

Portfolio Additions

- TOTAL INTERNATIONAL EQUITY
  - $152.5M- – BGI EAFE (International Developed Equity)
- TOTAL TRANSITION
  - $135.3M – TOTAL EQUITY TRANSITION
- TOTAL CASH
  - $190M – CASH–UNASSETIZED
- **TOTAL ADDITIONS****
  - **$477.8M**

***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 July 31, 2015

Portfolio Reductions

- TOTAL US EQUITY
  - $70M – E2 (US Large Cap)
  - $50M – E7 (US Large Cap)
  - $30M – INTECH (US Large Cap)
  - $35M – LSV (US Large Cap)
  - $19M – E3 (US Mid Cap)
  - $19M – E4 (US Mid Cap)
  - $15M – WELLINGTON (US Mid Cap)
  - $20M – DFA (US Small Cap)
  - $24M – E6 (US Small Cap)
  - $18M – TIMESSQUARE (US Small Cap)
- TOTAL INTERNATIONAL EQUITY
  - $15.7M – BGI EAFE (International Developed Equity)
- TOTAL FIXED INCOME
  - $100M – BGI US DEBT (Core Fixed Income)
- TOTAL MULTI-ASSET CLASS
  - $150M – WINDHAM (MAC)
- TOTAL GLOBAL INFLATION LINKED
  - $50M – GRESHAM (Global Inflation Linked)
- **TOTAL REDUCTIONS****
  - **$615.7M**

Portfolio Additions

- TOTAL CASH
  - $86M – CASH–ASSETIZED
  - $514M – CASH–UNASSETIZED
- TOTAL TRANSITION
  - $15.7M – TOTAL EQUITY TRANSITION
- **TOTAL ADDITIONS****
  - **$615.7M**

***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

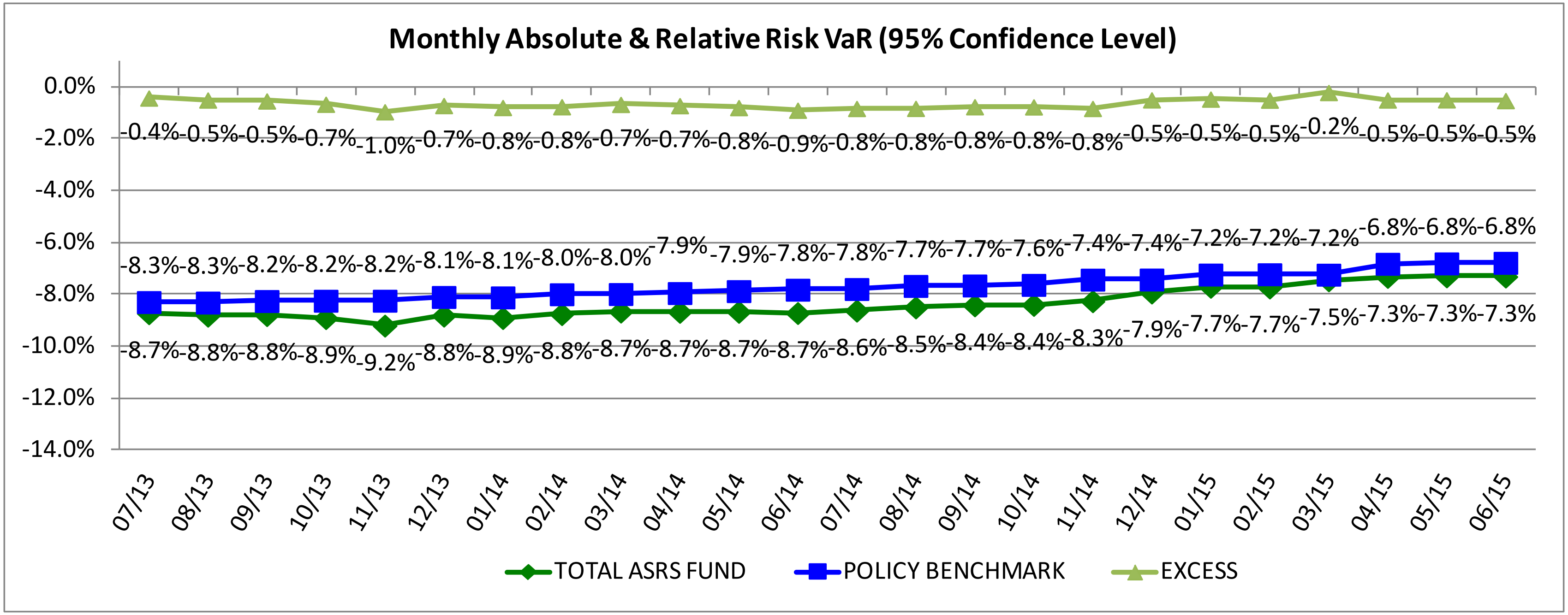
Month Ending June 30, 2015

Month-end Risk Profile

- Historical Risk (95% VaR) for all asset classes remain relatively constant from prior months. Total Plan risk increased a marginal 1bps and the Policy Benchmark decreased 2bps.

- Excess risk over the Policy Benchmark has stayed steady at -0.5%.

.



ARIZONA STATE RETIREMENT SYSTEM

As of June 30, 2015

TOTAL PLAN EXPOSURE OVERVIEW

Sector (Public US Equity Only)		$ Value	% Value	**Blended US BM	Difference
CONSUMER NON-CYCLICAL	$	2,401,793,754	23.3%	24.0%	(0.6%)
FINANCIAL	$	1,661,221,218	16.1%	17.1%	(1.0%)
TECHNOLOGY	$	1,196,466,204	11.6%	13.4%	(1.8%)
INDUSTRIAL	$	1,075,853,064	10.5%	9.9%	0.6%
CONSUMER CYCLICAL	$	1,038,339,840	10.1%	10.2%	(0.1%)
COMMUNICATIONS	$	887,452,594	8.6%	11.8%	(3.2%)
ENERGY	$	701,954,091	6.8%	7.9%	(1.1%)
FUNDS	$	547,161,106	5.3%	0.0%	5.3%
UTILITIES	$	332,345,411	3.2%	2.8%	0.4%
BASIC MATERIALS	$	297,453,056	2.9%	2.8%	0.1%
CASH	$	110,355,804	1.1%	0.0%	1.1%
GOVERNMENT	$	28,112,561	0.3%	0.0%	0.3%
INDEX	$	7,487,263	0.1%	0.0%	0.1%
DIVERSIFIED	$	7,156,392	0.1%	0.0%	0.0%
GRAND TOTAL	**$**	**10,293,152,359**	**100.0%**	**100.0%**	**0.0%**

Country Category (Total Plan)		$ Value	% Value	*Blended TOTAL BM	Difference
NORTH AMERICA	$	26,135,983,958	75.3%	66.9%	8.4%
EUROPE DEVELOPED	$	4,675,540,858	13.5%	17.1%	(3.7%)
ASIA DEVELOPED	$	2,427,038,914	7.0%	10.5%	(3.5%)
ASIA EM	$	868,918,850	2.5%	3.3%	(0.8%)
LATIN AMERICA	$	294,022,154	0.8%	1.2%	(0.4%)
AFRICA	$	162,164,189	0.5%	0.5%	(0.1%)
MIDDLE EAST	$	102,608,131	0.3%	0.3%	0.0%
EUROPE EM	$	52,068,518	0.1%	0.1%	0.0%
GRAND TOTAL	**$**	**34,718,345,571**	**100.0%**	**100.0%**	**0.0%**

Market Cap^ (Public Equities Only)		$ Value	% Value	*Blended TOTAL BM	Difference
1) 0 - 100M	$	3,181,153	0.0%	0.0%	0.0%
2) 100M - 500M	$	228,977,453	1.2%	1.3%	(0.1%)
3) 500M - 1B	$	564,120,413	3.0%	2.9%	0.1%
4) 1B - 5B	$	2,788,691,129	14.7%	21.4%	(6.7%)
5) 5B - 10B	$	1,938,221,082	10.2%	9.7%	0.6%
6) 10B - 50B	$	6,490,961,659	34.3%	30.1%	4.2%
7) >50B	$	6,928,859,025	36.6%	34.6%	2.0%
GRAND TOTAL	**$**	**18,943,011,913**	**100.0%**	**100.0%**	**0.0%**

^Excludes cash and non-traded securities

	Top 20 Issuer (Total Plan)		$ Value	% Value	Market Cap	Sector	Industry Group
1	CASH***	$	1,752,403,873	5.1%		CASH	Cash
2	US TREASURY N/B	$	1,254,017,476	3.6%		GOVERNMENT	SOVEREIGN
3	FANNIE MAE	$	770,954,165	2.2%		MORTGAGE SECURITIES	COMMERCIAL MBS
4	TREASURY BILL	$	502,992,805	1.5%		GOVERNMENT	SOVEREIGN
5	FREDDIE MAC	$	257,737,092	0.7%		MORTGAGE SECURITIES	FHLMC COLLATERAL
6	APPLE INC	$	243,046,784	0.7%	7) 50B+	TECHNOLOGY	COMPUTERS
7	MICROSOFT CORP	$	170,324,116	0.5%	7) 50B+	TECHNOLOGY	SOFTWARE
8	GOVERNMENT NATIONAL MORTGAGE /	$	152,918,396	0.4%		MORTGAGE SECURITIES	GNMA COLLATERAL
9	EXXON MOBIL CORP	$	152,059,315	0.4%	7) 50B+	ENERGY	OIL&GAS
10	ISHARES MSCI USA MOMENTUM FACT(	$	144,023,040	0.4%	3) 500M - 1B	FUNDS	EQUITY FUND
11	ISHARES MSCI USA QUALITY FACTOR I	$	137,997,200	0.4%	4) 1B - 5B	FUNDS	EQUITY FUND
12	JOHNSON & JOHNSON	$	133,980,499	0.4%	7) 50B+	CONSUMER NON-CYCLICAL	PHARMACEUTICALS
13	ISHARES MSCI USA VALUE FACTOR ET	$	133,469,550	0.4%	3) 500M - 1B	FUNDS	EQUITY FUND
14	ISHARES MSCI EMERGING MARKETS E	$	132,635,240	0.4%	6) 10B - 50B	FUNDS	EQUITY FUND
15	ISHARES MSCI USA SIZE FACTOR ETF	$	131,671,316	0.4%	2) 100M - 500I	FUNDS	EQUITY FUND
16	PFIZER INC	$	124,244,018	0.4%	7) 50B+	CONSUMER NON-CYCLICAL	PHARMACEUTICALS
17	JPMORGAN CHASE & CO	$	116,123,282	0.3%	7) 50B+	FINANCIAL	BANKS
18	AT&T INC	$	107,492,182	0.3%	7) 50B+	COMMUNICATIONS	TELECOMMUNICATIONS
19	PROCTER & GAMBLE CO/THE	$	95,066,628	0.3%	7) 50B+	CONSUMER NON-CYCLICAL	COSMETICS/PERSONAL CARE
20	VANGUARD TOTAL STOCK MARKET ET	$	94,665,718	0.3%	7) 50B+	FUNDS	EQUITY FUND

*__Blended TOTAL BM__: 23% SP500, 3% SP400, 3% SP600, 7% R2000, 18% MSCI EAFE, 5% MSCI EM, 2% MSCI Sml Cap, 16% BC US AGG, 6% BC US HY, 6% FTSE NAREIT GLOBAL, 2% DJ-UBS COMMODITY, 5% CUSTOM MULTI-ASSET CLASS, 4% S&P/LSTA LEVERED LOAN.

**__Blended US BM__: 80% SP500, 10% SP400, 10% SP600.

***__Cash__ does not represent an IMD tactical view; **Cash** includes the ASRS 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 June 30, 2015

Sector (Public Intl Equity Only)		$ Value	% Value	*Blended NON-US BM	Difference
FINANCIAL	$	2,130,119,676	25.5%	26.5%	(1.0%)
CONSUMER NON-CYCLICAL	$	1,705,304,086	20.4%	20.5%	(0.2%)
CONSUMER CYCLICAL	$	1,155,023,242	13.8%	12.3%	1.5%
INDUSTRIAL	$	973,321,619	11.6%	11.5%	0.2%
COMMUNICATIONS	$	660,290,766	7.9%	8.5%	(0.6%)
BASIC MATERIALS	$	446,582,802	5.3%	6.5%	(1.2%)
ENERGY	$	435,686,853	5.2%	5.6%	(0.4%)
TECHNOLOGY	$	372,195,419	4.4%	4.5%	(0.1%)
UTILITIES	$	268,205,853	3.2%	3.3%	(0.1%)
CASH	$	141,848,327	1.7%	0.0%	1.7%
DIVERSIFIED	$	60,438,487	0.7%	0.7%	0.0%
INDEX	$	18,864,792	0.2%	0.0%	0.2%
FX	$	1,704	0.0%	0.0%	0.0%
GRAND TOTAL	**$**	**8,367,883,629**	**100.0%**	**100.0%**	**0.0%**

Country Category (Public Intl Equity Only)		$ Value	% Value	*Blended NON-US BM	Difference
EUROPE DEVELOPED	$	4,303,551,190	51.4%	51.0%	0.4%
ASIA DEVELOPED	$	2,408,623,147	28.8%	32.2%	(3.4%)
ASIA EM	$	885,005,400	10.6%	10.9%	(0.3%)
LATIN AMERICA	$	276,280,180	3.3%	2.9%	0.4%
NORTH AMERICA	$	191,692,523	2.3%	0.1%	2.2%
AFRICA	$	149,925,003	1.8%	1.7%	0.1%
MIDDLE EAST	$	100,982,414	1.2%	0.9%	0.3%
EUROPE EM	$	51,823,773	0.6%	0.4%	0.2%
GRAND TOTAL	**$**	**8,367,883,629**	**100.0%**	**100.0%**	**0.0%**

	Top 20 Industry Groups (Public Intl Only		$ Value	% Value	*Blended NON-US BM	Difference
1	BANKS	$	1,155,019,520	13.8%	14.3%	(0.5%)
2	PHARMACEUTICALS	$	627,199,405	7.5%	7.5%	0.0%
3	TELECOMMUNICATIONS	$	444,893,373	5.3%	5.7%	(0.4%)
4	INSURANCE	$	428,296,834	5.1%	5.1%	0.0%
5	OIL&GAS	$	401,844,083	4.8%	5.1%	(0.3%)
6	FOOD	$	400,660,936	4.8%	4.5%	0.3%
7	RETAIL	$	315,960,704	3.8%	2.9%	0.9%
8	AUTO MANUFACTURERS	$	293,500,134	3.5%	3.6%	(0.1%)
9	CHEMICALS	$	235,489,938	2.8%	3.3%	(0.5%)
10	DIVERSIFIED FINAN SERV	$	210,692,300	2.5%	2.6%	(0.1%)
11	SEMICONDUCTORS	$	192,095,418	2.3%	2.3%	(0.1%)
12	ELECTRIC	$	183,543,939	2.2%	2.2%	(0.0%)
13	REAL ESTATE	$	181,989,724	2.2%	2.3%	(0.2%)
14	COMMERCIAL SERVICES	$	176,000,942	2.1%	1.8%	0.3%
15	BEVERAGES	$	166,357,852	2.0%	2.2%	(0.2%)
16	CASH	$	141,848,327	1.7%	0.0%	1.7%
17	MINING	$	136,654,545	1.6%	2.1%	(0.4%)
18	TRANSPORTATION	$	136,401,689	1.6%	1.6%	(0.0%)
19	ELECTRONICS	$	133,905,502	1.6%	1.5%	0.1%
20	BUILDING MATERIALS	$	133,155,083	1.6%	1.2%	0.4%

Market Cap** (Public Intl Equities Only)		$ Value	% Value	*Blended NON-US BM	Difference
1) 0 - 100M	$	2,803,608	0.0%	0.0%	0.0%
2) 100M - 500M	$	70,587,772	0.9%	0.4%	0.4%
3) 500M - 1B	$	160,224,219	2.0%	1.2%	0.8%
4) 1B - 5B	$	1,064,296,748	13.0%	11.7%	1.3%
5) 5B - 10B	$	1,074,580,997	13.1%	12.4%	0.7%
6) 10B - 50B	$	3,322,463,955	40.5%	39.3%	1.2%
7) >50B	$	2,507,239,068	30.6%	35.0%	(4.4%)
GRAND TOTAL	**$**	**8,202,196,367**	**100.0%**	**100.0%**	**0.0%**

**Excludes cash and non-traded securities

***Blended NON-US BM**: 72% MSCI EAFE, 20% MSCI EM, 8% MSCI Sml Cap.

ARIZONA STATE RETIREMENT SYSTEM

As of June 30, 2015

TOTAL FIXED INCOME EXPOSURE OVERVIEW

Sector (Public Fixed Income Only)	$ Value	% Value	*Blended FI BM	Difference
GOVERNMENT	$ 1,633,544,401	32.1%	32.3%	(0.2%)
MORTGAGE SECURITIES	$ 1,139,066,503	22.4%	21.9%	0.5%
FINANCIAL	$ 437,726,258	8.6%	9.3%	(0.7%)
COMMUNICATIONS	$ 386,771,658	7.6%	7.1%	0.5%
CONSUMER NON-CYCLICAL	$ 368,948,480	7.2%	7.0%	0.2%
ENERGY	$ 278,105,959	5.5%	6.3%	(0.8%)
CONSUMER CYCLICAL	$ 240,041,751	4.7%	5.0%	(0.3%)
INDUSTRIAL	$ 161,103,275	3.2%	3.8%	(0.6%)
TECHNOLOGY	$ 118,548,442	2.3%	2.0%	0.3%
BASIC MATERIALS	$ 99,414,387	2.0%	2.6%	(0.6%)
UTILITIES	$ 89,094,078	1.7%	2.2%	(0.4%)
CASH	$ 47,631,455	0.9%	0.0%	0.9%
BANK LOANS	$ 38,898,344	0.8%	0.0%	0.8%
INDEX	$ 31,791,223	0.6%	0.0%	0.6%
ASSET BACKED SECURITIES	$ 16,060,456	0.3%	0.4%	(0.1%)
DIVERSIFIED	$ 9,623,642	0.2%	0.2%	(0.0%)
GRAND TOTAL	**$ 5,096,370,311**	**100.0%**	**100.0%**	**0.0%**

	Top 20 Industry Groups (Public Fixed Income Only)	$ Value	% Value	*Blended FI BM	Difference
1	SOVEREIGN	$ 1,522,700,277	29.9%	30.2%	(0.3%)
2	FNMA COLLATERAL	$ 673,138,569	13.2%	9.3%	3.9%
3	FGLMC COLLATERAL	$ 221,418,198	4.3%	5.6%	(1.2%)
4	BANKS	$ 212,294,503	4.2%	5.0%	(0.9%)
5	TELECOMMUNICATIONS	$ 209,331,979	4.1%	4.0%	0.1%
6	OIL&GAS	$ 188,356,841	3.7%	4.2%	(0.5%)
7	MEDIA	$ 142,147,049	2.8%	2.6%	0.2%
8	DIVERSIFIED FINAN SERV	$ 131,512,252	2.6%	2.3%	0.2%
9	GNMA2 COLLATERAL	$ 114,468,096	2.2%	4.4%	(2.1%)
10	HEALTHCARE-SERVICES	$ 109,226,321	2.1%	1.7%	0.5%
11	PHARMACEUTICALS	$ 88,954,995	1.7%	1.5%	0.3%
12	COMMERCIAL MBS	$ 88,211,548	1.7%	1.4%	0.3%
13	ELECTRIC	$ 86,204,474	1.7%	2.0%	(0.3%)
14	PIPELINES	$ 81,695,344	1.6%	1.5%	0.1%
15	RETAIL	$ 80,809,958	1.6%	1.7%	(0.1%)
16	SOFTWARE	$ 66,076,929	1.3%	0.9%	0.4%
17	CHEMICALS	$ 62,282,401	1.2%	0.9%	0.3%
18	MUNICIPAL	$ 54,844,660	1.1%	0.6%	0.4%
19	COMMERCIAL SERVICES	$ 51,664,558	1.0%	1.1%	(0.0%)
20	REITS	$ 49,752,045	1.0%	0.9%	0.1%

Credit Rating Group** (Public Fixed Income Only)	$ Value	% Value	*Blended FI BM	Difference
01) AAA	$ 2,764,493,838	54.2%	52.7%	1.6%
02) AA	$ 207,346,774	4.1%	3.3%	0.8%
03) A	$ 458,268,979	9.0%	8.3%	0.7%
04) BBB	$ 430,819,574	8.5%	9.5%	(1.1%)
05) BB	$ 554,098,449	10.9%	13.0%	(2.1%)
06) B	$ 509,761,915	10.0%	9.7%	0.3%
07) CCC	$ 152,959,477	3.0%	3.3%	(0.3%)
08) CC	$ 289,595	0.0%	0.0%	(0.0%)
09) C	$ -	0.0%	0.1%	(0.1%)
10) D	$ 7,479,025	0.1%	0.1%	0.0%
11) Not Rated	$ 10,852,684	0.2%	0.0%	0.2%
GRAND TOTAL	**$ 5,096,370,311**	**100.0%**	**100.0%**	**0.0%**

Maturity Bucket (Public Fixed Income Only)	$ Value	% Value	*Blended FI BM	Difference
0-1Y	$ 169,078,623	3.3%	0.6%	2.7%
1Y-3Y	$ 822,923,033	16.2%	19.8%	(3.6%)
3Y-5Y	$ 745,156,940	14.7%	16.8%	(2.1%)
5Y-10Y	$ 1,727,169,340	34.1%	30.3%	3.8%
10Y-15Y	$ 193,581,572	3.8%	4.8%	(0.9%)
15Y+	$ 1,414,148,605	27.9%	27.7%	0.2%
GRAND TOTAL	**$ 5,072,058,113**	**100.0%**	**100.0%**	**0.0%**

*__Blended TOTAL BM__: 73% BC US AGG, 27% BC US HY.

ARIZONA STATE RETIREMENT SYSTEM
As of June 30, 2015

TOTAL PLAN RISK OVERVIEW

MONTHLY RISK

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
CASH - UNASSETIZED	$ 26,854,450	0%	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%
CASH - ASSETIZED	$ 298,700,008	1%	(3.3%)	(0.0%)	0.4%	(3.0%)	(0.0%)	0.4%	(5.6%)	(0.0%)	0.4%	(11.7%)	2.0%	(1.8%)	(0.0%)	0.4%
TOTAL FIXED INCOME	$ 5,096,370,311	15%	(2.2%)	(0.0%)	0.5%	(1.9%)	(0.0%)	0.3%	(2.9%)	(0.0%)	0.0%	(4.5%)	1.1%	(1.3%)	(0.0%)	0.6%
US EQUITY	$ 10,293,152,359	30%	(8.7%)	(2.7%)	37.3%	(8.3%)	(2.4%)	34.5%	(15.0%)	(4.4%)	36.2%	(29.9%)	5.8%	(4.2%)	(1.2%)	34.8%
INTERNATIONAL EQUITY	$ 8,367,883,629	24%	(10.4%)	(2.2%)	29.8%	(9.7%)	(2.2%)	32.4%	(15.7%)	(3.7%)	29.8%	(35.8%)	6.5%	(4.7%)	(1.1%)	31.6%
REAL ESTATE	$ 2,337,033,840	7%	(11.5%)	(0.8%)	10.4%	(10.8%)	(0.7%)	9.9%	(19.2%)	(1.2%)	9.9%	(38.2%)	7.1%	(5.4%)	(0.3%)	9.8%
FARMLAND & TIMBER	$ 170,400,180	0%	(12.5%)	(0.1%)	0.8%	(11.7%)	(0.1%)	0.8%	(20.8%)	(0.1%)	0.8%	(40.8%)	7.6%	(5.8%)	(0.0%)	0.8%
PRIVATE EQUITY	$ 2,476,130,823	7%	(11.7%)	(0.8%)	11.0%	(10.7%)	(0.7%)	10.4%	(18.9%)	(1.3%)	10.9%	(36.4%)	7.1%	(5.4%)	(0.4%)	10.5%
PRIVATE DEBT	$ 1,632,941,825	5%	(2.8%)	(0.0%)	0.4%	(3.9%)	(0.1%)	1.6%	(7.9%)	(0.3%)	2.2%	(16.4%)	2.7%	(2.2%)	(0.1%)	1.8%
OPPORTUNISTIC EQUITY	$ 485,586,901	1%	(11.8%)	(0.2%)	2.2%	(10.7%)	(0.1%)	2.0%	(19.0%)	(0.3%)	2.1%	(36.5%)	7.1%	(5.4%)	(0.1%)	2.1%
OPPORTUNISTIC DEBT	$ 1,080,595,253	3%	(6.7%)	(0.2%)	2.3%	(9.0%)	(0.2%)	3.1%	(14.9%)	(0.4%)	3.3%	(28.6%)	5.8%	(4.2%)	(0.1%)	3.1%
GLOBAL INFLATION LINKEC	$ 560,024,810	2%	(8.5%)	(0.1%)	1.5%	(8.2%)	(0.1%)	1.3%	(12.7%)	(0.2%)	1.3%	(26.5%)	5.0%	(4.1%)	(0.0%)	1.4%
INFRASTRUCTURE	$ 294,905,100	1%	(9.8%)	(0.1%)	1.1%	(9.1%)	(0.1%)	1.1%	(15.8%)	(0.1%)	1.1%	(35.1%)	5.9%	(4.7%)	(0.0%)	1.1%
MULTI-ASSET CLASS	$ 1,597,766,083	5%	(3.4%)	(0.2%)	2.1%	(3.3%)	(0.1%)	2.1%	(5.4%)	(0.2%)	2.0%	(12.9%)	2.1%	(1.8%)	(0.1%)	2.1%
GRAND TOTAL	**$ 34,718,345,571**	**100%**	**(7.3%)**	**(7.3%)**	**100.0%**	**(6.9%)**	**(6.9%)**	**100.0%**	**(12.2%)**	**(12.2%)**	**100.0%**	**(26.6%)**	**4.7%**	**(3.5%)**	**(3.5%)**	**100.0%**
INTERIM POLICY BENCHMARK			***(6.8%)***			***(9.2%)***			***(10.5%)***			***(19.7%)***	***6.1%***	***(3.1%)***		

ANNUALIZED RISK

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
CASH - UNASSETIZED	$ 26,854,450	0%	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%
CASH - ASSETIZED	$ 298,700,008	1%	(11.5%)	(0.1%)	0.4%	(10.5%)	(0.1%)	0.4%	(19.3%)	(0.2%)	0.4%	N/A	7.0%	(6.1%)	(0.0%)	0.4%
TOTAL FIXED INCOME	$ 5,096,370,311	15%	(7.5%)	(0.1%)	0.5%	(6.5%)	(0.1%)	0.3%	(10.0%)	(0.0%)	0.0%	N/A	3.9%	(4.3%)	(0.1%)	0.6%
US EQUITY	$ 10,293,152,359	30%	(30.1%)	(9.5%)	37.3%	(28.6%)	(8.3%)	34.5%	(52.1%)	(15.4%)	36.2%	N/A	20.1%	(14.6%)	(4.3%)	34.8%
INTERNATIONAL EQUITY	$ 8,367,883,629	24%	(36.2%)	(7.5%)	29.8%	(33.4%)	(7.8%)	32.4%	(54.5%)	(12.6%)	29.8%	N/A	22.4%	(16.2%)	(3.9%)	31.6%
REAL ESTATE	$ 2,337,033,840	7%	(39.8%)	(2.6%)	10.4%	(37.5%)	(2.4%)	9.9%	(66.7%)	(4.2%)	9.9%	N/A	24.4%	(18.6%)	(1.2%)	9.8%
FARMLAND & TIMBER	$ 170,400,180	0%	(43.4%)	(0.2%)	0.8%	(40.6%)	(0.2%)	0.8%	(72.0%)	(0.3%)	0.8%	N/A	26.4%	(20.0%)	(0.1%)	0.8%
PRIVATE EQUITY	$ 2,476,130,823	7%	(40.7%)	(2.8%)	11.0%	(37.2%)	(2.5%)	10.4%	(65.6%)	(4.6%)	10.9%	N/A	24.5%	(18.6%)	(1.3%)	10.5%
PRIVATE DEBT	$ 1,632,941,825	5%	(9.6%)	(0.1%)	0.4%	(13.5%)	(0.4%)	1.6%	(27.4%)	(0.9%)	2.2%	N/A	9.3%	(7.6%)	(0.2%)	1.8%
OPPORTUNISTIC EQUITY	$ 485,586,901	1%	(40.7%)	(0.5%)	2.2%	(37.2%)	(0.5%)	2.0%	(65.7%)	(0.9%)	2.1%	N/A	24.6%	(18.6%)	(0.3%)	2.1%
OPPORTUNISTIC DEBT	$ 1,080,595,253	3%	(23.2%)	(0.6%)	2.3%	(31.3%)	(0.8%)	3.1%	(51.7%)	(1.4%)	3.3%	N/A	20.0%	(14.5%)	(0.4%)	3.1%
GLOBAL INFLATION LINKEC	$ 560,024,810	2%	(29.4%)	(0.4%)	1.5%	(28.4%)	(0.3%)	1.3%	(44.0%)	(0.6%)	1.3%	N/A	17.3%	(14.3%)	(0.2%)	1.4%
INFRASTRUCTURE	$ 294,905,100	1%	(33.9%)	(0.3%)	1.1%	(31.5%)	(0.3%)	1.1%	(54.8%)	(0.5%)	1.1%	N/A	20.3%	(16.1%)	(0.1%)	1.1%
MULTI-ASSET CLASS	$ 1,597,766,083	5%	(11.9%)	(0.5%)	2.1%	(11.4%)	(0.5%)	2.1%	(18.8%)	(0.9%)	2.0%	N/A	7.3%	(6.4%)	(0.3%)	2.1%
GRAND TOTAL	**$ 34,718,345,571**	**100%**	**(25.3%)**	**(25.3%)**	**100.0%**	**(24.0%)**	**(24.0%)**	**100.0%**	**(42.4%)**	**(42.4%)**	**100.0%**	**N/A**	**16.3%**	**(12.3%)**	**(12.3%)**	**100.0%**
INTERIM POLICY BENCHMARK			***(23.5%)***			***(31.8%)***			***(36.4%)***			**N/A**	***21.3%***	***(10.8%)***		

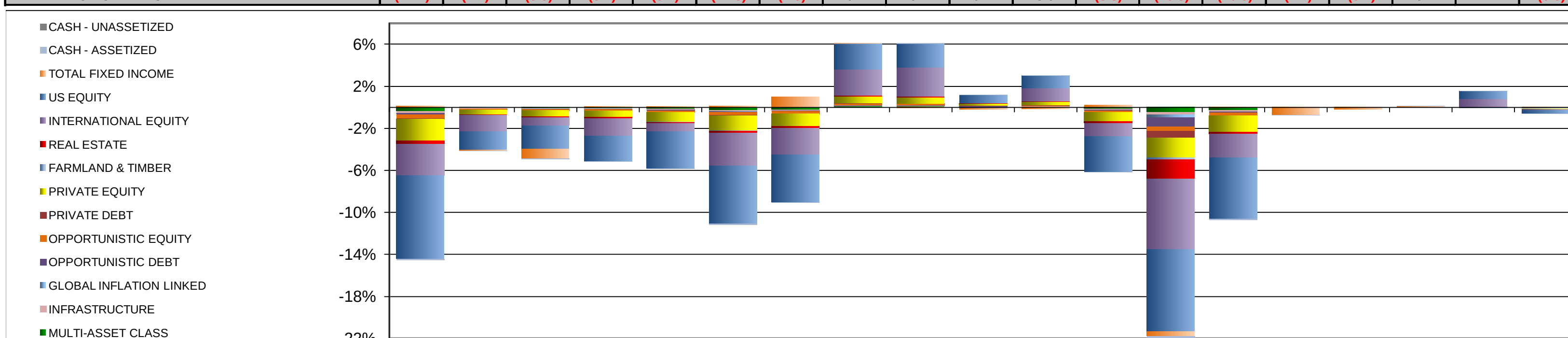
Strategy	$ Value	% Value	Beta SP500	Corr SP500	Beta MSCI EAFE	Corr MSCI EAFE	Duration	Convexity	Notional Exposure	Gross Exposure	Gross Leverage
CASH - UNASSETIZED	$ 26,854,450	0%	0.00		0.00				$ 26,854,450	$ 26,854,450	100.0%
CASH - ASSETIZED	$ 298,700,008	1%	0.20	0.98	0.15	0.90			$ 560,832,681	$ 298,700,008	100.0%
TOTAL FIXED INCOME	$ 5,096,370,311	15%	(0.00)	(0.02)	0.01	0.06	5.13	0.105	$ 4,831,506,764	$ 5,096,370,311	100.0%
US EQUITY	$ 10,293,152,359	30%	1.05	0.99	0.81	0.90	0.52	0.003	$ 10,457,002,017	$ 10,293,152,359	100.0%
INTERNATIONAL EQUITY	$ 8,367,883,629	24%	1.08	0.90	1.00	0.99	2.55	0.119	$ 8,385,220,154	$ 8,398,255,664	100.4%
REAL ESTATE	$ 2,337,033,840	7%	1.15	0.88	0.98	0.89			$ 2,337,033,840	$ 2,337,033,840	100.0%
FARMLAND & TIMBER	$ 170,400,180	0%	1.23	0.87	1.05	0.88			$ 170,400,180	$ 170,400,180	100.0%
PRIVATE EQUITY	$ 2,476,130,823	7%	1.25	0.95	0.94	0.85			$ 2,476,130,823	$ 2,476,130,823	100.0%
PRIVATE DEBT	$ 1,632,941,825	5%	0.30	0.60	0.24	0.58	0.57	0.004	$ 1,632,727,294	$ 1,632,979,670	100.0%
OPPORTUNISTIC EQUITY	$ 485,586,901	1%	1.25	0.95	0.94	0.85			$ 485,586,901	$ 485,586,901	100.0%
OPPORTUNISTIC DEBT	$ 1,080,595,253	3%	0.75	0.70	0.65	0.71			$ 1,080,595,253	$ 1,080,595,253	100.0%
GLOBAL INFLATION LINKEC	$ 560,024,810	2%	0.30	0.65	0.27	0.69	0.18	0.000	$ 1,122,247,308	$ 560,024,810	100.0%
INFRASTRUCTURE	$ 294,905,100	1%	1.05	0.96	0.90	0.98			$ 294,905,100	$ 294,905,100	100.0%
MULTI-ASSET CLASS	$ 1,597,766,083	5%	0.36	0.93	0.31	0.94	(6.57)	(1.912)	$ 1,638,113,773	$ 1,872,019,171	117.2%
GRAND TOTAL	**$ 34,718,345,571**	**100%**	**0.82**	**0.97**	**0.68**	**0.95**	**4.57**	**0.082**	**$ 35,499,156,537**	**$ 35,023,008,539**	**100.9%**

ARIZONA STATE RETIREMENT SYSTEM
As of June 30, 2015

TOTAL PLAN STRESS TESTS

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					
Stress Test Stand Alone																					
CASH - UNASSETIZED	$ 26,854,450	0.1%	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
CASH - ASSETIZED	$ 298,700,008	0.9%	(13.0)	(3.0)	(5.9)	(3.8)	(5.7)	(12.3)	(5.8)	4.2	9.8	2.7	4.4	(5.3)	(17.2)	(9.7)	(1.2)	0.0	0.2	0.9	(0.4)
TOTAL FIXED INCOME	$ 5,096,370,311	14.7%	1.0	(0.5)	(6.1)	0.7	0.6	0.9	6.7	0.0	(0.8)	(0.7)	(1.2)	1.4	(3.0)	0.0	(5.2)	(0.2)	0.6	0.0	0.3
US EQUITY	$ 10,293,152,359	29.6%	(26.7)	(5.9)	(7.5)	(8.1)	(11.8)	(18.6)	(15.2)	8.3	7.7	2.7	4.1	(11.4)	(26.4)	(19.7)	0.0	0.0	0.0	2.6	(0.8)
INTERNATIONAL EQUITY	$ 8,367,883,629	24.1%	(12.4)	(6.5)	(3.1)	(7.0)	(3.1)	(13.0)	(10.6)	10.2	11.5	(0.6)	5.3	(5.2)	(27.8)	(9.3)	0.0	0.0	0.0	3.1	(0.5)
REAL ESTATE	$ 2,337,033,840	6.7%	(4.4)	(1.0)	(1.3)	(1.3)	(1.9)	(3.1)	(2.5)	1.4	1.3	0.5	0.7	(1.9)	(27.1)	(3.2)	0.0	0.0	0.0	0.0	(0.1)
FARMLAND & TIMBER	$ 170,400,180	0.5%	(3.9)	(0.9)	(1.1)	(1.2)	(1.7)	(2.8)	(2.2)	1.2	1.1	0.4	0.6	(1.7)	(29.0)	(2.9)	0.0	0.0	0.0	0.0	(0.0)
PRIVATE EQUITY	$ 2,476,130,823	7.1%	(28.6)	(6.3)	(8.2)	(8.7)	(12.7)	(20.2)	(16.3)	9.1	8.2	3.0	4.3	(12.2)	(27.1)	(21.1)	0.0	0.0	0.0	0.0	(0.9)
PRIVATE DEBT	$ 1,632,941,825	4.7%	(1.0)	(0.2)	(0.3)	(0.3)	(0.4)	(0.7)	(0.5)	0.3	0.3	0.1	0.1	(0.4)	(14.6)	(0.7)	(0.0)	(0.0)	0.0	0.0	(0.0)
OPPORTUNISTIC EQUITY	$ 485,586,901	1.4%	(28.6)	(6.3)	(8.2)	(8.7)	(12.7)	(20.2)	(16.3)	9.1	8.2	3.0	4.4	(12.2)	(27.1)	(21.1)	0.0	0.0	0.0	0.0	(0.9)
OPPORTUNISTIC DEBT	$ 1,080,595,253	3.1%	(4.5)	(1.0)	(1.3)	(1.4)	(2.0)	(3.2)	(2.5)	1.4	1.3	0.5	0.7	(1.9)	(27.3)	(3.3)	0.0	0.0	0.0	0.0	(0.2)
GLOBAL INFLATION LINKED	$ 560,024,810	1.6%	(0.0)	0.0	0.0	(0.0)	(0.0)	(0.0)	(0.1)	(0.0)	0.0	0.0	0.0	(0.0)	(17.5)	0.0	0.1	0.0	(0.0)	(6.1)	(5.7)
INFRASTRUCTURE	$ 294,905,100	0.8%	(20.1)	(4.4)	(5.8)	(6.1)	(8.9)	(14.2)	(11.4)	6.4	5.8	2.1	3.1	(8.6)	(28.3)	(14.8)	0.0	0.0	0.0	0.0	(0.8)
MULTI-ASSET CLASS	$ 1,597,766,083	4.6%	(8.2)	(1.8)	(2.1)	(2.5)	(3.7)	(5.8)	(4.8)	2.6	2.3	0.9	1.2	(3.5)	(10.1)	(6.0)	0.1	0.0	(0.0)	0.1	(0.5)
GRAND TOTAL	**$ 34,718,345,571**	**100.0%**	**(14.4)**	**(4.2)**	**(4.9)**	**(5.1)**	**(5.8)**	**(11.1)**	**(8.1)**	**6.1**	**6.0**	**1.0**	**2.9**	**(6.0)**	**(21.9)**	**(10.7)**	**(0.8)**	**(0.2)**	**0.1**	**1.4**	**(0.5)**
INTERIM POLICY BENCHMARK			**(14.1)**	**(4.4)**	**(5.5)**	**(5.4)**	**(5.4)**	**(11.3)**	**(7.5)**	**6.7**	**6.7**	**0.7**	**3.0**	**(5.8)**	**(20.8)**	**(10.5)**	**(1.2)**	**(0.4)**	**0.1**	**1.7**	**(0.5)**

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%
Stress Test Contribution																					
CASH - UNASSETIZED	$ 26,854,450	0.1%	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
CASH - ASSETIZED	$ 298,700,008	0.9%	(0.1)	(0.0)	(0.1)	(0.0)	(0.0)	(0.1)	(0.0)	0.0	0.1	0.0	0.0	(0.0)	(0.1)	(0.1)	(0.0)	0.0	0.0	0.0	(0.0)
TOTAL FIXED INCOME	$ 5,096,370,311	14.7%	0.1	(0.1)	(0.9)	0.1	0.1	0.1	1.0	0.0	(0.1)	(0.1)	(0.2)	0.2	(0.4)	0.0	(0.8)	(0.2)	0.1	0.0	0.0
US EQUITY	$ 10,293,152,359	29.6%	(7.9)	(1.7)	(2.2)	(2.4)	(3.5)	(5.5)	(4.5)	2.5	2.3	0.8	1.2	(3.4)	(7.8)	(5.8)	0.0	0.0	0.0	0.8	(0.2)
INTERNATIONAL EQUITY	$ 8,367,883,629	24.1%	(3.0)	(1.6)	(0.8)	(1.7)	(0.8)	(3.1)	(2.6)	2.5	2.8	(0.1)	1.3	(1.3)	(6.7)	(2.2)	0.0	0.0	0.0	0.7	(0.1)
REAL ESTATE	$ 2,337,033,840	6.7%	(0.3)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.2)	0.1	0.1	0.0	0.0	(0.1)	(1.8)	(0.2)	0.0	0.0	0.0	0.0	(0.0)
FARMLAND & TIMBER	$ 170,400,180	0.5%	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	(0.0)	(0.1)	(0.0)	0.0	0.0	0.0	0.0	(0.0)
PRIVATE EQUITY	$ 2,476,130,823	7.1%	(2.0)	(0.4)	(0.6)	(0.6)	(0.9)	(1.4)	(1.2)	0.6	0.6	0.2	0.3	(0.9)	(1.9)	(1.5)	0.0	0.0	0.0	0.0	(0.1)
PRIVATE DEBT	$ 1,632,941,825	4.7%	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	0.0	(0.0)	(0.7)	(0.0)	(0.0)	(0.0)	0.0	0.0	(0.0)
OPPORTUNISTIC EQUITY	$ 485,586,901	1.4%	(0.4)	(0.1)	(0.1)	(0.1)	(0.2)	(0.3)	(0.2)	0.1	0.1	0.0	0.1	(0.2)	(0.4)	(0.3)	0.0	0.0	0.0	0.0	(0.0)
OPPORTUNISTIC DEBT	$ 1,080,595,253	3.1%	(0.1)	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	0.0	0.0	0.0	0.0	(0.1)	(0.8)	(0.1)	0.0	0.0	0.0	0.0	(0.0)
GLOBAL INFLATION LINKED	$ 560,024,810	1.6%	(0.0)	0.0	0.0	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	0.0	0.0	0.0	(0.0)	(0.3)	0.0	0.0	0.0	(0.0)	(0.1)	(0.1)
INFRASTRUCTURE	$ 294,905,100	0.8%	(0.2)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	0.1	0.0	0.0	0.0	(0.1)	(0.2)	(0.1)	0.0	0.0	0.0	0.0	(0.0)
MULTI-ASSET CLASS	$ 1,597,766,083	4.6%	(0.4)	(0.1)	(0.1)	(0.1)	(0.2)	(0.3)	(0.2)	0.1	0.1	0.0	0.1	(0.2)	(0.5)	(0.3)	0.0	0.0	(0.0)	0.0	(0.0)
GRAND TOTAL	**$ 34,718,345,571**	**100.0%**	**(14.4)**	**(4.2)**	**(4.9)**	**(5.1)**	**(5.8)**	**(11.1)**	**(8.1)**	**6.1**	**6.0**	**1.0**	**2.9**	**(6.0)**	**(21.9)**	**(10.7)**	**(0.8)**	**(0.2)**	**0.1**	**1.4**	**(0.5)**
INTERIM POLICY BENCHMARK			**(14.1)**	**(4.4)**	**(5.5)**	**(5.4)**	**(5.4)**	**(11.3)**	**(7.5)**	**6.7**	**6.7**	**0.7**	**3.0**	**(5.8)**	**(20.8)**	**(10.5)**	**(1.2)**	**(0.4)**	**0.1**	**1.7**	**(0.5)**



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.	

Short-Term Cash Management Risks

	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
7/31/2015	24	65	138	25	12	Low	High
6/30/2015	26	69	133	28	18	Low	Moderate
5/31/2015	24	61	119	28	14	Low	High
4/30/2015	25	60	118	28	15	Low	High
3/31/2015	25	62	118	25	`	High	High
2/28/2015	25	56	112	25	13	High	High
1/31/2015	24	62	123	25	21	High	High
12/31/2014	23	58	117	22	19	High	High
11/30/2014	22	55	113	22	13	Low	Moderate
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

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 Systemic Risk.
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: August 19, 2015

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 Q2-15

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 June 30, 2015 the Total Fund's market value was approximately $34.9 billion.

For the one-year period ending June 30, 2015, the Total Fund returned 3.2% (net of fees), outperforming the Interim SAA Policy by 1.6%. For the three-year period, the Total Fund produced a return of 11.4% per annum, outperforming the Interim SAA Policy by 0.9%. Over the past ten years, the Total Fund has returned 6.9% 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 June 30, 2015. (Confidential/Non-Public) – distributed at the meeting

Arizona State Retirement System

Independent ASRS Investment Program Oversight for the Period Ending June 30, 2015

August 24, 2015

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 June 30, 2015 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	8.1%
Constant 8%	8.0%
Excess Return	0.1%

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	0.6%	**3.2%**	**11.4%**	11.8%	6.9%	9.9%
Interim SAA Policy[1]	0.7%	**1.6%**	**10.5%**	11.2%	6.6%	9.6%
Excess Return	-0.1%	**1.6%**	**0.9%**	0.6%	0.3%	0.3%

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]	0.88%	0.78%	0.54%
Manager Selection Effect[2]	0.69%	0.26%	0.20%
Residual[4]	0.03%	-0.10%	-0.10%
Excess Return	**1.60%**	**0.94%**	**0.64%**

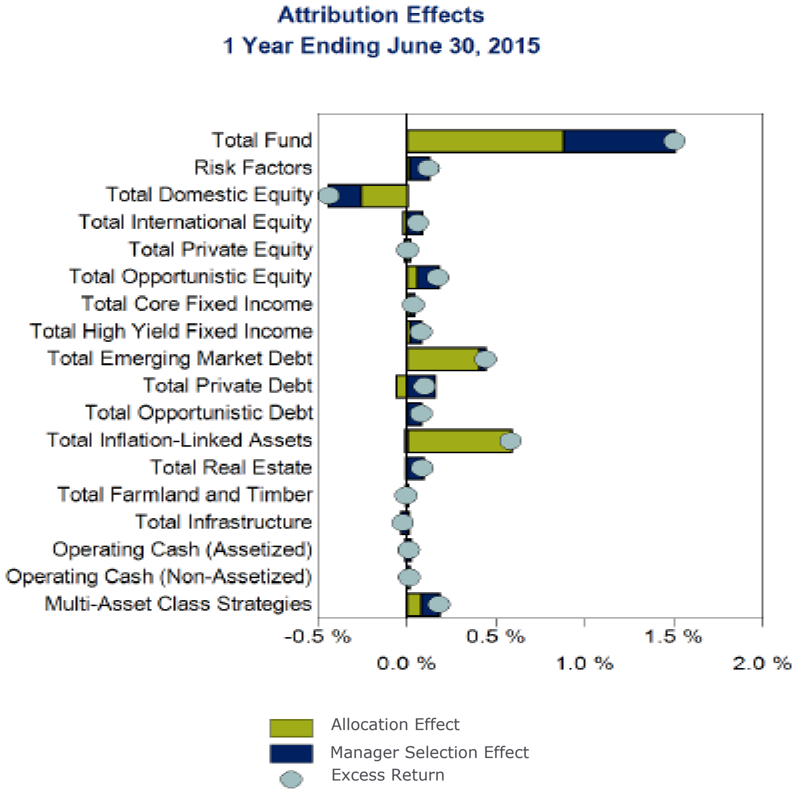
The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:

Allocation Effect: Measures the impact of the decision to over/under weight asset 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 and Manager Selection Effect.

Total Fund Attribution Detail



1 Year Excess Return: +1.60%

- Allocation Effect: +0.88%
  - Commodities tactical underweight (+0.59%)
  - Emerging Market Debt tactical underweight (+0.41%)
  - Opportunistic Equity tactical overweight (+0.06%)
  - Domestic Equity tactical underweight (-0.26%)
- Manager Selection Effect: +0.69%
  - Opportunistic Equity outperformed due to various managers (+0.18%)
  - Private Debt outperformed due to various managers (+0.16%)
  - Public Markets Fixed Income outperformed due to various managers (+0.11%)
  - Multi-Asset Class outperformed due to Bridgewater (+0.10)
  - Risk Factors outperformed (+0.10%)
  - Real Estate outperformed due to various managers (+0.09%)
  - International Equity outperformed due to various managers (+0.08%)
  - Domestic Equity underperformed due to various managers (-0.18%)
- Residual: 0.03%

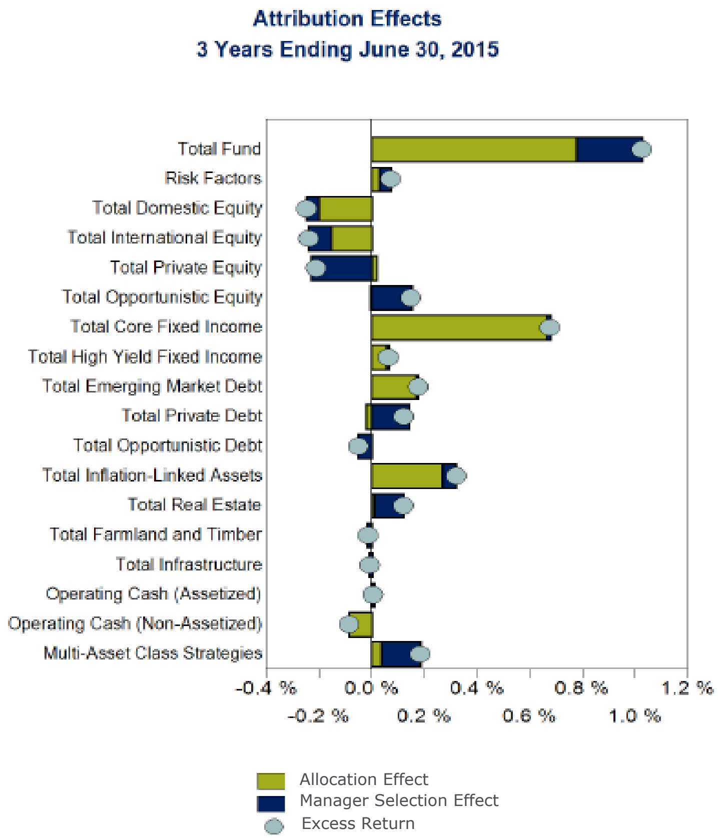
The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:

Allocation Effect: Measures the impact of the decision to over/under weight asset 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 and Manager Selection Effect.

Total Fund Attribution Detail



3 Year Excess Return: +0.94%

- Allocation Effect: +0.78%
  - Public Markets Fixed Income tactical underweight (+0.89%)
  - Commodities tactical underweight (+0.27%)
  - Domestic Equity tactical underweight (-0.20%)
  - International Equity tactical overweight (-0.16%)
- Manager Selection Effect: +0.26%
  - Opportunistic Equity outperformed due to various managers (+0.18%)
  - Multi-Asset Class Strategies outperformed due to Bridgewater (+0.15%)
  - Private Debt outperformed due to various managers (+0.14%)
  - Real Estate outperformed due to various managers (+0.11%)
  - Private Equity underperformed due to various managers (-0.23%)
  - International Equity underperformed due to various managers (-0.08%)
- Residual: -0.10%

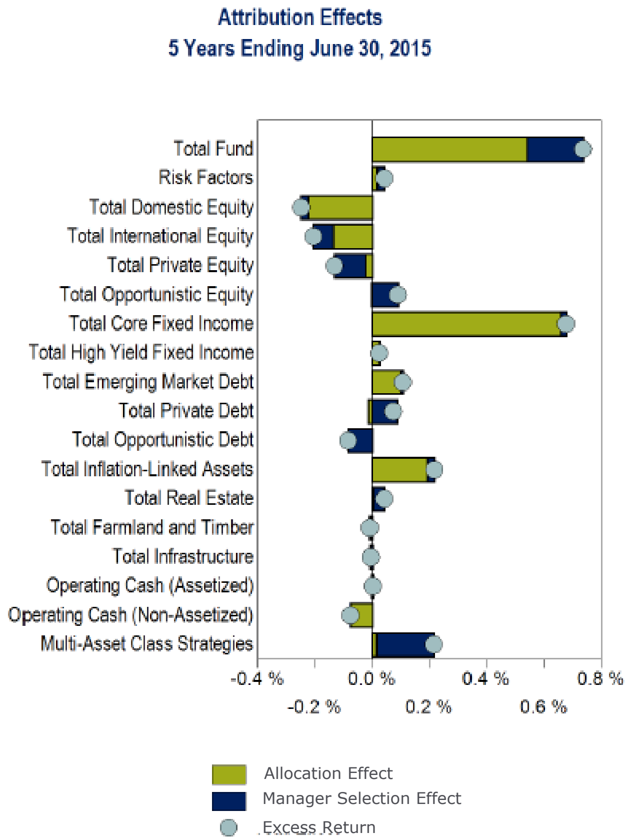
The Brinson-Fachler Attribution model explains excess return by identifying the size of contributors or detractors from excess return based on the three effects defined below:

Allocation Effect: Measures the impact of the decision to over/under weight asset 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 and Manager Selection Effect.

Total Fund Attribution Detail



5 Year Excess Return: +0.64%

- Allocation Effect: +0.54%
  - Public Markets Fixed Income tactical underweight (+0.78%)
  - Commodities tactical underweight (+0.19%)
  - Domestic Equity tactical underweight (-0.22%)
  - International Equity tactical overweight (-0.14%)
- Manager Selection Effect: +0.20%
  - Multi-Asset Class Strategies outperformed due to Bridgewater (+0.20%)
  - Opportunistic Equity outperformed due to various managers (+0.11%)
  - Private Debt outperformed due to various managers (+0.09%)
  - Private Equity underperformed due to various managers (-0.11%)
  - International Equity underperformed due to various managers (-0.07%)
- Residual: -0.10%

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 asset 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 and Manager Selection 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]	2.5%	14.5%
ASRS Custom Total Equity Benchmark	2.6%	14.8%
Excess Return	-0.1%	-0.3%
ASRS Domestic Equity	6.7%	17.6%
ASRS Custom Domestic Equity Benchmark	7.3%	17.8%
Excess Return	-0.6%	-0.2%
ASRS International Equity	-3.8%	10.0%
ASRS Custom Int'l Equity Benchmark	-4.1%	10.4%
Excess Return	0.3%	-0.4%
ASRS Public Markets Fixed Income	-0.3%	1.7%
ASRS Custom Fixed Income Benchmark	-2.0%	1.2%
Excess Return	1.7%	0.5%
ASRS Inflation-Linked	-24.0%	-7.4%
ASRS Custom Inflation-Linked Benchmark	-23.7%	-8.8%
Excess Return	-0.3%	1.4%
ASRS Multi-Asset Class Strategies	1.8%	11.6%
ASRS Multi-Asset Class Strategies Benchmark	1.1%	10.3%
Excess Return	0.7%	1.3%

[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	9.7%	13.3%	12.1%	Oct-07
Russell 2000	7.2%	15.0%	14.2%	
Excess Return	2.5%	-1.7%	-2.1%	
ASRS Opportunistic Equity[2]	28.6%	35.6%	33.6%	Apr-11
ASRS Private Debt	9.8%	--	12.3%	Jul-12
S&P/LSTA Levered Loan Index + 250 bps	5.2%	--	6.5%	
Excess Return	4.6%	--	5.8%	
ASRS Opportunistic Debt[2]	6.5%	9.7%	11.4%	Jan-08
ASRS Real Estate	13.8%	13.5%	7.1%	Oct-05
NFI - ODCE Index	12.4%	11.6%	6.1%	
Excess Return	1.4%	1.9%	1.0%	
ASRS Farmland and Timber	4.3%	--	3.8%	Jul-13
CPI ex-Food and Energy + 350 bps	5.4%	--	5.4%	
Excess Return	-1.1%		-1.6%	
ASRS Total Infrastructure	--	--	-1.7%	Oct-14
CPI - Infrastructure + 350 bps	--	--	2.3%	
Excess Return			-4.0%	

1- Performance of private markets portfolios and corresponding benchmarks is reported on a one quarter lag. Performance shown as of March 31, 2015.
2- Net absolute rate of return expectations range from 10-14% per annum.
Note: 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.

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

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	External CFs +	Internal CFs =	Total CFs during the Month	Last day of the Month Ending Balance*
Jul – 14	($153.7)	($59.0)	($212.7)	$249.6
Aug – 14	($117.4)	($133.1)	($250.5)	$141.8
Sep – 14	($84.7)	($6.8)	($91.5)	$365.4
Oct – 14	($64.8)	$57.7	($7.1)	$139.9
Nov – 14	($109.5)	($72.2)	($181.7)	$314.7
Dec – 14	($56.7)	($571.9)	($628.6)	$467.3
Jan – 15	($82.9)	($39.8)	($122.7)	$140.1
Feb – 15	($123.2)	$7.2	($116.0)	$80.4
Mar – 15	($64.8)	($19.3)	($84.1)	$418.0
Apr – 15	($90.9)	($154.8)	($245.7)	$550.1
May – 15	($47.8)	($37.8)	($85.6)	$479.0
Jun – 15	($74.4)	($117.1)	($191.5)	$318.3

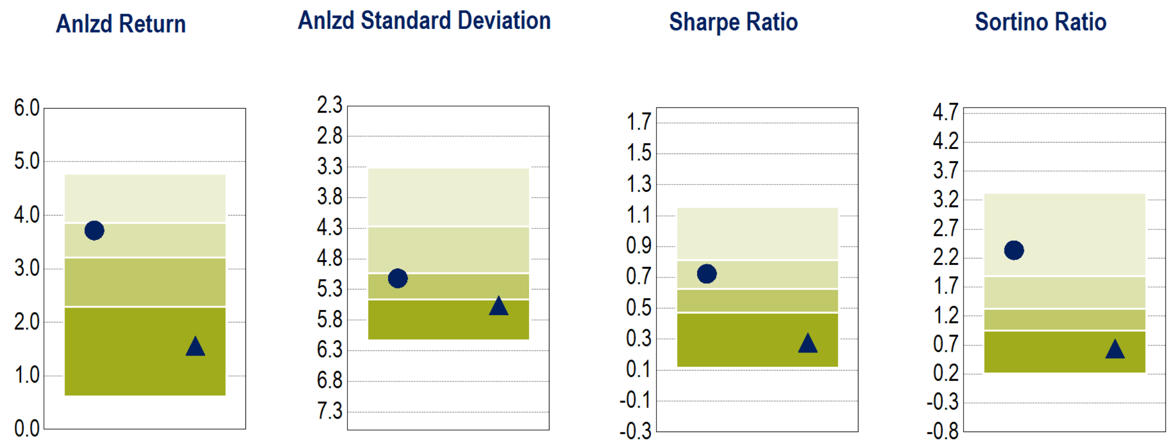
*** Includes assetized & unassetized cash balances (Inception of 1/26/15); represent monies to be used for funding needs that occur in subsequent month(s). Generally, monthly pension payments occur on the first day of month.**

Goal Met: Yes

Total Fund Risk Statistics vs. Peer Universe

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

1 Year



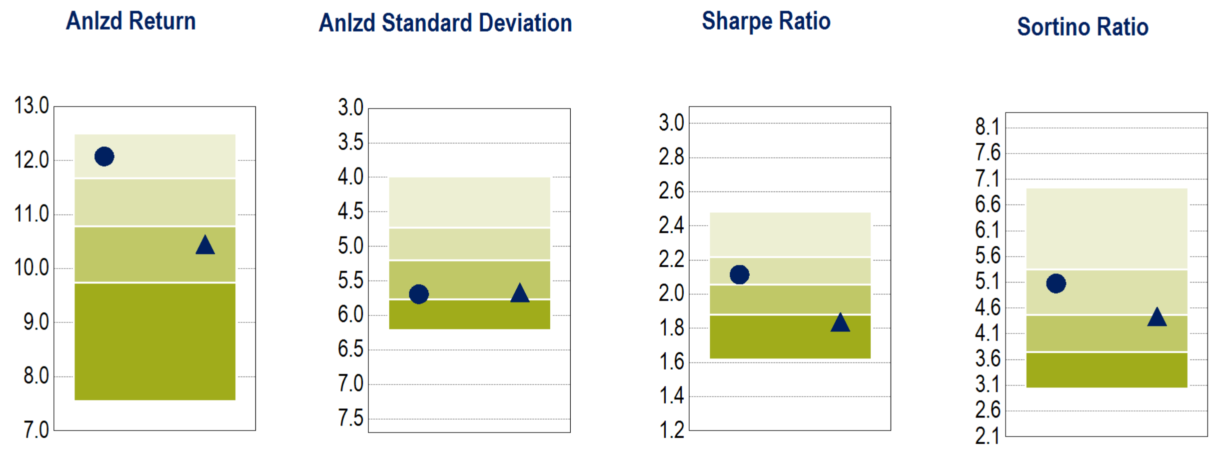
	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
● Total Fund				
Value	3.7	5.1	0.7	2.3
%tile	32	56	36	16
▲ Interim SAA Policy				
Value	1.6	5.6	0.3	0.6
%tile	90	78	91	87
Universe				
5th %tile	4.8	3.3	1.2	3.3
25th %tile	3.9	4.3	0.8	1.9
Median	3.2	5.0	0.6	1.3
75th %tile	2.3	5.5	0.5	1.0
95th %tile	0.6	6.1	0.1	0.2

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 100 observations for the period ending June 30, 2015, with total assets of $2,063 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



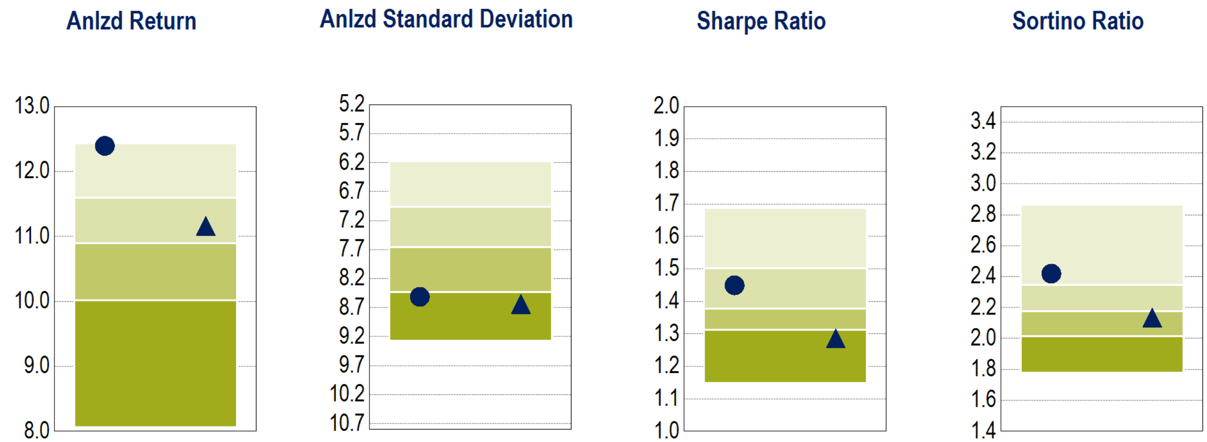
	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
● Total Fund				
Value	12.1	5.7	2.1	5.1
%tile	16	72	38	32
▲ Interim SAA Policy				
Value	10.5	5.7	1.8	4.4
%tile	57	71	82	52
Universe				
5th %tile	12.5	4.0	2.5	6.9
25th %tile	11.7	4.7	2.2	5.4
Median	10.8	5.2	2.1	4.5
75th %tile	9.7	5.8	1.9	3.8
95th %tile	7.6	6.2	1.6	3.1

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 100 observations for the period ending June 30, 2015, with total assets of $2,063 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



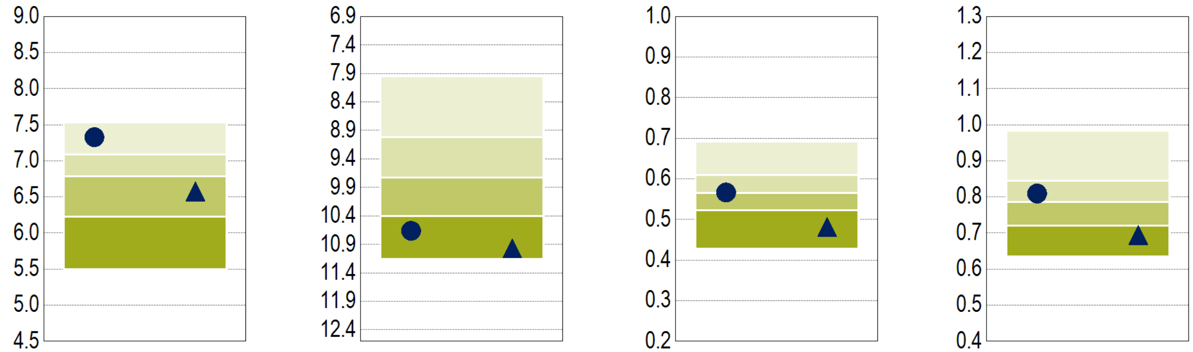
	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
● Total Fund				
Value	12.4	8.5	1.4	2.4
%tile	7	79	35	20
▲ Interim SAA Policy				
Value	11.2	8.6	1.3	2.1
%tile	42	84	81	58
Universe				
5th %tile	12.4	6.2	1.7	2.9
25th %tile	11.6	6.9	1.5	2.4
Median	10.9	7.6	1.4	2.2
75th %tile	10.0	8.4	1.3	2.0
95th %tile	8.1	9.3	1.2	1.8

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 100 observations for the period ending June 30, 2015, with total assets of $2,063 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



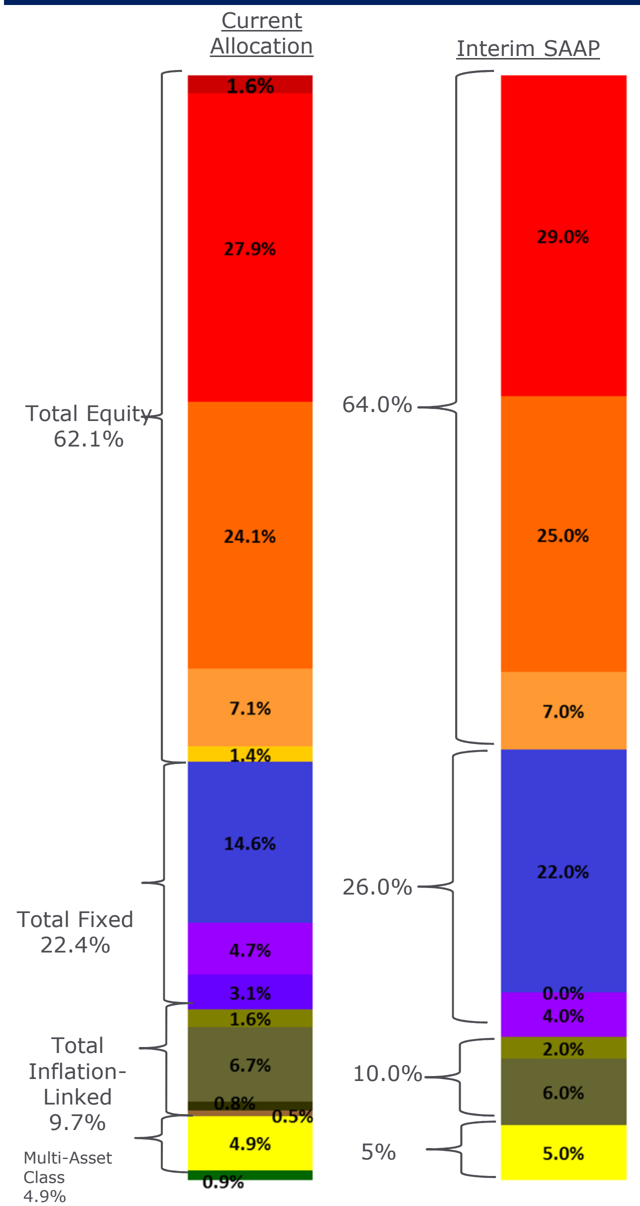
	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
● Total Fund				
Value	7.3	10.7	0.6	0.8
%tile	17	85	51	39
▲ Interim SAA Policy				
Value	6.6	11.0	0.5	0.7
%tile	65	90	86	86
Universe				
5th %tile	7.5	7.9	0.7	1.0
25th %tile	7.1	9.0	0.6	0.8
Median	6.8	9.7	0.6	0.8
75th %tile	6.2	10.4	0.5	0.7
95th %tile	5.5	11.1	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 100 observations for the period ending June 30, 2015, with total assets of $2,063 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 June 30, 2015 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]	$18,703,704,797	53.7%	54.0%	-0.3%		
Domestic Equity[2]	$9,738,087,643	27.9%	29.0%	-1.1%	16% - 36%	Yes
U.S. Large Cap	*$7,588,764,370*	*21.8%*	*23.0%*	*-1.2%*		
U.S. Mid Cap	*$1,073,753,486*	*3.1%*	*3.0%*	*0.1%*		
U.S. Small Cap	*$1,075,569,787*	*3.1%*	*3.0%*	*0.1%*		
International Equity[2]	$8,407,598,048	24.1%	25.0%	-0.9%	14% - 34%	Yes
Developed Large Cap	*$6,069,818,119*	*17.4%*	*18.0%*	*-0.6%*		
Developed Small Cap	*$687,351,544*	*2.0%*	*2.0%*	*0.0%*		
Emerging Markets	*$1,633,091,879*	*4.7%*	*5.0%*	*-0.3%*		
Private Equity[3]	$2,474,325,298	7.1%	7.0%	0.1%	6% - 10%	Yes
Opportunistic Equity[3,5]	$485,647,943	1.4%	0.0%	1.4%	0% - 3%	Yes
Total Equity	$21,663,678,038	62.1%	61.0%	1.1%	48% - 65%	Yes
U.S. Fixed Income	$5,081,547,655	14.6%	22.0%	-7.4%	8% - 28%	Yes
Core	*$3,781,019,278*	*10.8%*	*17.0%*	*-6.2%*		
High Yield	*$1,300,528,377*	*3.7%*	*5.0%*	*-1.3%*		
Private Debt[3]	$1,631,115,653	4.7%	4.0%	0.7%	8% - 12%	
Opportunistic Debt[3,5]	$1,089,167,963	3.1%	0.0%	3.1%	0% - 3%	Yes
Total Fixed Income	$7,801,831,271	22.4%	26.0%	-3.6%	18% - 35%	Yes
Commodities	$561,620,866	1.6%	2.0%	-0.4%	0% - 4%	Yes
Real Estate[3]	$2,343,221,525	6.7%	6.0%	0.7%	8% - 12%	Yes
Infrastructure	$294,905,121	0.8%	0.0%	0.8%	0% - 3%	Yes
Farmland and Timber	$170,400,209	0.5%	0.0%	0.5%	0% - 3%	Yes
Opportunistic Inflation-Linked[4]	$0	0.0%	0.0%	0.0%	0% - 3%	Yes
Total Inflation-Linked	$3,370,147,721	9.7%	8.0%	1.7%	8% - 16%	Yes
Multi-Asset Class Strategies	$1,703,372,187	4.9%	5.0%	-0.1%	0% - 12%	Yes
Cash[4]	$322,861,484	0.9%	0.0%	0.9%		
Operating Cash (Non-Assetized)	*$26,878,039*	*0.1%*	*0.0%*	*0.1%*		
Operating Cash (Assetized)	*$295,983,445*	*0.8%*	*0.0%*	*0.8%*		
Total	$34,861,890,700	100.0%	100.0%	0.0%		

[1]Total Domestic and International Equity includes Equity Risk Factor Portfolio with assets of $558.2 million.

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

[3]Values shown for private markets portfolios include cash flows that occurred during 1Q 2015.

[4]Cash includes money for the upcoming monthly pension distribution.

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

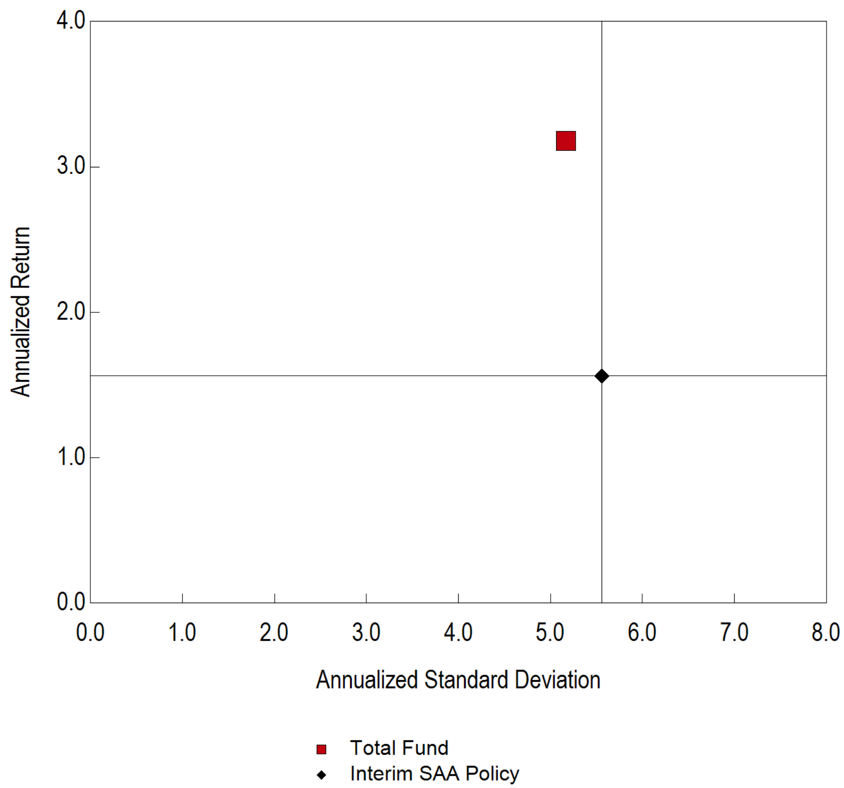
Note: Interim SAA Policy includes proration of 1% Private Equity and 2% Real Estate, which are unfunded.

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.

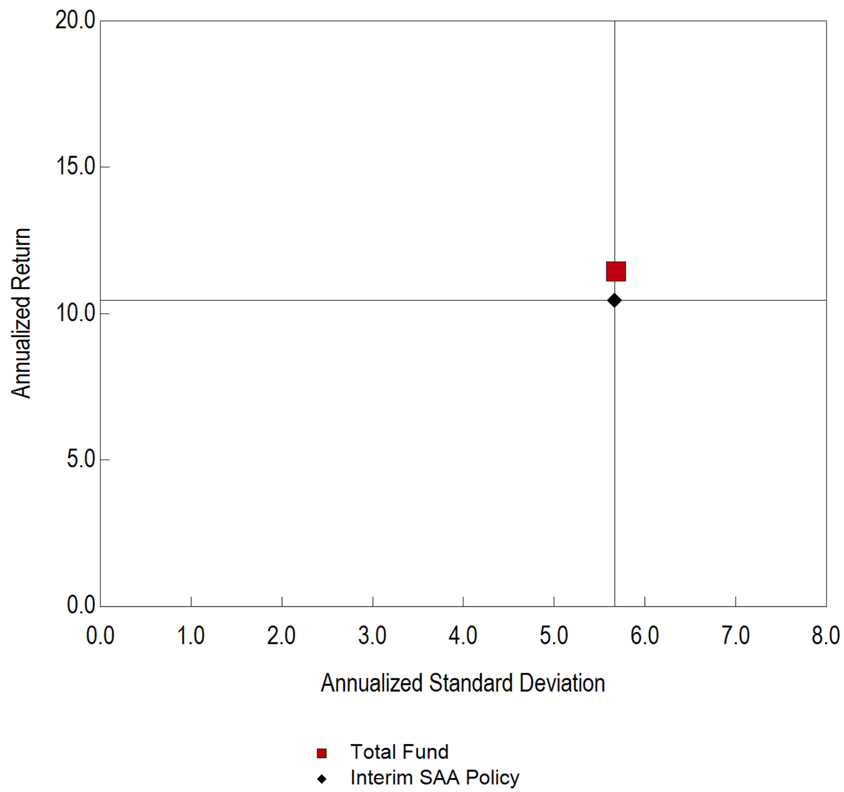
Market values include manager held cash.

Total Fund Analysis

1 Year Ending June 30, 2015



3 Years Ending June 30, 2015



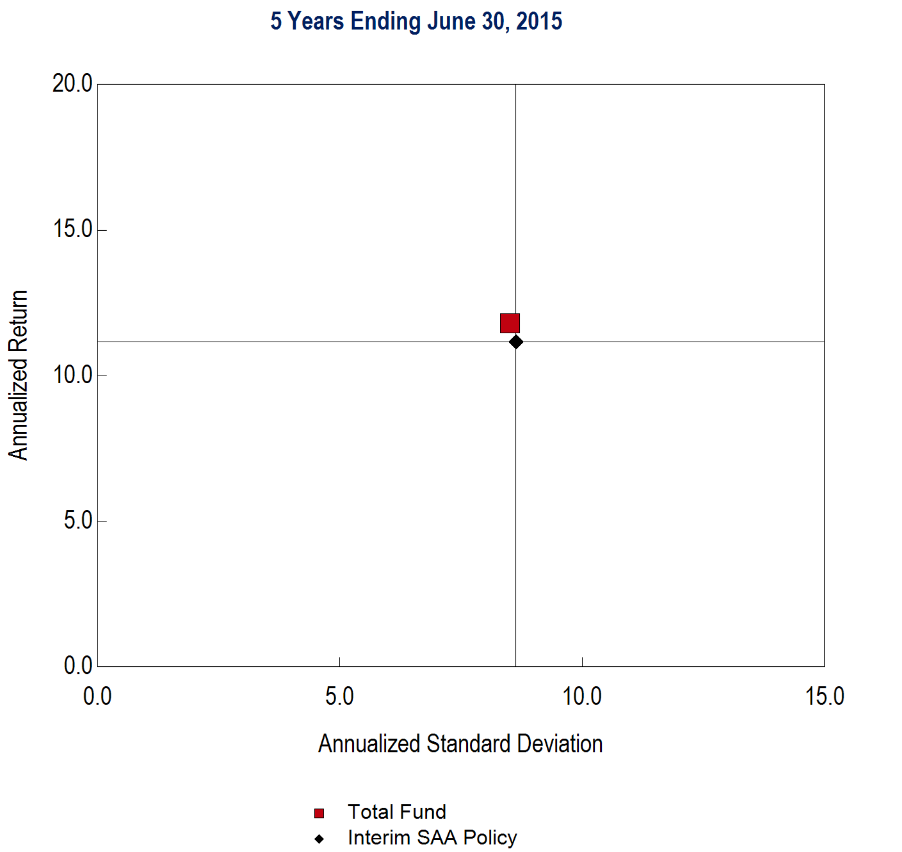
1 Year Ending June 30, 2015

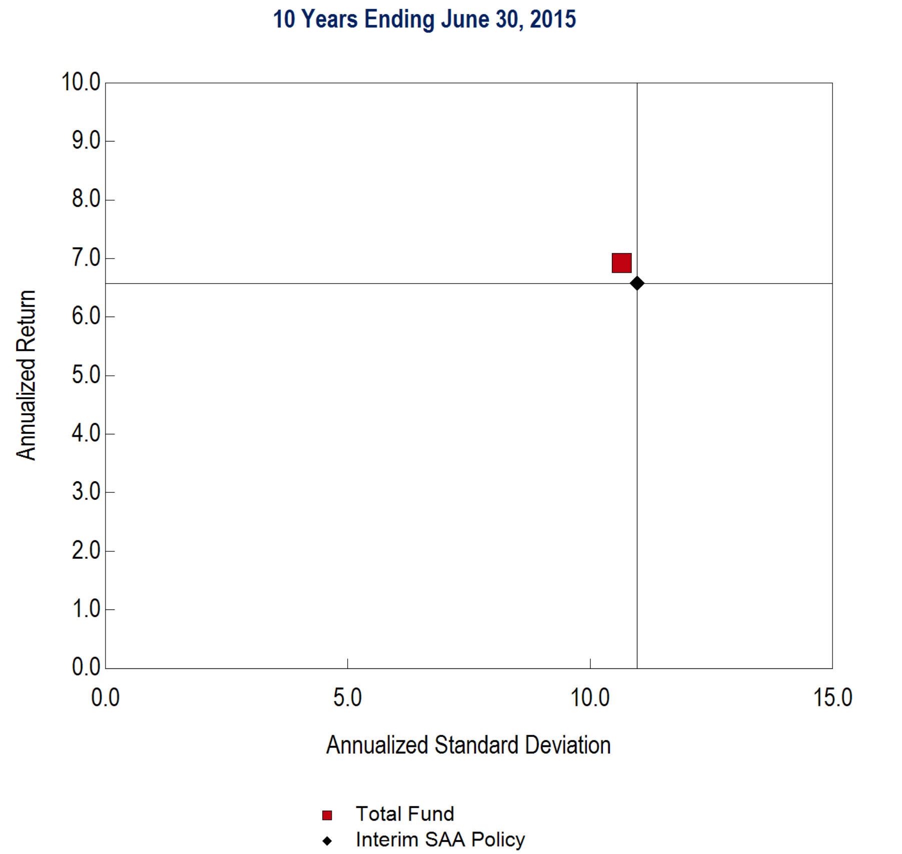
	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	3.2%	5.2%	0.6	1.5
Interim SAA Policy	1.6%	5.6%	0.3	0.6

3 Years Ending June 30, 2015

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	11.4%	5.7%	2.0	4.4
Interim SAA Policy	10.5%	5.7%	1.8	4.4

Total Fund Analysis





5 Years Ending June 30, 2015

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	11.8%	8.5%	1.4	2.3
Interim SAA Policy	11.2%	8.6%	1.3	2.1

10 Years Ending June 30, 2015

	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
Total Fund	6.9%	10.7%	0.5	0.8
Interim SAA Policy	6.6%	11.0%	0.5	0.7

Asset Class Performance Summary - Public Markets

	Market Value ($)	% of Portfolio	3 Mo (%)	Rank	FYTD (%)	Rank	1 Yr (%)	Rank	3 Yrs (%)	Rank	5 Yrs (%)	Rank	10 Yrs (%)	Rank		Inception (%)	Since
Total Fund	34,861,890,700	100.0	0.6	--	3.2	--	3.2	--	11.4	--	11.8	--	6.9	--	#	9.9	Jul-75
Interim SAA Policy			0.7	--	1.6	--	1.6	--	10.5	--	11.2	--	6.6	--		9.6	Jul-75
Over/Under			-0.1		1.6		1.6		0.9		0.6		0.3			0.3	
Actual Benchmark			0.7	--	2.4	--	2.4	--	11.0	--	11.4	--	6.6	--		--	Jul-75
Total Domestic and International Equity[1]	18,703,704,797	53.7	0.7	--	2.5	--	2.5	--	14.5	--	14.3	--	7.2	--	#	6.8	Jan-98
ASRS Custom Total Equity Benchmark			0.6	--	2.6	--	2.6	--	14.8	--	14.4	--	7.4	--		6.2	Jan-98
Over/Under			0.1		-0.1		-0.1		-0.3		-0.1		-0.2			0.6	
Total Domestic Equity	9,738,087,643	27.9	0.0	54	6.7	51	6.7	51	17.6	52	17.5	43	8.5	50		11.3	Jul-75
ASRS Custom Domestic Equity Benchmark			0.1	53	7.3	47	7.3	47	17.8	49	17.6	41	8.4	55		11.4	Jul-75
Over/Under			-0.1		-0.6		-0.6		-0.2		-0.1		0.1			-0.1	
eA All US Equity Net Median			0.2		6.8		6.8		17.7		17.1		8.5			12.7	Jul-75
Total International Equity	8,407,598,048	24.1	1.7	46	-3.8	66	-3.8	66	10.0	70	8.4	80	5.2	90		6.2	Apr-87
ASRS Custom Int'l Equity Benchmark			0.9	63	-4.1	68	-4.1	68	10.4	68	8.7	77	6.1	65		5.9	Apr-87
Over/Under			0.8		0.3		0.3		-0.4		-0.3		-0.9			0.3	
eA All ACWI ex-US Equity Net Median			1.4		-2.3		-2.3		11.7		10.1		6.8			7.8	Apr-87
Total Public Markets Fixed Income	5,081,567,512	14.6	-1.2	67	-0.3	90	-0.3	90	1.7	67	3.6	56	4.7	44		8.3	Jul-75
ASRS Custom Fixed Income Benchmark			-1.2	67	-2.0	96	-2.0	96	1.2	81	3.0	68	4.3	58		--	Jul-75
Over/Under			0.0		1.7		1.7		0.5		0.6		0.4			--	
eA All US Fixed Inc Net Median			-0.6		1.2		1.2		2.4		3.9		4.5			8.1	Jul-75
Total Inflation-Linked Assets	561,620,866	1.6	4.2	--	-24.0	--	-24.0	--	-7.4	--	-4.3	--	--	--		-3.5	Feb-10
ASRS Custom Inflation-Linked Benchmark			4.7	--	-23.7	--	-23.7	--	-8.8	--	-5.8	--	--	--		-4.9	Feb-10
Over/Under			-0.5		-0.3		-0.3		1.4		1.5					1.4	
Total Multi-Asset Class Strategies	1,703,372,187	4.9	-1.5	57	1.8	29	1.8	29	11.6	1	12.9	1	8.1	6		7.9	Jan-04
Multi-Asset Class Strategies Custom Benchm			-0.6	26	1.1	31	1.1	31	10.3	14	11.0	6	6.2	58		6.3	Jan-04
Over/Under			-0.9		0.7		3.2		1.3		1.9		1.9			1.6	
eA Global TAA Net Median			-1.4		-0.3		-0.3		6.3		7.3		7.0			7.1	Jan-04
Operating Cash (Assetized)	295,983,445	0.8	1.0													5.1	Feb-15
ASRS Cash Assetization Custom Benchmark			-0.1													3.2	Feb-15
Over/Under			1.1													1.9	

[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 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 (%)	Since
Total Fund	**34,861,890,700**	**100.0**	**0.6**	**3.2**	**11.4**	**11.8**	**9.9**	**Jul-75**
Interim SAA Policy			*0.7*	*1.6*	*10.5*	*11.2*	*9.6*	*Jul-75*
Over/Under			-0.1	1.6	0.9	0.6	0.3	
Actual Benchmark			*0.7*	*2.4*	*11.0*	*11.4*	*--*	*Jul-75*
Total Private Equity	**2,440,430,496**	**7.0**	**1.8**	**9.7**	**13.3**	**14.3**	**12.1**	**Oct-07**
Russell 2000 1 QTR Lagged			*4.0*	*7.2*	*15.0*	*14.3*	*14.2*	*Oct-07*
Over/Under			-2.2	2.5	-1.7	0.0	-2.1	
Total Opportunistic Equity[1]	**442,669,347**	**1.3**	**4.6**	**28.6**	**35.6**		**33.6**	**Apr-11**
Total Private Debt	**1,564,975,116**	**4.5**	**2.1**	**9.8**	**--**	**--**	**12.3**	**Jul-12**
S&P/LSTA Leveraged Loan Index + 250 bps 1 QTR Lagged			*2.7*	*5.2*			*6.5*	*Jul-12*
Over/Under			-0.6	4.6			5.8	
Total Opportunistic Debt[1]	**1,088,650,206**	**3.1**	**2.1**	**6.5**	**9.7**	**9.3**	**11.4**	**Jan-08**
Total Real Estate	**2,207,150,467**	**6.3**	**2.2**	**13.8**	**13.5**	**14.0**	**7.1**	**Oct-05**
NCREIF ODCE 1 QTR Lagged (net)			*3.2*	*12.4*	*11.6*	*13.2*	*6.1*	*Oct-05*
Over/Under			-1.0	1.4	1.9	0.8	1.0	
Total Farmland and Timber	**154,690,907**	**0.4**	**0.7**	**4.3**	**--**	**--**	**3.8**	**Jul-13**
CPI ex-Food and Energy + 350 bps 1 QTR Lagged			*1.4*	*5.4*	*--*		*5.4*	*Jul-13*
Over/Under			-0.7	-1.1			-1.6	
Total Infrastructure	**294,905,121**	**0.8**	**-2.0**	**--**	**--**	**--**	**-1.7**	**Oct-14**
CPI - Infrastructure + 350 bps			*1.7*				*2.3*	
Over/Under			-3.7				-4.0	

Note: Performance in private markets asset classes is based on net of fee money-weighted (IRR) performance data.
Composition of Interim SAA Policy can be found in the appendix.
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 State Street.
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.
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.

Public Market Asset Class Analysis

3 Years Ending June 30, 2015

	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Tracking Error	Rank	Info Ratio	Rank	Anlzd AJ	Rank	Beta	Sharpe Ratio
Total Fund	100.0%	11.4%	32	5.7%	72	1.1%	51	0.9	41	1.1%	21	1.0	2.0
Interim SAA Policy	--	10.5%	57	5.7%	71	--	--	--	--	--	74	--	1.8
Total Domestic and International Equity	53.7%	14.5%	--	8.6%	--	0.6%	--	-0.5	--	-0.1%	--	1.0	1.7
ASRS Custom Total Equity Benchmark	--	14.8%	--	8.7%	--	--	--	--	--	--	--	--	1.7
Total Domestic Equity	27.9%	17.6%	52	8.8%	16	0.5%	1	-0.4	--	0.0%	44	1.0	2.0
ASRS Custom Domestic Equity Benchmark	--	17.8%	49	8.9%	18	--	--	--	--	--	43	--	2.0
Total International Equity	24.1%	10.0%	70	10.2%	48	0.7%	1	-0.7	--	-0.3%	80	1.0	1.0
ASRS Custom Int'l Equity Benchmark	--	10.4%	68	10.3%	59	--	--	--	--	--	74	--	1.0
Total Public Markets Fixed Income	14.6%	1.7%	67	3.8%	72	0.6%	1	0.9	35	0.5%	88	1.0	0.4
ASRS Custom Public Markets Fixed Income Benchmark	--	1.2%	81	3.6%	70	--	--	--	--	--	96	--	0.3
Total Inflation-Linked Assets	1.6%	-7.4%	--	12.1%	--	2.5%	--	0.6	--	1.3%	--	1.0	-0.6
ASRS Custom Inflation-Linked Benchmark	--	-8.8%	--	11.9%	--	--	--	--	--	--	--	--	-0.7
Multi-Asset Class Strategies	4.9%	11.6%	1	7.1%	71	2.3%	9	0.6	1	0.0%	26	1.1	1.6
Multi-Asseet Class Strategies Custom Benchmark	--	10.3%	14	6.0%	44	--	--	--	--	--	25	--	1.7

Note: Performance is reported net of fees.

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

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

Public Market Asset Class Analysis

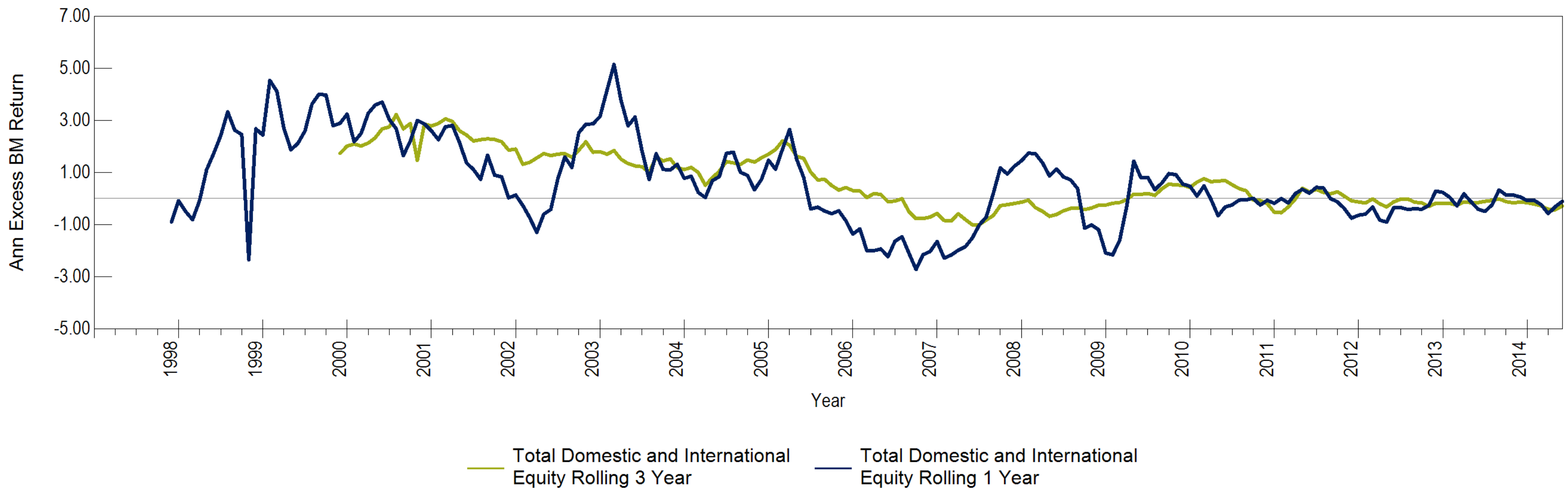
5 Years Ending June 30, 2015

	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Tracking Error	Rank	Info Ratio	Rank	Anlzd AJ	Rank	Beta	Sharpe Ratio
Total Fund	100.0%	11.8%	20	8.5%	78	1.1%	29	0.6	40	0.9%	27	1.0	1.4
Interim SAA Policy	--	11.2%	42	8.6%	84	--	--	--	--	--	68	--	1.3
Total Domestic and International Equity	53.7%	14.3%	--	13.1%	--	0.6%	--	-0.3	--	0.0%	--	1.0	1.1
ASRS Custom Total Equity Benchmark	--	14.4%	--	13.2%	--	--	--	--	--	--	--	--	1.1
Total Domestic Equity	27.9%	17.5%	43	12.8%	29	0.5%	1	-0.2	--	-0.2%	37	1.0	1.4
ASRS Custom Domestic Equity Benchmark	--	17.6%	41	12.7%	27	--	--	--	--	--	34	--	1.4
Total International Equity	24.1%	8.4%	80	15.3%	37	0.8%	1	-0.4	--	-0.2%	80	1.0	0.5
ASRS Custom Int'l Equity Benchmark	--	8.7%	77	15.6%	53	--	--	--	--	--	77	--	0.6
Total Public Markets Fixed Income	14.6%	3.6%	56	3.4%	63	0.5%	1	1.1	11	0.5%	87	1.0	1.1
ASRS Custom Public Markets Fixed Income Benchmark	--	3.0%	68	3.3%	60	--	--	--	--	--	97	--	0.9
Total Inflation-Linked Assets	1.6%	-4.3%	--	13.9%	--	2.6%	--	0.6	--	1.3%	--	1.0	-0.3
ASRS Custom Inflation-Linked Benchmark	--	-5.8%	--	14.3%	--	--	--	--	--	--	--	--	-0.4
Multi-Asset Class Strategies	4.9%	12.9%	1	9.4%	85	2.2%	4	0.8	1	1.5%	19	1.0	1.4
Multi-Asseet Class Strategies Custom Benchmark	--	11.0%	6	8.9%	74	--	--	--	--	--	51	--	1.2

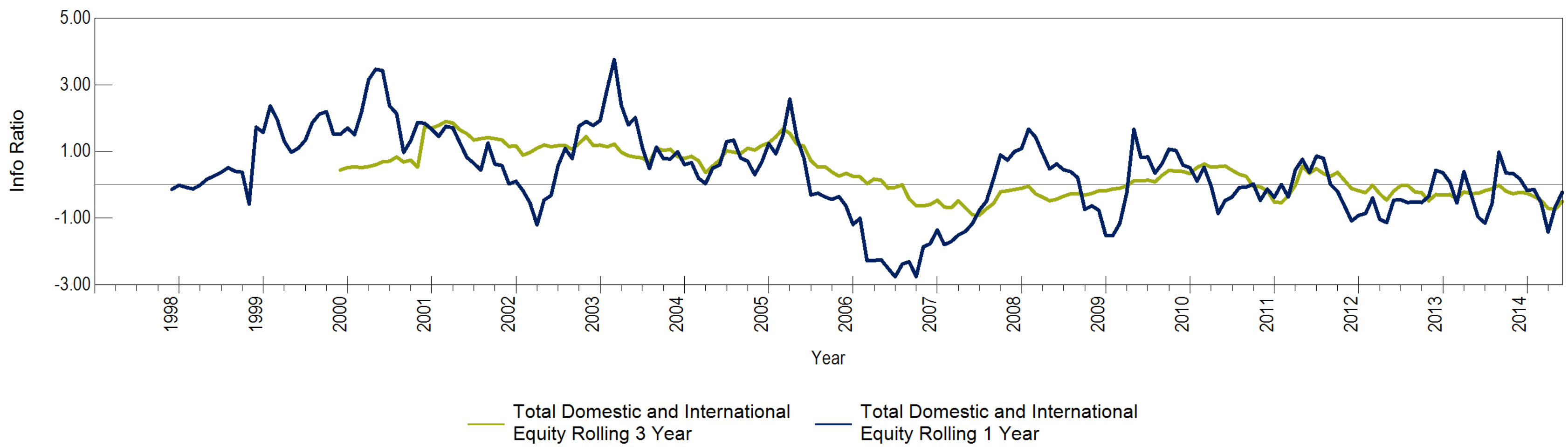
Note: Performance is reported net of fees.
Underlying composites do not add up to 100% because the chart excludes private market composites.
Ranks for statistics shown above are based on the respective universe against which the portfolio is ranked on the asset class performance summary that precedes this section of the analysis.
Rankings are from highest (1) to lowest (100) in the eVestment Universe.
Composition of Interim SAA Policy and ASRS Custom Benchmarks can be found in the appendix.

Asset Class Analysis - Total Domestic and International Equity

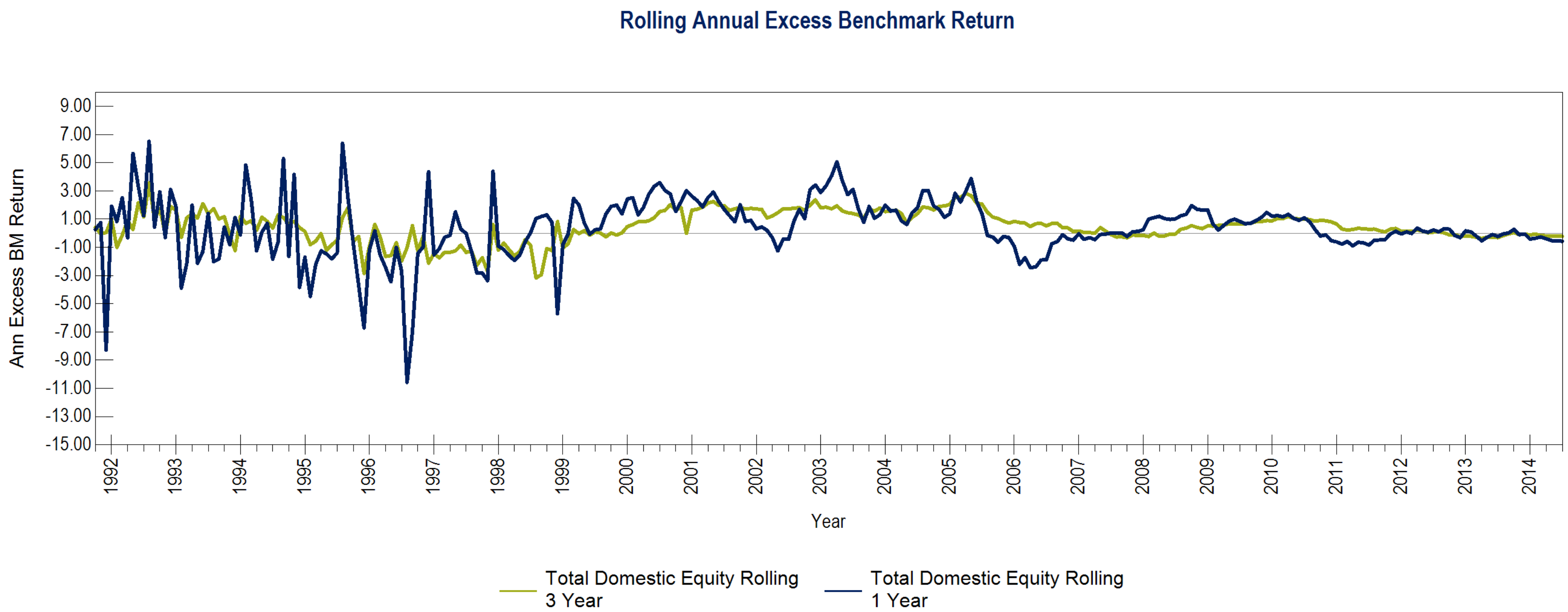
Rolling Annual Excess Benchmark Return

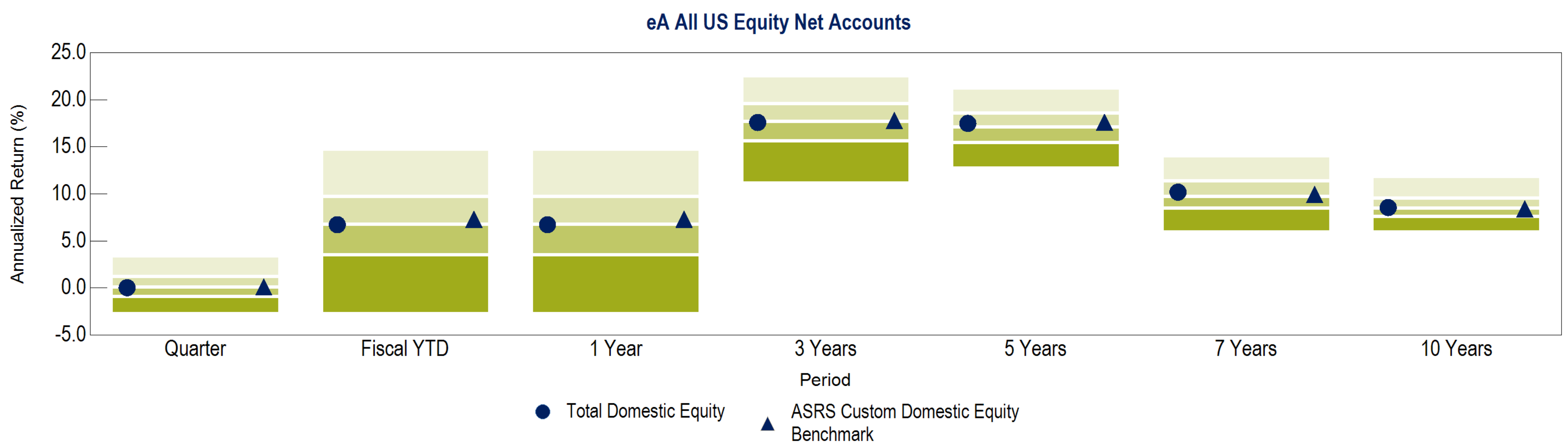


Rolling Information Ratio



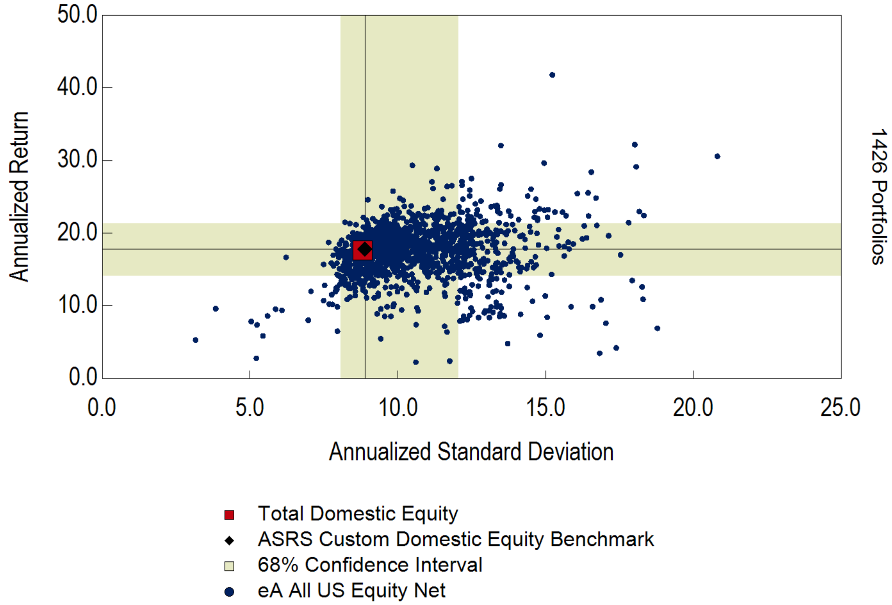
Asset Class Analysis - Total Domestic Equity



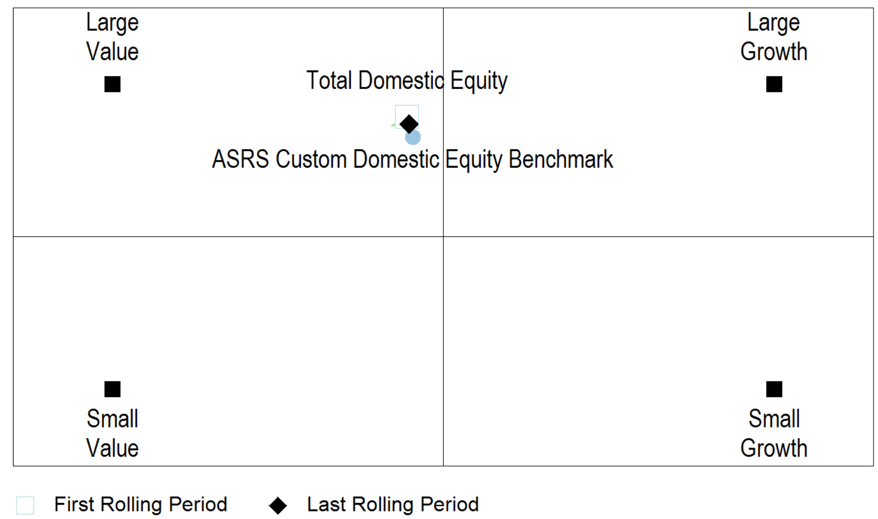


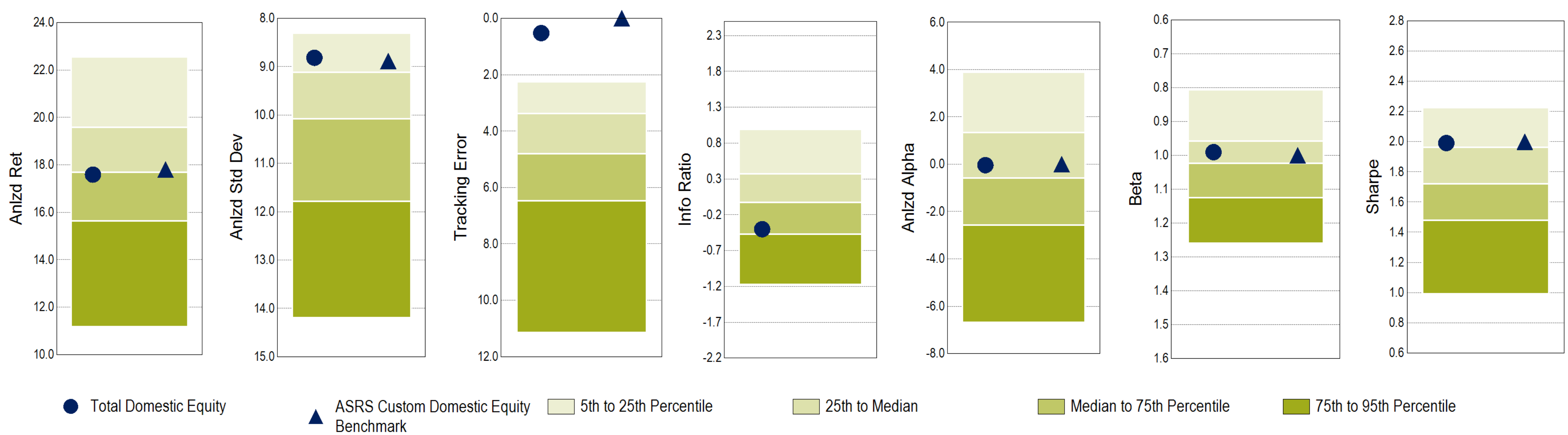
Asset Class Analysis - Total Domestic Equity

3 Year Risk Return



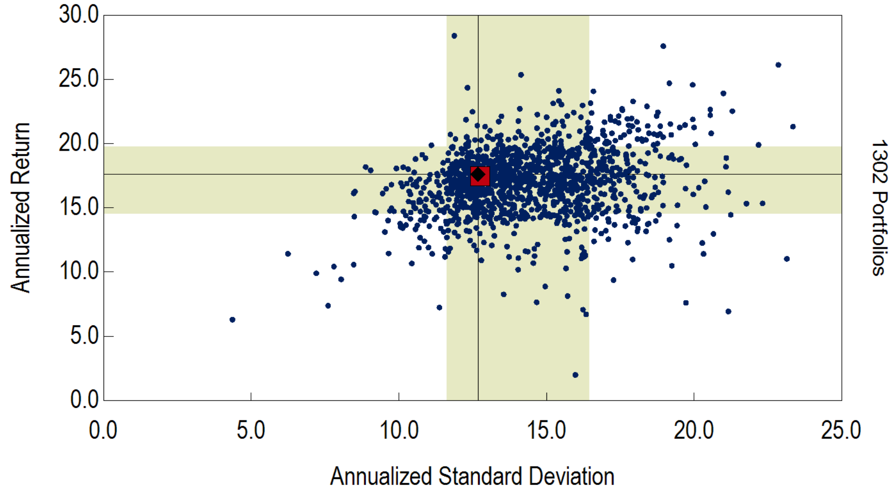
3 Year Style Map





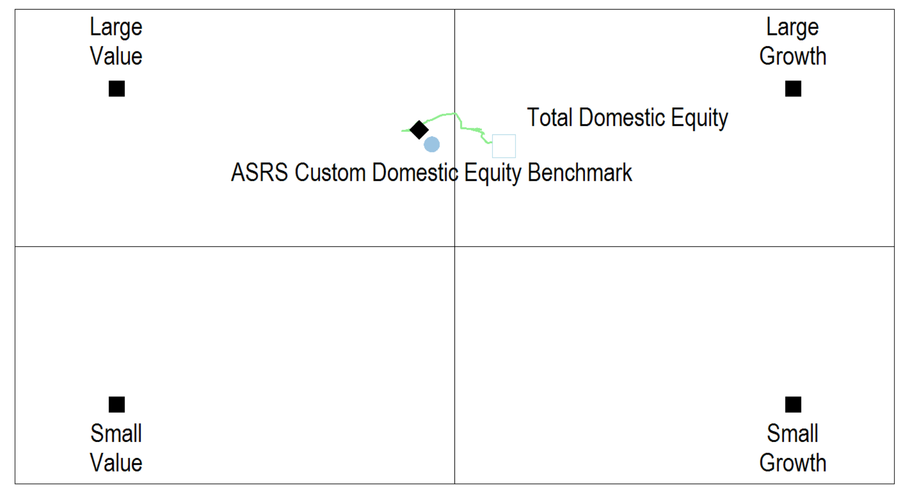
Asset Class Analysis - Total Domestic Equity

5 Year Risk Return

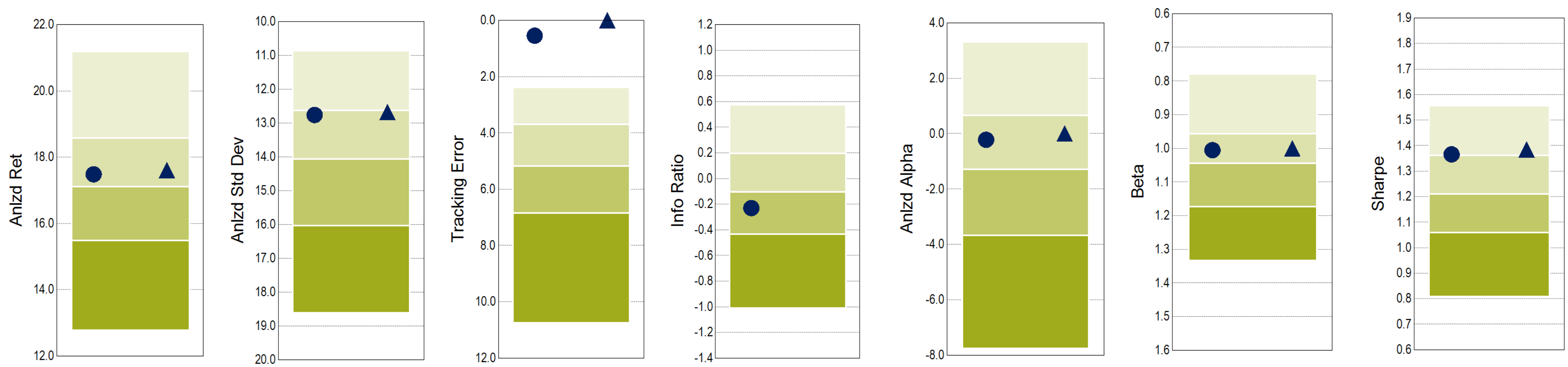


- Total Domestic Equity
- ASRS Custom Domestic Equity Benchmark
- 68% Confidence Interval
- eA All US Equity Net

5 Year Style Map

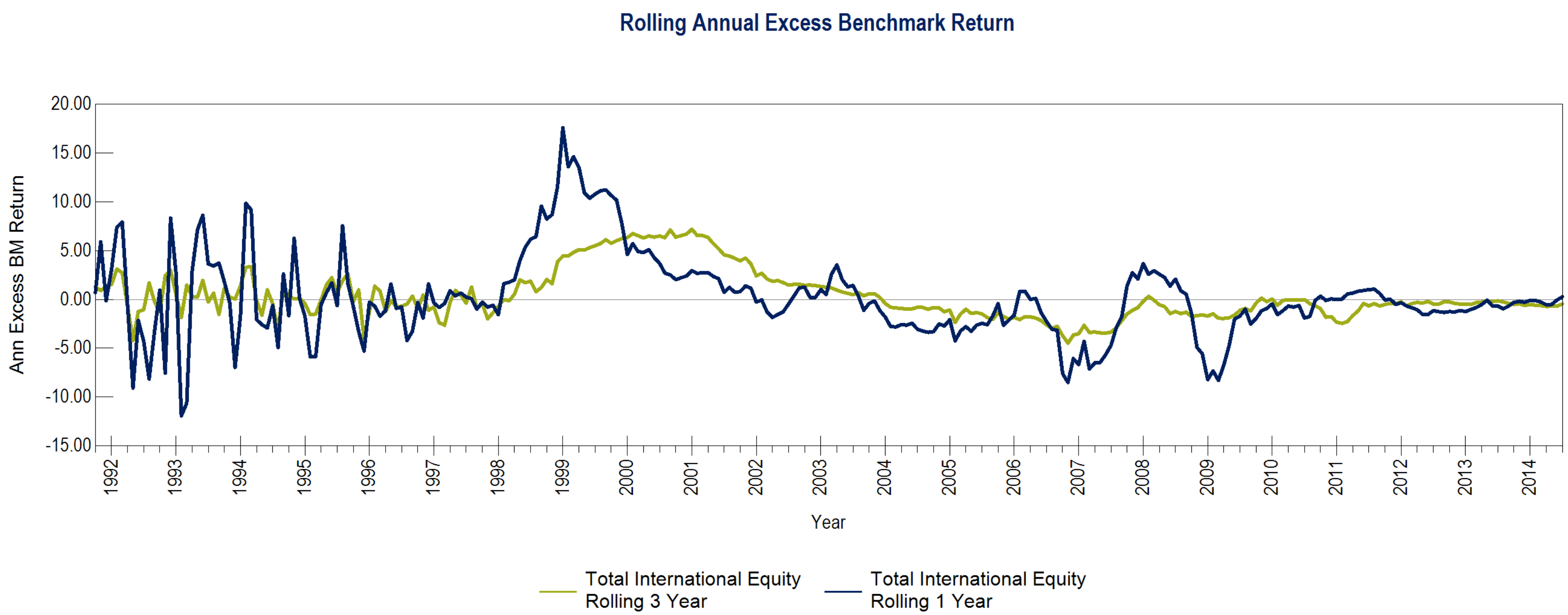


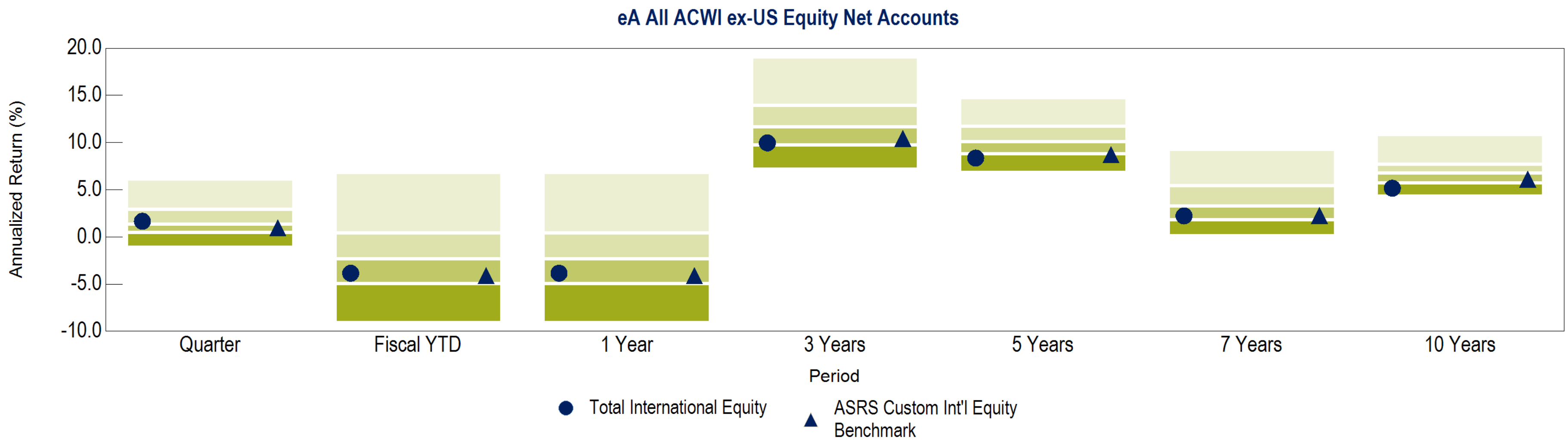
First Rolling Period   Last Rolling Period



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

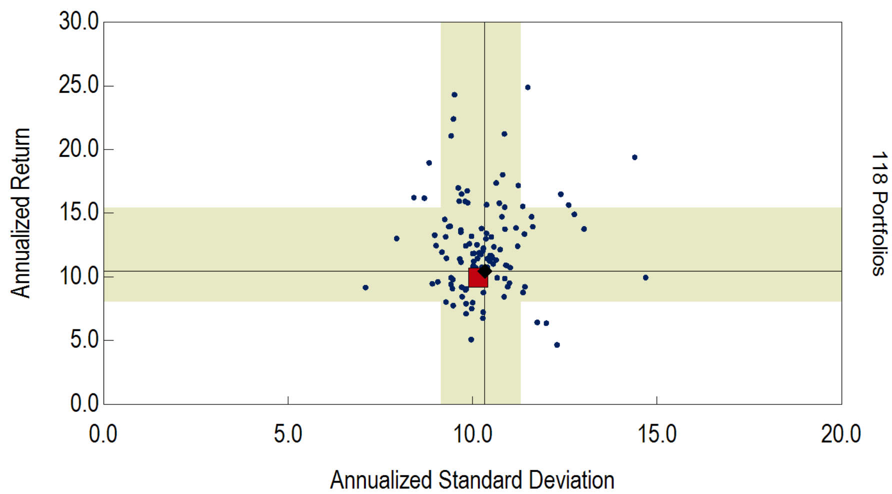
Asset Class Analysis - Total International Equity





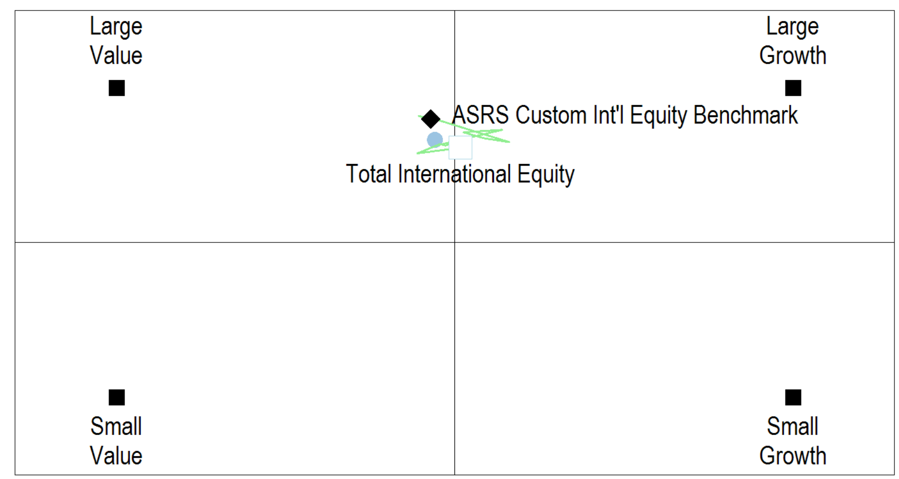
Asset Class Analysis - Total International Equity

3 Year Risk Return

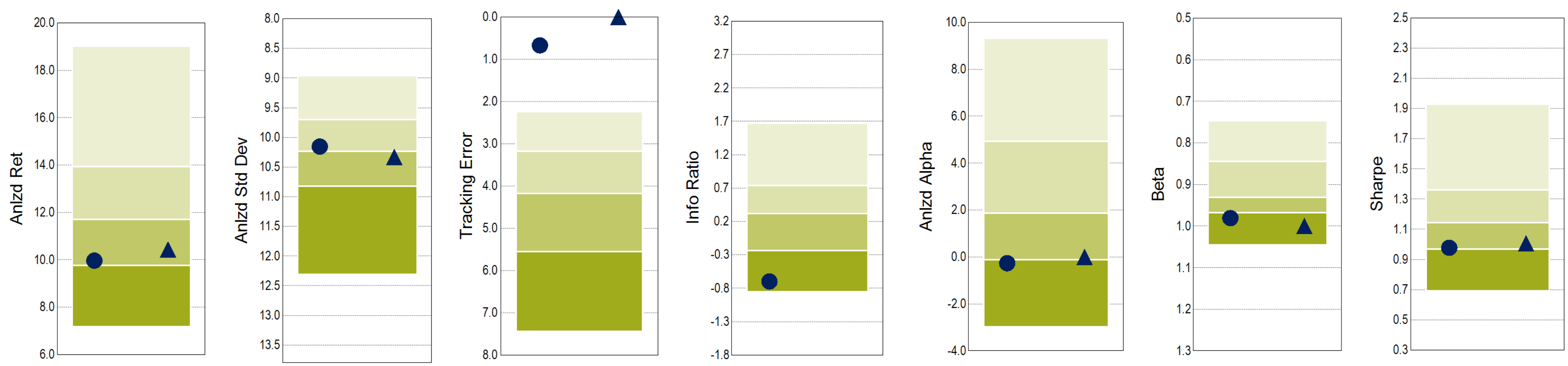


- Total International Equity
- ASRS Custom Int'l Equity Benchmark
- 68% Confidence Interval
- eA All ACWI ex-US Equity Net

3 Year Style Map



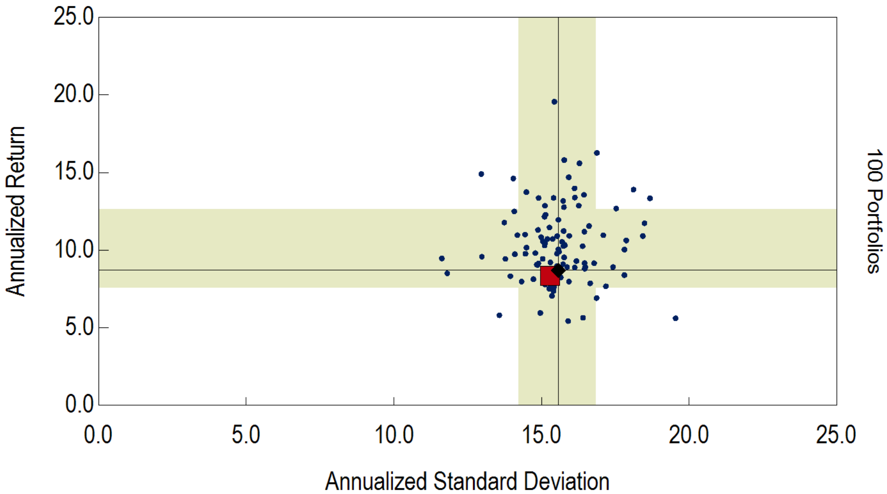
First Rolling Period ◆ Last Rolling Period



● Total International Equity ▲ ASRS Custom Int'l Equity Benchmark | 5th to 25th Percentile | 25th to Median | Median to 75th Percentile | 75th to 95th Percentile

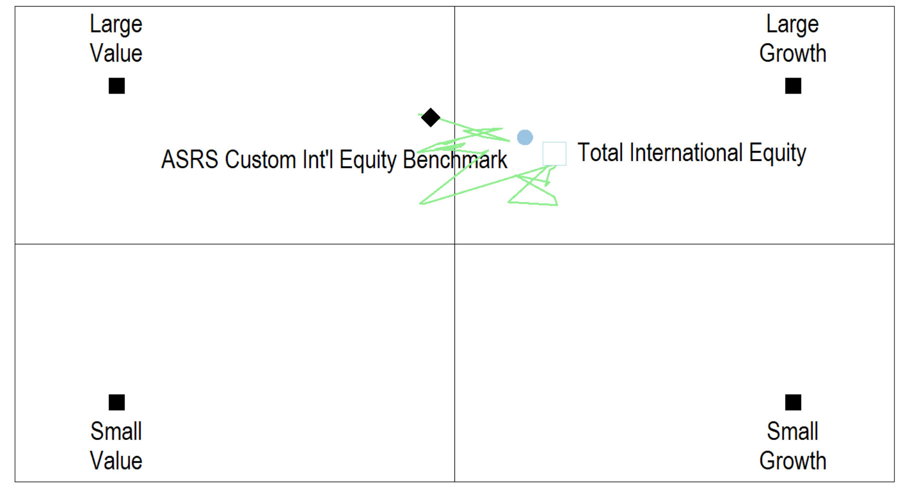
Asset Class Analysis - Total International Equity

5 Year Risk Return

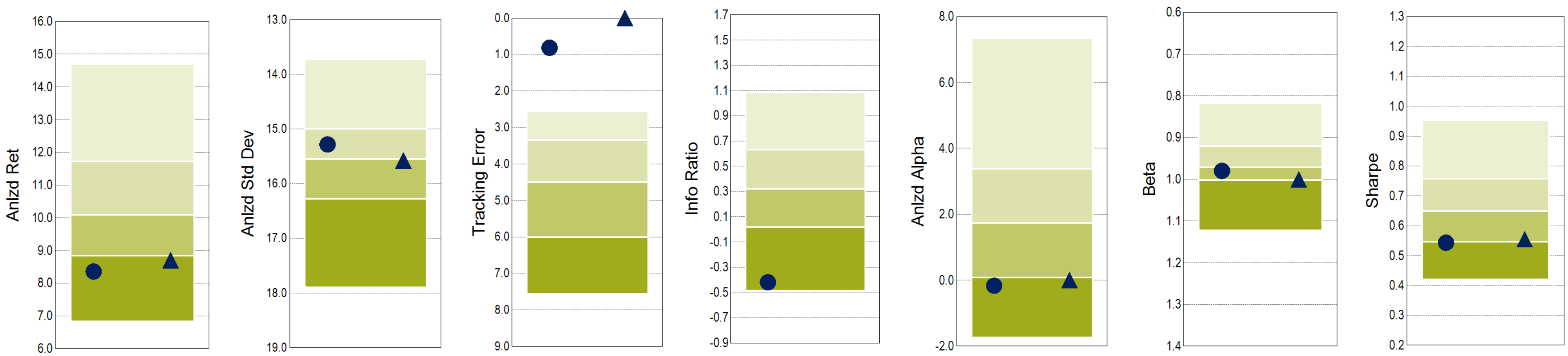


- Total International Equity
- ASRS Custom Int'l Equity Benchmark
- 68% Confidence Interval
- eA All ACWI ex-US Equity Net

5 Year Style Map



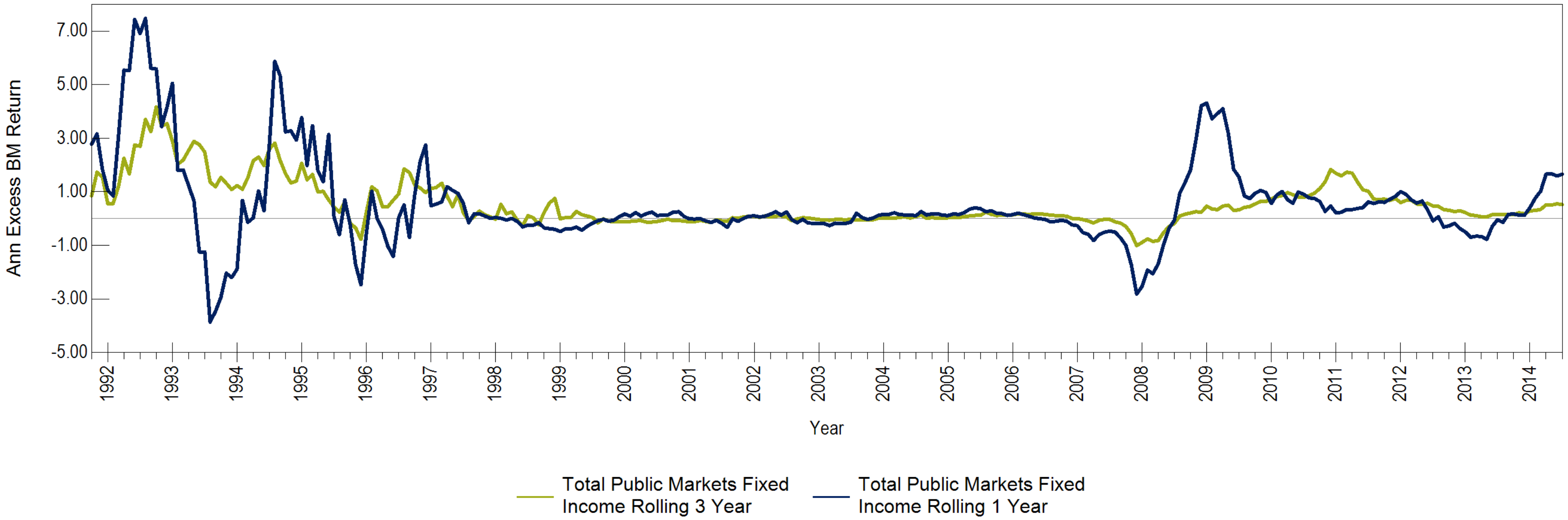
First Rolling Period | Last Rolling Period



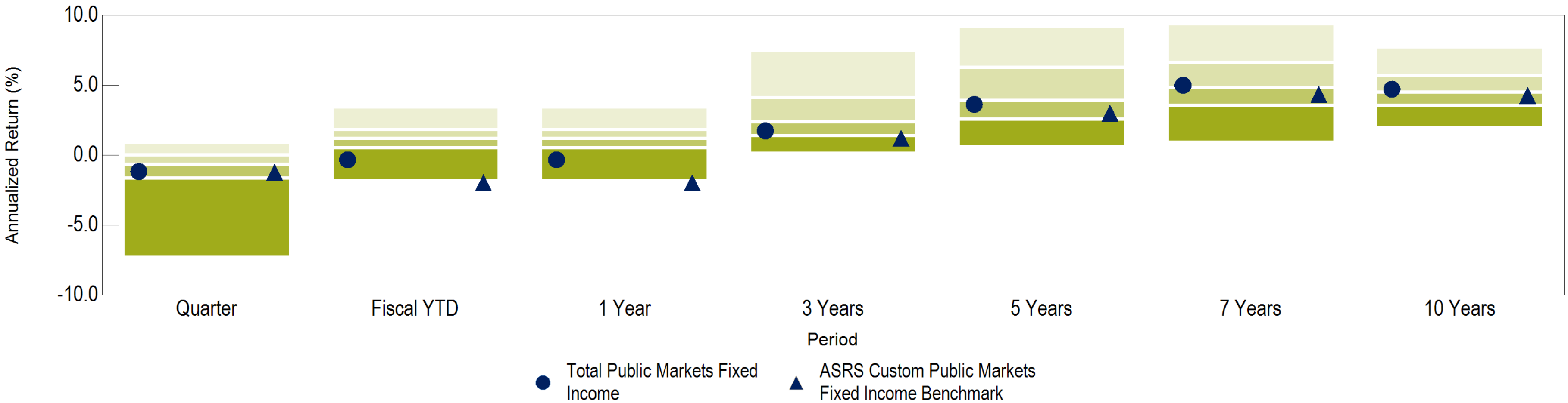
Total International Equity | ASRS Custom Int'l Equity Benchmark | 5th to 25th Percentile | 25th to Median | Median to 75th Percentile | 75th to 95th Percentile

Asset Class Analysis - Total Public Markets Fixed Income

Rolling Annual Excess Benchmark Return

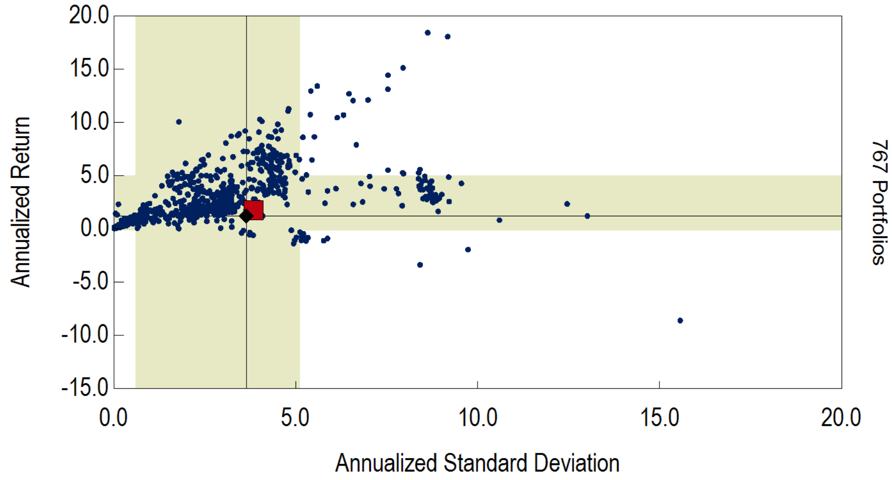


eA All US Fixed Inc Net Accounts



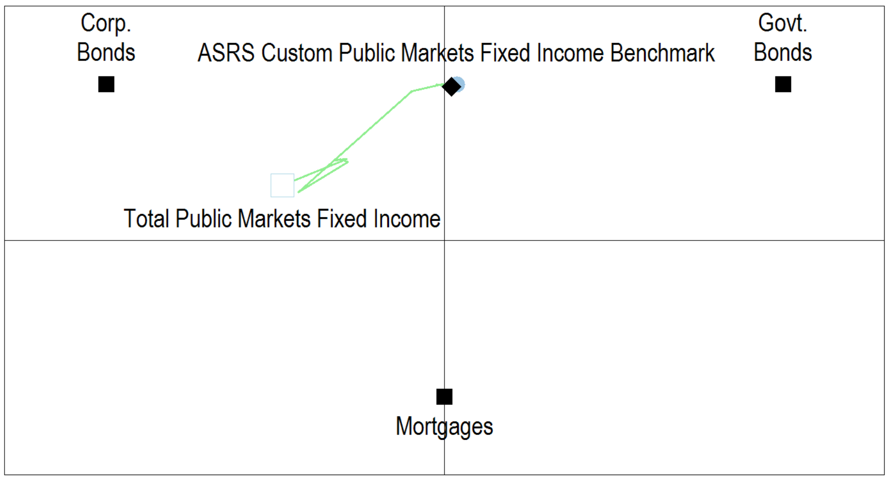
Asset Class Analysis - Total Public Markets Fixed Income

3 Year Risk Return

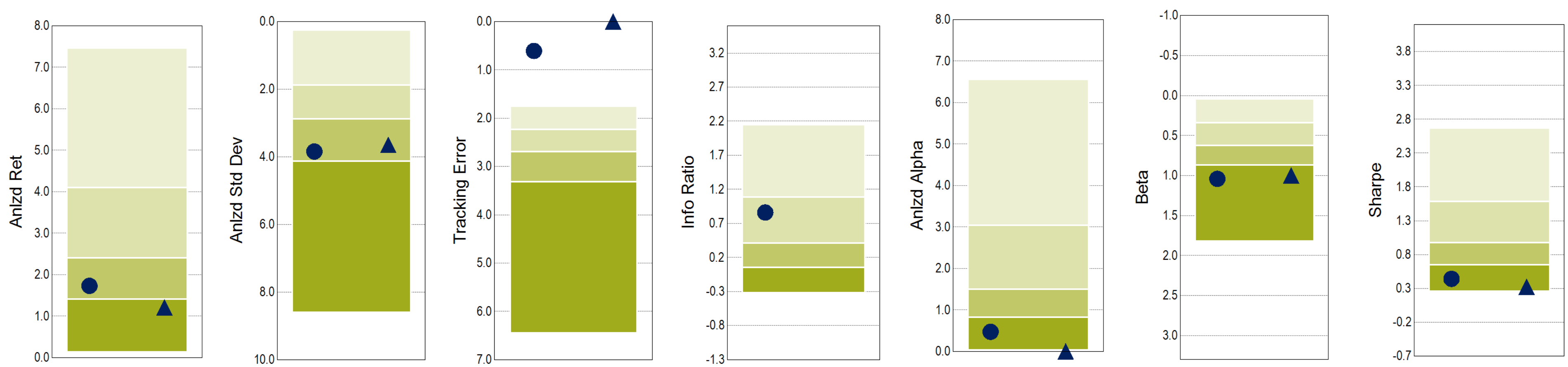


- Total Public Markets Fixed Income
- ASRS Custom Public Markets Fixed Income Benchmark
- 68% Confidence Interval
- eA All US Fixed Inc Net

3 Year Style Map



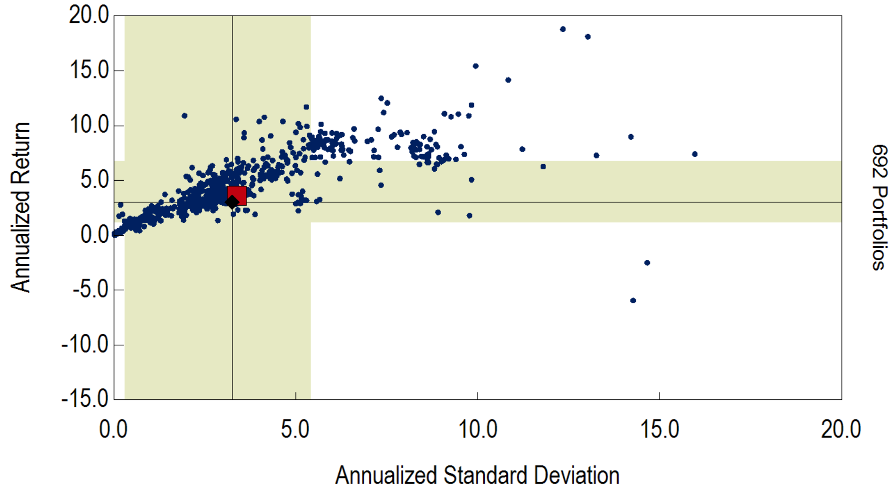
First Rolling Period ◆ Last Rolling Period



● Total Public Markets Fixed Income ▲ ASRS Custom Public Markets Fixed Income Benchmark 5th to 25th Percentile 25th to Median Median to 75th Percentile 75th to 95th Percentile

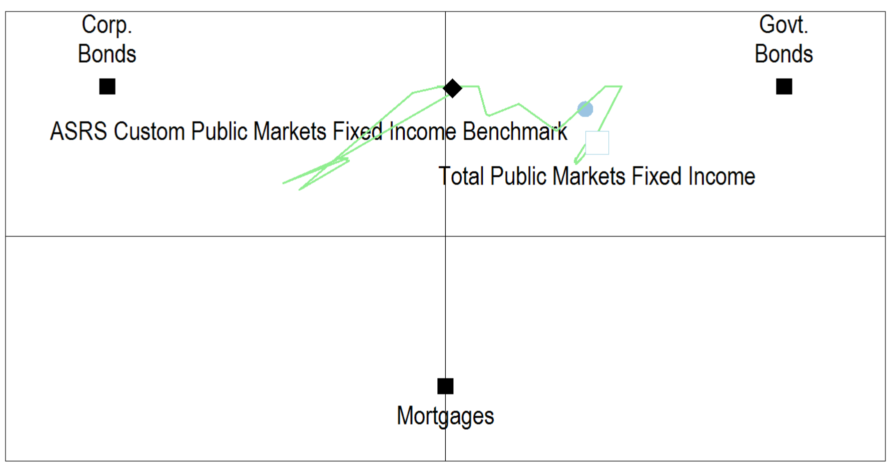
Asset Class Analysis - Total Public Markets Fixed Income

5 Year Risk Return

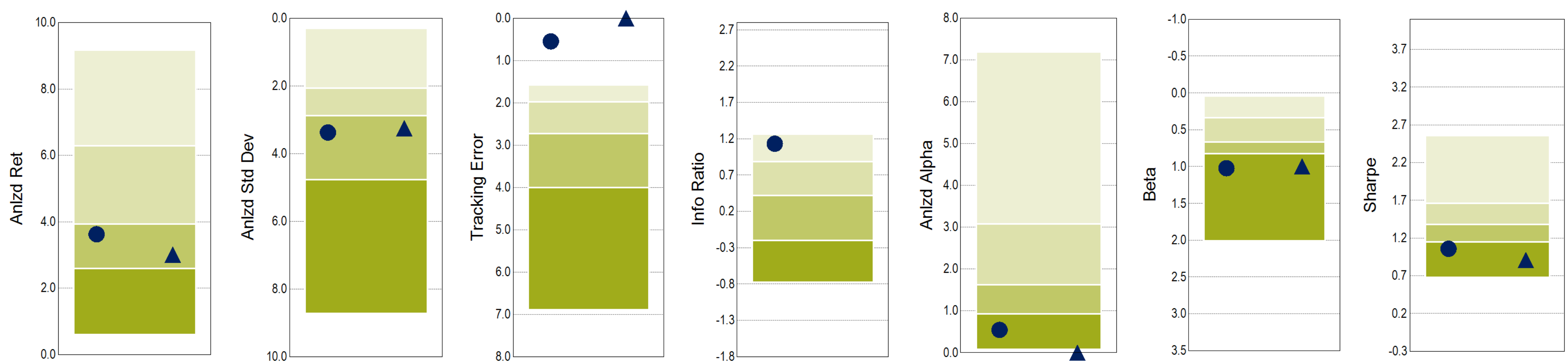


- Total Public Markets Fixed Income
- ASRS Custom Public Markets Fixed Income Benchmark
- 68% Confidence Interval
- eA All US Fixed Inc Net

5 Year Style Map

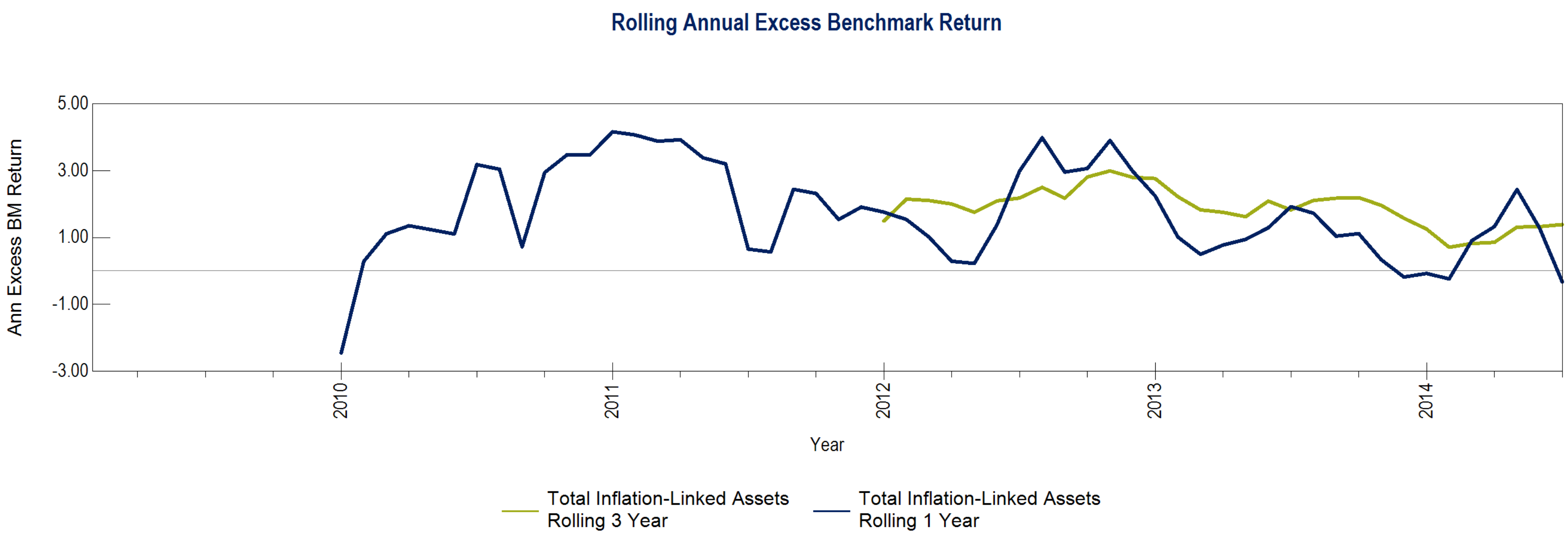


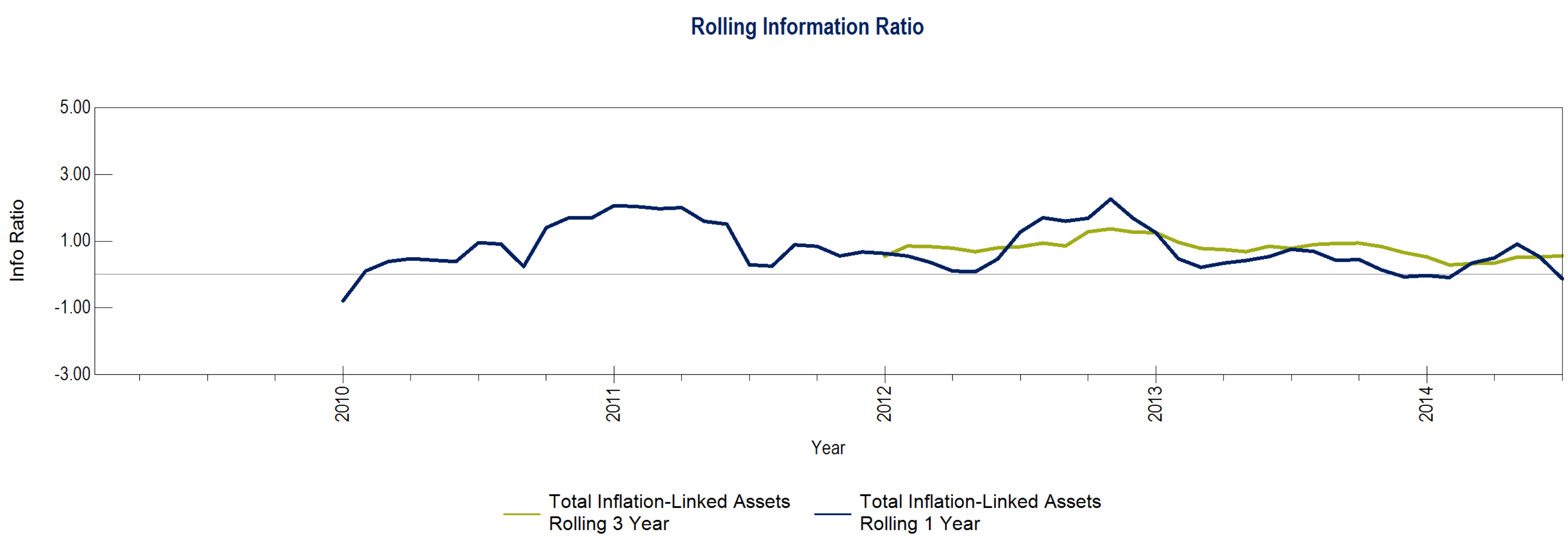
First Rolling Period ◆ Last Rolling Period



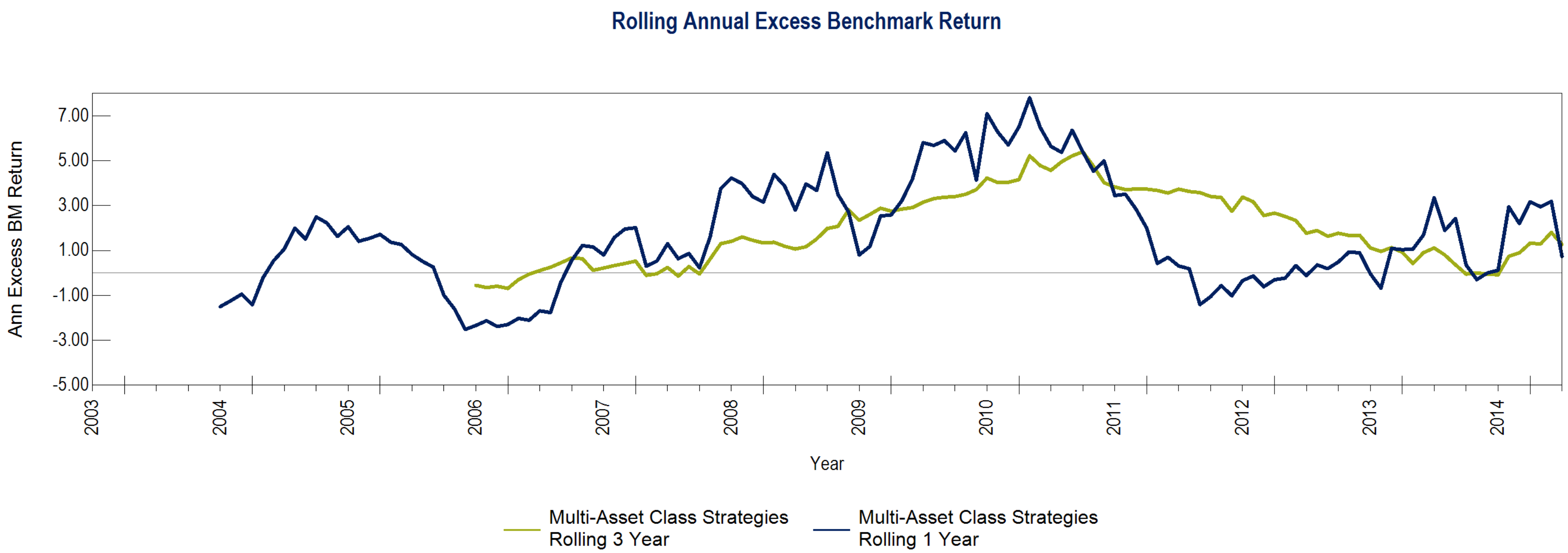
Total Public Markets Fixed Income | ASRS Custom Public Markets Fixed Income Benchmark | 5th to 25th Percentile | 25th to Median | Median to 75th Percentile | 75th to 95th Percentile

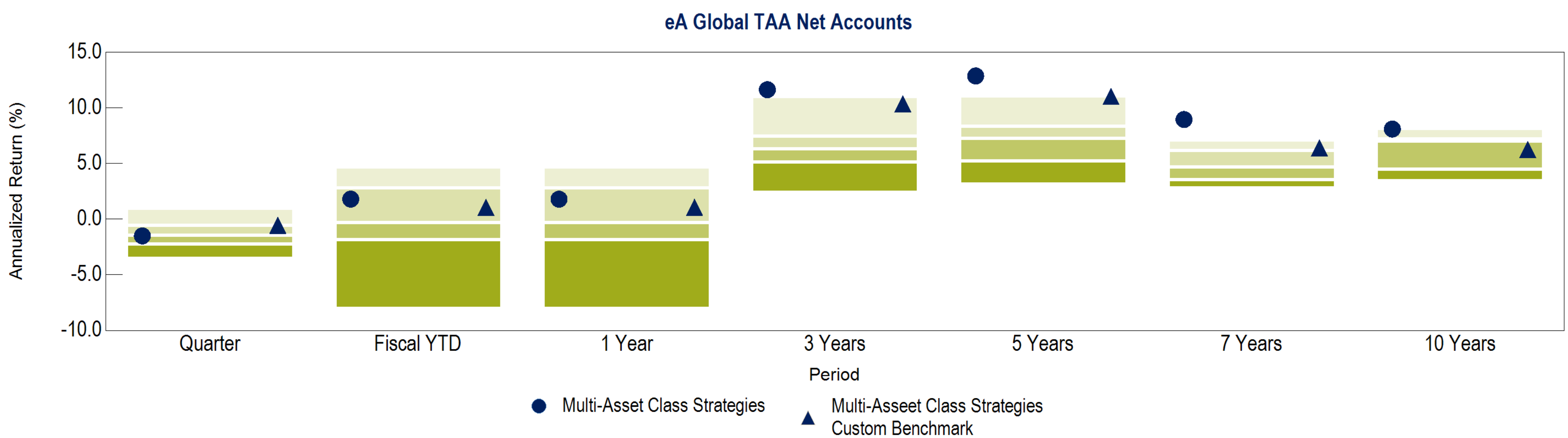
Asset Class Analysis - Total Inflation-Linked Assets





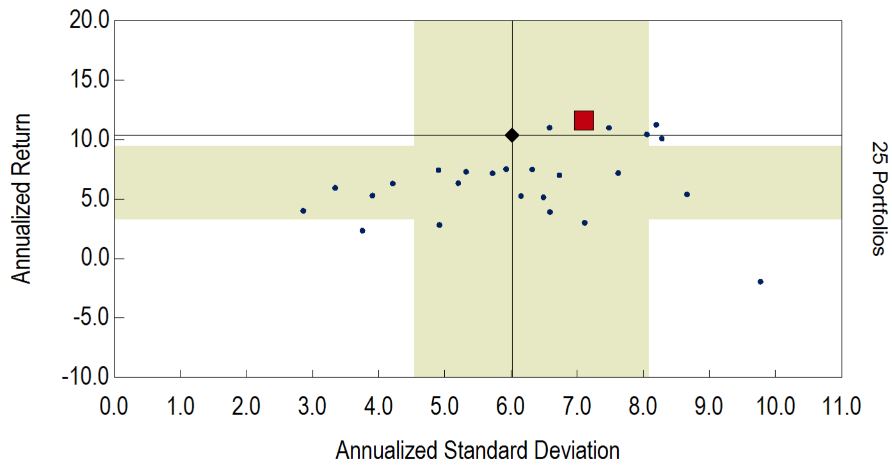
Asset Class Analysis - Multi-Asset Class Strategies



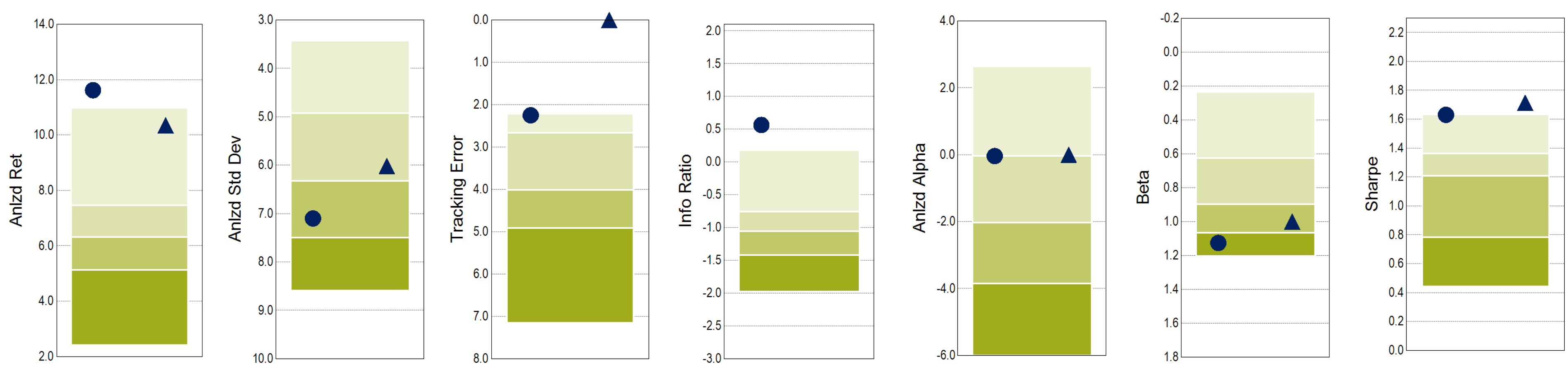


Asset Class Analysis - Multi-Asset Class Strategies

3 Years Ending June 30, 2015



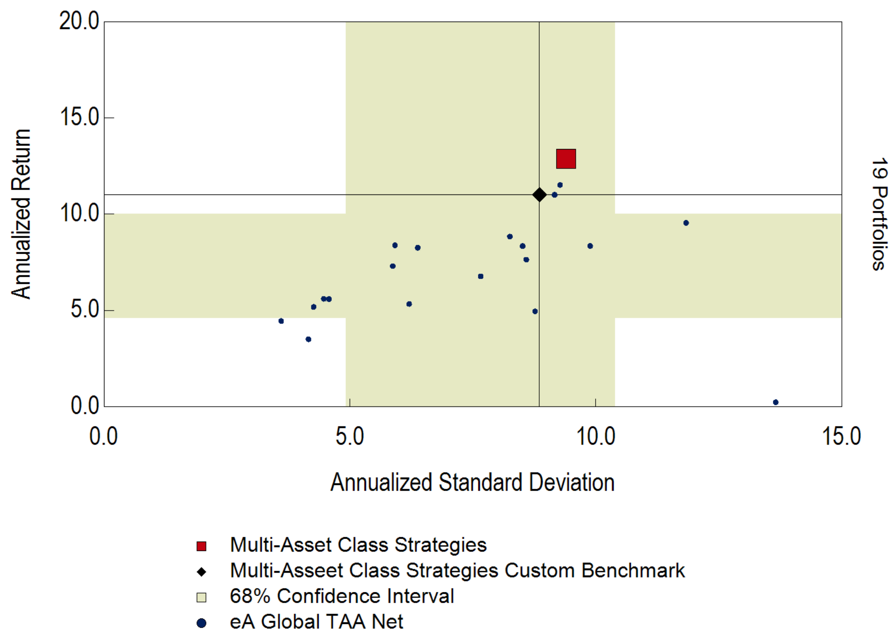
- Multi-Asset Class Strategies
- Multi-Asseet Class Strategies Custom Benchmark
- 68% Confidence Interval
- eA Global TAA Net

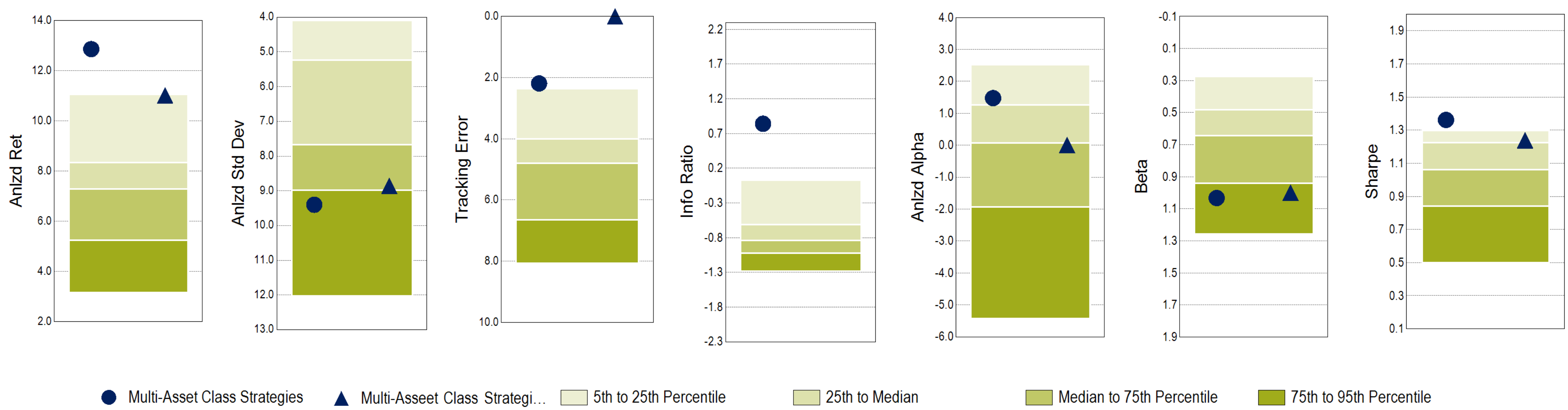


Multi-Asset Class Strategies | Multi-Asset Class Strategies Custom Benchmark | 5th to 25th Percentile | 25th to Median | Median to 75th Percentile | 75th to 95th Percentile

Asset Class Analysis - Multi-Asset Class Strategies

5 Years Ending June 30, 2015





Asset Class Committee Monitoring

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

- **June 23, 2015 – Private Markets Committee**
  - Monthly Status Report, General Discussion and Deal Flow
  - Real Estate Pipeline Discussion
    - Informational item to provide an update on real estate investment pipeline and to solicit guidance as necessary
  - Real Estate Manager Recommendation (increase commitment to $300 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 10%)
    - The ASRS has current commitments to this manager at $100 million
    - 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 and the ASRS private markets team recommended the ASRS approve a variance request from an existing real estate manager to amend the financing criteria required to make an investment
      - Equity ownership guidelines amended in order to proceed to diligence phase of the investment process
    - Committee approved the variance request to equity position cap allowing up to 35% of equity ownership

- **July 20, 2015 – Private Markets Committee**
  - Monthly Status Report, General Discussion and Deal Flow
  - Semi-Annual SMA review – the private markets committee reviewed market conditions, capital deployment and strategic outlook within the SMA program
  - Real Estate Manager Recommendation ($200 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 10%)
    - The ASRS is currently invested with this manager in multiple funds across the ASRS private markets landscape
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

Asset Class Committee Monitoring

- **July 20, 2015 – Private Markets Committee (continued)**
  - Real Estate Manager Recommendation ($200 million)
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 10%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Opportunistic Equity Manager Recommendation (20% of first round funding or $100 million)
    - RCLCo and the Private Markets Committee recommended that a co-investment opportunity with a current ASRS manager be committed to within Opportunistic Equity
    - The private markets committee asked that more diligence be completed on items in the co-investment guidelines Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation at the July 29, 2015 meeting
  - Variance Request
    - RCLCO and the ASRS private markets team recommended the ASRS approve a variance request from an existing real estate manager to amend the geographic investment guidelines criteria
      - Current guidelines did not allow for investment in this specific geographic region
    - Committee approved the variance request
  - Variance Request
    - RCLCO and the ASRS private markets team recommended the ASRS approve a variance request from an existing real estate manager to amend the geographic and investment structure criteria in the investment guidelines
      - Variance would allow for updated term structure and geographic criteria
    - Committee approved the variance request
  - Real Estate Manager Recommendation (termination of investment period)
    - RCLCo and ASRS private markets team recommended the ASRS approve termination of the investment period in an existing manager
    - Consistent with strategic plan at the Total Fund level (SAAP Target to Real Estate is 10%)
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

General Observations

- **The Fund continues to make significant progress moving the portfolio from the Interim SAAP toward the long-term SAAP. New long-term SAAP adopted as of April 1, 2015.**
  - Current Interim SAAP includes proration of 1.1% Private Equity, 4.1% Real Estate and 5.6% Private Debt which are unfunded. Continued build out of private markets asset classes provides opportunity to take advantage of illiquidity premium to produce expected returns in excess of what we believe can be achieved in the public markets.

- **IMD has already taken significant steps to move the Fund toward implementation of the recently approved SAAP.**
  - The largest single underweight position in the Fund is Private Debt, which was increased from a 3% SAAP target to a 10% SAAP target (current actual is 4.7%).
    - $3.9 billion in commitments to private debt strategies equates to approximately 11.2% of Total Fund assets vs. the SAAP target of 10%.
  - Emerging Market Debt investment managers have been liquidated as the asset class was removed from the SAAP.
  - Multi-Asset Class Strategies (formerly GTAA) has been restructured and moved 'above the line' and now has an explicit 5% target within the SAAP.

- **Cash Assetization Program implemented:**
  - To facilitate fund liquidity by decreasing the settlement times and market frictions related to overall investment management.
  - To retain unleveraged Total Fund market (beta) exposure, and concurrently offset the hindrance on investment performance from maintaining sizeable transitional cash balances intended to meet fund payment obligations (e.g., pension, health supplement, LTD, fees, accounts payable and associated capital calls).

- **ASRS SAAP Benchmark evaluation is complete. New SAAP targets are effective April 1, 2015.**

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

Market Environment Update and Outlook

Economic Environment

- **Second quarter GDP growth rate printed at +2.3%.**
  - Retail sales (ended May) at +1.6% on a year-over-year growth rate basis.
  - The inventory-to-sales ratio at May 31 was flat at 1.4 and has remained relatively flat since early 2010.
  - Corporate profits as a percent of GDP increased in the first quarter to 10.7% from 10.4% in the fourth quarter and remain elevated relative to historical levels.
  - The U.S. trade deficit widened slightly during May.

- **The unemployment rate fell to 5.3% in Q2 from 5.5% in Q1 2014; U-6, a broader measure of unemployment, fell to 10.5% during the second quarter.**

- **The Case-Shiller Home Price Index (as of 4/30) increased slightly to 170.0 from first quarter levels (168.2) and is at levels higher than that of pre-financial crisis levels of 150.92.**

- **Rolling 12-month seasonally adjusted CPI increased to +0.2% from -0.02% at the end of March; Capacity Utilization increased slightly to 77.8% in June.**

- **Fed Funds rate remains at 0.25%, while the 10-year Treasury Yield finished Q2 at 2.4% up 50 basis points from Q1.**

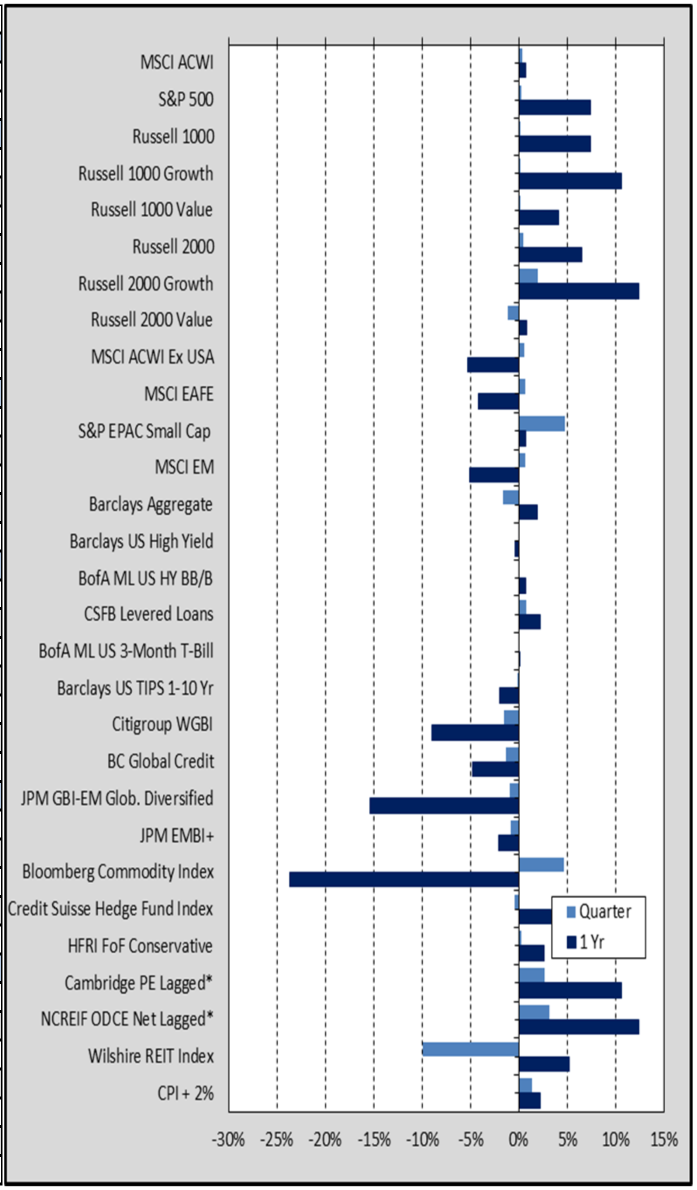
- **The Fed balance sheet declined slightly in Q2 2015, while the European Central Bank balance sheet increased in the same period.**
  - ECB continues asset purchases of €60 billion per month.

- **S&P valuations increased in June remaining above the 10-year and long-term averages**
  - Cyclically adjusted Shiller PE ratio (26.6x) is above the long-term average of 16.4x and above the 10-year average of 22.9x.

- **The U.S. Dollar continues to strengthen against a basket of major currencies as the Fed ends its quantitative easing program and the ECB ramps up easing.**
  - Currency volatility has seen a sustained uptick since Q1.

Market Environment – Q2 2015 Overview

		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
World Equity Benchmarks						
MSCI ACWI	World	0.3%	0.7%	13.0%	11.9%	6.4%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Domestic Equity Benchmarks						
S&P 500	Large Core	0.3%	7.4%	17.3%	17.3%	7.9%
Russell 1000	Large Core	0.1%	7.4%	17.7%	17.6%	8.1%
Russell 1000 Growth	Large Growth	0.1%	10.6%	18.0%	18.6%	9.1%
Russell 1000 Value	Large Value	0.1%	4.1%	17.3%	16.5%	7.0%
Russell 2000	Small Core	0.4%	6.5%	17.8%	17.1%	8.4%
Russell 2000 Growth	Small Growth	2.0%	12.3%	20.1%	19.3%	9.9%
Russell 2000 Value	Small Value	-1.2%	0.8%	15.5%	14.8%	6.9%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
International Equity Benchmarks						
MSCI ACWI Ex USA	World ex-US	0.5%	-5.3%	9.4%	7.8%	5.5%
MSCI EAFE	Int'l Developed	0.6%	-4.2%	12.0%	9.5%	5.1%
S&P EPAC Small Cap	Small Cap Int'l	4.7%	0.7%	16.3%	12.9%	7.7%
MSCI EM	Emerging Equity	0.7%	-5.1%	3.7%	3.7%	8.1%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Domestic Fixed Income Benchmarks						
Barclays Aggregate	Core Bonds	-1.7%	1.9%	1.8%	3.3%	4.4%
Barclays US High Yield	High Yield	0.0%	-0.4%	6.8%	8.6%	7.9%
BofA ML US HY BB/B	High Yield	0.0%	0.7%	6.8%	8.4%	7.2%
CSFB Levered Loans	Bank Loans	0.8%	2.2%	5.3%	5.7%	4.8%
BofA ML US 3-Month T-Bill	Cash	0.0%	0.0%	0.1%	0.1%	1.4%
Barclays US TIPS 1-10 Yr	Inflation	-0.1%	-1.9%	-0.5%	2.4%	3.7%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Global Fixed Income Benchmarks						
Citigroup WGBI	World Gov. Bonds	-1.5%	-9.0%	-2.4%	1.0%	3.1%
BC Global Credit	Global Bonds	-1.3%	-4.8%	2.2%	4.3%	4.2%
JPM GBI-EM Glob. Diversified	Em. Mkt. Bonds (Local)	-1.0%	-15.4%	-3.8%	0.9%	5.9%
JPM EMBI+	Em. Mkt. Bonds	-0.9%	-2.1%	2.8%	6.2%	7.2%
		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
Alternative Benchmarks						
Bloomberg Commodity Index	Commodity	4.7%	-23.7%	-8.8%	-3.9%	-2.6%
Credit Suisse Hedge Fund Index	Hedge Fund	-0.5%	3.3%	7.1%	6.2%	5.9%
HFRI FoF Conservative	Fund of Funds	0.2%	2.6%	5.5%	3.6%	2.6%
Cambridge PE Lagged*	Private Equity	2.6%	10.5%	14.4%	15.1%	13.7%
NCREIF ODCE Net Lagged*	Real Estate	3.2%	12.4%	11.6%	13.4%	6.0%
Wilshire REIT Index	REIT	-9.9%	5.2%	9.0%	14.7%	6.9%
CPI + 2%	Inflation/Real Assets	1.4%	2.2%	3.3%	3.9%	4.1%



* As of 3/31/2015

Second Quarter 2015 Market Review

Positives

- **Divergence in monetary policies signaling different investment environments globally**
- **US Economy shows strength relative to other developed markets**
- **ECB monetary easing continues with €60 billion in monthly asset purchases**
  - ECB commits €1.3 trillion in asset purchases in the Eurozone
  - Global risk assets responding positively
  - Negative short dated interest rates in Eurozone
- **Contagion risk from Greece's Euro exit is largely contained**
  - Greece represents only 1.7% of total Eurozone GDP
- **Developed world inflation is low**
  - In US, CPI for all Urban Consumers on a seasonally adjusted basis bounced back to positive territory after posting negative results in Q1

Negatives

- **Geopolitical instability continues to drive volatility**
  - Instability in the Mid-East, Eastern Europe, Greece, China
- **Slowing economic growth in China may have broad implications for many emerging economies**
  - Commodity producers impacted
- **Fed rate hike uncertainty contributed to volatility in domestic markets**
  - Market expecting a slow pace to rate increases
- **Valuations remain above 10 year and long term averages**
  - Developed Equity P/Es above median

Market Environment

Global Equity

- **U.S. equities posted modest gains in the second quarter as global monetary accommodation ramped up.**
- **Small cap stocks outperformed large cap stocks during the quarter, with the Russell 2000 Index returning 0.4% and the Russell 1000 Index returning 0.1%.**
- **International equities outperformed U.S. markets during the quarter, returning 0.5%, as measured by the MSCI ACWI ex-U.S. Index.**
  – Developed markets returned 0.6% as measured by the MSCI EAFE Index. Relatively strong returns were posted by Hong Kong and Japan at +5.6% and +3.1% respectively.
  – Emerging markets returned +0.7% as measured by the MSCI Emerging Markets Index in U.S. dollar terms. Russia and China bolstered the quarter returning +7.6% and +6.0% respectively.

Private Equity

- **New private equity commitments totaled $101.5 billion in Q2 2015.**
  – Rapid fundraising pace continues for high demand managers.
- **Buyout and growth equity funds raised $57 billion in Q2 2015.**
  – Very strong Q2 totals driven by one fund which raised $17 billion.
- **Venture capital raised $24.6 billion ended June.**
  – At 13% of total private equity raised, commitments are just below the 10-year historic relative average and are buoyed by strong IPO and M&A environment.
- **Energy funds raised $30.1 billion representing 16% of capital raised in Q2.**
  – Investors are opportunistically approaching the energy market dislocation.
- **Asian private equity commitments slowed to total 6% of total funds raised down from 10% in 2014.**
- **European commitments comprised 17% of all new PE commitments in Q2 2015.**
  – 70% of European funds raised were based in the United Kingdom.

Market Environment

Fixed Income

- **The yield curve steepened amid global financial instability in the Eurozone and the Fed's rate hike signaling.**
- **The spread between two and 10-year rates increased to 176 basis points from 138 basis points ended March. Treasury Inflation-Protected Securities, or TIPS, returned -1.1% during the quarter, as measured by the Barclays US TIPS Index.**
- **The Barclays Long Duration Credit Index lost -7.3% as the long end of the curve ended the quarter 57 basis points higher.**
- **Long Treasuries fell -8.3% and investment-grade corporate debt lost -2.9%.**
  - Despite strong earnings and credit fundamentals, the overall performance of US high-grade corporate bonds was hindered by record new issuance, which contributed to 16 basis points of spread widening in the quarter. Issuance has totaled almost $650 billion year-to-date (with a record issuance of $155 billion in May). This issuance is over 20% higher than in the first half of 2014.
- **The Barclays 1-3 year Government/ Credit Index returned 0.1% and US high yield bonds were flat returning 0%.**
- **Emerging markets debt continued to slow in local and external currency as yields increased globally.**
  - US dollar-denominated debt, as measured by the JP Morgan EMBI Index, fell 34 basis points; local currency debt fell 96 basis points, according to the JP Morgan GBI-EM Index.
  - Emerging market currencies—in particular, the Mexican peso, Thai baht and Turkish Lira—weakened against the US dollar.

Real Assets/Inflation-Linked Assets

- **Massive energy market dislocation.**
  - Oil prices trending lower.
  - Private equity and private debt opportunities attractive.
  - Potential for public stressed/distressed credit, equity and commodity plays.
- **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.**
- **Select infrastructure opportunities are attractive.**
  - Target opportunistic strategies in niche sub-sectors to take advantage of market dislocations.
- **NEPC continues to believe in the long-term demand drivers in agriculture.**
  - Long-term commodity prices driven by growing emerging market demand.
  - Softness in commodity prices may provide attractive entry point.
- **Timber opportunity set limited but warrants further review**
  - 45% increase in housing starts forecasted; timber prices highly correlated

Market Environment

Commodities

- **Commodities broke their three quarter losing streak with the Bloomberg Commodity Index posting a 4.7% gain.**
  - Energy and agriculture led the way, while industrial metals, precious metals and livestock declined.
  - The Bloomberg WTI Crude Oil Index gained 17.5% for the quarter amid continued declines in rig counts and announced project deferrals, expectations of demand rebounding and lower US output.

Real Estate

- **NEPC continues to be neutral on core real estate in the US 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.**
  - Real estate fundamentals and debt terms are attractive, however valuations are high and the possibility of rising interest rates and the impact on cap rates causes concern.

- **U.S. REITs posted a very weak quarter with a -9.9% return.**
  - FFO multiples are high, at approximately 15x but are decreasing.
  - REITs are trading at a discount to NAV.

- **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 and uneven with global markets experiencing large capital inflows.
  - Banks in EU are still overleveraged and have significant real estate exposure to jettison.

Market Outlook and Recommendations

- **Be judicious with risk**
  - Avoid chasing risk for only marginal return enhancements
  - Less liquid opportunities may provide the best risk-adjusted approach, but liquidity needs should be incorporated (e.g., substituting direct lending for high yield)
- **Catalysts are present to drive international equity markets above pre-financial crisis highs**
  - Encourage an equal weight exposure to international developed and US equities
  - If currency hedged, encourage larger international developed equity exposure relative to US equities
- **Question the "traditional" approach; different investment environments require different perspectives of risk and return**
  - A low-return environment may require a fresh perspective
  - Continue to remove traditional portfolio constraints by adding active managers with skill to exploit inefficiencies within and across asset classes (e.g., flexible global equity, global asset allocation, absolute return fixed income)
- **Rethink fixed income portfolio structure in light of current market environment**
  - Use of an unconstrained/multi-sector fixed income portfolio may provide sound diversification and enhanced liquidity
  - Examine if alternatives are available to traditional portfolio positions (e.g., combining cash and long treasuries vs. holding core bond portfolio)

NEPC Updates

June 30, 2015

Highlights of Second Quarter Happenings at NEPC

NEPC Research

Recent White Papers

- *2015 2nd Quarter Market Thoughts*
- *Rising Rates and Implications for Credit Investors* (April 2015) – Seth Bancroft, Senior Research Analyst, Traditional Research
- *Socially Responsible Investing in Action* (May 2015) – Sheila Healy Berube, CFA, Senior Consultant.
- *A Dynamic Approach to Pension Glide Paths* (May 2015) - Christopher A. Levell, ASA, CFA, CAIA, Partner, Client Strategy


RISING RATES AND IMPLICATIONS FOR CREDIT INVESTORS

Seth Bancroft, Senior Research Analyst, Traditional Research

NEPC Client Recognitions

- NEPC is pleased to announce that two of our clients recently won *Institutional Investor Intelligence* Awards. Ruth Ryerson, Executive Director at Wyoming Retirement System, was a co-winner of the Executive Director of the Year award, along with Steve Yoakum from Public School and Education Employee Retirement Systems of Missouri. Dave Underwood, Deputy CIO and Portfolio Manager – Equities at Arizona State Retirement System, won the *Institutional Investor Intelligence* Award: Innovator.

NEPC Recognitions

- We are pleased to announce that **NEPC has won two Alternative Investment Awards for 2015** from *Wealth & Finance International*, one for Sustained Excellence in Client Investment Management and the other for Macro Strategy Specialist of the Year – USA. Awards Coordinator Peter Rujgev commented, "The caliber of the 2015 nominees was simply outstanding and this ensured that the judging process was more than a little demanding. Put simply, our winners represent the very best of the best and with such a tremendous amount of competition, it is an honor to acknowledge them and wish them well for another award winning year ahead."

News from NEPC

- **Doris Ewing honored by the NASP**. Please join us in congratulating retired NEPC Partner, Doris Ewing, who was honored as the first female African-American Partner of an Investment Consulting Firm at the NASP Women's Legends Tea on June 14 in Chicago. Congratulations Doris!

Recent Events

- **NEPC Clients Invited to the White House**. A diverse group of NEPC clients were invited to the White House on June 16 for the Clean Energy Investment Summit. The goal of the event was to help address the fundraising gap for scalable investments in clean energy and catalyze more institutional investment. Attendees engaged with senior members of the Administration to discuss recent or potential clean energy investments.

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 – 3/31/2015 – 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
- **4/1/2015 - present – 20% S&P 500/3% S&P 400/3% S&P 600/17% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/11% Barclays Capital Aggregate/4% Barclays Capital High Yield/10% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/10% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodities Index TR/5% Multi-Asset Class Custom Index**

- ***Interim SAA Policy:** 23% S&P 500/3% S&P 400/3% S&P 600/18% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/17% Barclays Capital Aggregate/5% Barclays Capital High Yield/4% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/6% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodity Index/5% Multi-Asset Class Custom Index

Note: Interim SAA Policy includes proration of 1.1% Private Equity, 4.1% Real Estate and 5.6% Private Debt which are unfunded. Private Equity was prorated to domestic equity; Real Estate was prorated to domestic equity and fixed income; Private Debt was prorated to Core and High Yield Fixed Income. Recently approved Strategic Asset Allocation Policy effective April 1, 2015.

[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 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 through 3/31/2015; 40% S&P 500, 6% S&P 400, 6% S&P 600, 34% MSCI EAFE, 4% MSCI EAFE Small Cap, 10% 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, 15% S&P 600 through 3/31/2015.; 77% S&P 500, 11.5% S&P 400, 11.5% 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 through 3/31/2015; 71% MSCI EAFE, 8% MSCI EAFE Small Cap and 21% 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 through 3/31/2015; 73% Barclays Capital U.S. Aggregate Index, 27% Barclays Capital U.S. High Yield Bond 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% Bloomberg Commodity Index through 8/31/2010; 30% Barclays Capital U.S. TIPS, 70% Bloomberg Commodity Index through 5/31/2011; 100% Bloomberg Commodity Index thereafter.

- **Multi-Asset Class Custom 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% Bloomberg Commodity Index through 06/30/2012; 43% S&P 500, 25% MSCI EAFE, 28% Barclays Capital Aggregate, and 4% Bloomberg Commodity Index through 3/31/2015; market value weighted average of the benchmarks for Bridgewater (91 Day T-Bill) and Windham (52% MSCI ACWI net, 30% Citi WGBI, 9% DJ US REIT, and 9% Bloomberg 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.

Information Disclaimer and Reporting Methodology

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.
- 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 within.
- Some index returns displayed in this report or used in calculation of a policy, allocation or custom benchmark may be preliminary and subject to change.
- This report is provided as a management aid for the client's internal use only. Information contained in this report does not constitute a recommendation by NEPC.
- This report may contain confidential or proprietary information and may not be copied or redistributed to any party not legally entitled to receive it.

Reporting Methodology

- The client's custodian bank is NEPC's preferred data source unless otherwise directed. NEPC generally 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 manager fees as indicated on each page.
- 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 taken into account in all 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.

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

FROM: Mr. Gary R. Dokes, Chief Investment Officer (CIO)
Mr. Karl Polen, Head of Private Markets Investing

DATE: August 10, 2015

RE: Agenda Item #5: Presentation, Discussion, and Appropriate Action Regarding to the ASRS Real Estate Strategic Plan Revisions

Purpose
To present, discuss, and take appropriate action regarding revisions to the Real Estate Investment Program Strategic Plan.

Recommendation
Recommend the Investment Committee approve the ASRS Real Estate Investment Program Strategic Plan, dated June 23, 2015.

Background
The ASRS invests in real estate in accordance with a Real Estate Strategic Plan approved by the Investment Committee and the Board. This Strategic Plan was last updated in October of 2011. The Private Markets committee at its meeting on July 20, 2015, reviewed and approved proposed changes to the Strategic Plan and is recommending them to the Investment Committee.

The proposed changes expand the separate account program to encompass a target of 75% of real estate assets. The separate account program is being expanded in order to pursue customized investment strategies, greater alignment of interest and enhanced control through partner of one structures and reduced fees. The proposed changes align the strategic plan with current risk management perspectives by updating the permitted property types and modifying the risk categories to focus on objective and functional risks of property based on leasing status and life cycle stage. The proposed strategic plan maintains leverage targets in the 50% to 60% range, but measures leverage at the total portfolio level allowing some flexibility at the property level for fixed rate debt while constraining variable rate debt at lower leverage levels.

The ASRS real estate consultant has reviewed the revised plan, and has concluded it is appropriate and concurs in its adoption.

Attachments:
1. Real Estate Strategic Plan – Redline compared to prior adopted Strategic Plan
2. Real Estate Strategic Plan – Draft Plan Dated June 23, 2015
3. Strategic Investment Policy (SIP006)

REAL ESTATE INVESTMENT PROGRAM STRATEGIC PLAN

APPROVED: JULY 16, 2004

REVISED: ~~OCTOBER 21~~June 23, 2015~~1~~

ARIZONA STATE RETIREMENT SYSTEM

3300 N CENTRAL AVENUE
PHOENIX, AZ 85012

TABLE OF CONTENTS

Executive Summary

The Arizona State Retirement System (ASRS) has determined that, over the long term, inclusion of Real Estate (RE) investments in the total portfolio will provide benefits to the ASRS. In 2003, the ASRS approved a six percent (6%) funding target to institutional RE investments as a part of the ASRS' asset allocation policy. Through subsequent modifications, this target allocation has been increased to 10%. The target allows for a range of plus/minus two percent (+/- 2%). To reach and maintain the ~~six~~ ten percent (~~6%~~10%) funded target, the ASRS will make allocations in accordance with amounts determined by a pacing study and implementation plan – updated ~~at least twice~~ annually.

Formatted: Character scale: 100%, Expanded by 0.15 pt

This document establishes the specific objectives and policies involved in the implementation and oversight of the RE program. The objectives define the specific role and return expectations of the RE program. The policies provide specifications for acceptable investment styles and management of the various risks associated with the asset class.

Objectives

The purpose of the ASRS' RE program is to provide the following benefits:

- Achieve attractive risk-adjusted returns.
- Enhance the overall diversification of the ASRS' investment program.
- Generate regular cash flow from stabilized properties.

RE is expected to positively contribute to the ASRS' investment objective to meet or exceed the actuarial assumed investment rate of return of the ASRS. In addition to achieving attractive risk-adjusted returns relative to other asset classes, another objective for RE is to enhance the overall diversification of the ASRS' investment program.

For purposes of total fund performance, the ASRS real estate program will be benchmarked on a net of fees basis against the net return of the NCREIF Fund Index - Open End Diversified Core Equity (NFI-ODCE). However, 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. Incremental returns are expected to result from any one or more of the following active management strategies.

1. Actively managing those assets providing stabilized returns from cash flow in order to maintain and grow cash flow levels over the duration of the hold period.
2. Assume life cycle or market risk to actively create/restore value for realization or stabilized hold.
3. Tactically allocate to strategies favored by market dynamics during isolated periods of time.

The Private Markets Committee (PrivMC) may take a course of action at any time to reduce ASRS' exposure to the real estate asset class or terminate any future funding to the asset class when appropriate risk adjusted returns appear unachievable.

Policies

A. Portfolio Composition

All portfolio investments will be classified by their general risk/return profile. There are two major categories:

1. ~~Core~~ Stable Investments

~~Core~~ Stable investments include existing, substantially leased income-producing properties located principally in metropolitan areas that exhibit reasonable economic diversification. ~~Core~~Stable properties typically exhibit the following characteristics:

- Predictable income flows with a high proportion of anticipated total return arising from current income and cash flow;
- Located in ~~an economically diversified~~a metropolitan area with adequate demand generators or location features relevant to the property;
- Credit quality tenants or multi-tenant with a staggered lease maturity schedule ~~Quality construction and design features~~;
- Quality construction and design features;
- Reasonable ~~assurance~~ expectation of a broad pool of potential purchasers upon disposition;
- ~~Properties requiring quality asset and portfolio management but not requiring specialized operating expertise which is not readily available in the market.~~
- Investments deemed by the PrivMC to be consistent with the goals of the ~~Core~~Stable portfolio.

These investments may come in the form of a separately managed account, commingled fund, joint venture, direct investment, co- investment or secondary structure as determined ~~by~~ to be the most appropriate vehicle for the specific investment.

Stable investments may include any property type which generates income from rent or similar charges for the right to occupy the property. This includes without limitation apartments, student housing, senior housing, office, medical office, industrial, self-storage and hotels. Stable properties will not include any "for sale" properties such as condominiums or single family residential which reflect a strategy of subdivision of a property in smaller units for sale whether by plat, condominium regime, or other similar method. Agricultural and infrastructure assets (except parking as an interim or complementary use) will not be considered part of the real estate portfolio. The PrivMC will decide whether property types or strategies or appropriate for inclusion in the Real Estate portfolio.

Formatted: Not Highlight

Public RE securities (e.g. Real Estate Investment Trusts or REITs) will also be considered part of the ~~core~~Stable component of the ASRS' portfolio. Public RE securities are publicly traded companies that manage a portfolio of real estate based investments in order to produce income and capital appreciation for investors.

2. ~~Non-Core~~Value Creation Investments

~~Non-Core~~Value Creation investments represent those properties and/or investment strategies that require specialized acquisition and management expertise or skill to mitigate the business and leasing risk that may be associated with individual investments. ~~Non-Core~~Value Creation investments have greater associated volatility compared to ~~Core~~ Stable investments. ~~Non-Core~~Value Creation investments may exhibit one or more of the following characteristics:

- Properties involving significant appreciation, lease-up, construction, development and/or redevelopment risks;

- ~~Properties located in secondary and tertiary markets, which are not economically diversified and may have accompanying susceptibility to imbalances of demand and supply;~~
- For Sale ~~P~~property types including (but not limited to) ~~hotels, motels, senior housing, and~~condominiums and single family residential housing~~. which require specialized management skills focusing primarily on operating business expertise rather than pure real estate management expertise~~;
- Debt Securities and/or Properties which are considered to be in "work out" mode;

Formatted: Indent: Left: 0.08", Line spacing: At least 10 pt

- ~~Properties involving significant appreciation, lease-up, development and/or redevelopment risks;~~
- ~~Financing or investment structures that impact cash flows and/or require additional administrative expertise~~Distressed for control and restructuring situations
- Mezzanine or preferred equity with significant equity features; and,
- Investments deemed by the PrivMC to be consistent with the goals of the ~~Non-Core~~Value Creation portfolio.

Formatted: Not Expanded by / Condensed by

~~Non-Core~~Value Creation ~~properties can further be broken down into two categories: Value Added and Opportunistic. These~~ investments may come in the form of a commingled fund, joint venture, direct investment, co- investment or secondary structure as determined by the most appropriate vehicle for the specific investment.

~~Value Added RE is characterized as traditional properties that take on moderate additional risk from one or more of the following sources – leasing, redevelopment, repositioning, location in secondary and tertiary markets and specialized property types including hotels, student housing, senior housing or other property types requiring specialized management skills.~~

~~Opportunistic RE takes on additional risks from Value Added RE strategies in order to achieve a higher level of return. Opportunistic investments may include direct RE assets such as development or major redevelopment of office, retail, industrial, multifamily, hotel or specialized property types. Additionally, opportunistic investments could include land investing, operating company investing, distressed debt/properties, and other specialized investments.~~

While the characteristics of risk/return can be grouped and broadly defined, the return expectations from each group will vary from market cycle to market cycle.

Near term, five to seven (5-7) years, return expectations for each group are as follows:

Component	Expected Net Returns
~~Core~~Stable - Private	Net NFI-ODCE
~~Core~~ Public Securities	FTSE EPRA/NAREIT Global Index
~~Non-Core~~Value Creation - Private	Greater than net NFI-ODCE

The aggregate benchmark for the RE portfolio will be Net NFI-ODCE. The selection of a benchmark is not intended to establish a portfolio structure.

~~The long-term goal of the RE portfolio as a whole (for implementation by approximately 2020) will be investment of 65% (plus or minus 10%) of real estate assets to core and value add strategies and 35% (plus or minus 10%) of assets in opportunistic strategies. As much as feasible, compliance will be measured at the asset level and individual assets may transition from one category to another as their characteristics change. Risk criteria will not be applied at the manager or account level. Progression toward the long-term goal will be considered when considering new allocations and investments.~~

~~As of mid-2011, the RE portfolio holds higher than the target amounts in opportunistic real estate and is under-weight in core and value add. During the transition process the portfolio constraints will be the same as those in the prior version of this real estate strategic plan. To wit, the constraints shall remain:~~

The risk constraints by category are as follows:

Component	Minimum/Maximum

~~Total Core~~Stable	Minimum 40~~20~~%
Public Securities	Maximum 30%
~~Non-Core~~Value Creation ~~(Value Add plus Opportunistic)~~	Maximum 60~~80~~%

Construction and development risk (excluding fully preleased build to suits) Maximum 30%

~~Based on the current portfolio, it is anticipated that the above constraints will be utilized through 2020.~~

B. Portfolio Structure

The ASRS will implement its total RE allocation through two distinct programs.

1. ~~Strategic~~ Separate Account Allocations

~~50~~75% (+/- 10%) of the portfolio allocations will be directed to ~~Strategic~~ Separate Account Manager (SMA) relationships wherein the selected managers will manage across ~~Core~~Stable, ~~Value Added~~ and ~~Opportunistic~~ Value Creation investments to achieve the 8% net return objective on an inception IRR basis. ~~over rolling five-year periods.~~ ASRS will be the majority owner and will have significant control rights in any Separate Account, including the right to terminate the investment period preventing new investments being made in the account. Separate Account Relationships are intended to be limited in number (~~estimated at 4-6~~estimated at 10 to 15). Firms are expected to be vertically integrated with full service capabilities (property construction, leasing, management etc.) in their targeted investment class(es).

2. ~~Tactical~~ Commingled Allocations

~~50~~25% (+/- 10%) of the portfolio allocations will be directed toward ~~Tactical~~ Commingled investment strategies based on market opportunities and expected returns. Investments may include, but not be limited to, Public Securities, Open-ended Commingled Funds, Closed-end Commingled Funds and other permissible vehicles discussed herein. In Commingled Investments, ASRS will be a non-control minority owner, generally less than 20% although it may elect to own a larger non-control position in “club” type structures.

C. Risk Management

The primary risks associated with equity RE investments include implementation risk, investment manager risk, property market risk, asset and portfolio risk, and liquidity risks. The ASRS will mitigate risk in a prudent manner. Key to the management of risks is clearly established roles and responsibilities of all participants. The ASRS decision-making process is set forth in the governance document known as SIP006, attached heretor as exhibit “A”.~~, investment structures and management of risks associated with investing in RE equity are detailed in Exhibit A of this document. Additional r~~Risks will be mitigated through appropriate selection and use of Investment Structures, prudent Diversification and use of Leverage and appropriate Valuation policies as discussed below.

1. Investment Structures

The ASRS recognizes that, ~~regardless of investment structure,~~ RE is a~~n~~ relatively illiquid asset class. The degree of illiquidity is impacted by the investment structure with closed end structures being highly illiquid and open end funds being moderately illiquid. ~~Structures~~Separate accounts that maximize investor control of the assets are preferred because of the ability to negotiate terms to enhance alignment of interest with custom fee structures, negotiate terms permitting the termination of the investment period preventing new investments from being added to the account, create tailored investment criteria, enhance control through a certification process to ensure individual assets meet investment criteria and enhance liquidity through the ability to control exits.~~.~~ ~~The risk associated with the reduced investor control in higher return strategies will be mitigated by limiting exposure to any single investment strategy and/or manager.~~

~~The ASRS will utilize a variety of investment structures. In all cases, the investment structure will be~~

~~determined by the need and ability to mitigate the risks associated with the risk/return profile of a particular investment, including manager and strategy diversification.~~

The ASRS may invest through the following vehicle options:

a. ~~Individually~~Separately Managed Accounts

The ASRS may purchase assets on a ~~wholly~~ majority (50% or greater) owned basis through ~~Individually~~ Separately Managed Account (~~I~~SMA) structures, ~~in a commingled vehicle~~ or through direct ownership. ~~The ASRS may also consider joint venture or co-investment ownership within IMA structures.~~ASRS will hold not less than a 50% interest in property in SMA structures and will have control over liquidity after a reasonable period of time for properties to achieve stabilization.

b. Commingled Vehicles

The ASRS may also purchase assets through the ownership of units or shares of commingled vehicles. Any legally permissible vehicle will be allowed including, but not limited to, joint ventures, limited partnerships, real estate investment trusts and limited liability corporations.

2. Diversification

The ASRS will seek to diversify its RE program by manager, property type, property location, and investment style. However, initial allocations, i.e. implementation of the RE program may result in temporary variances to the policies stated below. Variances to the Manager, Vehicle and Property type/location policies will be reviewed and approved by the PrivMC. ~~and discussed and presented to the IC/Board.~~

a. Manager

The ASRS will implement a multi-manager program. At the time of investment, no manager will be more than thirty percent (30%) of the target RE portfolio to ensure that any possible underperformance of one manager will not unduly impact the total portfolio.

b. Vehicle

The ASRS will diversify the risk associated with a single manager and the implemented strategy through the diversification of selected investments. At the time of investment, no single commingled investment will be more than thirty percent (30%) of the target RE portfolio to ensure that any possible underperformance of one vehicle will not unduly impact the total portfolio. When investing in commingled investments, the ASRS will generally mitigate manager and vehicle risk by limiting its pro rata position within any commingled vehicle to twenty percent (20%) of the total equity capital raised at the final close of the vehicle or at the time of investment for open-ended investments. Exceptions to this 20% limit may be made by the PrivMC when allocating to club and joint venture structures.

c. Property Type and Location

The ASRS will diversify its exposure to property type and location. However, it is expected that at various points in time, the portfolio may be more heavily exposed to a single property type or location by virtue of opportunities available in the market, which are projected to generate the alpha targeted by the ASRS. Exposure to any ~~single property type or~~ geographic location (defined as a ~~single NCREIF region~~Metropolitan Statistical Area as determined by the U.S. Office of Management and Budget and/or a single country except the United States) in excess of forty percent (40%) of the total targeted real estate portfolio will be reviewed as an exception by the PrivMC. Portfolio limits by property type are shown in the following table:

Apartments	50%
Retail	30%
Office (including Medical Office)	30%
Industrial	30%
Student Housing	15%
Senior Housing	15%
Hotel	10%
Self-Storage	10%

Other property types authorized by PrivMC	10%

With the maturation of the RE asset class, investments have become global in nature and ASRS may invest outside the United States. ~~The ASRS will seek optimal risk adjusted returns within the context of opportunities located both domestically and internationally.~~ International investments will be limited to no more than thirty percent (30%) of the total targeted RE portfolio and may include ~~core~~Stable private and public investments as well as ~~non-core~~Value Creation- investments.

3. Leverage

~~The use of leverage, in and of itself, will not be used to define the risk level of the individual asset. As previously discussed, the mid-2011 portfolio will require the RE portfolio to allow for an interim limit on leverage of sixty-five percent (65%) of the targeted RE allocation. The long term~~

~~goal (for implementation by approximately 2020) will be a leverage limit of 55% of the target RE portfolio.~~

Leverage will be targeted to a range of 50% to 60% of the total portfolio, although individual accounts may have different leverage policies. The PrivMC will monitor and evaluate individual leverage policies so that collectively they result in achieving the target leverage. If appraisal changes, market events or other factors cause actual leverage to be outside the target range, the PrivMC will adopt plans that are expected to result in the portfolio to returning to the target leverage range within a reasonable period of time.

~~Strategic~~ Separate Account Managers ~~(SM)~~ will have broad discretion in the use of debt within their individual mandates, however each separate account will have a financing policy approved by the PrivMC as part of the account approval and reviewed annually. ~~no Strategic Manager Portfolio (SMP) will be granted authority in their governing documents to exceed 50% loan to value on a portfolio basis without PrivMC approval.~~ Such governance documents may allow higher initial loan to cost and allow~~grant~~ reasonable time frames to achieve target leverage with stabilization of properties and to remedy excess leverage situations which occur temporarily in program formation or as a result of appraisal changes. Risk classification of assets held in each SMP will be determined solely on the characteristics of the property; property level debt will not be utilized to classify asset risk. ~~SMs~~ Appropriateness of leverage ratios will be established based on property type, the stability of the rental stream and whether the loan is fixed rate or not. The following table illustrates leverage limits for property types and loan types.

	Permitted loan to value for Fixed rate loans or multi-family loans with affordable housing subsidy features with an initial term at least 7 years	Loan to cost at acquisition for Variable Rate Loans	Loan to value at stabilization for Variable Rate Loans
Apartments, student housing and senior housing	75% if amortizing 70% if interest only	65%	50%
Single tenant lease with investment grade tenant	75% if amortizing 70% if interest only	65%	50%
Other property types	65% if amortizing 60% if interest only	65%	50%

Formatted: Not Expanded by / Condensed by

Separate Account Managers will be evaluated on the prudent use of leverage to ~~most~~ consistently meet/exceed the net 8% return target on an inception IRR basis.~~over rolling five year periods~~

~~Tactical~~ Commingled Allocations may include the use of leverage within specific strategies. Leverage in ~~Tactical~~ Commingled Portfolio investments will be reviewed and approved in conjunction with PrivMC approval of each allocation. It is expected that the loan to value ratio for the ~~Tactical~~ Commingled Portfolio will not exceed 60% in the aggregate across all investments however, the PrivMC will determine acceptable leverage for each investment during the approval process. Tactical allocations will be evaluated relative to targeted returns, equity multiples and vintage year performance.

Variances to the leverage policies will be reviewed and approved by the PrivMC. ~~and discussed and presented to the IC/Board.~~

~~4.~~ 4 Valuations

All investments in a~~n~~ ~~I~~SMA and directly owned investments will be independently valued on an annual basis in accounts established or amended after 2012. For accounts established in 2012 or earlier, assets will be appraised not less than once every three years by a qualified expert (certified Member of the Appraisal Institute-MAI). During interim years, if applicable, valuations will be performed by the Manager in accordance with industry standards. Investments held in commingled funds will be subject to the agreed upon valuation policy approved with the selection of the investment.

Formatted: Body Text, Justified, Indent: Left: 0.17", First line: 0.5", Right: 0.15", Space Before: 6 pt, No bullets or numbering, Tab stops: Not at 0.67"

Formatted: Indent: Left: 0.5"

Exhibit A (attach copy of SIP006)

~~Roles for Participants~~

~~The ASRS RE program shall be planned, implemented, and monitored through the coordinated efforts of the Board, Investment Committee (IC), Private Markets Committee (PrivMC), Director, CIO, and Investment Management Division (IMD) RE staff, and RE consultant (Consultant). The IMD RE staff will be primarily responsible for implementing the investment decisions of the PrivMC, the IC and the Board. The ASRS has out-sourced the "back office" function for real estate investments. Set forth below is the delegation of the major responsibilities of each participant.~~

~~Duties of the Board~~

- ~~Establish the allocation to and role of real estate to the ASRS.~~
- ~~Approve the RE Investment Program Strategic Plan and any changes and modifications to same.~~
- ~~Review and approve macro-level strategic investment policies which guide the strategic vision for ASRS investments.~~
- ~~Formally review the RE asset class on an annual basis.~~

~~Duties of the Investment Committee (IC)~~

- ~~Recommend to the Board the RE Investment Program Strategic Plan and any changes and modifications to same.~~
- ~~Provide expert advice to the Board and PrivMC.~~

~~Duties of the Private Markets Committee (PrivMC)~~

- ~~Recommend to the IC the Strategic Plan for the RE program.~~
- ~~Recommend to the Director the selection, retention and termination of asset class consultants and staff-extension consultants.~~
- ~~Final decision making authority on investments for the RE program subject to referral to IC in accordance with Board procedures.*~~
- ~~Final decision making authority on real estate related investments recommended pursuant to the opportunistic private investments strategic plan subject to referral to IC in accordance with Board procedures.*~~
- ~~Approve the hiring/retention/termination of legal counsel for the RE program in accordance with procurement procedures.*~~
- ~~Review and, as appropriate, approves tactical variances to the objectives and policies of RE program targets/ranges during the implementation period.~~

~~*Decisions require the consensus of the Director and CIO.~~

~~Duties of the Director~~

- ~~Member of the PrivMC. No investments made without concurrence of Director.~~
- ~~Approve the selection, retention and termination of asset class committee consultants and staff extension consultants. The IC must consent to the Director's recommendation before the primary consultant for an asset class committee is hired or terminated.~~
- ~~Review and approve the RE Standard Operating Procedures.~~
- ~~Consent to the decisions made by the PrivMC; requires CIO's concurrence.~~

~~Duties of the CIO~~

- ~~Member of the PrivMC. No investments made without concurrence of CIO.~~
- ~~Execute the decisions made by the PrivMC.~~
- ~~Review and approve the RE Standard Operating Procedures.~~

~~Duties of the IMD RE Staff~~

- ~~Prepare, in consultation with the consultant, the strategic plan and updates thereto.~~
- ~~Review potential investments and make investment recommendations to the Director, CIO and PrivMC.~~
- ~~Oversee the day-to-day operational activities of the RE program including manager identification, due diligence, agreements, consultant activities, legal counsel activities, investment cash flows and other real estate compliance to policy.~~
- ~~Coordinate PrivMC meetings.~~
- ~~Develop RE Standard Operating Procedures.~~

~~Duties of the Consultants~~

- ~~Act as a fiduciary and advisor to the Plan on all investment decisions involving a first time (this excludes for instance, fund add-ons and secondary market purchases of an LP interest in a partnership already owned by the ASRS) investment with a partner or partnership, as well as other RE program matters as determined and requested by the Private Markets Committee.~~
- ~~Advise on the establishment, ongoing review, and recommendations of revisions to the RE Investment Program Strategic Plan and Tactical Asset Allocation Plan.~~
- ~~Advise on the implementation of the policy and managing the RE program.~~
- ~~Conduct, as requested by the ASRS, Due Diligence activities with full fiduciary responsibilities.~~
- ~~Bring any non-conforming items or significant issues to the attention of the PrivMC, and as applicable, to the IC and/or Board.~~
- ~~Perform other duties and responsibilities as defined by contract relationship.~~

~~Duties of the "Back Office"~~

- ~~Prepare Quarterly Performance Reports~~
- ~~Collect data and manage the data flow to and from RE managers.~~
- ~~Execute capital calls and distributions from investment vehicles.~~

REAL ESTATE INVESTMENT PROGRAM STRATEGIC PLAN

APPROVED: JULY 16, 2004

REVISED: June 23, 2015

ARIZONA STATE RETIREMENT SYSTEM
3300 N CENTRAL
AVENUE
PHOENIX, AZ 85012

Table of Contents

Executive Summary

The Arizona State Retirement System (ASRS) has determined that, over the long term, inclusion of Real Estate (RE) investments in the total portfolio will provide benefits to the ASRS. In 2003, the ASRS approved a six percent (6%) funding target to institutional RE investments as a part of the ASRS' asset allocation policy. Through subsequent modifications, this target allocation has been increased to 10%. The target allows for a range of plus/minus two percent (+/- 2%). To reach and maintain the ten percent (10%) funded target, the ASRS will make allocations in accordance with amounts determined by a pacing study and implementation plan updated annually.

This document establishes the specific objectives and policies involved in the implementation and oversight of the RE program. The objectives define the specific role and return expectations of the RE program. The policies provide specifications for acceptable investment styles and management of the various risks associated with the asset class.

Objectives

The purpose of the ASRS' RE program is to provide the following benefits:

- Achieve attractive risk-adjusted returns.
- Enhance the overall diversification of the ASRS' investment program.
- Generate regular cash flow from stabilized properties.

RE is expected to positively contribute to the ASRS' investment objective to meet or exceed the actuarial assumed investment rate of return of the ASRS. In addition to achieving attractive risk-adjusted returns relative to other asset classes, another objective for RE is to enhance the overall diversification of the ASRS' investment program.

For purposes of total fund performance, the ASRS real estate program will be benchmarked on a net of fees basis against the net return of the NCREIF Fund Index - Open End Diversified Core Equity (NFI- ODCE). However, 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. Incremental returns are expected to result from any one or more of the following active management strategies.

1. Actively managing those assets providing stabilized returns from cash flow in order to maintain and grow cash flow levels over the duration of the hold period.
2. Assume life cycle or market risk to actively create/restore value for realization or stabilized hold.
3. Tactically allocate to strategies favored by market dynamics during isolated periods of time.

The Private Markets Committee (PrivMC) may take a course of action at any time to reduce ASRS' exposure to the real estate asset class or terminate any future funding to the asset class when appropriate risk adjusted returns appear unachievable.

Policies

A. Portfolio Composition

All portfolio investments will be classified by their general risk/return profile. There are two major categories:

1. Stable Investments

Stable investments include existing, substantially leased income-producing properties located principally in metropolitan areas that exhibit reasonable economic diversification. Stable properties typically exhibit the following characteristics:

- Predictable income flows with a high proportion of anticipated total return arising from current income and cash flow;
- Located in a metropolitan area with adequate demand generators or location features relevant to the property;
- Credit quality tenants or multi-tenant with a staggered lease maturity schedule ;
- Quality construction and design features;
- Reasonable expectation of a broad pool of potential purchasers upon disposition;
- Investments deemed by the PrivMC to be consistent with the goals of the Stable portfolio.

These investments may come in the form of a separately managed account, commingled fund, joint venture, direct investment, co- investment or secondary structure as determined to be the most appropriate vehicle for the specific investment.

Stable investments may include any property type which generates income from rent or similar charges for the right to occupy the property. This includes without limitation apartments, student housing, senior housing, office, medical office, industrial, self-storage and hotels. Stable properties will not include any "for sale" properties such as condominiums or single family residential which reflect a strategy of subdivision of a property in smaller units for sale whether by plat, condominium regime or other similar method. Agricultural and infrastructure assets (except parking as an interim or complementary use) will not be considered part of the real estate portfolio. The PrivMC will decide whether property types or strategies or appropriate for inclusion in the Real Estate portfolio.

Public RE securities (e.g. Real Estate Investment Trusts or REITs) will also be considered part of the Stable component of the ASRS' portfolio. Public RE securities are publicly traded companies that manage a portfolio of real estate based investments in order to produce income and capital appreciation for investors.

2. Value Creation Investments

Value Creation investments represent those properties and/or investment strategies that require specialized acquisition and management expertise or skill to mitigate the business and leasing risk that may be associated with individual investments. Value Creation investments have greater associated volatility compared to Stable investments. Value Creation investments may exhibit one or more of the following characteristics:

- Properties involving significant appreciation, lease-up, construction, development and/or redevelopment risks;
- For Sale property types including (but not limited to) condominiums and single family residential housing;
- Debt Securities and/or Properties which are considered to be in “work out” mode;
- Distressed for control and restructuring situations;
- Mezzanine or preferred equity with significant equity features; and,
- Investments deemed by the PrivMC to be consistent with the goals of the Value Creation portfolio.

Value Creation investments may come in the form of a commingled fund, joint venture, direct investment, co- investment or secondary structure as determined by the most appropriate vehicle for the specific investment.

While the characteristics of risk/return can be grouped and broadly defined, the return expectations from each group will vary from market cycle to market cycle.

Near term, five to seven (5-7) years, return expectations for each group are as follows:

Component	Expected Net Returns
Stable - Private	Net NFI-ODCE
Public Securities	FTSE EPRA/NAREIT
Global Index Value Creation - Private	Greater than net NFI-ODCE

The aggregate benchmark for the RE portfolio will be Net NFI-ODCE. The selection of a benchmark is not intended to establish a portfolio structure.

The risk constraints by category are as follows:

Component	Minimum/Maximum
Stable	Minimum 40%
Public Securities	Maximum 30%
Value Creation	Maximum 60%

Construction and development risk (excluding fully preleased build to suits) Maximum 30%.

B. Portfolio Structure

The ASRS will implement its total RE allocation through two distinct programs.

1. Separate Account Allocations

75% (+/- 10%) of the portfolio allocations will be directed to Separate Account Manager (SMA) relationships wherein the selected managers will manage across Stable, and Value Creation investments to achieve the 8% net return objective on an inception IRR basis. The ASRS will be the majority owner and will have significant control rights in any Separate Account, including the right to terminate the investment period preventing new investments being made in the account. Separate Account Relationships are intended to be limited in number (estimated at 10 to 15). Firms are expected to be vertically integrated with full service capabilities (property construction, leasing, management etc.) in their targeted investment class(es).

2. Commingled Allocations

25% (+/- 10%) of the portfolio allocations will be directed toward Commingled investment strategies based on market opportunities and expected returns. Investments may include, but not be limited to, Public Securities, Open-ended Commingled Funds, Closed-end Commingled Funds and other permissible vehicles discussed herein. In Commingled Investments, ASRS will be a non-control minority owner, generally less than 20% although it may elect to own a larger non-control position in "club" type structures.

C. Risk Management

The primary risks associated with equity RE investments include implementation risk, investment manager risk, property market risk, asset and portfolio risk, and liquidity risks. The ASRS will mitigate risk in a prudent manner. Key to the management of risks is clearly established roles and responsibilities of all participants. The ASRS decision-making process is set forth in the governance document known as SIP006, attached hereto as "Exhibit A." Risks will be mitigated through appropriate selection and use of Investment Structures, prudent Diversification and use of Leverage and appropriate Valuation policies as discussed below.

1. Investment Structures

The ASRS recognizes that RE is a relatively illiquid asset class. The degree of illiquidity is impacted by the investment structure with closed end structures being highly illiquid and open end funds being moderately illiquid. Separate accounts that maximize investor control of the assets are preferred because of the ability to negotiate terms to enhance alignment of interest with custom fee structures, negotiate terms permitting the termination of the investment period preventing new investments from being added to the account, create tailored investment criteria, enhance control through a certification process to ensure individual assets meet investment criteria and enhance liquidity through the ability to control exits.

The ASRS may invest through the following vehicle options:

a. Separately Managed Accounts

The ASRS may purchase assets on a majority (50% or greater) owned basis through Separately Managed Account (SMA) structures, or through direct ownership. The ASRS will hold not less than a 50% interest in property in SMA structures and will have control over liquidity after a reasonable period of time for properties to achieve stabilization.

b. Commingled Vehicles

The ASRS may also purchase assets through the ownership of units or shares of commingled vehicles. Any legally permissible vehicle will be allowed including, but not limited to, joint ventures, limited partnerships, real estate investment trusts and limited liability corporations.

2. Diversification

The ASRS will seek to diversify its RE program by manager, property type, property location, and investment style. However, initial allocations, i.e. implementation of the RE program may result in temporary variances to the policies stated below. Variances to the Manager, Vehicle and Property type/location policies will be reviewed and approved by the PrivMC.

a. Manager

The ASRS will implement a multi-manager program. At the time of investment, no manager will be more than thirty percent (30%) of the target RE portfolio to ensure that any possible underperformance of one manager will not unduly impact the total portfolio.

b. Vehicle

The ASRS will diversify the risk associated with a single manager and the implemented strategy through the diversification of selected investments. At the time of investment, no single commingled investment will be more than thirty percent (30%) of the target RE portfolio to ensure that any possible underperformance of one vehicle will not unduly impact the total portfolio. When investing in commingled investments, the ASRS will generally mitigate manager and vehicle risk by limiting its pro rata position within any commingled vehicle to twenty percent (20%) of the total equity capital raised at the final close of the vehicle or at the time of investment for open-ended investments. Exceptions to this 20% limit may be made by the PrivMC when allocating to club and joint venture structures.

c. Property Type and Location

The ASRS will diversify its exposure to property type and location. However, it is expected that at various points in time, the portfolio may be more heavily exposed to a single property type or location by virtue of opportunities available in the market, which are projected to generate the alpha targeted by the ASRS. Exposure to any geographic location (defined as a Metropolitan Statistical Area as determined by the U.S. Office of Management and Budget and/or a single country except the United States) in excess of forty percent (40%) of the total targeted real estate portfolio will be reviewed as an exception by the PrivMC. Portfolio limits by property type are shown in the following table:

Apartments	50%
Retail	30%
Office (including Medical Office)	30%
Industrial	30%
Student Housing	15%
Senior Housing	15%
Hotel	10%
Self-Storage	10%
Other property types authorized by PrivMC	10%

With the maturation of the RE asset class, investments have become global in nature and the ASRS may invest outside the United States. International investments will be limited to no more than thirty percent (30%) of the total targeted RE portfolio and may include Stable private and public investments as well as Value Creation investments.

3. Leverage

Leverage will be targeted to a range of 50% to 60% of the total portfolio, although individual accounts may have different leverage policies. The PrivMC will monitor and evaluate individual leverage policies so that collectively they result in achieving the target leverage. If appraisal changes, market events or other factors cause actual leverage to be outside the target range, the PrivMC will adopt plans that are expected to result in the portfolio to returning to the target leverage range within a reasonable period of time.

Separate Account Managers will have broad discretion in the use of debt within their individual mandates, however each separate account will have a financing policy approved by the PrivMC as part of the account approval and reviewed annually. Such governance documents may allow higher initial loan to cost and allow reasonable time frames to achieve target leverage with stabilization of properties and to remedy excess leverage situations which occur temporarily in program formation or as a result of appraisal changes. Risk classification of assets held in each SMP will be determined solely on the characteristics of the property; property level debt will not be utilized to classify asset risk. Appropriateness of leverage ratios will be established based on property type, the stability of the rental stream and whether the loan is fixed rate or not. The following table illustrates leverage limits for property types and loan types.

	Permitted loan to value for Fixed rate loans or multi-family loans with affordable housing subsidy features with an initial term at least seven (7) years	Loan to cost at acquisition for Variable Rate Loans	Loan to value at stabilization for Variable Rate Loans
Apartments, student housing and senior housing	75% if amortizing 70% if interest only	65%	50%
Single tenant lease with investment grade tenant	75% if amortizing 70% if interest only	65%	50%
Other property types	65% if amortizing 60% if interest only	65%	50%

Separate Account Managers will be evaluated on the prudent use of leverage to consistently meet/exceed the net 8% return target on an inception IRR basis.

Commingled Allocations may include the use of leverage within specific strategies. Leverage in Commingled Portfolio investments will be reviewed and approved in conjunction with PrivMC approval of each allocation. It is expected that the loan to value ratio for the Commingled Portfolio will not exceed 60% in the aggregate across all investments however, the PrivMC will determine acceptable leverage for each investment during the approval process. Tactical allocations will be evaluated relative to targeted returns, equity multiples and vintage year performance.

Variances to the leverage policies will be reviewed and approved by the PrivMC.

4. Valuations

All investments in a SMA and directly owned investments will be independently valued on an annual basis in accounts established or amended after 2012. For accounts established in 2012 or earlier, assets will be appraised not less than once every three years by a qualified expert (certified Member of the Appraisal Institute-MAI). During interim years, if applicable, valuations will be performed by the Manager in accordance with industry standards. Investments held in commingled funds will be subject to the agreed upon valuation policy approved with the selection of the investment.

Exhibit A

(Attach copy of SIP006)

Investment Manager, Partner, and Co-Investment Selection and Oversight

Purpose:
To codify the policy to be utilized for the selection of public market and private market investment managers and partners. Throughout the remainder of this policy the term *investment manager* will refer to both public and private market investment managers and partners.

Policy:
The ASRS will establish and follow an Investment Manager, Partner, and Co-investment Selection Policy that will govern the process and activities regarding the selection of ASRS investment managers.

The process is outlined as follows:

1. **Opportunity Set - Sourcing**

   The primary responsibility for sourcing investment managers and co-investments resides with the Investment Management Division (IMD). In addition, any other party, specifically including Director, ASRS investment consultants (both staff extension consultants as well as the general consultant), and ASRS trustees may communicate investment manager recommendations or opportunities to either the Director or Chief Investment Officer (CIO).

2. **Opportunity Set - Screening**

   The CIO or designee will determine if the investment manager recommendations or co-investment opportunities deserve further internal or external due diligence resource allocation. This determination will be based upon the merits of the opportunity under consideration, within the context of:

   - ASRS strategic asset allocation;
   - IMD Investment House Views;
   - Investment manager organization structure;
   - Investment manager investment strategy, terms and structure; and
   - ASRS investment priorities.

3. **Analysis and Due Diligence**

   IMD staff will provide expertise in, and project-manage, the investment manager analysis and due diligence process. This process will include the development of a comprehensive due diligence packet which will be developed by staff extension consultants, IMD staff, or a combination of both. The CIO will determine which staff-extension consultants will be utilized and the related scope-of-work and product deliverables.

   The due diligence packet will include sufficient information to ensure the manager has been properly vetted and enable the asset class committee to make an informed decision, and will include but not be limited to the following information, when relevant to the manager:

1. Organization
2. Staff
3. Strategy
4. Terms
5. Performance
6. Risk
    a. Investment Risk Management
    b. Operational Risk Management
7. Disclosures
8. Miscellaneous

As applicable, public markets managers and private markets managers may have additional factors included.

The full list of due diligence packet contents can be found in Appendix I.

Decision to hire an investment manager should primarily be evidence-based and based on a reasonable expectation of their ability to add value to ASRS investment goals and objectives. Evidence typically includes empirical data, historical statistical analysis, risk-adjusted return metrics, and risk measures (ex., alpha, beta, r-squared, standard deviation, and Sharpe ratio) in combination with a forward-looking confidence in the strategy and its theoretical logic.

The analysis and due diligence of co-investments, whereby ASRS has the opportunity to participate in a pending investment to be made by a manager of a fund or account, will be evaluated through a process as described in Appendix II.

4. Asset Class Committee Meetings – Decision Making

The CIO will determine which Asset Class Committee (Public Markets or Private Markets) is the appropriate forum to discuss the investment manager under consideration and work with IMD staff regarding the meeting dates for respective Committees.

The due diligence packet will be disseminated to the relevant Committee membership prior to the meeting in order to allow members sufficient time to review and prepare for the meeting.

The ASRS general investment consultant and Internal Audit (IA) will be notified of each Public Market Committee and Private Market Committee meeting and will be provided an agenda and due diligence packet in advance for each meeting in order to allow them sufficient time should they wish to attend or ask questions. The ASRS general investment consultant and IA may attend any Public Market Committee or Private Market Committee meeting.

Asset Class Committees will be comprised of the Director, CIO and one or more IMD portfolio managers as determined by the CIO based upon related skills and knowledge and, as applicable, staff-extension consultants.

Voting members of the Committee include the Director, CIO and one or more IMD portfolio managers. Investment manager selection decisions require the consensus of both the Director and CIO.

As applicable, the ASRS Procurement Officer will distribute Confidentiality and Disclosure forms to IMD staff, which will be completed and returned prior to commencing the meeting.

5. Post-Committee Meeting Documentation and Dissemination

Asset Class Committee meeting minutes will be prepared by IMD staff, which will include the agenda and motions or directives and decisions made by the Committee. The meeting minutes will be disseminated to voting Committee members for review and approval. Once approved, the minutes (which may be marked as confidential and non-public) will be disseminated to the Investment Committee (IC) Trustees, ASRS general investment consultant, and IA.

6. Governance Oversight

The ASRS general consultant will conduct an independent review, at least annually, of the process to determine compliance with the Policy and Appendix A, and that the investment recommendation is consistent with ASRS Strategic Asset Allocation Policy targets/ranges, House Views and, as applicable, investment programs' pacing and implementation plans. The general consultant will use the following information and resources to help make their determination: investment due diligence packet; Committee meeting minutes and motions and other presentation materials; general and specific market knowledge of the investment, and discussions with the Director, CIO, or Portfolio Managers.

If the general consultant does not believe that the Policy and Appendix are being followed, or that a prudent decision is being made, they shall contact any or all of the following parties: Board Chair; Investment Committee Chair; Chief Internal Auditor; Director.

As standard operating procedure, the CIO will keep the IC informed of the selection and termination decisions made regarding investment managers.

During each external audit, the external financial auditor will review this policy and conduct a sample process review or audit to determine possible omissions or violations, and report such omissions or violations to any or all of the following parties: Board Chair; Investment Committee Chair; Chief Internal Auditor; Director, and may include such findings in their monthly investment compliance report which resides in the Director's section of the Board packet.

7. Post-Investment Manager and Co-Investment Selection Monitoring

Public and private investment managers and co-investments are monitored by various functions performed by the CIO, IMD staff, ASRS custody bank, general consultant, staff extension consultants and other service providers and reported to the Asset Class Committees, IC and Board.

ASRS custody bank provides look-through Committee on Uniform Security Identification Procedures (CUSIP)-level capabilities for separate account public manager portfolios and generates various customizable reports on holdings, risk, and returns. IMD staff uses this and other information from a third-party research providers as the basis for staff's quarterly conference calls with the managers to review performance, attribution, and consistency of process and decision-making, and other matters related to firm personnel, Assets Under Management (AUM), and operations.

For private investments, ASRS external back-office provider calculates performance measurements as well as other services such as: document warehousing, administers ASRS approval capital calls and distributions, and various aggregate program and individual fund level reports. IMD staff may use this information in their calls, meetings, and correspondence with managers and their participation at limited partner advisory committees of which we are members. IMD staff also provides timely private market program information such as portfolio performance, portfolio news, detail fund activity and pacing activity to the Private Markets

Committee

With respect to ASRS Real Estate Strategic Manager program, staff extension consultants provide operational and an investment oversight functions that ensures that each proposed investment is in compliance with contracted investment criteria, i.e., investment type, underwriting, leverage, etc. and that, subsequent to purchase, investments are monitored on an ongoing basis.

On a quarterly basis, ASRS general consultant generates an investment performance reports containing information about both public and private managers. IMD staff and the general consultant provides asset class presentations to the Investment Committee which includes performance measurement relative to the mandate's benchmarks as well as select risk and return metrics relative to peers, and a qualitative review of the manager.

Appendix I

The due diligence packet will include sufficient information to ensure the manager has been properly vetted and enable the asset class committee to make an informed decision and include, but not be limited to the following information when relevant to the manager:

1. **Organization**
    a. History of the firm
    b. Firm ownership
    c. Office location(s)
    d. Strategy offerings and capabilities
    e. Staff allocated across and/or between strategies
    f. Assets Under Management for the firm
2. **Staff**
    a. Team background/biographies
    b. Organizational responsibilities
    c. Operational capabilities
    d. Technical resources
    e. Key additions/subtractions to team
3. **Strategy**
    a. Description of investment strategy and/or philosophy
    b. Idea sourcing resources
    c. Research sources: in-house and external
    d. Decision-making process
    e. Staff allocated to the strategy
    f. Asset under Management (AUM) for the strategy
    g. Comparison with other strategies
4. **Terms**
    a. Fees
    b. Fee structure
    c. Vehicle structure
    d. Benchmark definition
5. **Performance**
    a. Historical rates of return (public markets)
    b. Multiples of invested capital return (private markets)
    c. Internal rates of return (private markets)
    d. Peer manager universe criteria
    e. Comparative returns versus peers and/or prior funds
    f. Historical quartile ranking analysis
6. **Risk**
    a. Investment Risk Management
        i. Risk metrics

ii. Portfolio limitations
iii. Portfolio characteristics
iv. Portfolio diversification

b. Operational Risk Management
i. Personnel turnover
ii. Information security
iii. Internal controls
iv. Regulatory oversight
v. Legal inquiries/investigations

7. Disclosures

a. Placement agents
b. Conflict of interest

8. Miscellaneous

a. Integration of strategy with other ASRS mandates
b. Strategic relationship role of manager with ASRS
c. Composition of current investors in the strategy
d. Analysis of competing managers and firms

As applicable, also assess public markets managers and public markets managers for:

Public Markets

1. Terms

e. alpha and tracking error targets
b. Most-favored nations clauses

2. Investment Risk

a. Portfolio turnover
b. Correlation to benchmark
c. Correlation to peers
d. Volatility of returns
e. Risk adjusted return metrics

Private Markets

1. Terms:

a. Investment time horizon and total fund term
b. GP commitment
c. Co-investment policy
d. Key man provision
e. No-fault termination
f. Recall/recycle provisions

2. Operational risk:

a. Legal structure
b. Placement agent disclosures

c. GP reference checks

3. **Investment risk:**
   a. Fund leverage
   b. Portfolio company references
   c. Fund Opportunity SWOT Analysis

For co-investments, whereby ASRS has the opportunity to participate in a pending investment to be made by the manager of a fund or account, the analysis and due diligence process will be as follows:

Debt Co-Investment Opportunities:

When evaluating debt co-investment opportunities, IMD staff and the Asset Class Committee will focus on portfolio and ASRS Total Fund construction considerations, while the merits of a particular investment will be determined by the investment manager of the fund. IMD staff will review a due diligence packet for the co-investment opportunity provided by the investment manager to determine its suitability with respect to portfolio and Total Fund considerations including but not limited to the following:

- The size of ASRS' commitment to the fund,
- The overall portfolio concentration (ex. industry, geographic etc.) of the fund,
- The fund's investment guidelines, and
- ASRS Total Fund considerations.

For suitable co-investment opportunities, IMD staff will prepare a memo summarizing its conclusions and submit it to the appropriate Asset Class Committee, along with the due diligence packet provided by the manager, to obtain approval.

Equity Co-Investment Opportunities:

Due to the higher risk associated with equity investments, equity co-investment opportunities require confirmatory due diligence by IMD staff and/or staff extension consultants. The primary due diligence will be performed by the financial sponsor. Staff or the extension consultant will perform additional diligence to confirm that appropriate diligence has been done by the sponsor and to confirm that the major results of the diligence reasonably support the investment thesis and metrics. The scope of such confirmatory diligence will be determined on a case by case basis by the CIO in consultation with the portfolio manager for the project.

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 Dokes, Chief Investment Officer (CIO)
Mr. Karl Polen, Head of Private Markets Investing

DATE: August 8, 2015

RE: **Agenda Item #6:** Presentation, Discussion, and Appropriate Action Regarding the ASRS Private Market Selection, Diligence Fees and Monitoring

Purpose
To present and discuss information regarding the ASRS Private Markets selection, diligence fees and monitoring.

Recommendation
Informational only; no action required.

Background
ASRS invests a portion of its assets in a variety of private markets strategies. We present a paper, which describes the strategies, policies, and processes the ASRS employs in implementing the strategies. This paper is prompted by concerns about private markets investing which have been raised in the financial press and by the SEC in their new role regulating such investments under Dodd-Frank. The outline of the paper will be to commence with a summary of the main concerns which have been raised. We will then proceed with a fairly detailed account of ASRS processes in selection, diligence and monitoring private markets investments. We then consider the effectiveness and adequacy of ASRS processes in light of industry standards as reflected in CAIA materials. We will close by revisiting the concerns and discussing how our processes address or mitigate them.

Attachments:
Selection, Diligence, Fees and Monitoring Report

Private Markets Investing

Selection, Diligence, Fees and Monitoring

August 10, 2015

Contents

1 Introduction

1.1 Background

ASRS invests a portion of its assets in a variety private markets strategies. This paper describes the strategies and ASRS policies and processes it employs in implementing the strategies. This paper is prompted by concerns about private markets investing which have been raised in the financial press and by the SEC in their new role regulating such investments under Dodd-Frank. The outline of the paper will be to commence with a summary of the main concerns which have been raised. We will then proceed with a fairly detailed account of ASRS processes in selection, diligence and monitoring private markets investments. We then consider the effectiveness and adequacy of ASRS processes in light of industry standards as reflected in CAIA materials. We will close by revisiting the concerns and discussing how our processes address or mitigate them.

1.2 The Role of Private Markets Investments

Private Markets Investments are investments in less liquid assets that are generally not traded on exchanges. In accordance with the strategic asset allocation, ASRS has established target allocations in private markets assets as follows:

Asset Class	Allocation
Private Debt	10%
Real Estate	10%
Private Equity	8%
Infrastructure & Farmland	0-3%
Private Opportunistic Equity	0-3%

Following a rigorous and extended analysis, ASRS has integrated private markets assets in its strategic asset allocation because of their risk and return characteristics in relation to liquid assets. ASRS believes the inclusion of private markets assets supports and is critical to attaining its investment goals including, but not limited to, the achievement of the actuarial target return.

1.3 Concerns Expressed in the Financial Press and by the SEC

A number of articles have recently appeared in the financial press asking questions and directing criticism at managers in the alternative asset management space. Journalists and bloggers, notably but by no means exclusively Gretchen Morgenson of the New York Times[1] and Yves Smith of Naked Capitalism[2], have been pointed in these critical remarks.

Under Dodd-Frank, many alternative asset managers are now required to register with the SEC as registered investment advisors and regulated under

[1] http://topics.nytimes.com/top/reference/timestopics/people/m/gretchen_morgenson/index.html
[2] http://www.nakedcapitalism.com/

the Investment Advisors Act of 1940. Advisors are required to maintain and update a form ADV and are subject to a variety of rules including reporting and disclosure requirements and are subject to periodic examination by the SEC. These rules went in to effect in 2011 with phased compliance requirements through 2012. So, this is a very new program with standards that are only now settling in place.

Under these rules, the SEC Office of Compliance Inspections and Examinations ("OCIE") began their examinations in late 2012. Directors of the OCIE have made public statements about their examination programs and concerns based on those examinations providing guidance on their planned focus in on-going exams.[3] [4]

While we will not attempt to address every criticism, broadly the concerns raised include:

- Criticism of the diligence methods of investors and their consultants
- Inadequate transparency on fees
- Misallocation of expenses among the asset managers and portfolio companies or parallel vehicles
- Favoritism among partners in allocation of co-invest cost and opportunities.

The press, bloggers and the SEC have been very helpful to investors in bringing these issues to light and encouraging focus on them.

1.4 The Role of ASRS

ASRS is responsible for the prudent and diligent implementation of the private markets investment program. The remainder of this document will describe the processes used by ASRS in order to achieve the goals of the program.

2 Selection and Diligence

2.1 Introduction

We will begin this section with a discussion of the governance documents and processes which regulate our investment activities. We will then describe our sourcing and diligence methods for each of the private markets asset classes.

2.2 Governance Documents

2.2.1 Strategic Plans

The real estate program and private equity program operate pursuant strategic plans approved by the ASRS board. The strategic plans generally set forth

[3] http://www.sec.gov/news/speech/private-equity-look-back-and-glimpse-ahead.html.
[4] http://www.sec.gov/news/speech/2014–spch05062014ab.html

the investment goals and objectives for their respective asset class including portfolio composition, portfolio structure and risk management provisions.. The real estate strategic plan was last updated on October 21, 2011 and the private equity strategic plan was last updated on December 10, 2010.

2.2.2 SIP006

SIP006 is a governing rule that provides policy direction on "Investment Manager, Partner, and Co-Investment Selection and Oversight". It establishes roles and responsibilities with respect to its subject matter among ASRS staff, the asset class committees and the consultants. It describes due diligence processes and responsibilities. SIP006 provides a diligence check list and every investment report is required to include a copy of the check list confirming that all required has been completed. A copy of SIP006 is found in Appendix A.

2.2.3 Pacing and Implementation Plans

In the fourth quarter of each year, the private markets committee reviews pacing and implementation plans for private equity, private debt and real estate. The purpose of these plans is to provide more detailed implementation guidance for investments in the ensuing year. The plans establish investment levels for new commitments and investment themes for consideration. The pacing and implementation plans for private equity and private debt are prepared by ASRS staff. The pacing and implementation plans for real estate are prepared by the real estate consultant.

2.3 Private Equity

2.3.1 Sourcing

ASRS staff takes the lead in sourcing private equity investments. ASRS researches private equity funds through the Preqin database to find consistent high performers. ASRS maintains its own tracking to monitor private equity sponsors of interest and proactively reaches out to them in an effort to secure allocations in their offerings.

ASRS maintains a tracking spreadsheet which focuses its initial screening on funds that consistently perform in the first or second quartile of their vintage. Research supports concentration of efforts on managers with consistent high performance. Harris, et al (2014) [5] survey the literature on performance persistence. Though not unequivocal, this research continues to support the, perhaps obvious, conclusion that a private equity investor should select among high performing asset managers.

[5] Robert S. Harris, Tim Jenkinson, Steven N. Kaplan and Rudiger Stucke. Has Persistence Persisted in Private Equity? Evidence from Buyout and Venture Capital Funds. Available at SSRN. 2014.

As would not be surprising based on this research, managers who always perform in the top quartile are exceedingly rare. Among the thousands of managers monitored in the Preqin database, only four North American managers with at least three funds of track record have performed in the top quartile in all of their funds. ASRS has sought to invest with all four and is invested with two of them. Of the remaining two, one did not grant ASRS an allocation and the other granted an allocation but the investment was not completed because the manager would not negotiate legal terms required by ASRS.

In light of this research, ASRS goal in the initial screening is to identify managers persistently in the top half of performance and call on those managers as they come to market with fund offerings.

2.3.2 Reinvestment

A substantial portion of ASRS private equity investments are reinvestments with a firm with which ASRS has prior experience. Investing in multiple funds with the same firm allows the parties to become better acquainted and tends to increase access to co-invest deal flow. By attending annual meetings, participating on advisory boards and other contact, ASRS becomes well acquainted with its partners, their organizations and their business methods. However, the performance and underwriting expectations for renewals are the same as for new investments.

2.3.3 PME methods and other quantitative analysis

ASRS has adopted PME and Direct Alpha methods[6][7] as its primary means for quantitative performance underwriting. The advantage of PME methods is that they manage performance of an investment relevant to a public index. This method of benchmarking removes the headwind or tailwind of market context and provides an objective view of value added by the private equity sponsor. Recent updates to this research [8] indicate that a median private equity sponsor should be expected to outperform a relevant market index with a PME of 1.2 and Direct Alpha of 3%. So, our next layer of screening is to conduct a more detailed analysis of fund performance using these methods.

ASRS began using these methods nearly three years ago. At that time, no commercially available service provided these calculations. So, a member of the ASRS team with a background in computer programming created software to efficiently process fund cash flows combined with data extracted from Bloomberg to perform these calculations.

In addition to PME methods, ASRS analyzes traditional performance measures of loss ratio, IRR and TVPI as part of its performance analysis systems.

[6]Steven N. Kaplan and Antoinette Schoar. Private Equity Performance: Returns, Persistence and Capital Flows; The Journal of Finance, 60(4), August 2005.

[7]Oleg Gredil, Barry E Griffiths, and Rudiger Stucke. Benchmarking Private Equity: The Direct Alpha Method. Available at SSRN, 2014.

[8]Robert S. Harris, Tim Jenkinson and Steven N. Kaplan. Private Equity Performance: What Do We Know? The Journal of Finance, 69(5), October 2014.

For funds which pass quantitative screens described, ASRS undertakes more detailed due diligence. ASRS will meet with an investment manager at least once prior to making an investment decision and often twice, once at ASRS offices and also at the sponsors offices. ASRS reviews the PPM for the fund and contents of a data room for the fund. A diligence check list for such review is provided in SIP006, referenced above. ASRS emphasizes a review of investments at the portfolio company level to understand the source of value add by the sponsor.

2.3.4 Organizational Assessment

ASRS considers private equity investing to be a team hiring decision. While ASRS engages in robust quantitative analysis of prior investments, those prior investments are, in essence, illustrations of the sponsor's investment approach and skill and the new fund will be populated with all new investments. Thus, ASRS emphasizes organizational assessment as part of its private equity program.

In 2014, ASRS retained the services of an organizational consulting firm, Denison Consulting, to help it refine its efforts in organizational underwriting. ASRS believes that firms with a healthy culture are more likely to perform at a high level and maintain that performance. The signs of a healthy culture include

- a clearly stated mission with well understood goals and objectives
- consistency and congruence of the organization structure, resources and skill sets with the tasks it pursues
- high involvement with appropriate empowerment at different levels of the organization, appropriate compensation and sharing of rewards in a team oriented environment
- adaptability with evidence of ability to learn from experience and evolve with a changing environment and market context.

ASRS considers the stability of an organization in its assessment and expects a firm to be reasonably stable. However, a static firm is unlikely to be a positive sign. Cornelli, et al (2014) find that static firms under-perform firms with some turnover.[9] Healthy firms are dynamic and ASRS uses the factors described above in an effort to discern a healthy dynamic in the firms it is considering for an investment partnership relationship.

As you might reasonably expect, the best firms are growing. A firm needs to grow in order to be able to offer attractive career paths to employees at all levels of the organization. Static or declining firms will have trouble attracting and retaining the most qualified personnel. Research by Hamilton Lane finds that growing firms, even rapidly growing firms, are more likely to outperform private

[9]Francesca Cornelli, Elena Simintzi, Vikrant Vig. Team Stability and Performance in Private Equity. Coller Institute of Private Equity. http://www.collerinstitute.com/Research/Paper/264 . 2014.

equity median performance than stable or declining firms. Similarly, firms that come back to the fund-raising market regularly outperform firms that have been out of the market for more than five years.[10]

2.3.5 External Consultant Report

ASRS outsources much fund due diligence to its private equity investment consultant, Meketa. Meketa does an extensive review culminating in a report of over 50 pages describing the potential investment. This work includes:

- a thorough review of the PPM and other materials in the sponsor data room
- a lengthy due diligence questionnaire
- one or more onsite meetings
- full track record analysis
- reference calls
- credit and background checks
- a review of pipeline and pending investments
- a review of legal terms to determine if they are in line with market and appropriate for ASRS]
- SIP006 check list confirming all required diligence has been completed.

2.3.6 Planned enhancements to diligence

Starting in mid-2015, ASRS has expanded its diligence to consider matters identified in SEC exams. We will request to review any deficiency letters received from the SEC and the sponsor's response to such letter. We will request information about the sponsor's expense allocation policies. We will request information about the sponsor's policies on monitoring and other fees and how those are handled in any fee offset provisions.

2.3.7 Legal process

ASRS has retained counsel with a high level of expertise in representing institutional investors in investment partnerships and other structures. Counsel negotiates the terms of partnership agreements, subscription agreements and a custom side letter incorporating ASRS specific terms.

Figure 1: ASRS Private Equity IRRs compared to Burgiss Index

	One Quarter	One Year	Three Years	Five Years	Inception
Private Equity IRR	0.93%	10.78%	14.23%	14.72%	12.44%
Russell 2000	9.37%	3.75%	17.26%	14.62%	13.96%
Burgiss IRR	1.98%	11.67%	13.95%	13.36%	11.35%

2.3.8 Results

If ASRS is successful in its efforts, it will achieve investment results with returns in excess of median private equity fund results and, over the long run, returns in excess of public market indices.

The policy benchmark for the private equity program is Russell 2000. This benchmark is an index of smaller publicly listed companies which may be comparable in size to many private equity portfolio company holdings. It also reflects an opportunity cost for the private equity program – over the long run, private equity should be expected to provide a return premium to a relevant public index. The disadvantage to the approach is lack of comparability in the valuation metrics of daily market value versus quarterly appraisal based marks which can lead to large tracking error over shorter time spans.

The results of a comparison to Russell 2000 are presented in figure 1. As you can see, the private equity inception IRR has trailed the Russell 2000 by 1.52%. However, in the most recent year private equity beat R2K by 7.03%. Although lower than the public market benchmark, the 12.44% inception return is an attractive absolute return and the Russell 2000 is not expected to continue to earn returns at the level it has during the post-GFC bull market.

ASRS also assesses its private equity fund selection performance by comparing its results with funds in the Burgiss database from 2007 (the inception of the ASRS private equity program) and later vintages. The advantage of this approach is that it is an "in sample" performance assessment compared to similar assets avoiding the mismatches which can result when comparing appraisal based valuations with daily market valuations. The results in figure 1 show that ASRS private equity has outperformed the Burgiss index on an inception to date basis by 1.09% per year.

2.4 Real Estate

2.4.1 Background

Pursuant to 2011 modifications to the strategic plan, the ASRS real estate program is planned to be implemented primarily through a separate account program, sometimes called the "strategic manager" program, although a portion of the program will continue to be implemented through commingled funds. A

[10] Hamilton Lane. 2015 Market Overview. http://www.hamiltonlane.com/MediaRoom/zzdzd/

substantial portion of the assets of the real estate program is still reflected in legacy assets which are expected to run off over the next several years.

2.4.2 The separate account program

The separate account program is being implemented in order to achieve the following benefits:

- Customized investment criteria reflecting ASRS goals and portfolio targets
- Enhanced liquidity through ability to terminate investment period and direct liquidation of assets
- Reduced risk by increasing portion of stabilized assets in the portfolio
- Reduced fees by direct operator relationships avoiding double promote
- Enhanced operational performance by partnering with property type experts
- Reduced transaction cost from a buy and hold strategy avoiding unnecessary trading based on arbitrary fund lives

In order to implement this program, ASRS retained the services of a consultant with very deep contacts in the universe of real estate operators and underwriting expertise at the property level. Each of the separate accounts is implemented as a "discretion in a box" mandate. The consultant serves in a role to ensure compliance with the investment criteria. Every property proposed for acquisition is presented to the consultant for review to determine if it complies with the investment criteria.

The sourcing of relationships for the separate account program is implemented through an outbound search managed by the consultant. Typically dozens of operators will apply for allocation of funds. The applicants are reduced to a short list of finalists for deeper diligence and negotiations and competitive negotiation of fees and terms.

The diligence for real estate managers is comparable to what is described for private equity firms and includes complete review of track record, organizational assessment, pipeline, background checks and reference calls. The real estate consultant reports include the SIP006 checklist confirming all required diligence has been completed.

The legal process for separate account investments is highly customized and accomplished with counsel with expertise in documenting this type of investment.

2.4.3 Commingled funds

A portion of the ASRS program will continue to be invested in commingled funds. The process for selecting, diligizing and investing in real estate commingled funds is accomplished pursuant to SIP006 and is substantially similar to the process described for private equity above.

Figure 2: ASRS Real Estate Performance Compared to ODCE

	One Quarter	One Year	Three Years	Five Years	Inception
Real Estate IRR	6.33%	14.83%	13.84%	14.33%	6.91%
ODCE IRR	3.02%	11.45%	11.38%	12.79%	6.04%

Figure 3: ASRS Current Real Estate Portfolio Compared to Legacy Portfolio

	Portfolio IRR	ODCE IRR	Outperformance
Total RE Legacy Portfolio	5.67	5.42	0.25
Total RE Current Portfolio	17.90	11.72	6.17

2.4.4 Results

ASRS benchmarks its real estate portfolio against the ODCE index. The results of the ASRS portfolio compared to the ODCE index are presented in figure 2. ASRS real estate outperformed its benchmark in every time frame and outperformed the benchmark by 0.87% on the inception IRR.

Given the the substantial structural changes in the program, we also considered the relative performance of the legacy portfolio compared to the portfolio implemented by the current management team pursuant to the processes described herein. The results of that analysis are presented in figure 3. The current portfolio outperformed its benchmark by 6.17% compared to outperformance of 0.25% for the legacy portfolio.

2.5 Private Debt

2.5.1 Background

Commencing in 2012, the ASRS strategic asset allocation provided an allocation to private debt. The ASRS investment management team has taken the lead in implementing that portfolio with support of its consultants. For reasons discussed in response to the question 4.1, this program has been implemented as a separate account program. ASRS established an initial goal to implement the program domestically as approximately 2/3 corporate debt and 1/3 real estate debt. ASRS recently expanded the mandate to include European debt and that mandate is in the process of implementation.

2.5.2 Sourcing

Private debt is an emerging asset class with far fewer managers in the market compared to private equity or real estate. Nevertheless, ASRS identified and interviewed over 50 prospective managers for potential mandates in this program.

It identified these managers through a combination of research in the Preqin database, industry networking and consultant referrals.

2.5.3 Track Record

ASRS limited its search to firms with a demonstrable track record in implementing the mandate for which it was applying. Performance in these loan origination strategies is capped at the interest rate and fees charged. So, performance evaluation is focused more on loss avoidance and the loss track record of each manager was carefully examined to determine if the manager could successfully originate and collect loans in sufficient volume to fulfill the ASRS requirement. Emphasis was placed on evaluation of recovery ratios through the global financial crisis.

2.5.4 Organization factors

Although private debt is relatively new as an asset class, ASRS focused on managers with established teams with extensive experience in their relevant markets. ASRS looked for deep organizations including capability in orgination, credit and monitoring. Firms with deep origination capability have an advantage in the market. They have a direct relationship with borrowers and financial sponsors that provide them with early access to possible transactions and better ability to negotiate favorable terms in time sensitive transactions. Such firms tend to be market makers rather than takers and are in a position to syndicate larger loans to other funds retaining a portion of origination fees as additional consideration for the benefit of the ASRS account. ASRS only invested with firms with substantial credit capability with a team providing credit analysis coverage across the range of relevant markets and industries. Finally, ASRS required an active monitoring function with regular monitoring of borrower sales and cash flow and frequent borrower calls. Active monitoring plays a key role in identifying problems early and minimizing losses with problem credits.

2.5.5 Account Structure

Private Debt SMAs are implemented as discretionary accounts with a custom investment criteria stating parameters on deal structure, concentration limits, hedging requirements for rate or currency, leverage and other relevant risk factors. The accounts provide liquidity control including the ability to terminate the investment period, usually after one year. The accounts are scalable with the ability to increase (or reduce) the size of the account in accordance with ASRS goals.

2.5.6 Results

ASRS benchmarks private against the leveraged loan index plus 250bp. The results of the private debt program are shown in figure 4. The ASRS private debt inception IRR performance exceeds its benchmark by 7.64%.

Figure 4: Private Debt Perfomance

	One Quarter	One Year	Three Years	Five Years	Inception
Private Debt IRR	2.13%	10.51%	NA%	NA%	13.10%
Lev Loan+250 IRR	0.06%	3.60%	NA%	NA%	5.46%

Figure 5: Private Opportunistic Equity Performance Results

	One Quarter	One Year	Three Years	Five Years	Inception
Private Opportunistic IRR	12.82%	28.97%	NA%	NA%	35.24%
Absolute 8 IRR	1.96%	8.00%	NA%	NA%	8.00%

2.6 Private Opportunistic Equity

2.6.1 Background

ASRS invests in a private opportunistic equity program. This program is structured to capture equity investment opportunities that are temporal in nature due to market dislocations, assets that do not clearly fall within the mandate of a defined asset class or other special situations.

Private opportunistic equity investments are sourced and underwritten in the same manner as other investments. Generally speaking, they are categorized as either dominantly real estate or private equity in nature and assigned to a diligence process with a consultant relevant to the nature of the investment. The process for a private equity related co-investment would be the same as described in the private equity section of this paper, and similarly for real estate related opportunistic investments. All of the opportunistic equity investments have been implemented in the form of a co-investment or direct investment.

2.6.2 Results

Opportunistic Equity investments are benchmarked for reporting purposes against an absolute 8% return. The results of the private opportunistic equity investing program are presented in figure 5. The inception to date IRR on this program is 35.24%.

2.7 Farming and Infrastructure

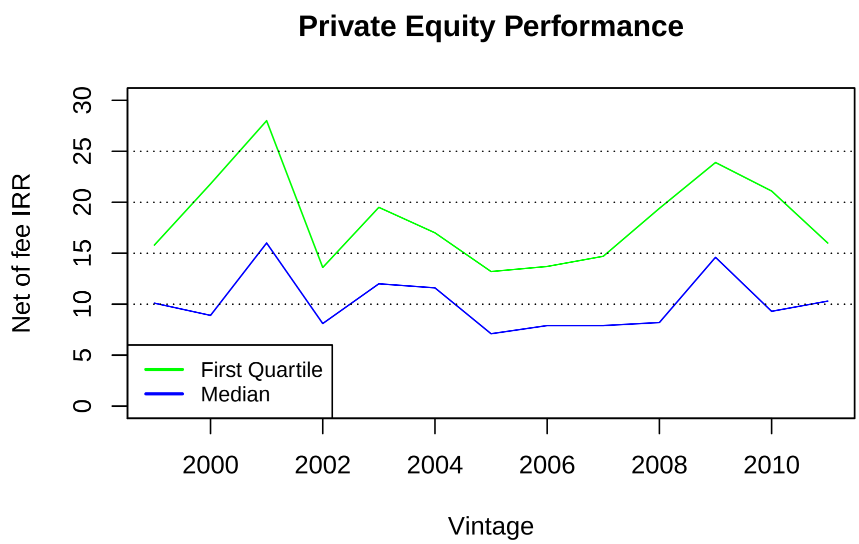
2.7.1 Background

ASRS has invested in two funds engaged in U.S. agriculture and developed markets infrastructure. The program is very new with the great bulk of the investments outstanding less than a year. The underwriting methods for this program are administered under SIP006 and are the same as those described for private equity.

Figure 6: Farming and Infrastructure Performance Results

	One Quarter	One Year	Three Years	Five Years	Inception
Farming and Infrastructure IRR	1.86%	3.86%	NA%	NA%	3.89%
CPI+350 IRR	1.12%	4.95%	NA%	NA%	4.99%

Figure 7: Comparative Private Equity Performance (Source:Preqin)



2.7.2 Results

Farming and Infrastructure investments are considered “inflation linked” assets and benchmarked against CPI+350bp. The results for this program are shown in figure 6.

3 Fees

3.1 Role of fee management and negotiation

Management of cost is one of the most important jobs in achieving a successful investment program. However, in the case of alternative assets one should be cautious about making fees the primary or driving objective when selecting investment partners. As you can see in figure 7, the difference in net of fee performance between median and first quartile private equity managers is over 500bp per year. So, an inferior manager cannot discount fees enough to compensate for performance differences.

So, the ASRS process starts with screening for consistent performance. Once a candidate field of high performers is identified, ASRS conducts diligence on them and, after selecting firms with which it would want to have an investing relationship, it then negotiates terms and fees. ASRS works closely with outside counsel to negotiate and structure legal documents that are favorable to ASRS and include well-crafted "most favorable nation" clauses that ensure that ASRS has the best fees when compared to other investors of similar size. An investor would be at risk of adverse selection if it reversed the process and screened first on pliability of fees.

3.2 Separately Managed Accounts

3.2.1 Transition to SMAs

ASRS has transitioned a substantial portion of its alternative assets to implementation in a separately managed account (SMA) format. All but one investment in the private debt portfolio are implemented in an SMA format and plans are in place to increase the portion of real estate implemented through SMAs to approximately three-fourths over the next five years.

ASRS favors SMAs in its investing program because they have the following advantages:

- Customized investment mandate with tailored investment restrictions
- Improved liquidity by the ability to turn off investment periods or direct liquidations
- Scalable investment size with the ability to increase (or decrease) the allocation depending on performance and investment goals
- Favorable fees and terms
- In the case of real estate, ability to make direct investments with high quality operators avoiding "double promote" by going through intermediary asset managers
- In the case of private debt, ability to concentrate assets with the most capable firms

Through these programs, ASRS has initiated approximately $5 billion in SMA relationships over the last several years.

3.2.2 Real Estate

ASRS staff and its consultant RCLCO work collaboratively to implement the real estate SMA program.

Generally, the approach is to identify a target area for investment and then conduct a search for potential managers to implement the requirement. Fees are then competitively negotiated among finalists before making a final selection. In order to compare fees, we use a model that benchmarks fees through a standardized set of economics and then calculates a net present value fee over the life of a venture. We weight the net present value in favor of incentive fees by discounting incentive fees contingent on performance at a higher rate (8%) than the rate we use to discount guaranteed fees (4%). By doing so we rate more favorably firms who are willing to take more of their fee on at-risk basis dependent on performance.

We then compare the fees on a net present value basis across the candidates. figure 8 provides a hypothetical example of how we make that comparison. We show for each manager the composition of fees in each category and then compare the percentage of fees that are performance oriented.

The outcome of this competitive fee negotiation is that we consistently get low guaranteed fees of 50 to 75 bp, generally on invested capital only. We also negotiate favorable waterfalls that are fully crossed with no catchup. Detailed calculations comparing the asset management and performance fees are provided in a file entitled “ASRS Fee Comparison Model.xlsx” in the “Real Estate SMA Fee Analysis” folder.

Starting in mid-2015, ASRS added additional fee analysis to its process to document the evolution of fees across the negotiation and to compare those fees to market. An example redacted report is included as Appendix B.

3.2.3 Private Debt

The approach to private debt fee negotiation is very similar to what is described for real estate. For each of the mandates, we have negotiated fees in a competitive scenario with screened and well qualified asset managers. The result of this competitive negotiation is that we have achieved typical fees of 100bp on invested capital only. This is a savings of 50 to 75bp per annum on invested capital and a savings of approximately 200bp over the life of the fund because no fees are charged on committed but uncalled capital. We have purposely concentrated our allocations with individual managers to increase our leverage and negotiating power. We believe we are the largest investor (or one of the largest) with a number of managers providing substantially better negotiating leverage and resulting economics including waivers of fees on committed capital which are charged to smaller investors. Waterfalls are fully crossed, often at discounts to market terms.

3.3 Commingled Fund Investments

3.3.1 Fee management in a commingled fund context

ASRS pursues several avenues for fee reduction when it invests in commingled funds. The techniques used by ASRS in this context include:

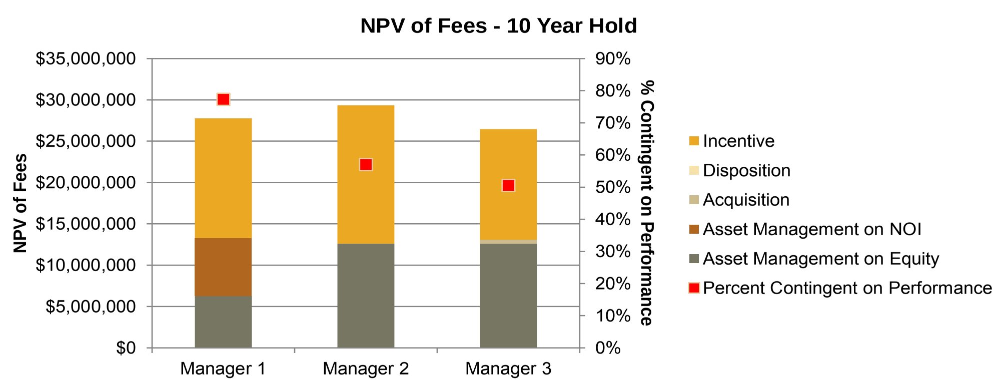
- MFNs in side letters to ensure it receives most favorable terms for its size of investment
- Fee reductions associated with size of investment

FEE MODELING OF PROSPECTIVE MANAGERS

- **Fee Drag is Calculated for Each Manager and Compared**
  - The below table illustrates total fee and promote drag from three separate account managers. This drag on performance is a critical factor in the ultimate selection of manager:

SUMMARY OF FEE DRAG			
	Manager 1	**Manager 2**	**Manager 3**
Property Level Gross Return	15.25%	15.25%	15.25%
Portfolio IRR After Fees	14.12%	14.24%	14.19%
ASRS IRR After Fees, Promotes, Co-Invest	12.91%	12.92%	13.08%
Reduction from Fee/Promote Impact	2.34%	2.33%	2.17%

  - Along with total drag on investment IRR returns, we also seek to understand the total dollar amount of fees paid to the manager, especially on a net present value (NPV) basis.
  - Furthermore, we attempt to structure fees and promotes in such a way that aligns interest between the manager and ASRS. This is done in part by tying fees and promotes to performance of the investment itself. The following chart illustrates this:



RCLCO

Figure 8: Fee Comparison example

- Fee reductions for first close
- No or reduced fee co-investments

3.3.2 Reduction for size of investment or first close

ASRS regularly receives reductions for size of investment or participation in a first close. In the real estate portfolio, we negotiated substantial discounts as a first closer in two different core property funds. In private debt, we negotiated a 40% reduction to less than 50bp for asset management for a core debt fund (the only commingled investment in the private debt portfolio).

3.3.3 Co-investments

Participation in co-investments is a powerful tool for fee reduction which we have used in in our private markets portfolios. ASRS has been an active co-investor, committing approximately $600 million to co-investments since its first co-investment in 2011. ASRS policy in co-investments has been to invest in relatively concentrated positions where it feels it can conduct adequate diligence and has high conviction both in the sponsor and the opportunity. ASRS does not devote effort to co-invest opportunities if there is an inadequate time frame for diligence or the potential scale of the investment is less than $10 to $20 million.

Some observers have noted that co-investments have been a two edged sword for many institutional investors. On the one hand, they average down fees, but on the other performance has been inconsistent, sometimes putting a drag on performance.

ASRS has been highly selective and disciplined with its co-investment program. Not only have we achieved fee reduction, but the co-investments have been quite accretive to overall performance. The combined IRR on co-investments has been over 30%.

As noted above, the SEC has taken an interest in certain aspects of co-investment programs. It is unclear whether SEC actions will impact ASRS ability to participate in co-investments or the cost of doing so.

4 Monitoring

4.1 Background

ASRS closely monitors its private markets investments through the combined efforts of the ASRS team, the back-office provider, the investment consultants and the ASRS external auditor.

4.2 Roles and Responsibilities

4.2.1 ASRS Staff

The ASRS team performs the following functions to monitor investments

- Prepare various reports including
  - monthly portfolio report outlining portfolio composition and most recent reported performance
  - quarterly performance chart pack including PME analysis
  - annual reports to the Investment Committee
- Ongoing investment accounting
  - Accounting related to capital calls, distributions and reported NAVs
  - Quarterly reconciliation of cash flows to capital account statements
  - Review financial statements to ascertain fees charged by each manager in order to compile schedules required for quarterly and annual financial statements
- Prepare the Comprehensive Annual Financial Report which includes
  - an investment section describing private markets investments
  - a summary of asset management fees and incentive fees paid to private markets asset managers
- Attend quarterly update calls for all SMAs
- Participate in annual meetings or ASRS office face-to-face meetings with a goal of an in-person meeting with each sponsor once per year
  - In the case of real estate SMAs, an annual meeting is held at the location of a property holding in the account
- Participate on advisory boards when applicable

4.2.2 The Back-Office Provider

ASRS retains the services of a back office provider in the implementation of the private markets program. Duties of the back-office provider include maintaining the official book of record for the investments, calculation of returns, processing of capital calls, maintaining a data base of reports from managers, and preparing periodic reports to the ASRS.

4.2.3 Investment Consultants

Duties of the investment consultant include:

- Validating all capital calls
- Compliance reports
  - Annually for all SMAs
  - On a rotating basis for commingled investments
  - Contents of the compliance
    * Review of valuation policy
    * Review of fee calculations including assets management (net of offsets) and incentive fees
    * Review of expense policies to determine that expenses allocated to the fund or portfolio companies are appropriate under the partnership agreement and consistent with the general partner's responsibilities
- In the case of real estate SMAs
  - Review all investments for compliance with the investment criteria
  - Maintain a dynamic risk management system to monitor and forecast risk characteristics (location, property type, life cycle stage) of the portfolio
  - Prepare monthly reports including portfolio composition, occupancy trends, sales trends, leverage analysis, construction status and investment pipeline
  - Review quarterly financial statements at the property and SMA level
  - Review standardized monitoring templates prepared quarterly by the asset manager for every property
  - Attend the quarterly update call with the manager and ASRS
  - Prepare semiannual asset management reviews for the private markets committee
  - Attend the annual meeting with the manager and ASRS
  - Review annual budgets and business plans
  - Annual update of project pro formas for all assets to monitor cash flow and risk characteristics
  - Review of appraisals to determine if appropriate appraisal methodology has been used
  - Review ancillary fees for consistency with market when required under contractual terms

4.2.4 External Auditor

The external auditor on a sampling basis reviews individual investments to verify that appropriate financial statements and other records exist for each investment, the capital account is reconciled to the financial statements and with respect to a sample of new investments that appropriate diligence procedures were followed and appropriate legal documents are executed memorializing the investment. The external reviews schedules in the CAFR, including schedules disclosing asset management and incentive fees paid to private investment partnerships.

4.3 The Reporting System

4.3.1 The back office provider quarterly reports

The back office provider prepares a quarterly report of portfolio composition and performance for each of the private markets asset classes. The composition of the portfolio is presented in relevant categories of geography, industry, property type and other categories as appropriate for the portfolio. This is the official record of the investment and is used in calculating total fund performance and asset values.

4.3.2 ASRS internal website

ASRS has developed the technology to download data from back office provider on a real-time basis, updated weekly as a matter of practice, and automatically generate an HTML formatted report for each fund showing its cash flow, NAV trend and most recent performance statistics. The results of this are posted to an internally hosted website to facilitate navigation and access to individual fund statistics. On a quarterly basis concurrently with each quarter closing accomplished by back office provider, ASRS reconciles the contents of its internal database used for the website with the back office provider to ensure accuracy and consistency.

4.3.3 Monthly reports

Each month ASRS prepares a report for the private markets committee summarizing most recent data on fund cash flow, NAV and performance. This report is generated automatically from the same database as used for the website.

Additionally, the real estate investment consultant prepares a monthly report for real estate SMAs as described in section 4.2.3

4.3.4 Quarterly chart pack

The back office provider is unable to provide PME calculations. Each quarter, ASRS prepares a performance chart pack showing the performance of private markets assets calculated on a PME basis. This report is generated automatically from the same database as used for the website.

4.3.5 Annual Asset Class Review

Each year an asset class review presentation is made to the investment committee for each of the private markets asset classes.

4.3.6 Comprehensive Annual Financial Report

Each year the ASRS produces an audited Comprehensive Annual Financial Report. This report includes a section describing investments, including private markets, and schedules detailing asset management and incentive fees paid on private markets investments.

4.3.7 Compliance Reports

In connection with compliance reviews, the investment consultants will prepare compliance reports confirming that they have reviewed asset management and incentive fee calculations including any related offset provisions, valuation policies and expense policies. The consultant will note any deficiencies found as a result of this review. In the case of real estate SMAs, an appraisal review report stating a conclusion about the appropriateness of the appraisal methods used.

5 Discussion of Adequacy and Effectiveness of ASRS processes

We will conclude this paper by revisiting concerns mentioned initially. We present a series of questions and answers deriving from those concerns.

5.1 Is ASRS sourcing and diligence of investments adequate and effective?

In order to assess the adequacy of our sourcing and diligence practices, we look to the literature of the Chartered Alternative Investment Analyst Association (CAIA). This association provides education and to certify individuals for expertise in alternative investments. The CAIA level two provides advanced training in alternative investments. The CAIA materials[11] describe a sourcing and diligence process that includes the following:

- Strategy formulation
- Sourcing and Screening
- Performance analysis
- Team assessment

[11]Keith Black, Donald Chambers and Hossein Kazemi. 2012. *CAIA Level II: Advanced Core Topics in Alternative Investments*. Second Edition. John Wiley & Sons. Chapter 9.

- Comparative evaluation
- Legal diligence and negotiation

ASRS fulfills all these functions through its processes. It uses strategic plans and annual implementation to provide structural and thematic direction to the investment program. Through SIP006, ASRS clearly delineates roles, responsibilities, delegation of authority and processes for the completion of investments. ASRS has implemented proactive sourcing programs through database search and industry networking to identify leading firms for implementation of the strategies it has chosen. ASRS is an industry leader in performance evaluation implementing all standard methods (TVPI, IRR and loss ratio) and more sophisticated PME measures years ahead of more general adoption by other practitioners. In its team assessment practices, ASRS goes beyond standard assessment of team stability to a dynamic assessment of team evolution in a growing and successful organization. ASRS sourcing practices are usually successful in identifying multiple qualified candidates for a given assignment ASRS compares and conducts a comparative evaluation of those firms in making a final selection. ASRS employs expert attorneys to lead the document negotiation process on terms negotiated by the investment team.

We assess the effectiveness of these efforts by considering results. As reported above, the private debt and private opportunistic equity portfolios both substantially outperform their benchmark, as does the non-legacy portion of the real estate portfolio which was implemented by the current management team using these methods. The private equity portfolio exceeds the Burgiss benchmark of private equity investments. The farming and infrastructure investments trail their benchmark but this investment is very new with the bulk of capital deployed in the fourth quarter of 2014.

5.2 Does ASRS manage its fee negotiations effectively?

Managing cost is an extremely important part of any successful investment program. However, fee negotiations need to be put in perspective. Reduced fees make a good investment better but cannot make a bad investment good. The ASRS sourcing and diligence process is usually successful at identifying multiple highly qualified managers for a given mandate and ASRS negotiates fees and terms only with such managers in a competitive context.

ASRS is transitioning its private markets investment program to where approximately 50% of private assets will be invested through separate accounts or co-invests. By investing in larger scale with asset managers we are able to achieve significant fee savings compared to market terms in fund investments. When ASRS invests in commingled products, it negotiates most favored nation clauses to make sure it receives the most favorable terms available based on the size of its investment.

5.3 Does ASRS adequately monitor its investments?

To answer this question, we again look to the CAIA literature[12] for industry standards in monitoring. This literature identifies the following goals for monitoring:

- Performance measurement and reporting
- Risk monitoring
- Compliance monitoring
- Support in reinvestment decisions
- Liquidity planning

5.3.1 Performance measurement and financial reporting

ASRS in collaboration with its back office provider monitors and reports on fund values. Performance is measured using traditional measures of time weighted returns, IRR, and TVPI and compared to relevant benchmarks. Additionally, ASRS calculates and monitors PME measurements for comparison of fund performance across different market environments. ASRS accounting staff reconcile reported NAVs and cash flows to ensure accuracy of financial presentation.

ASRS accounting staff review investment partnership financial statements to determine the amount of fees paid. All ASRS private markets investments require annual audited financial statements. The amount of fees paid in an investment is a required accounting disclosure and this information is available in the partnership financial statements. This information is compiled and the amount of asset management and incentive fees paid in each portfolio is reported in the ASRS Comprehensive Annual Financial Report and certain reports to the board.

5.3.2 Compliance and risk monitoring

ASRS has implemented a compliance review process for its private markets investment program. The investment will review investment partnerships to (a) determine if asset management fees including any required offsets and incentive are calculated in accordance with partnership terms, (b) review valuations policies to determine if they are appropriate and (c) review expense allocation policies to determine if appropriate expenses are being absorbed by the manager in consideration of the asset management fee and not charged to the fund or portfolio holdings of the fund. Under this review program, separate accounts are reviewed every year and commingled investments are reviewed on a rolling basis such that at least 50% of private markets NAV is reviewed each year.

This information coupled with reviews by external auditors gives ASRS confidence that appropriate valuation methods are being used on its private markets

[12] Black, Chambers and Kazemi (2012). Chapters 10-12.

portfolio. Coupled with reports from the back office provider and various consultants, ASRS is able to monitor the composition of its portfolio in risk categories relevant to the type of investment. In the case of real estate separate accounts, a separate consultant report is prepared on every asset to confirm it complies with the investment criteria for the account.

ASRS monitors compliance with the partnership agreement on key economic matters of fee calculations and expense allocations.

5.3.3 Support in reinvestment decisions

ASRS investment staff build an active relationship with their managing partners through participation in regular calls, annual meetings and where applicable advisory boards. This contact helps ASRS deepen its understanding of the manager's organization and business practices which is extremely valuable in making reinvestment decisions. By building relationships across multiple investments, ASRS increases its access to co-investment opportunities.

ASRS requests the opportunity to review and potentially participate in co-investments with all its partnerships. ASRS has been an active co-investor completing about $600 million in commitments to co-investments since it began its co-investment program in 2011.

The SEC has indicated they plan to review co-investment policies as part of its regulatory effort to ensure equitable access and fair allocation of expenses. It is unclear how this effort might impact ASRS.

5.3.4 Liquidity Planning

ASRS models its commitments and forecasts cash flow and NAVs in its annual pacing studies. The purpose of this modeling is to help ensure that the exposure to the asset class falls within the range established for it in the strategic asset allocation. Annual commitment levels to new investments are adjusted as necessary based on the results of these studies.

6 Has ASRS addressed the concerns raised in the press and by the SEC?

At the outset, we noted criticism of private assets investments in the financial press and by the SEC. The concerns were summarized as follows:

- Criticism of the diligence methods of investors and their consultants
- Inadequate transparency on fees
- Misallocation of expenses among the asset managers and portfolio companies or parallel vehicles
- Favoritism among partners in allocation of co-invest cost and opportunities.

We believe that ASRS processes address these concerns. Our diligence processes meet all the standards of the industry as reflected in CAIA literature and in many cases exceed them. We are transparent on fees and report the amount paid in our comprehensive annual financial report and in certain board reports. We are cognizant of the risks of financial sponsors misallocating expenses to their investment partnerships and have commenced a program to research and monitor this. ASRS is an active and successful co-investor and proactively seeks out co-investment opportunities with its partners.

7 Concluding Remarks

The additional sunshine of securities regulation under Dodd-Frank has been a positive development for private markets investors. The required disclosures and SEC examinations are forcing sponsors to improve disclosure and reconsider expense allocation and other practices to delivery value for the fees they charge.

The information from these required disclosures is shedding light on previously opaque practices. Perhaps ironically, the availability of this information through SEC filings has led to negative coverage in the press. So, the level of criticism has increased even as the processes of the SEC are expected to lead to improvements.

ASRS has implemented a private markets investment program with industry leading practices in sourcing, diligizing and monitoring investments. This has led to a successful program with favorable risk and return characteristics. In light of recent disclosures from increased SEC regulation, ASRS has taken steps to enhance its monitoring program to ensure it has the information it needs on fees and expense allocations to continue to make effective investment decisions.

A Investment Manager, Partner, and Co-Investment Selection and Diligence ("SIP006")

Investment Manager, Partner, and Co-Investment Selection and Oversight

Purpose:
To codify the policy to be utilized for the selection of public market and private market investment managers and partners. Throughout the remainder of this policy the term *investment manager* will refer to both public and private market investment managers and partners.

Policy:
The ASRS will establish and follow an Investment Manager, Partner, and Co-investment Selection Policy that will govern the process and activities regarding the selection of ASRS investment managers.

The process is outlined as follows:

1. **Opportunity Set - Sourcing**

   The primary responsibility for sourcing investment managers and co-investments resides with the Investment Management Division (IMD). In addition, any other party, specifically including Director, ASRS investment consultants (both staff extension consultants as well as the general consultant), and ASRS trustees may communicate investment manager recommendations or opportunities to either the Director or Chief Investment Officer (CIO).

2. **Opportunity Set - Screening**

   The CIO or designee will determine if the investment manager recommendations or co-investment opportunities deserve further internal or external due diligence resource allocation. This determination will be based upon the merits of the opportunity under consideration, within the context of:

   - ASRS strategic asset allocation;
   - IMD Investment House Views;
   - Investment manager organization structure;
   - Investment manager investment strategy, terms and structure; and
   - ASRS investment priorities.

3. **Analysis and Due Diligence**

   IMD staff will provide expertise in, and project-manage, the investment manager analysis and due diligence process. This process will include the development of a comprehensive due diligence packet which will be developed by staff extension consultants, IMD staff, or a combination of both. The CIO will determine which staff-extension consultants will be utilized and the related scope-of-work and product deliverables.

   The due diligence packet will include sufficient information to ensure the manager has been properly vetted and enable the asset class committee to make an informed decision, and will include but not be limited to the following information, when relevant to the manager:

1. Organization
2. Staff
3. Strategy
4. Terms
5. Performance
6. Risk
    a. Investment Risk Management
    b. Operational Risk Management
7. Disclosures
8. Miscellaneous

As applicable, public markets managers and private markets managers may have additional factors included.

The full list of due diligence packet contents can be found in Appendix I.

Decision to hire an investment manager should primarily be evidence-based and based on a reasonable expectation of their ability to add value to ASRS investment goals and objectives. Evidence typically includes empirical data, historical statistical analysis, risk-adjusted return metrics, and risk measures (ex., alpha, beta, r-squared, standard deviation, and Sharpe ratio) in combination with a forward-looking confidence in the strategy and its theoretical logic.

The analysis and due diligence of co-investments, whereby ASRS has the opportunity to participate in a pending investment to be made by a manager of a fund or account, will be evaluated through a process as described in Appendix II.

4. Asset Class Committee Meetings – Decision Making

The CIO will determine which Asset Class Committee (Public Markets or Private Markets) is the appropriate forum to discuss the investment manager under consideration and work with IMD staff regarding the meeting dates for respective Committees.

The due diligence packet will be disseminated to the relevant Committee membership prior to the meeting in order to allow members sufficient time to review and prepare for the meeting.

The ASRS general investment consultant and Internal Audit (IA) will be notified of each Public Market Committee and Private Market Committee meeting and will be provided an agenda and due diligence packet in advance for each meeting in order to allow them sufficient time should they wish to attend or ask questions. The ASRS general investment consultant and IA may attend any Public Market Committee or Private Market Committee meeting.

Asset Class Committees will be comprised of the Director, CIO and one or more IMD portfolio managers as determined by the CIO based upon related skills and knowledge and, as applicable, staff-extension consultants.

Voting members of the Committee include the Director, CIO and one or more IMD portfolio managers. Investment manager selection decisions require the consensus of both the Director and CIO.

As applicable, the ASRS Procurement Officer will distribute Confidentiality and Disclosure forms to IMD staff, which will be completed and returned prior to commencing the meeting.

5. Post-Committee Meeting Documentation and Dissemination

Asset Class Committee meeting minutes will be prepared by IMD staff, which will include the agenda and motions or directives and decisions made by the Committee. The meeting minutes will be disseminated to voting Committee members for review and approval. Once approved, the minutes (which may be marked as confidential and non-public) will be disseminated to the Investment Committee (IC) Trustees, ASRS general investment consultant, and IA.

6. Governance Oversight

The ASRS general consultant will conduct an independent review, at least annually, of the process to determine compliance with the Policy and Appendix A, and that the investment recommendation is consistent with ASRS Strategic Asset Allocation Policy targets/ranges, House Views and, as applicable, investment programs' pacing and implementation plans. The general consultant will use the following information and resources to help make their determination: investment due diligence packet; Committee meeting minutes and motions and other presentation materials; general and specific market knowledge of the investment, and discussions with the Director, CIO, or Portfolio Managers.

If the general consultant does not believe that the Policy and Appendix are being followed, or that a prudent decision is being made, they shall contact any or all of the following parties: Board Chair; Investment Committee Chair; Chief Internal Auditor; Director.

As standard operating procedure, the CIO will keep the IC informed of the selection and termination decisions made regarding investment managers.

During each external audit, the external financial auditor will review this policy and conduct a sample process review or audit to determine possible omissions or violations, and report such omissions or violations to any or all of the following parties: Board Chair; Investment Committee Chair; Chief Internal Auditor; Director, and may include such findings in their monthly investment compliance report which resides in the Director's section of the Board packet.

7. Post-Investment Manager and Co-Investment Selection Monitoring

Public and private investment managers and co-investments are monitored by various functions performed by the CIO, IMD staff, ASRS custody bank, general consultant, staff extension consultants and other service providers and reported to the Asset Class Committees, IC and Board.

ASRS custody bank provides look-through Committee on Uniform Security Identification Procedures (CUSIP)-level capabilities for separate account public manager portfolios and generates various customizable reports on holdings, risk, and returns. IMD staff uses this and other information from a third-party research providers as the basis for staff's quarterly conference calls with the managers to review performance, attribution, and consistency of process and decision-making, and other matters related to firm personnel, Assets Under Management (AUM), and operations.

For private investments, ASRS external back-office provider calculates performance measurements as well as other services such as: document warehousing, administers ASRS approval capital calls and distributions, and various aggregate program and individual fund level reports. IMD staff may use this information in their calls, meetings, and correspondence with managers and their participation at limited partner advisory committees of which we are members. IMD staff also provides timely private market program information such as portfolio performance, portfolio news, detail fund activity and pacing activity to the Private Markets Committee

With respect to ASRS Real Estate Strategic Manager program, staff extension consultants provide operational and an investment oversight functions that ensures that each proposed investment is in compliance with contracted investment criteria, i.e., investment type, underwriting, leverage, etc. and that, subsequent to purchase, investments are monitored on an ongoing basis.

On a quarterly basis, ASRS general consultant generates an investment performance reports containing information about both public and private managers. IMD staff and the general consultant provides asset class presentations to the Investment Committee which includes performance measurement relative to the mandate's benchmarks as well as select risk and return metrics relative to peers, and a qualitative review of the manager.

The due diligence packet will include sufficient information to ensure the manager has been properly vetted and enable the asset class committee to make an informed decision and include, but not be limited to the following information when relevant to the manager:

1. **Organization**
   a. History of the firm
   b. Firm ownership
   c. Office location(s)
   d. Strategy offerings and capabilities
   e. Staff allocated across and/or between strategies
   f. Assets Under Management for the firm
2. **Staff**
   a. Team background/biographies
   b. Organizational responsibilities
   c. Operational capabilities
   d. Technical resources
   e. Key additions/subtractions to team
3. **Strategy**
   a. Description of investment strategy and/or philosophy
   b. Idea sourcing resources
   c. Research sources: in-house and external
   d. Decision-making process
   e. Staff allocated to the strategy
   f. Asset under Management (AUM) for the strategy
   g. Comparison with other strategies
4. **Terms**
   a. Fees
   b. Fee structure
   c. Vehicle structure
   d. Benchmark definition
5. **Performance**
   a. Historical rates of return (public markets)
   b. Multiples of invested capital return (private markets)
   c. Internal rates of return (private markets)
   d. Peer manager universe criteria
   e. Comparative returns versus peers and/or prior funds
   f. Historical quartile ranking analysis
6. **Risk**
   a. Investment Risk Management

i. Risk metrics
ii. Portfolio limitations
iii. Portfolio characteristics
iv. Portfolio diversification

b. Operational Risk Management
   i. Personnel turnover
   ii. Information security
   iii. Internal controls
   iv. Regulatory oversight
   v. Legal inquiries/investigations

7. Disclosures

a. Placement agents
b. Conflict of interest

8. Miscellaneous

a. Integration of strategy with other ASRS mandates
b. Strategic relationship role of manager with ASRS
c. Composition of current investors in the strategy
d. Analysis of competing managers and firms

As applicable, also assess public markets managers and public markets managers for:

<u>Public Markets</u>

1. Terms

e. alpha and tracking error targets
b. Most-favored nations clauses

2. Investment Risk

a. Portfolio turnover
b. Correlation to benchmark
c. Correlation to peers
d. Volatility of returns
e. Risk adjusted return metrics

<u>Private Markets</u>

1. Terms:

a. Investment time horizon and total fund term
b. GP commitment
c. Co-investment policy
d. Key man provision
e. No-fault termination
f. Recall/recycle provisions

2. Operational risk:

a. Legal structure
b. Placement agent disclosures
c. GP reference checks

3. **Investment risk:**
    a. Fund leverage
    b. Portfolio company references
    c. Fund Opportunity SWOT Analysis

For co-investments, whereby ASRS has the opportunity to participate in a pending investment to be made by the manager of a fund or account, the analysis and due diligence process will be as follows:

Debt Co-Investment Opportunities:

When evaluating debt co-investment opportunities, IMD staff and the Asset Class Committee will focus on portfolio and ASRS Total Fund construction considerations, while the merits of a particular investment will be determined by the investment manager of the fund. IMD staff will review a due diligence packet for the co-investment opportunity provided by the investment manager to determine its suitability with respect to portfolio and Total Fund considerations including but not limited to the following:

- The size of ASRS' commitment to the fund,
- The overall portfolio concentration (ex. industry, geographic etc.) of the fund,
- The fund's investment guidelines, and
- ASRS Total Fund considerations.

For suitable co-investment opportunities, IMD staff will prepare a memo summarizing its conclusions and submit it to the appropriate Asset Class Committee, along with the due diligence packet provided by the manager, to obtain approval.

Equity Co-Investment Opportunities:

Due to the higher risk associated with equity investments, equity co-investment opportunities require confirmatory due diligence by IMD staff and/or staff extension consultants. The primary due diligence will be performed by the financial sponsor. Staff or the extension consultant will perform additional diligence to confirm that appropriate diligence has been done by the sponsor and to confirm that the major results of the diligence reasonably support the investment thesis and metrics. The scope of such confirmatory diligence will be determined on a case by case basis by the CIO in consultation with the portfolio manager for the project.

B Example of Real Estate Fee Analysis

MgrX Fee Analysis

Background

ASRS is considering a SMA partnership relationship with MgrX to pursue real estate investments in the United States. This paper analyzes fees in this partnership, the fee negotiation process and compares the fees to market fees.

Discussion of Market Fees

Market Fees for real estate investment and asset management services are fees charged by well-qualified asset managers to provide these services. ASRS generally would only consider a manager qualified if it has raised at least two and usually several prior funds, has earned above average returns and is able to raise a fund of at least $1 billion.

Based on a review of the Preqin database and our own experience, we believe market fees for such managers include an asset management fee component and an incentive fee component. Based on our experience, asset management fees range from 1.25% to 2% and we believe that 1.5% is a reasonable estimate of the asset management fee for an investor of ASRS scale. Incentive fees are more standardized with an incentive fee of 20% of profit above an 8% hurdle with a 50% catchup being the norm.

Starting in 2011, it has been ASRS policy to redirect real estate investments to separate accounts in order to achieve reduced fees, among other benefits. This analysis will demonstrate the savings from this method.

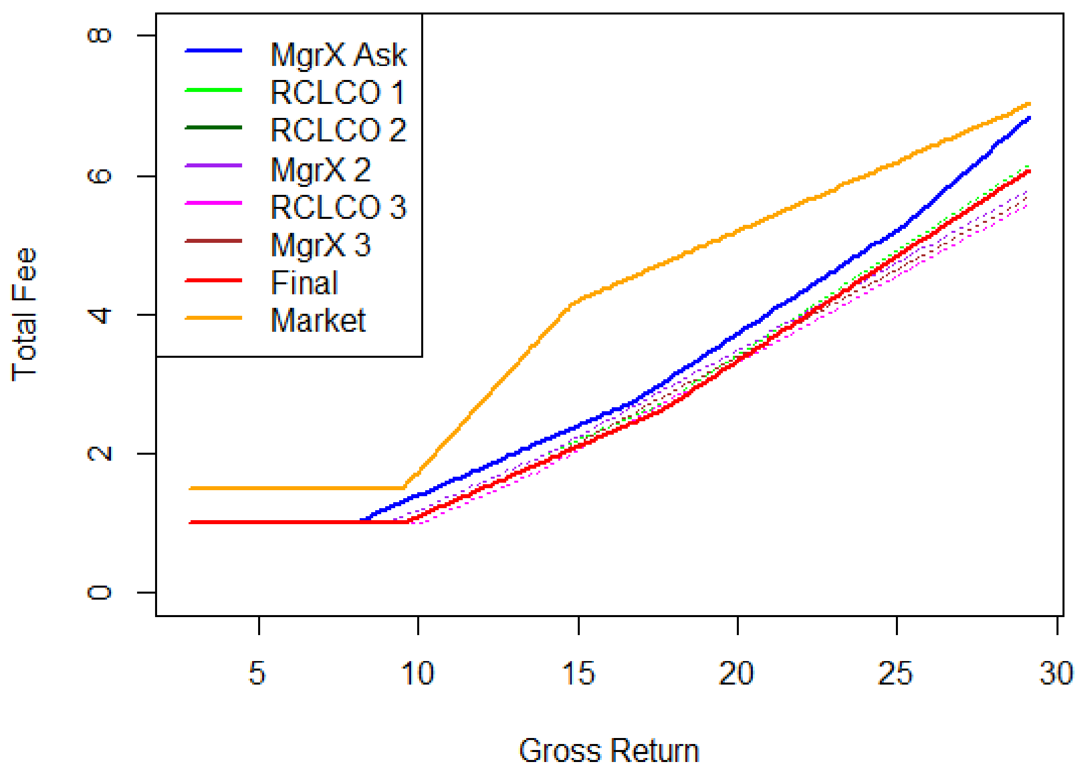
Negotiations with MgrX

ASRS policy is to engage extensive negotiations with its managers in order to achieve favorable final negotiated fees which reduce costs to ASRS, are structured to align interests and motivate the manager to high performance.

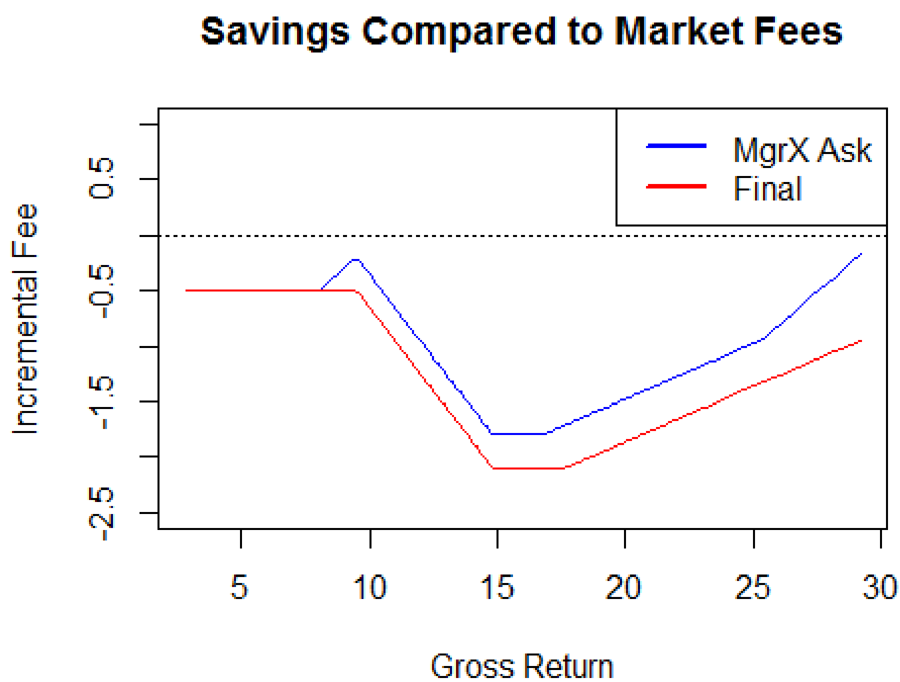
The following chart shows the evolution of fee negotiation with MgrX through a sequence of seven offers and counter-offers leading to the final negotiated result. This chart also shows Market Fees as describe above.

Description	MgrX Ask	RCLCO 1	RCLCO 2	MgrX 2	RCLCO 3	MgrX 3	Final	Market
Tier 1 Hurdle	7%	8%	9%	8%	9%	8.5%	8.5%	8%
Tier 1 Promote	20%	20%	20%	20%	20%	20%	20%	20%
Tier 2 Hurdle	14%	15%	12%	12%	12%	12%	15%	NA
Tier 2 Promote	30%	30%	25%	25%	25%	25%	30%	NA
Tier 3 Hurdle	20%	NA	NA	NA	NA	NA	NA	NA
Tier 3 Promote	40%	NA	NA	NA	NA	NA	NA	NA
Catchup	none	none	none	none	none	none	none	50%
Asset Mgmt	1%	1%	1%	1%	1%	1%	1%	1.5%

A comparison of the various fee proposals across a range of return is shown in the following graph. These graphs present a single year arithmetic return to illustrate the dynamic of the structure.



The savings of the final negotiated fees compared to market and the manager's initial ask position are shown in the following graph, again showing sensitivity to a range of potential returns in a single year arithmetic return context.

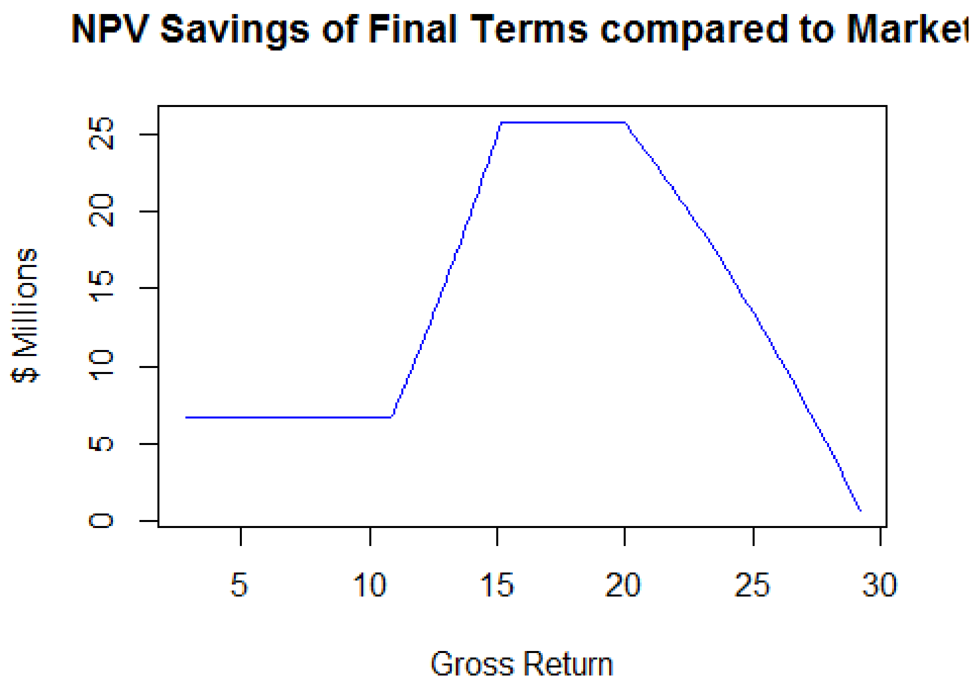


Calculation of Savings from Negotiated Fees over a fund life

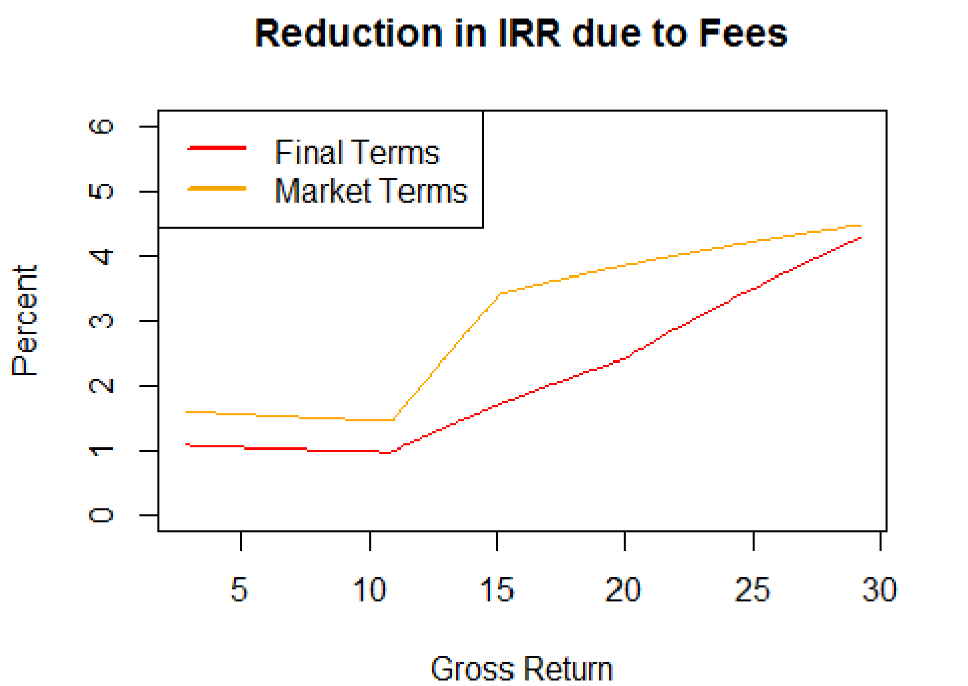
The proposed investment with MgrX involves a $200 million commitment and it is anticipated that this money will be invested over approximately three years. While these assets are intended for long term hold, for purposes of this analysis we assume a eight year hold to make it comparable to a typical weighted average fund life.

We measure fees on a net present value basis discounting non-contingent fees at 4% and discounting contingent incentive fees at 8%.

The following two graphs show the net present value savings in fees from the final negotiated deal compered to market terms and a comparison of fee drag in the two structures. These graphs illustrate computations of compound returns over the eight year assumed time frame, taking in to account fees on committed capital and the timing of payment of fees and promote.



NPV Savings of Final Terms compared to Market
$ Millions
0
5
10
15
20
25
5
10
15
20
25
30
Gross Return

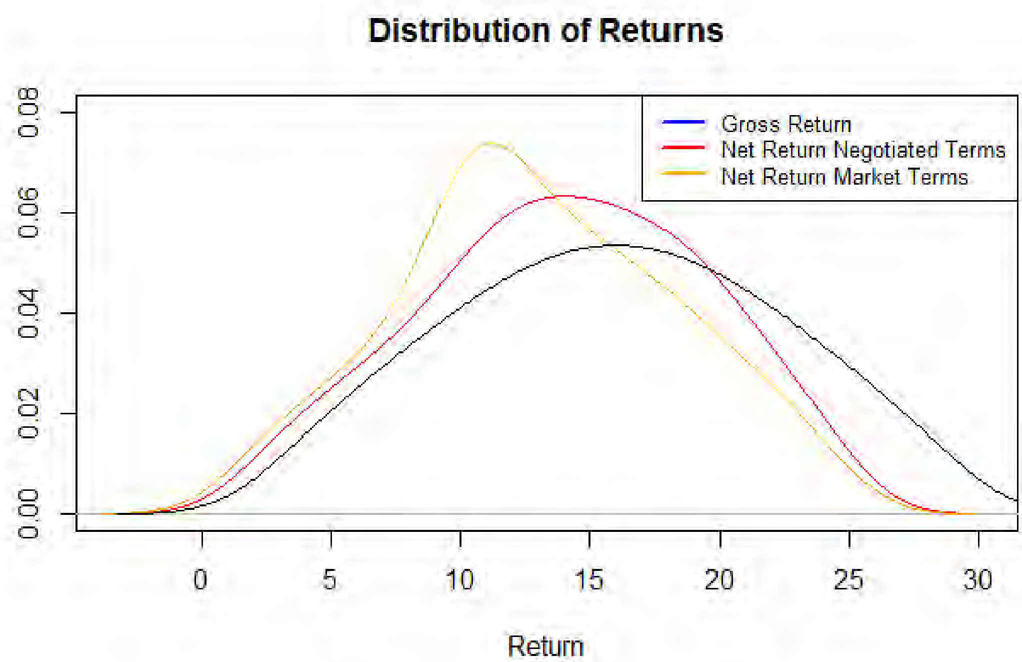


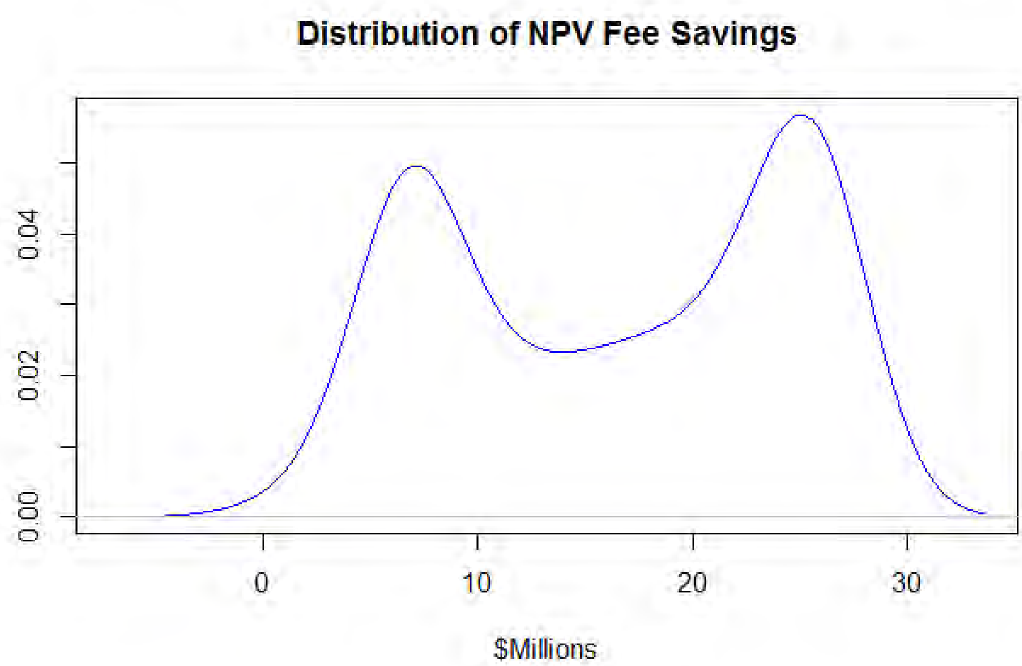
Reduction in IRR due to Fees
Final Terms
Market Terms
Percent
0
1
2
3
4
5
6
5
10
15
20
25
30
Gross Return

Expected Values of Returns and Fee Savings

Assuming the gross returns are normally distributed with a mean 16% and a standard deviation of 8%, the following two graphs show the probability density function of gross and net returns and fee savings of the negotiated terms versus market.

The median net return under the negotiated terms is 14.15%. The median net present value fee savings is $17.52 million.


Distribution of Returns
Gross Return
Net Return Negotiated Terms
Net Return Market Terms
0.00
0.02
0.04
0.06
0.08
0
5
10
15
20
25
30
Return


Distribution of NPV Fee Savings
0.00
0.02
0.04
0
10
20
30
$Millions

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.

Created June 2008; Revised June 2013

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.